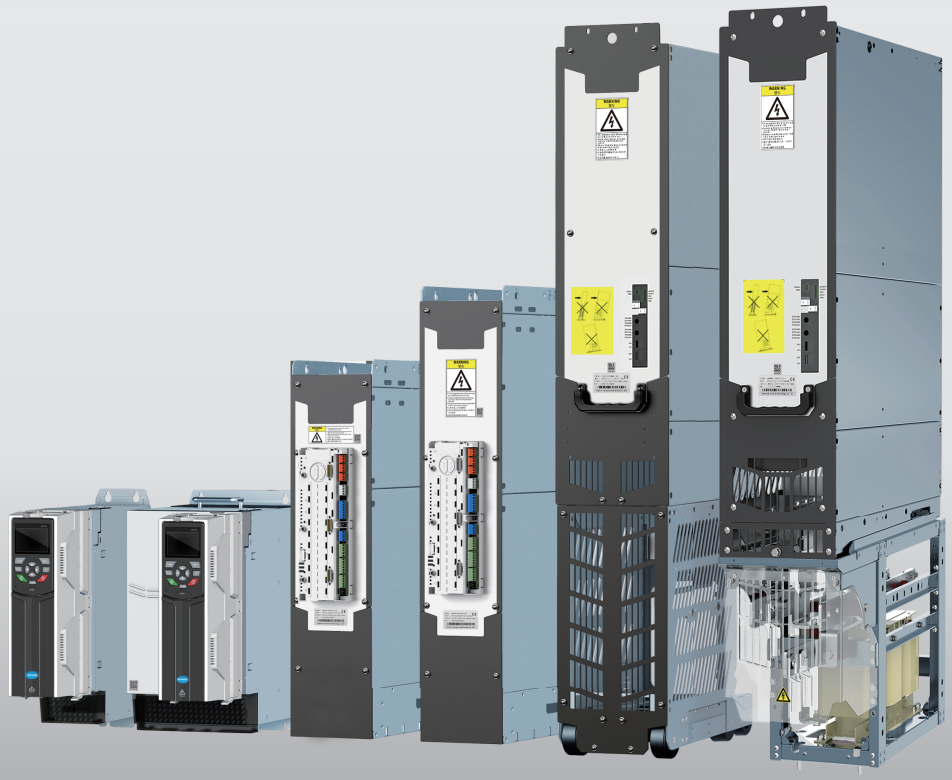
INOVANCE

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MD880 Series AC Drive

Software User Guide

(HCU-50S, HCU-51S, HCU-50S-SG, and HCU-51S-SG)

Industrial Automation | Intelligent Elevator | New Energy Vehicle | Industrial Robot | Rail Transit

Data code 19012098 A02

Preface

Applicable Scope

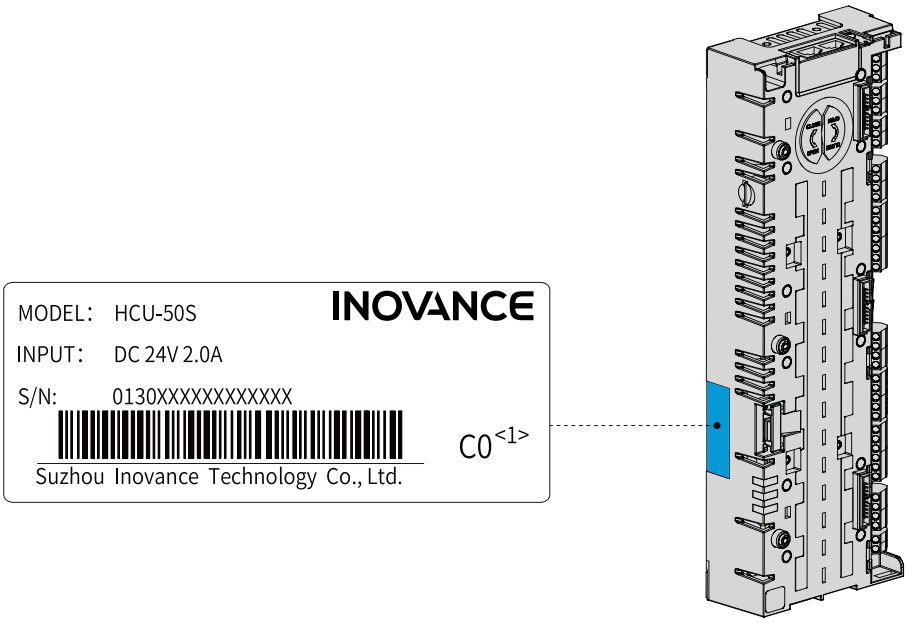


Figure -1 Nameplate

Note

- <1>: Version number, which is B0, C0, or E0.
- The preceding nameplate is just for your reference.
- This guide is applicable for HCU-50S (B0, C0, and E0), HCU-50S-CS (B0, C0, and E0), HCU-51S (B0, C0, and E0), and HCU-51S-CS (B0, C0, and E0).

Introduction

Thank you for purchasing the Inovance MD880 high-performance multi-drive AC drive.

The MD880 has set a new industrial benchmark in terms of structure, power density, response, control precision, and scope of application. Product advantages:

- Voltage class: 400 V/500 V/690 V
- Rated power range: 3.7 kW to 7100 kW
- Complete rectifier module types: basic rectifier, regenerative rectifier, and active rectifier
- Compatible with asynchronous induction motors and PMSM
- Excellent dynamic response and control accuracy

Wide application range:

Metallurgy:

Blast furnace loading winding, converter tilting, slab continuous casting, dry quenching coke lifting, long product hot strip continuous rolling, strip hot strip continuous rolling, hot strip wide thick plate, strip single rack cold rolling, strip cold continuous rolling, pickling line, continuous decoiling line, galvanizing line, and color coating line.

Non-ferrous metals:

Hot rolling of aluminum strip, cold rolling of aluminum strip, aluminum foil rolling mill, and cold rolling of copper strip.

Papermaking:

Pulp preparation and paper copying equipment, including a variety of pulp production lines, paper machines, coating machines, super finish devices, and rewinding machines.

Port power supply:

Large-power shore power supplies for ports: 60 Hz AC power supply and DC power supplies.

Harbor equipment and other large lifting equipment:

Shore container bridge crane, rubber tired (rail type) container gantry crane, grab ship unloader, stacker, ship loader, portal crane, large shipbuilding gantry crane, large metallurgical casting crane, automatic slag grab crane, automatic garbage crane, steel mill intelligent steel coil crane, and building materials grab crane.

Ships and marine devices:

Main thruster, side thruster, shaft belt generator, bilge flush pump, sea water pump, and winch.

Oil offshore and land drilling rigs:

Top drive, mud pump, winch, and turntable.

Test bench:

New energy, diesel, wind power, gearbox, and motor.

Others

Shield machine, belt machine, and mining equipment.

This software guide is applicable to the MD880-50-SG series inverters. The guide provides detailed information about the software, including basic usage, function nodules, parameters, connector resources, data flow diagrams and troubleshooting. New users must read this guide carefully. If you have any questions, contact Inovance for technical support.

Notes
• Drawings in this guide are for illustration only. The structural details may not match the product you purchase. • This guide may be modified without prior notice due to continuous product upgrade. • For any questions during usage, please contact your local agent or customer service center.

More Documents

Rectifiers	Data Code
MD880-20 Series Basic Rectifier Module Hardware Guide	19011491
MD880-30 Series Regenerative Rectifier Hardware User Guide	19011313
MD880-40 Series Active Rectifier Hardware User Guide	19011311
MD880-40 Series Active Rectifier Software User Guide	19011980
Inverters	Data Code
MD880-50 Series Inverter Software Guide	19012019
MD880-50 Series Inverter Hardware Guide	19011312

Revision History

Date	Version	Description
November 2022	A02	Modified the guide name to MD880 Series AC Drive Software Guide (HCU-50S, HCU-51S, HCU-50S-SG, and HCU-51S-SG).
June 2022	A01	Added description about the E0 version.
April 2022	A00	First release.

How to Obtain

This guide is not delivered with the product. You can obtain the PDF version by the following method:

Log in to Inovance's website (*www.inovance.com*), choose Support > Download, search by keyword, and then download the PDF file.

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1 Terms and Abbreviations

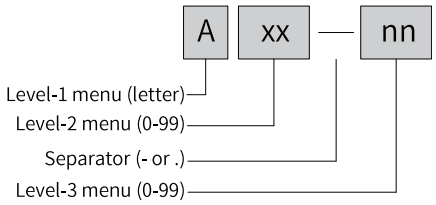
Term	Meaning
HCU-50S/51S	High performance inverter control modules HCU-50S, HCU-51S, HCU-50S-CS, and HCU-51S-CS which can control MD880-50-SG series products
SOP-20-880	Smart operation panel used with HCU-50S/51S control modules
InoDriveStudio	PC software commissioning tool used with HCU-50S/51S
IDS	Abbreviation of InoDriveStudio
AI	Analog input
AO	Analog output
DI	Digital input
DO	Digital output
RO	Digital output with relay output
HDI	High-speed digital input
HDO	High-speed digital output
OFF1	A start/stop command corresponding to bit0 of control word 1. The rising edge corresponds to the start command, whereas the low level corresponds to the stop command.
OFF2	An emergency stop command, corresponding to bit1 of control word 1, that can immediately become active in any state. The high-level input allows the drive to run, whereas the low-level input inhibits IGBT output.
OFF3	A quick stop command, corresponding to bit2 of control word 1, that can immediately become active in any state. The high-level input allows the drive to run, whereas the low-level input forces the drive to decelerate to stop according to OFF3 deceleration time and then inhibits IGBT output.
Operation enable	A command corresponding to bit3 of control word 1 and determined after the start (OFF1) command becomes active. The high-level input allows the drive to enter the running state and enables IGBT output, whereas the low-level input locks the drive in the ready-to-run state and inhibits IGBT output.
Connector	Special read-only parameter to record the operation data of HCU-50S/51S. Its value can be read through its reference source parameter, and its data change waveform can be recorded by the oscilloscope.
Bit connector	A connector parameter that records only one bit of data, the value of which is 0 or 1
B connector	Bit connector
Word connector	A connector parameter that records a piece of analog data
K connector	Word connector
Reference source parameter	A special parameter through which you can read the parameter value of a connector by setting the number of the connector parameter for control of HCU-50S/51S
Bit reference source parameter	A reference source parameter that is used to read a bit connector and output one bit of data
Word reference source parameter	A reference source parameter that is used to read a word connector and output an analog numerical value
Terminal start/ stop module	A set of common ways of using terminals to control drive start/stop
Motor-driven potentiometer	A software-based virtual potentiometer output, which can be adjusted by the increase/decrease command of the C4-05/C4-06 motor-driven potentiometer

Note

"Word" and "bit" mentioned in this guide, for example, in "word connector", "bit connector", and "control word", indicate the length of data. "Bit" represents 1-bit data, the value of which can be 0 or 1. "Word" represents 16-bit data, the range of which can be 0 to 65535 (unsigned) or –32768 to +32767 (signed).

2 Parameter Setpoint and Output Value

The HCU-50S/51S parameters are represented by a three-level menu structure, as shown in the following figure:



Note

- The separators "-" and "." used in parameter menus represent the same meaning. For example, A0-00 is the same as A0.00. This guide uses A0-00, whereas the LED panel may display A0.00.
- Level-1 menus can contain the following letters: A, b, C, d, E, F, H, L, n, o, P, and U. The letters are case sensitive for the purpose of display on the LED panel.

- Parameter setpoints are values set by users.
- The output value of the parameter refers to the value obtained by reading the parameter from the HCU-50S/51S control module.

For most parameters, the output values are equal to the setpoints. However, for reference source parameters of the HCU-50S/51S control module, the setpoint indicates that the value of parameter A is sourced from parameter B, that is, the output value of parameter A is equal to the output value of parameter B.

In this guide, "parameter numbers" are used to indicate the parameter setpoints. "[Parameter numbers]" are used to indicate the parameter output values. For example:

- U9-32 = 10%
- C0-00 = 1932
- [C0-00] = 10%

C0-00 represents the channel 1 speed control main reference selection and comes from the value of a connector U9-32. When U9-32 is 10%, the actual output value of [C0-00] is 10%.

For the reference source parameter C0-00, setpoint 1932 only indicates that the setpoint is sourced from the value of the U9-32 connector. We focus more on the main reference output for speed control of channel 1 and use the [C0-00] parameter to indicate the actual output value of the parameter, that is, 10%.

3 Introduction to Commissioning Tools

The MD880 series product supports both the SOP-20-880 smart operating panel and InoDriveStudio for parameter setting and commissioning. Commissioning steps and parameters related to the SOP-20-880 smart operating panel are basically the same as those related to InoDriveStudio. This chapter describes how to use the SOP-20-880 smart operating panel and InoDriveStudio for commissioning.

3.1 SOP-20-880

The SOP-20-880 smart operating panel features LCD display and a wide power supply range and is applicable to single-drive/multi-drive systems. The operating panel provides functions such as parameter setting, status monitoring, parameter copy, fault analysis and locating, program download, USB relay, and mass storage.

3.1.1 Keys and Display

3.1.1.1 Keys

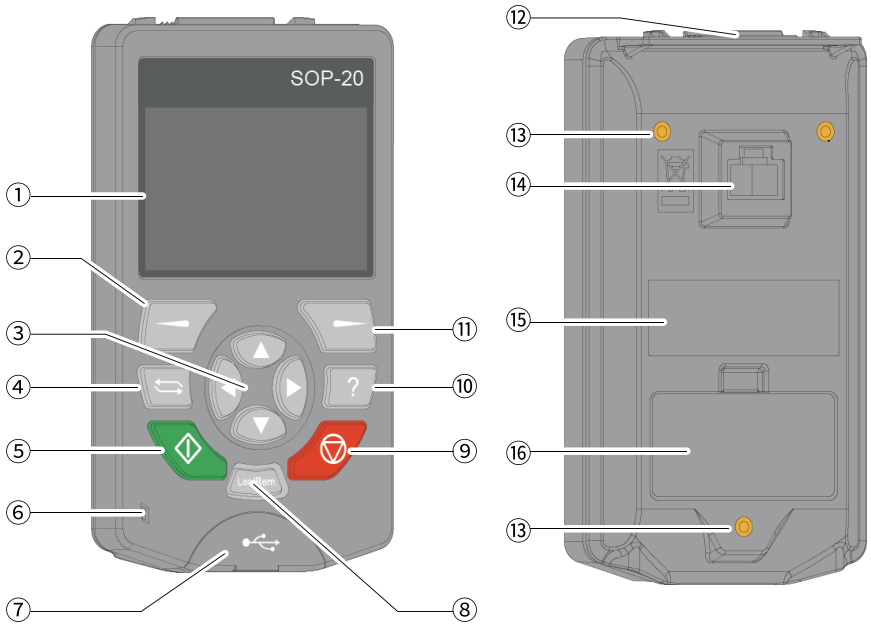


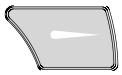
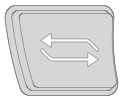
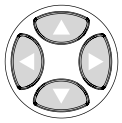
Figure 3-1 Diagram of SOP-20-880 appearance and keys

Table 3–1 SOP-20-880 components

Item	Name
①	Display
②	Left soft key
③	Arrow keys
④	Shift
⑤	Run
⑥	Status indicator

Item	Name
⑦	USB connection terminal
⑧	Loc/Rem switchover key
⑨	Stop key/Reset key
⑩	Help
⑪	Right soft key
⑫	Snap-fit joint
⑬	Fastening screw
⑭	RJ45 port
⑮	Product nameplate
⑯	Battery cover

Table 3–2 Shortcut key functions

Key	Name	Description
	Left soft key	Used for exiting or cancellation. This key is located on the left below the display. It corresponds to different functions in different situations. On the home page, pressing this key enters the device selection page.
	Right soft key	Used for selection or confirmation. This key is located on the right below the display. It corresponds to different functions in different situations. On the home page, pressing this key enters the menu page.
	Shift	Used to quickly enter the device selection page. On some pages where operations cannot be interrupted, the quick device switchover function is disabled and this key is disabled.
	Help	Used to open a help page. Content on the help page is contextual. That is, content on the help page depends on the menu or view displayed previously.
	Run	Used to start the device in the local control mode.
	Stop key/Reset key	Used to stop the device in the local control mode. When the device is faulty, the stop key is used to reset the device.
	Loc/Rem switchover key	Used to switch between the local SOP-20-880 and the remote connection.
	Arrow keys	The up and down arrow keys are used to select options in a menu or list, scroll up or down a text page, and adjust a value (such as setting time, inputting a password, and changing a parameter value). The left and right arrow keys are used to move the cursor left and right.

3.1.1.2 Homepage

SOP-20-880 has a monochrome LCD display with a resolution of 240×160 pixel and white backlight.

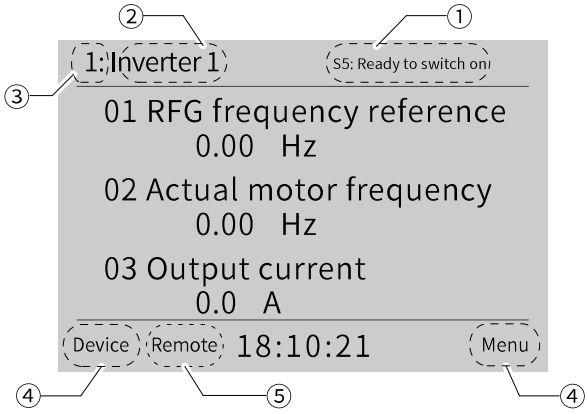


Figure 3-2 Homepage

Table 3–3 Homepage description

No.	Content	Description
①	Device status and fault information	Shows the running status of the current device. When the device fails, fault information appears and blinks and the running status is not displayed.
②	Controlled device name	Shows the name of the device that is being controlled by SOP-20-880.
③	Controlled device ID	Shows the ID of the device that is being controlled by SOP-20-880.
④	Function key	Device: Displays the device list. Menu: Displays the menu list. Select: Selects specified items. OK: Confirms the prompt content on a menu. Back: Returns to the previous menu.
⑤	Loc/Rem switchover key	Local: Local control by SOP-20-880 is enabled. Rem: Remote control by using I/O or the bus is enabled. Blank: This function is unavailable on the device.

3.1.1.3 Status Indicator

The SOP-20-880 smart operating panel is equipped with a status indicator to indicate faults and alarms, as below.

Table 3–4 Status indicators

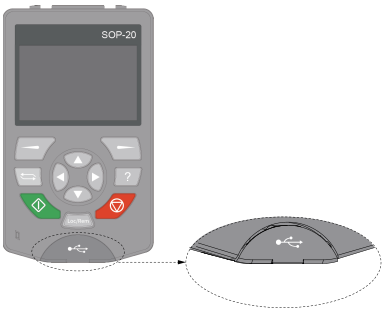
Indicator	Illustration	Meaning
Steady green		The device is running properly.
Blinking green		The SOP-20-880 is interchanging data with the PC through USB connection.

Indicator	Illustration	Meaning
Steady red		Communication between the SOP-20-880 and the device is normal, but the device is faulty.
Blinking red		Communication between the SOP-20-880 and the device is interrupted.

3.1.2 Repeater-to-PC Connection

The Type-B Mini USB port on the bottom of the SOP-20-880 is used to connect to a PC. Use a cable not longer than 3 m for the connection. Communication between the SOP-20-880 and the PC is implemented using the USB 2.0 communication protocol.

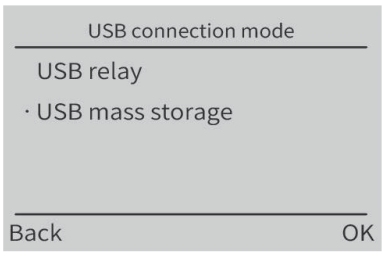
1. Open the USB terminal cover.



2. Connect the USB terminal to the PC using a cable with a ferrite magnetic ring.

3. After the SOP-20-880 is connected to the PC through the USB cable, the USB repeater mode and the USB mass storage mode are displayed for selection.

- In the USB repeater mode, the SOP-20-880 serves as a repeater for communication between the device and the PC. To use InoDriveStudio for commissioning, select the USB repeater mode.
- In the USB mass storage mode, the SOP-20-880 serves as a memory.



Note

For details about how to use the SOP-20-880, see the *SOP-20-880 Smart Operating Panel Guide*.

3.2 Introduction to InoDriveStudio

InoDriveStudio (IDS for short) is a proprietary software product developed by Inovance for commissioning Inovance high-performance industrial drive products. Users can use this software to commission, troubleshoot and monitor drives.

InoDriveStudio only supports the Windows platform, including but not limited to the following operating systems: Windows XP Professional, Windows Server 2003, Windows Vista, Windows 7, Windows 8, and Windows 10.

3.2.1 Main Screen

Double-click  to access the software. The following page is displayed.

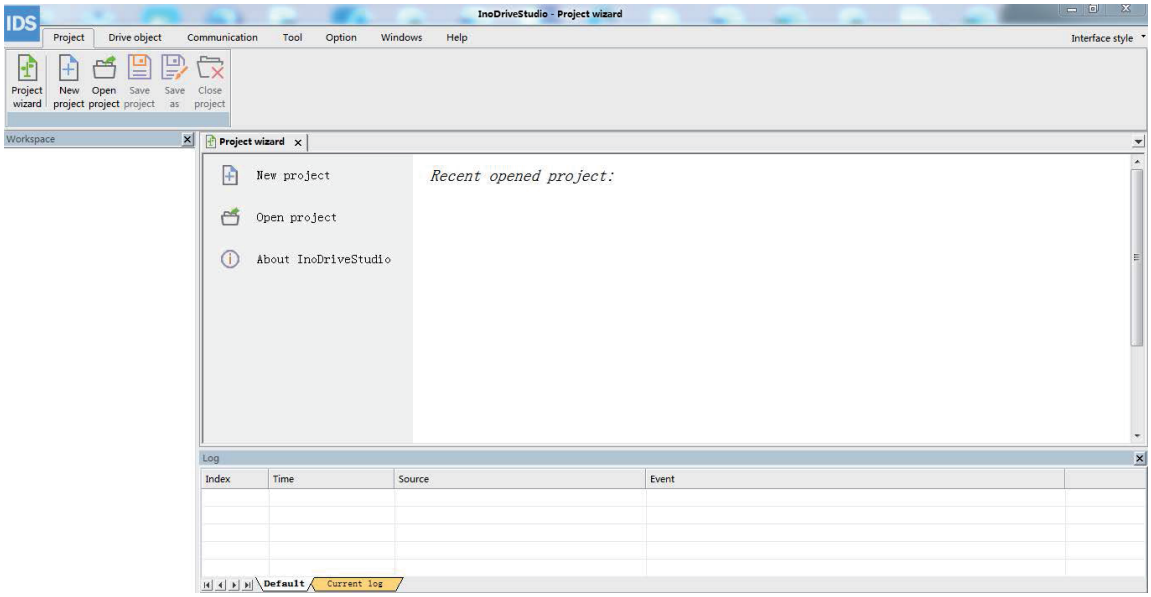


Figure 3-3 Start page

No.	Name	Description
①	Title bar	Displays information such as the window title or opened files.
②	Menu bar	Displays function modules by category.
③	Workspace	Displays relevant navigation information such as the current projects.
④	Window area	Displays the detailed information of an item specified in the workspace.
⑤	Multi-functional area	Displays the log window, monitoring window, control panel window, and fault alarm window.
⑥	Status bar	Displays the current project status.

3.2.2 Creating a Project

1. Choose "Project > New project" to create an online project, and a dialog box will appear, as shown in the following figure.

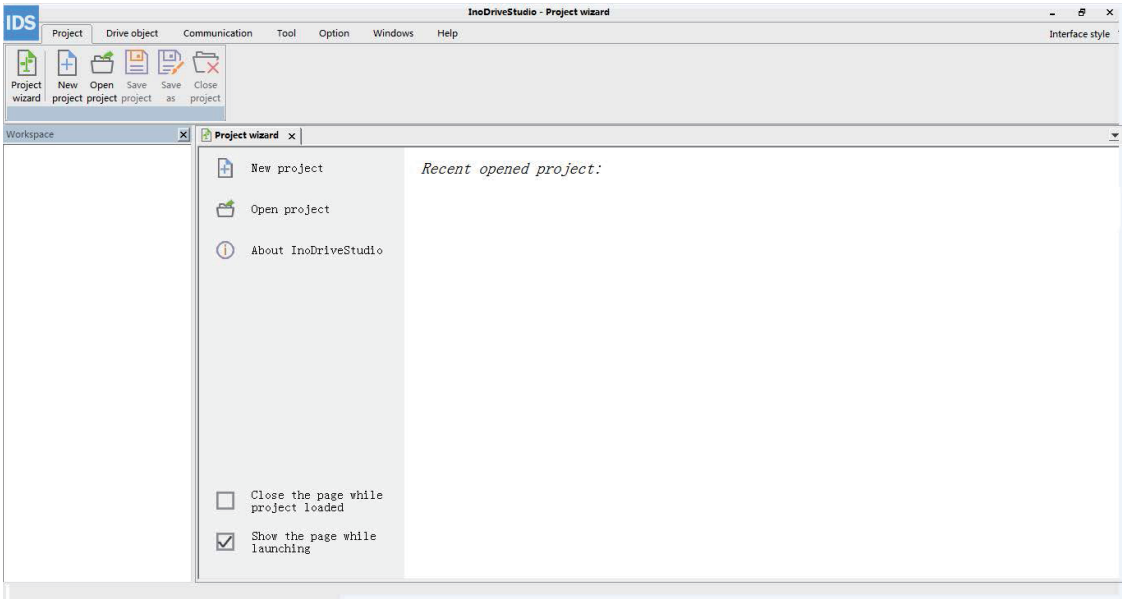


Figure 3-4 Home page for creating a project

No.	Name	Description
①	New project	Click this button to open the dialog box for creating projects as required.
②	Open project	Click this button to open the dialog box for selecting a project file to open.
③	About InoDriveStudio	Click this button to view information relevant to the current InoDriveStudio system version.
④	Help	Click this button to view the help document.
⑤	Close the page while project loaded	If this item is selected, the project wizard will automatically close after the project is loaded. If this item is not selected, the project wizard will not close.
⑥	Show the page while launching	If this item is selected, the project wizard will automatically appear after the software is started. If this item is not selected, you can choose "Project" > "Project wizard" to access the wizard.
⑦	Recent opened project	Click this option to view eight recently opened projects, which are listed in descending chronological order. You can double-click a file name to open the corresponding project. Hover the cursor over a file name, the file background color will change to light blue and  will appear. If you click the icon, the file will be excluded from the list of latest projects, but will not be deleted.

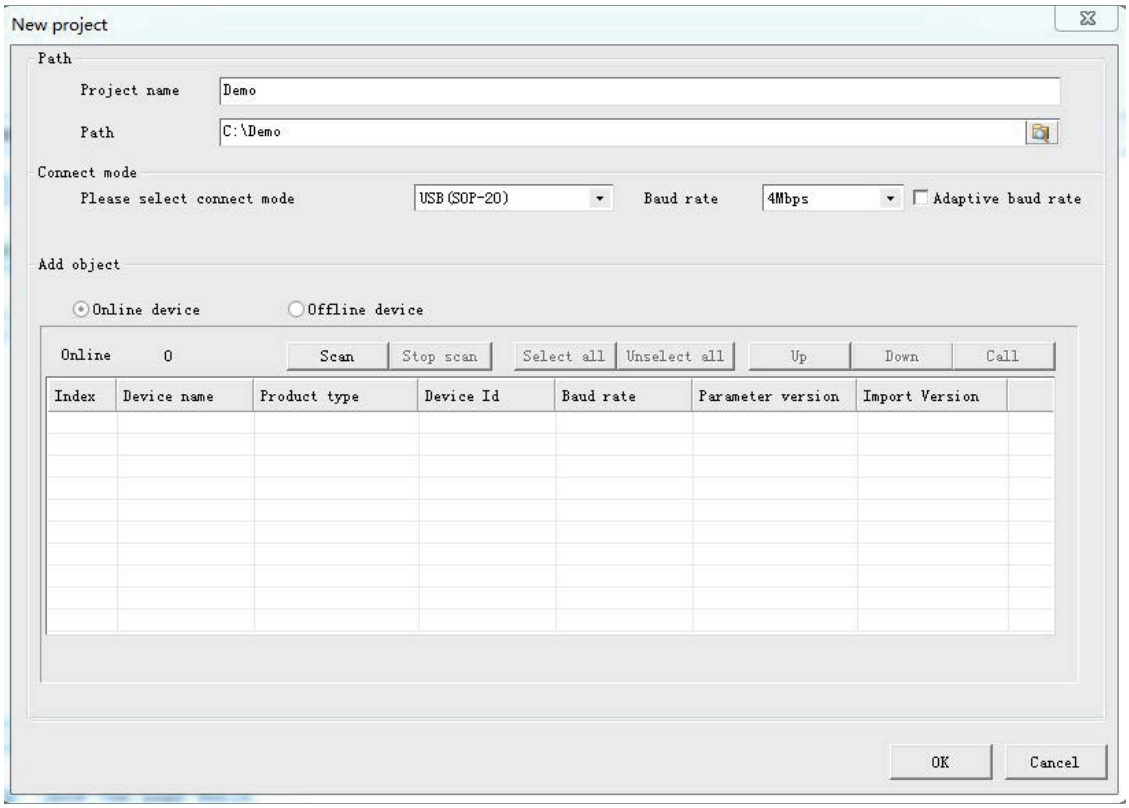


Figure 3-5 "New project" page

No.	Name	Description
①	Project name	Specify a name for the project to be created.
②	Path	Specify a path on the computer for storing the project to be created.
③	Connection mode	Specify a communication mode and relevant parameters for the project to be created. The USB, TCP/IP, and gateway communication modes are supported. You can also change the connection mode through "Communication Settings" under the "Communication" menu bar. The project will be connected to the device in the set connection mode.
④	Online equipment	Specify an online object you want to add to the project to be created. Online objects can be scanned and displayed.
⑤	Offline equipment	Specify an offline object you want to add to the project to be created. Offline objects can be confirmed based on information such as product types and versions.
⑥	Adaptive baud rate	In the USB communication mode, specify whether to scan the drive controller in the adaptive baud rate mode. If this item is selected, objects on all the supported baud rates will be scanned. If this item is not selected, only the drive objects on the specified baud rate will be scanned.

Note

- When multiple devices are cascaded, ensure that the communication address of each device is unique and that the baud rate is the same for all the devices. Set the communication address through A10-03 and set the baud rate through A10-04.
- When multiple devices are cascaded, ensure that each device name is unique. Otherwise, project creation fails.

2. Click "Scanning".

In the USB connection mode:

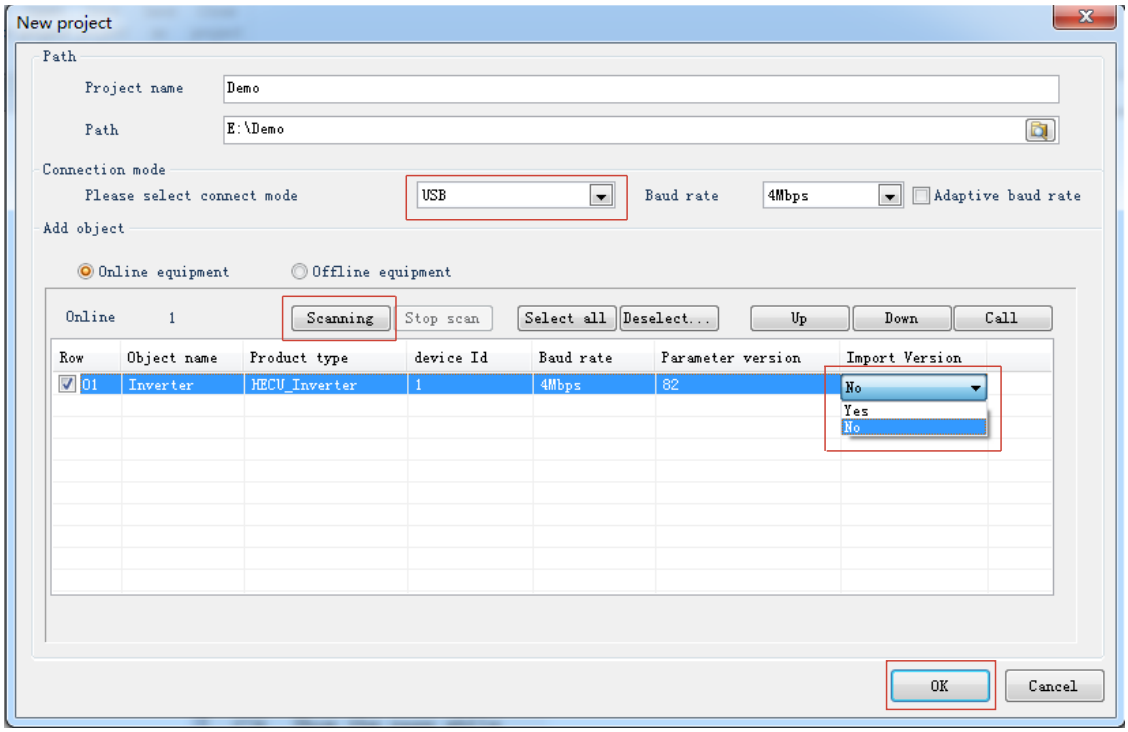


Figure 3-6 Starting scanning in the USB connection mode

Note

When importing the software configuration table for the first time, select "Yes" for "Import Version".

In the TCP/IP (HETN-10) connection mode:

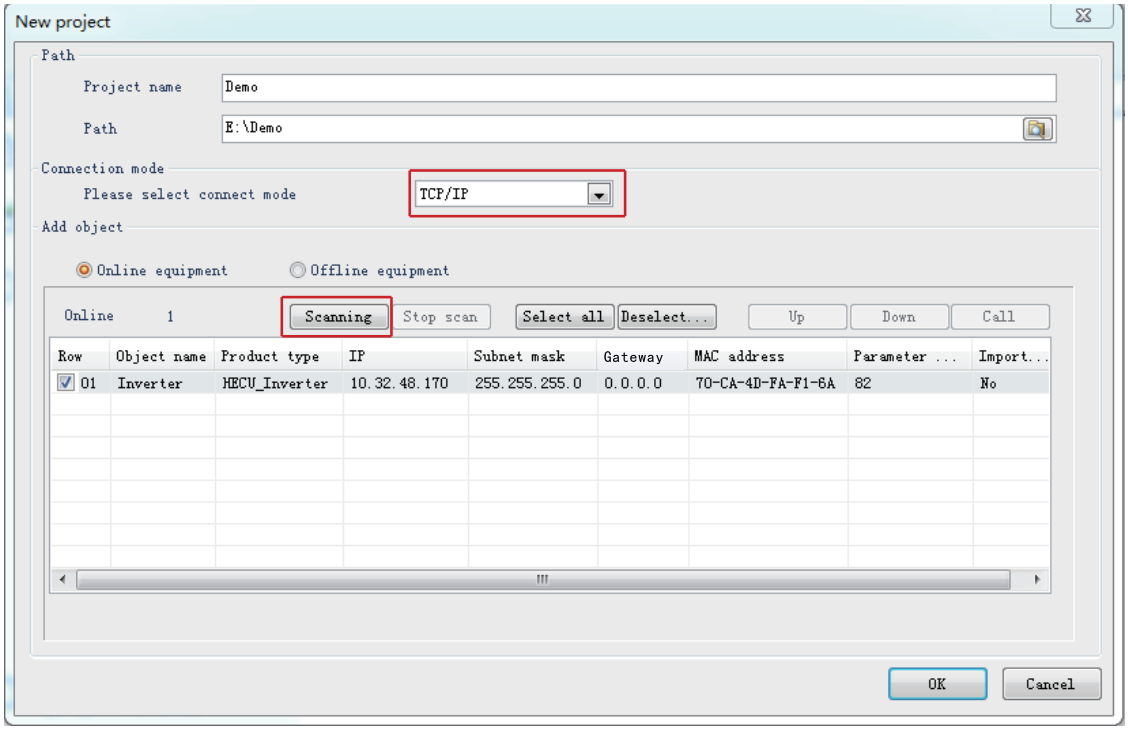


Figure 3-7 Starting scanning in the TCP/IP (HETN-10) connection mode

Note

See *HETN-10 Ethernet Test Module User Guide* for the setting of the IP address, subnet mask, and gateway address.

In the TCP/IP (HGW-10) connection mode:

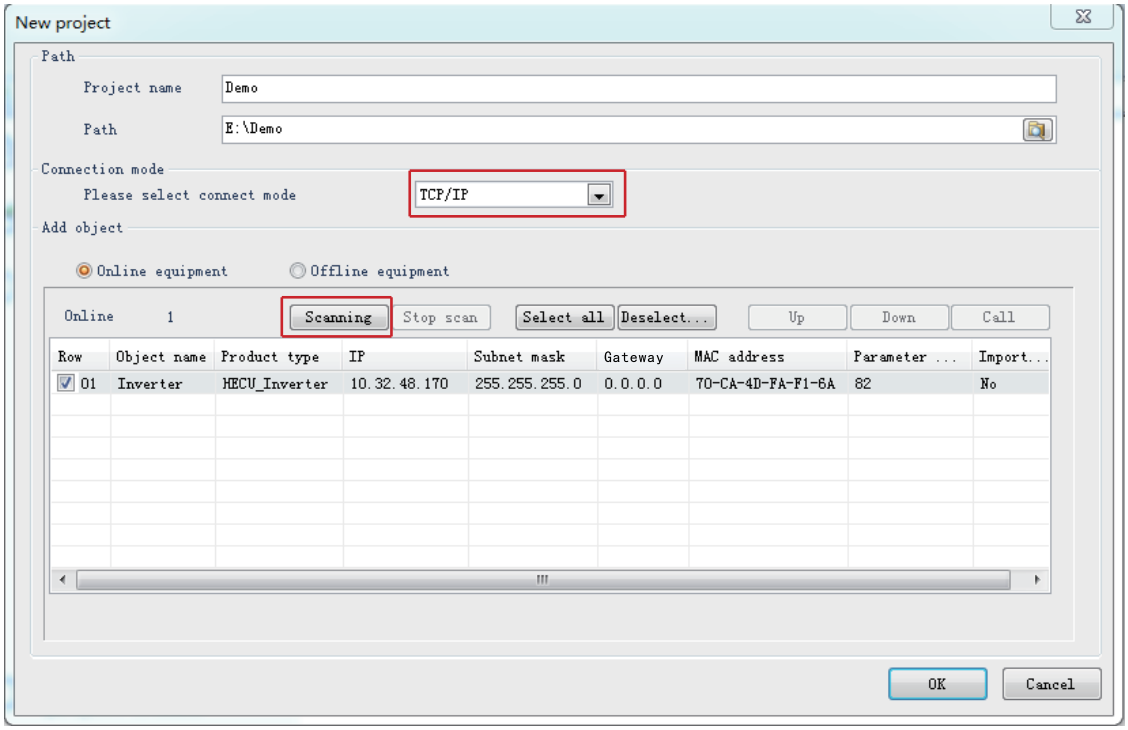


Figure 3-8 Starting scanning in the TCP/IP (HGW-10) connection mode

Note

One Ethernet network has multiple gateways. If "IP acquisition" is set to "Scan", too many devices may be detected. It is recommended to set "IP acquisition" to "Config". After you select "IP config" or "Config", the "Config IP" dialog box is displayed, on which you can manually add up to 10 IP addresses for HGW-10. After configuring IP addresses, click "Scan", and all devices with the IP addresses will be displayed in the list. If the checkbox in the dialog box is not selected, devices of the IP address will not be scanned.

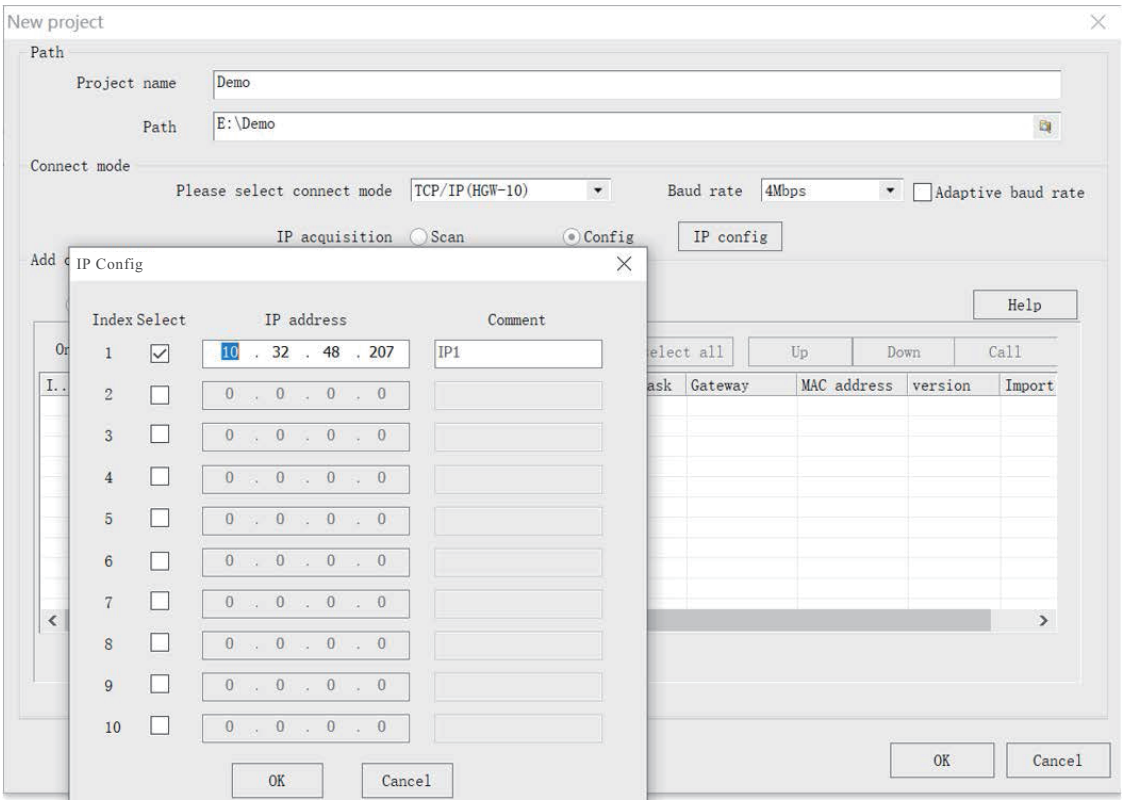


Figure 3-9 Dialog box for configuring the IP address manually

Note

For centralized commissioning, running data collection, and other functions of the gateway and MD880 series product, see *HGW-10 Digital Gateway Commissioning and Monitoring Module User Guide*.

3. Click "OK". The new project is created, as shown in the following figure. Then, relevant settings and commissioning operations can be performed.

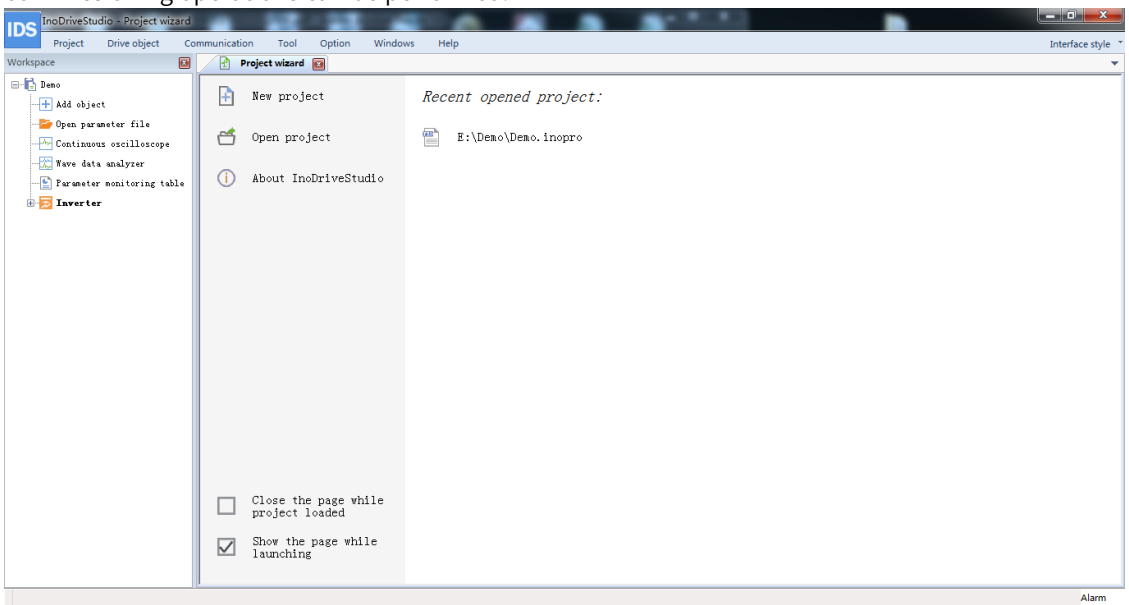


Figure 3-10 Main page

3.2.3 Basic Functions

3.2.3.1 Viewing and Modifying Parameters

Parameter viewing and modification are basic functions of the InoDriveStudio commissioning software. After a device is connected, choose "Inverter" > "Parameter table" > "Parameter list" in the workspace to open the parameter list of the current device. See the following figure.

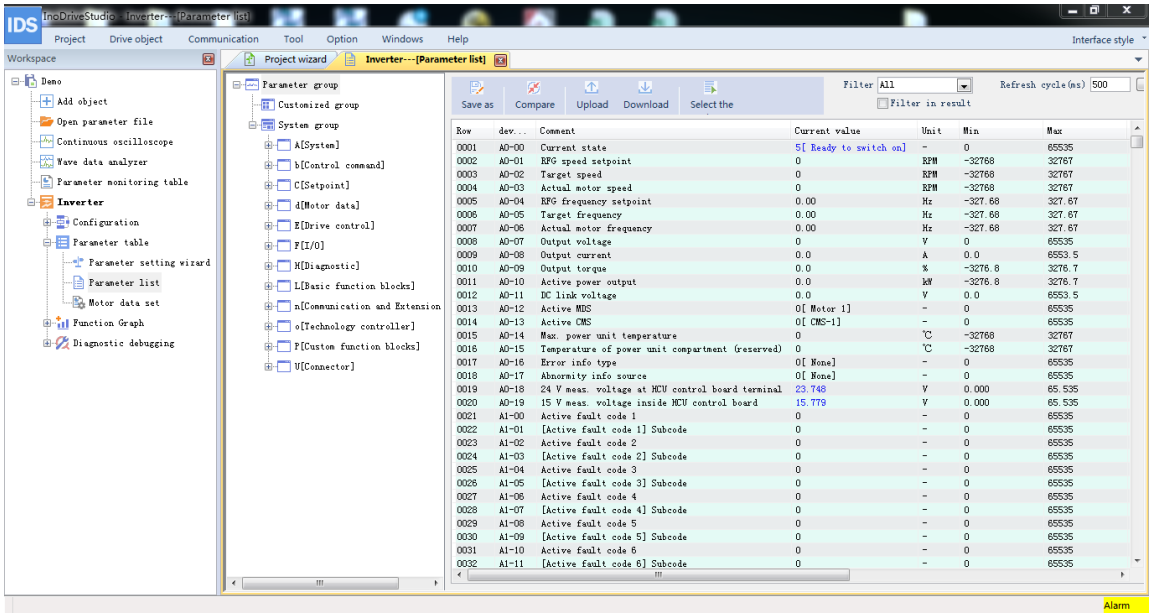


Figure 3-11 Parameter list

- Parameter groups are in the left part, while information about each parameter group is in the right part in the parameter list.
- The parameter information columns include the parameter name, current value, default value, unit, modification mode, and communication address.
- After parameters are modified, they are downloaded to the device.
- When the current value of a parameter differs from the default value, the current value is blue.
- When the new value of a parameter exceeds the parameter value range, the new value does not take effect.
- If a parameter supposed to be modified only at stop is modified during device running, the modification does not take effect.
- Some parameter description information can be input in the "Filter" drop-down list for fuzzy matching of parameters on the current page. For example, click "System group" for all parameters and select "Torque" from the "Filter" drop-down list. All parameters containing "torque" will be displayed.

3.2.3.2 Control Panel

The control panel of InoDriveStudio can be used to start/stop devices and reset devices upon faults. You can open the control panel through "Inverter" > "Diagnostic debugging" > "Debug " > "Control Panel".

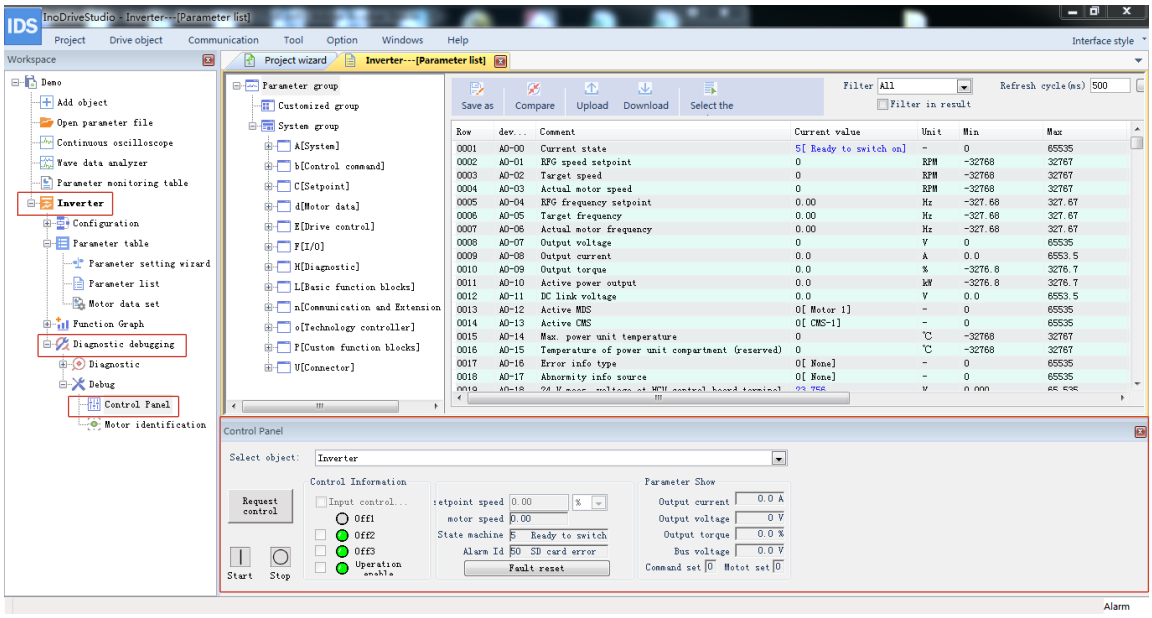


Figure 3-12 Accessing the control panel

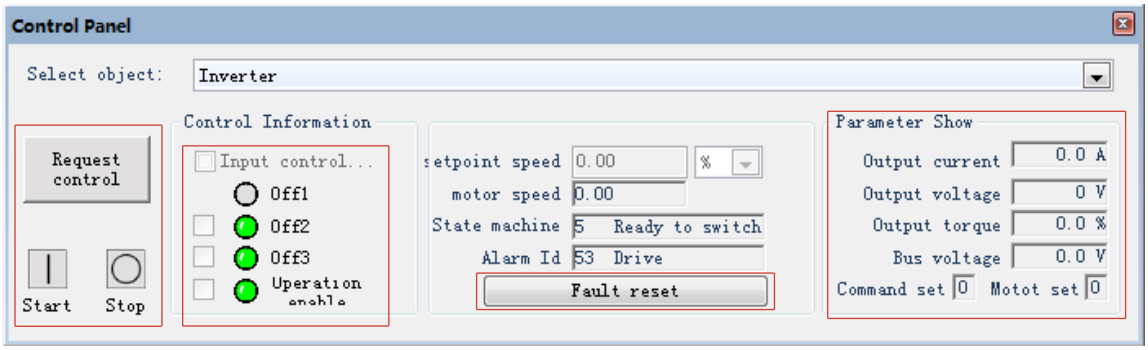


Figure 3-13 Control panel

- The control panel can be used to control start/stop of the device and monitor the device status.
- To control the device through the control panel, click "Request control" to obtain the device control permission.
- Then, click the "Start" or "Stop" buttons to start or stop the device.
- If "Input control bit" is selected, you can select "Off1", "Off2", "Off3", or "Operation enable" for switchover of control words to start or stop the device.
- For reset upon fault, click the "Fault reset" button.
- Pressing the space key for three consecutive times can trigger the OFF2 stop command.
- After the AC drive is started by the control panel, if HCU fails to communicate with InoDriveStudio, a 52-1 error will be reported.

3.2.3.3 Viewing Faults and Alarms

The following two ways are available for viewing faults using InoDriveStudio.

1) Viewing current faults

Method 1: Choose "Inverter > Diagnostic debugging > Diagnostic > Fault alarm table" to access the list of current faults and alarms, as shown in the following figure.

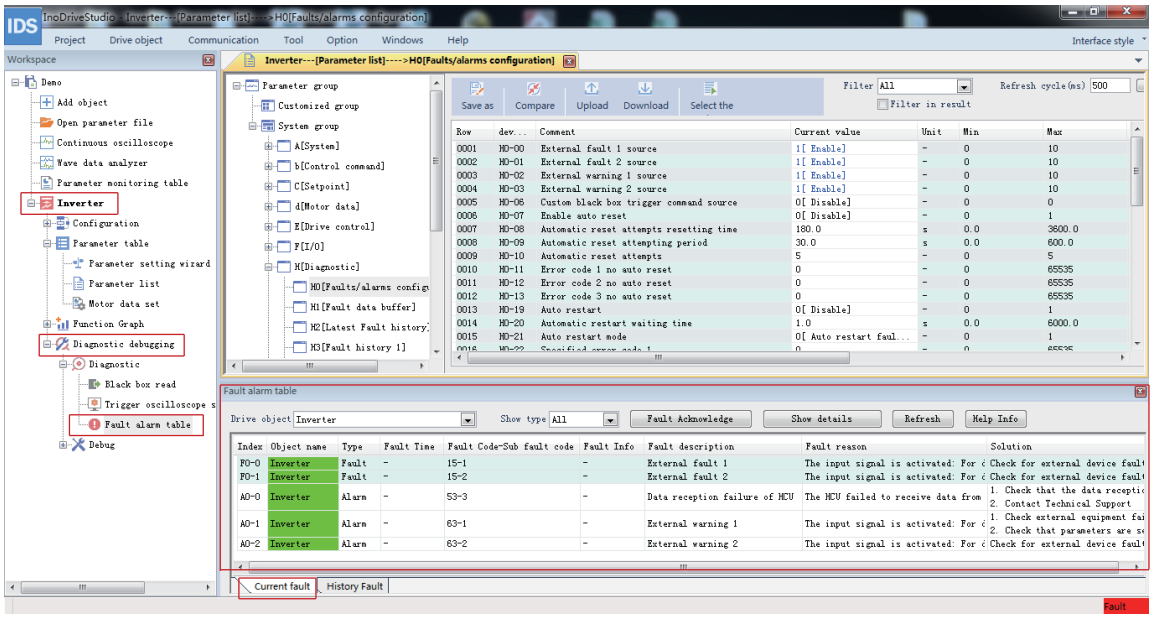


Figure 3-14 List of current faults and alarms

Method 2: Access parameters of group A1 to check current faults and alarms, as shown in the following figure.

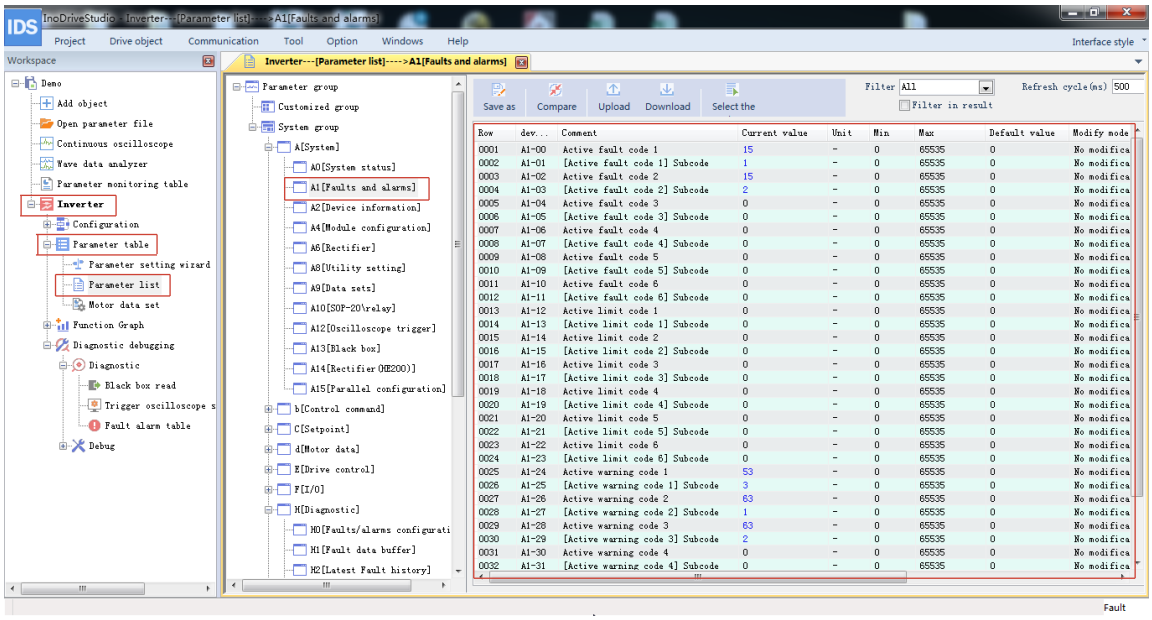


Figure 3-15 Viewing faults through parameters

2) Viewing historical faults

Method 1: Choose "Inverter > Diagnostic debugging > Diagnostic > Fault alarm table > History Fault" to access the list of historical faults and alarms, as shown in the following figure.

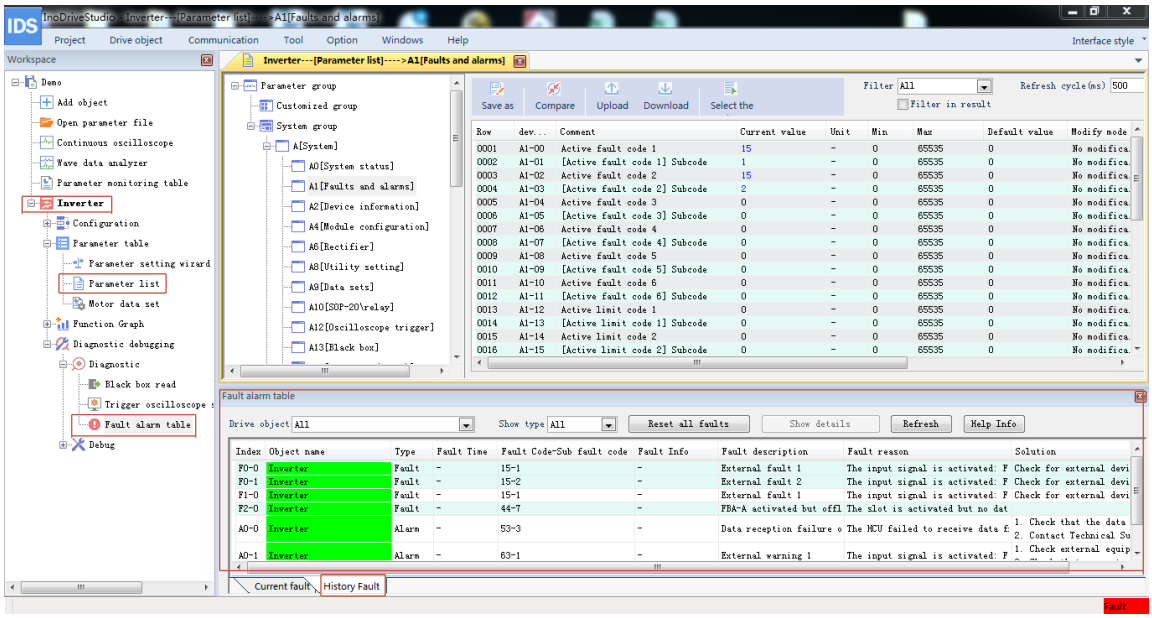


Figure 3-16 List of historical faults and alarms

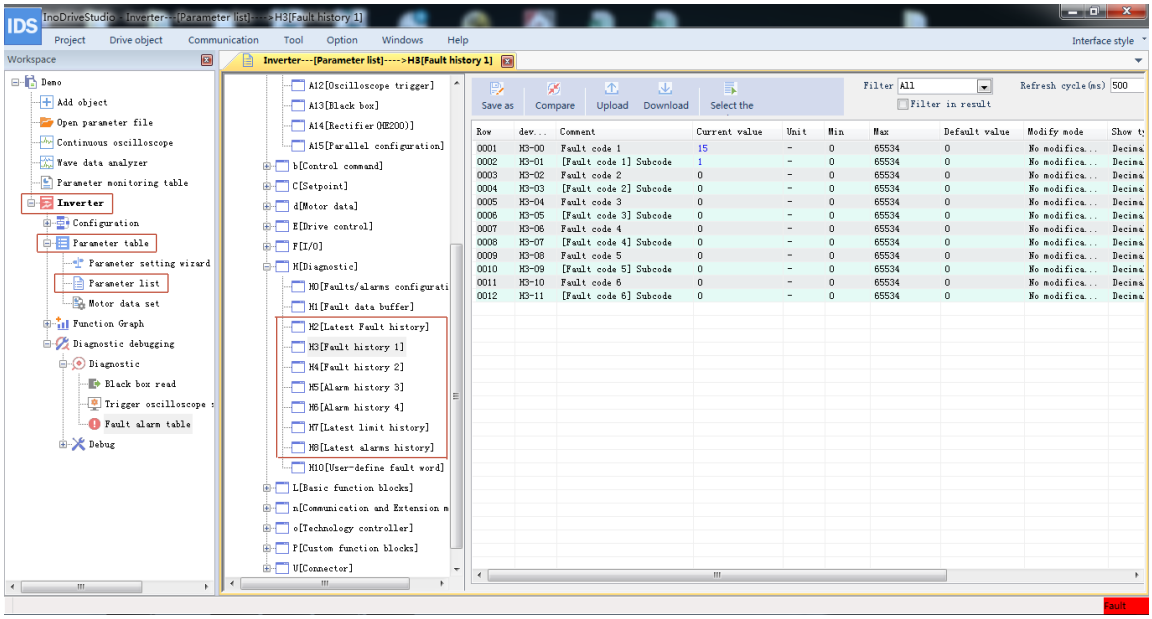


Figure 3-17 Viewing historical faults through parameters

Note

You can double-click a fault in the list to obtain the fault help file and learn the detailed information of the fault.

3.2.3.4 Comparing Parameters

InoDriveStudio provides the function of comparing parameters. You can access the comparison function page in two ways:

- In the menu bar, choose "Drive object" > "Compare".
- Click the "Compare" button above the parameter list.

The following figure illustrates the two ways of entering the comparison function page.

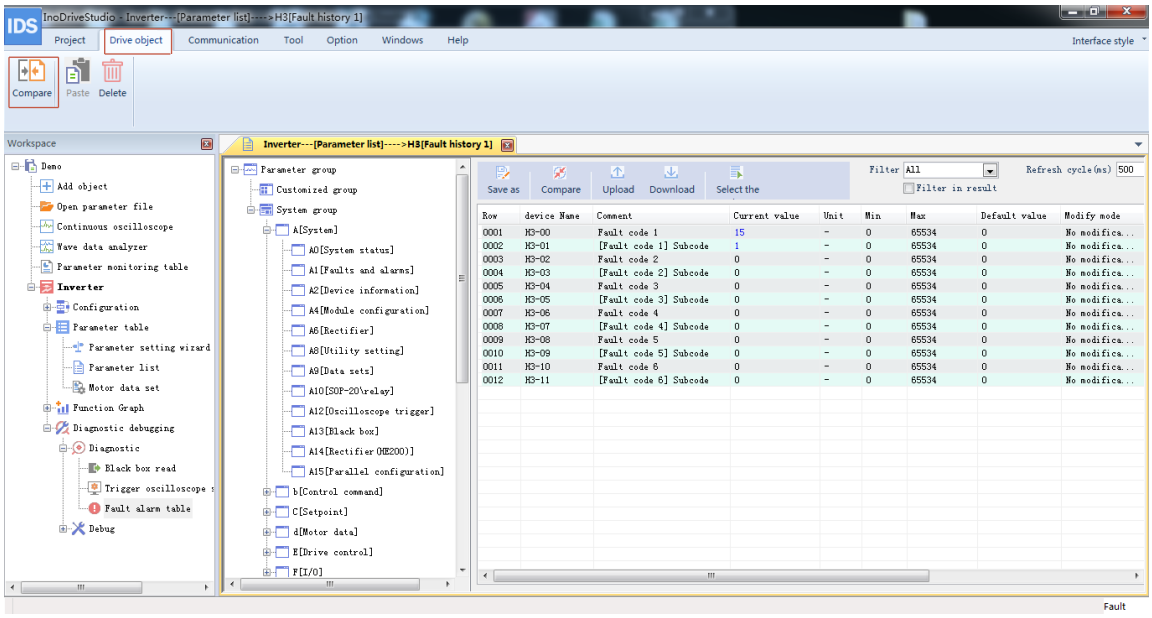


Figure 3-18 Buttons for entering the comparison function page

On the comparison function page, you can compare two offline parameter files or the current values and factory defaults of the inverter module parameters. The comparison result can be set to contain inconsistent parameters only, consistent parameters only, or all parameters, as shown in the following figure.

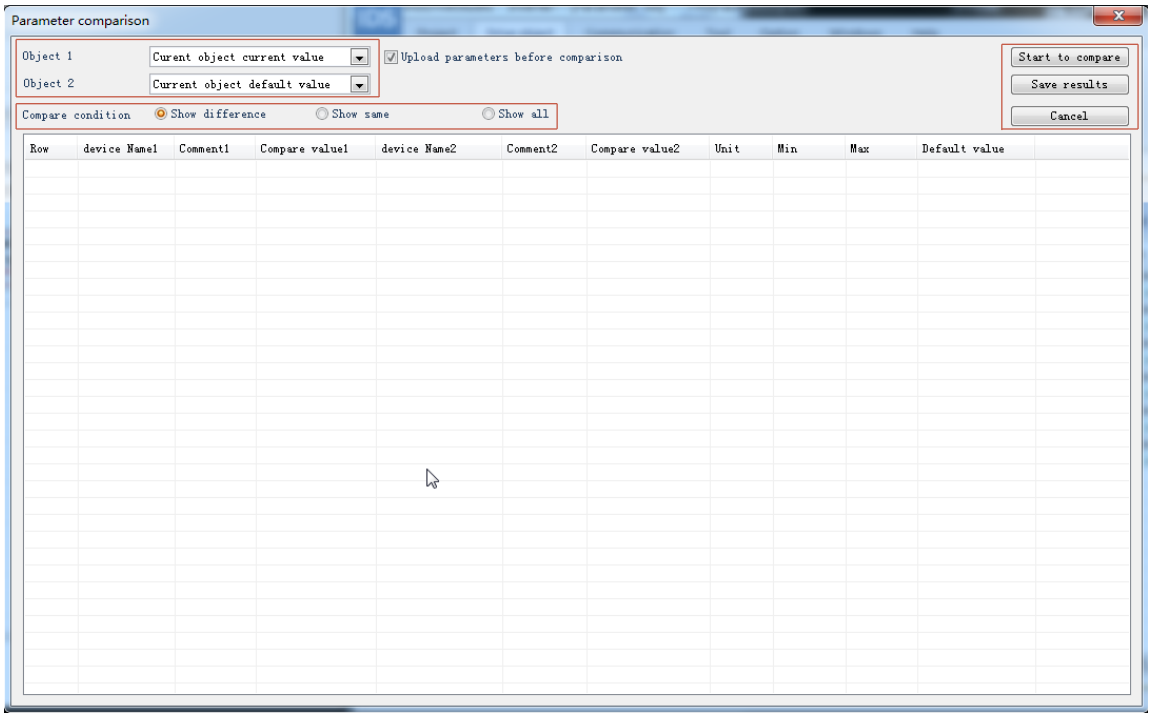
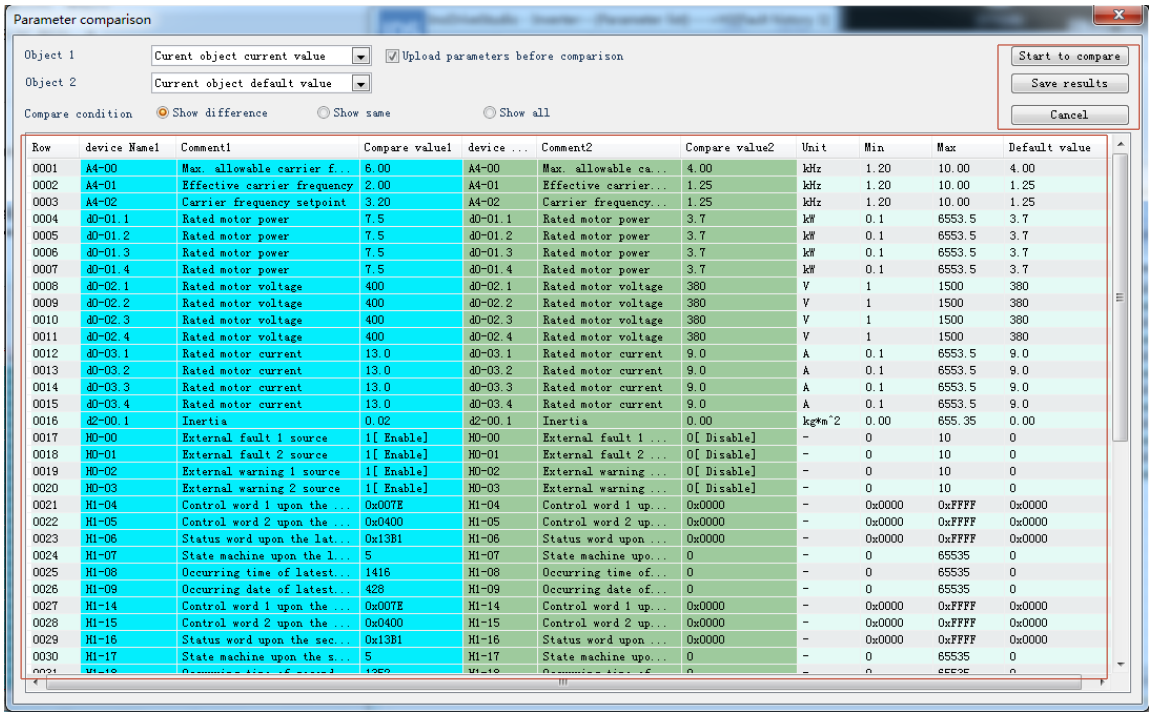


Figure 3-19 Comparison function page



Row	device Name1	Comment1	Compare value1	device ...	Comment2	Compare value2	Unit	Min	Max	Default value
0001	A4-00	Max. allowable carrier f...	6.00	A4-00	Max. allowable ca...	4.00	kHz	1.20	10.00	4.00
0002	A4-01	Effective carrier frequency	2.00	A4-01	Effective carrier...	1.25	kHz	1.20	10.00	1.25
0003	A4-02	Carrier frequency setpoint	3.20	A4-02	Carrier frequency...	1.25	kHz	1.20	10.00	1.25
0004	d0-01.1	Rated motor power	7.5	d0-01.1	Rated motor power	3.7	kW	0.1	6553.5	3.7
0005	d0-01.2	Rated motor power	7.5	d0-01.2	Rated motor power	3.7	kW	0.1	6553.5	3.7
0006	d0-01.3	Rated motor power	7.5	d0-01.3	Rated motor power	3.7	kW	0.1	6553.5	3.7
0007	d0-01.4	Rated motor power	7.5	d0-01.4	Rated motor power	3.7	kW	0.1	6553.5	3.7
0008	d0-02.1	Rated motor voltage	400	d0-02.1	Rated motor voltage	380	V	1	1500	380
0009	d0-02.2	Rated motor voltage	400	d0-02.2	Rated motor voltage	380	V	1	1500	380
0010	d0-02.3	Rated motor voltage	400	d0-02.3	Rated motor voltage	380	V	1	1500	380
0011	d0-02.4	Rated motor voltage	400	d0-02.4	Rated motor voltage	380	V	1	1500	380
0012	d0-03.1	Rated motor current	13.0	d0-03.1	Rated motor current	9.0	A	0.1	6553.5	9.0
0013	d0-03.2	Rated motor current	13.0	d0-03.2	Rated motor current	9.0	A	0.1	6553.5	9.0
0014	d0-03.3	Rated motor current	13.0	d0-03.3	Rated motor current	9.0	A	0.1	6553.5	9.0
0015	d0-03.4	Rated motor current	13.0	d0-03.4	Rated motor current	9.0	A	0.1	6553.5	9.0
0016	d2-00.1	Inertia	0.02	d2-00.1	Inertia	0.00	kg*m^2	0.00	655.35	0.00
0017	H0-00	External fault 1 source	1[Enable]	H0-00	External fault 1 ...	0[Disable]	-	0	10	0
0018	H0-01	External fault 2 source	1[Enable]	H0-01	External fault 2 ...	0[Disable]	-	0	10	0
0019	H0-02	External warning 1 source	1[Enable]	H0-02	External warning ...	0[Disable]	-	0	10	0
0020	H0-03	External warning 2 source	1[Enable]	H0-03	External warning ...	0[Disable]	-	0	10	0
0021	H1-04	Control word 1 upon the ...	0x007E	H1-04	Control word 1 up...	0x0000	-	0x0000	0xFFFF	0x0000
0022	H1-05	Control word 2 upon the ...	0x0400	H1-05	Control word 2 up...	0x0000	-	0x0000	0xFFFF	0x0000
0023	H1-06	Status word upon the lat...	0x13B1	H1-06	Status word upon ...	0x0000	-	0x0000	0xFFFF	0x0000
0024	H1-07	State machine upon the l...	5	H1-07	State machine upo...	0	-	0	65535	0
0025	H1-08	Occurring time of latest...	1416	H1-08	Occurring time of...	0	-	0	65535	0
0026	H1-09	Occurring date of latest...	428	H1-09	Occurring date of...	0	-	0	65535	0
0027	H1-14	Control word 1 upon the ...	0x007E	H1-14	Control word 1 up...	0x0000	-	0x0000	0xFFFF	0x0000
0028	H1-15	Control word 2 upon the ...	0x0400	H1-15	Control word 2 up...	0x0000	-	0x0000	0xFFFF	0x0000
0029	H1-16	Status word upon the sec...	0x13B1	H1-16	Status word upon ...	0x0000	-	0x0000	0xFFFF	0x0000
0030	H1-17	State machine upon the s...	5	H1-17	State machine upo...	0	-	0	65535	0

Figure 3-20 Example results of comparison between current values and factory defaults

3.2.3.5 Backing Up and Downloading Parameters

With InoDriveStudio, HCU parameters can be backed up to the computer through the "Upload" function in the parameter list, or the selected parameter group can be backed up through the "Save as" function; Use the "Download" function to restore the parameter files in the computer to the HCU.

- Steps of backing up parameters using the "Upload" function
  Choose "Parameter list > Upload", enter the name of the file to be saved in the "Save As" dialog box, select the file type as "Parameter file (*.inoprm)", click "Save", and wait for the upload to complete.

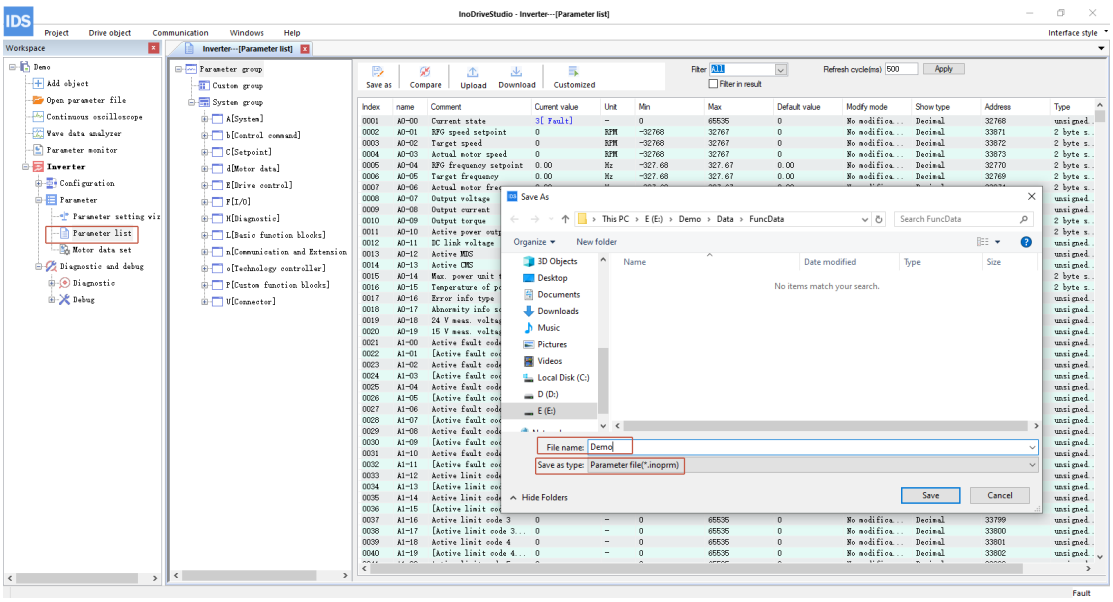


Figure 3-21 Backing up parameters by clicking the "Upload" button

- Steps of backing up parameters using the "Save as" function
  In the parameter list, select the parameter group to be backed up and click the "Save as" button. In the "Save As" dialog box, enter the file name and select the file type as "Parameter file (*.inoprm)". Check "Upload parameters before saving" and click "Save". Wait for the upload to be completed.

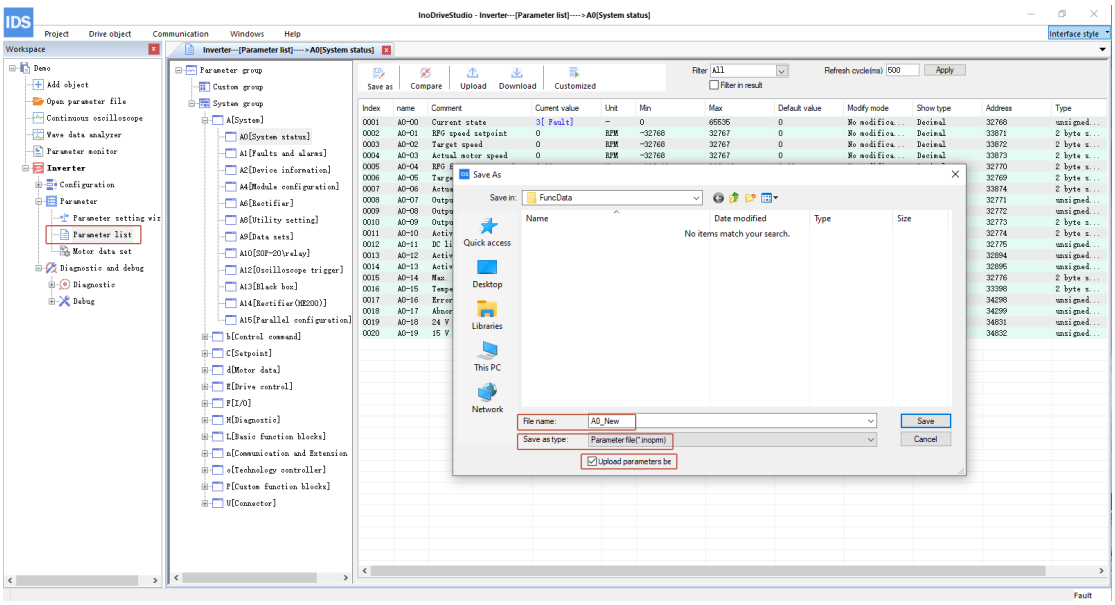


Figure 3-22 Backing up parameters by clicking the "Save as" button

Note

- If the "Upload" button is used for parameter copy, all parameters are backed up.
- To back up specified parameters, see section "User-defined Parameter Groups".
- When using the "Save as" button to back up parameters, set the file type to "*.inoprm" and select the option of "Upload parameters before save".

- Steps of downloading parameters
  In the parameter list, click the "Download" button. In the pop-up dialog box, select the file to be downloaded, select the download mode and click "Open". Wait for the download to complete.

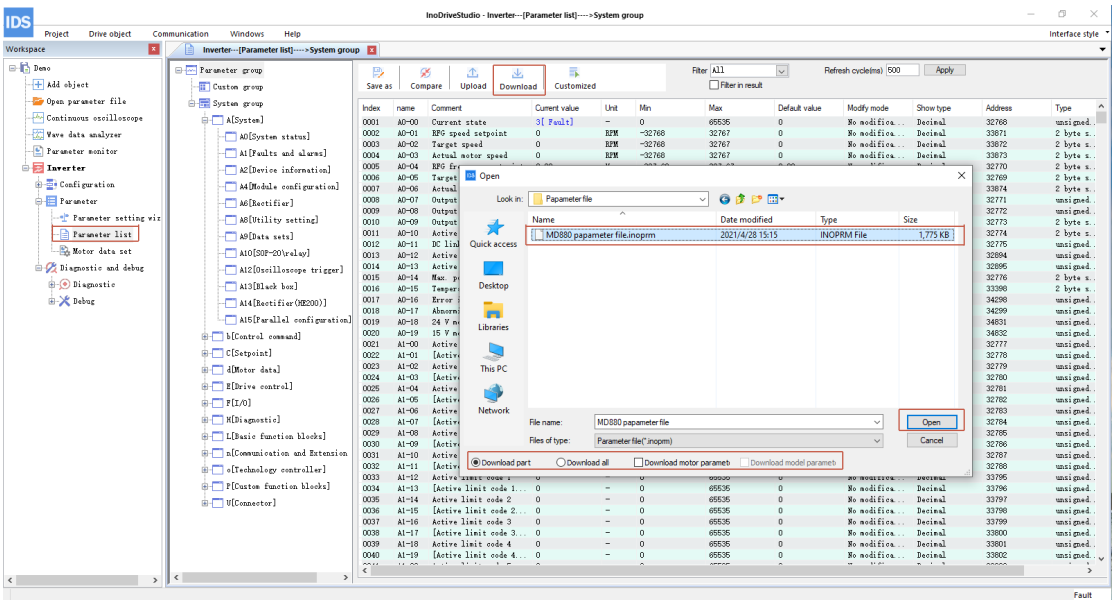


Figure 3-23 Parameter downloading

Download part/Download all: By default, all the parameters, excluding motor parameters (parameters of group d) and model-related parameters, are downloaded. The SOP-20-880 communication rate (A10-04) and communication address (A10-03) are not downloaded. To download motor parameters, select "Download motor parameters". The "Download part" and "Download all" modes do not support model parameter downloading.

3.2.3.6 User-defined Parameter Group

InoDriveStudio allows you to select parameters and combine them into user-defined parameter groups as needed. Such parameter groups can be saved into parameter files or user-defined parameter group configuration files.

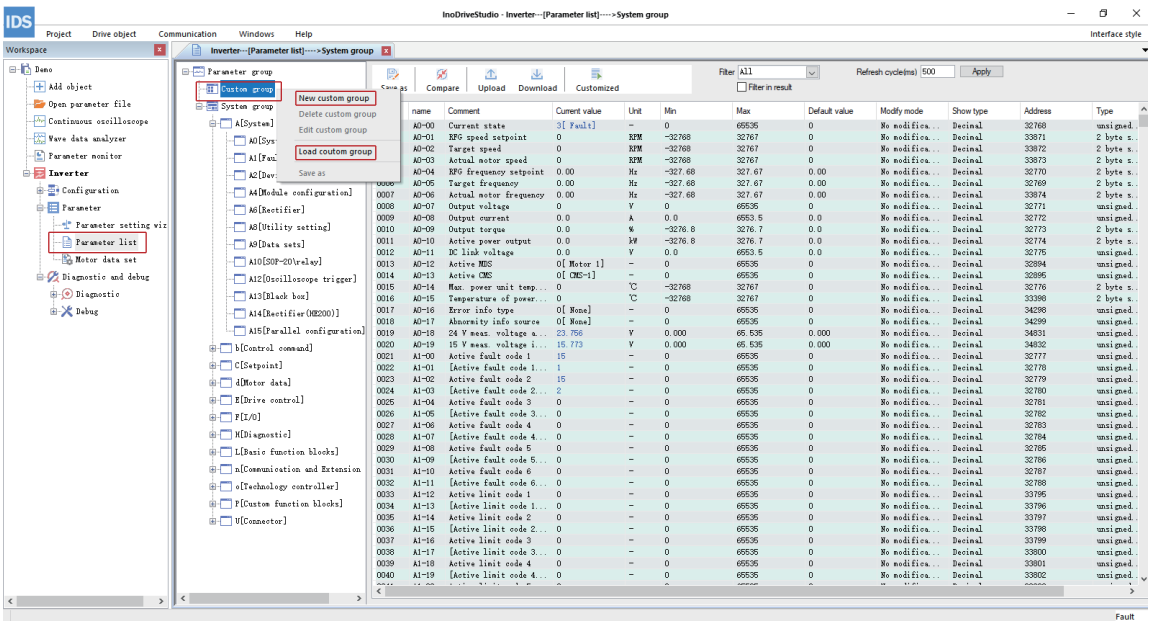


Figure 3-24 Entering a user-defined parameter group

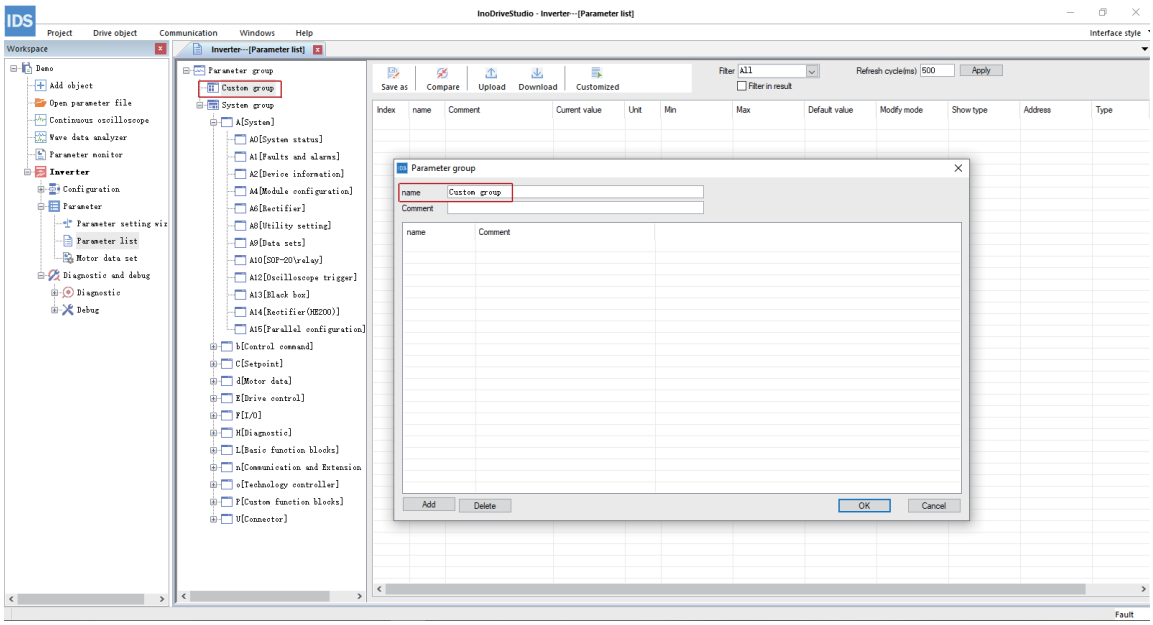


Figure 3-25 Page of a user-defined parameter group

Defining a parameter group

Select "Parameter list". Right-click "Custom group" and select "New custom group" or "Load custom group". In the dialog box that appears, set a user-defined group name, click "Add" or "Delete" to add or delete target parameters, and click "OK". The user-defined parameter group is generated.

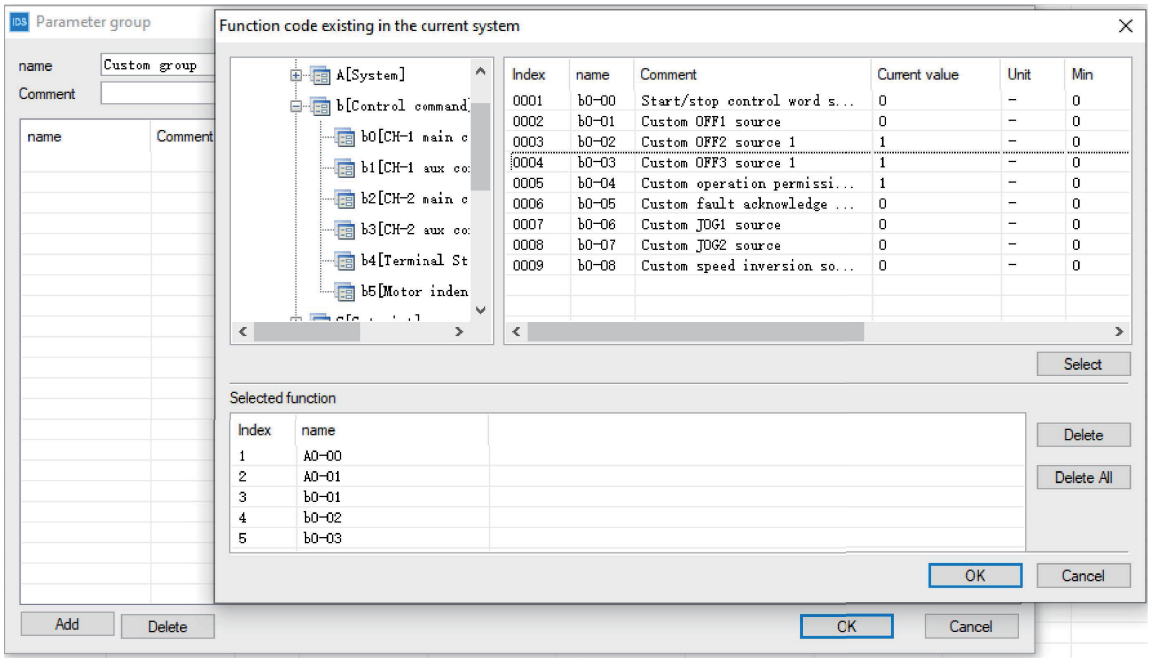


Figure 3-26 Parameters in a user-defined parameter group

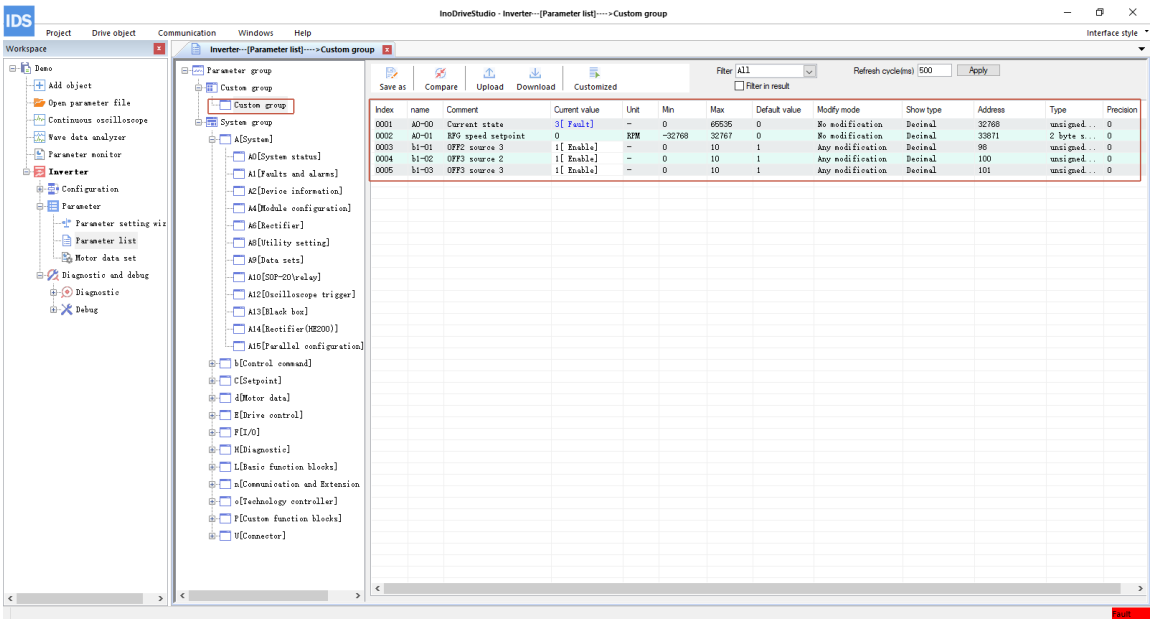


Figure 3-27 New file of a user-defined parameter group

Right-click on the created user-defined parameter group and select "New custom group", "Delete custom group", "Edit custom group", "Load custom group", or "Save as" as needed.

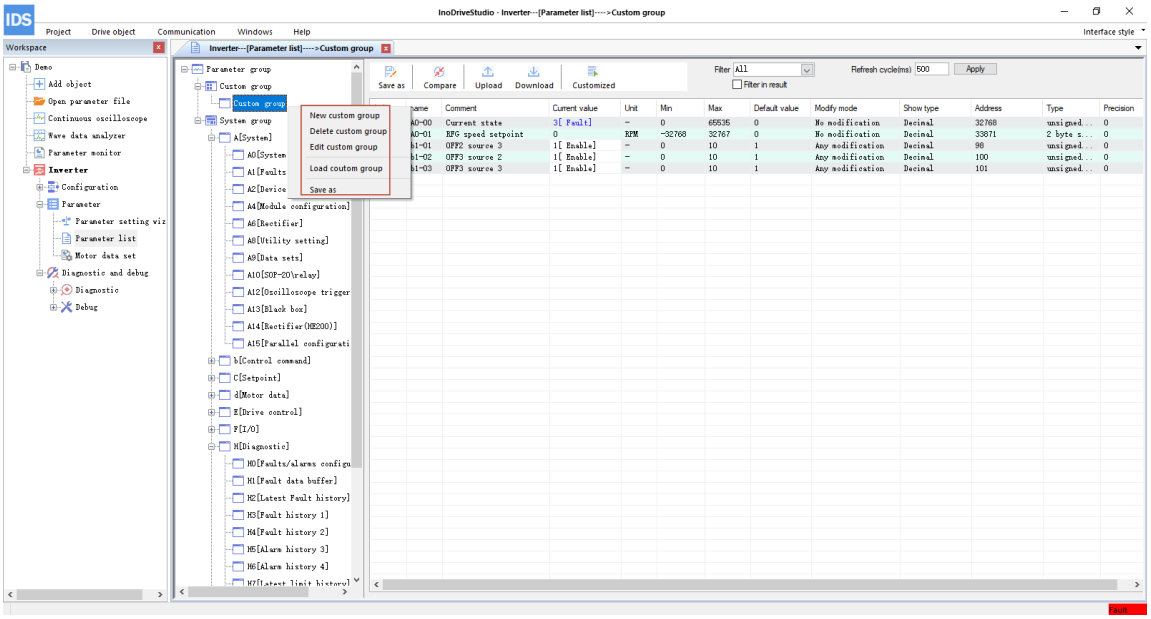


Figure 3-28 Operations on a user-defined parameter group

User-defined parameters can be saved as files of different formats:

- Parameter file (*.inoprm): The saved file supports parameter download, contains parameter values, and can be downloaded to other devices.
- Parameter group file (*.inogrp): The saved file is a parameter group configuration file that can be loaded to a user-defined group. It only contains user-defined parameter group information.
- CSV file (*.csv): Parameters are saved into a CSV file, which can be directly opened.

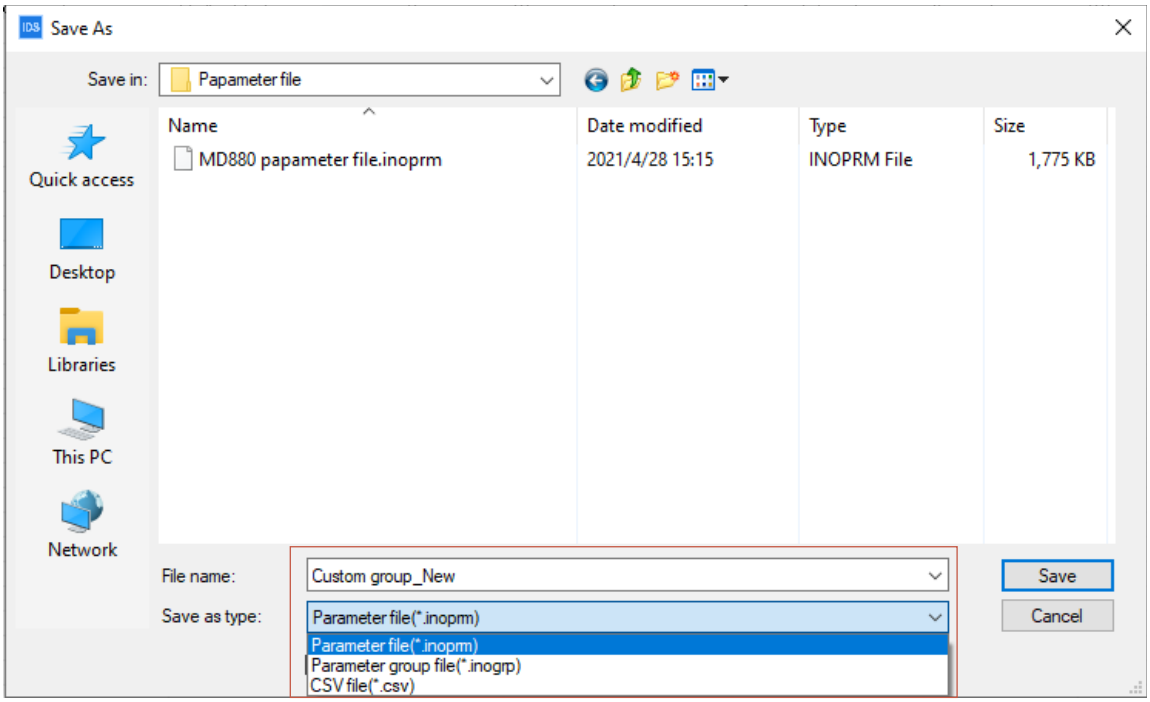


Figure 3-29 User-defined Parameter Group

3.2.4 Waveform Recording and Analysis

Analysis of real-time data curves is the most important for commissioning. InoDriveStudio provides three means for online real-time recording and conditional triggering recording of data curves, and offline viewing of waveforms.

3.2.4.1 Continuous Oscilloscope

Field commissioning often requires monitoring the device operation status in real time. The continuous oscilloscope of InoDriveStudio can monitor and record device data or status in real time. Click "Continuous oscilloscope" under "Workspace" to access the "Continuous oscilloscope" window. This window mainly consists of the channel selection, waveform display, waveform configuration, and toolbar parts, as shown below:

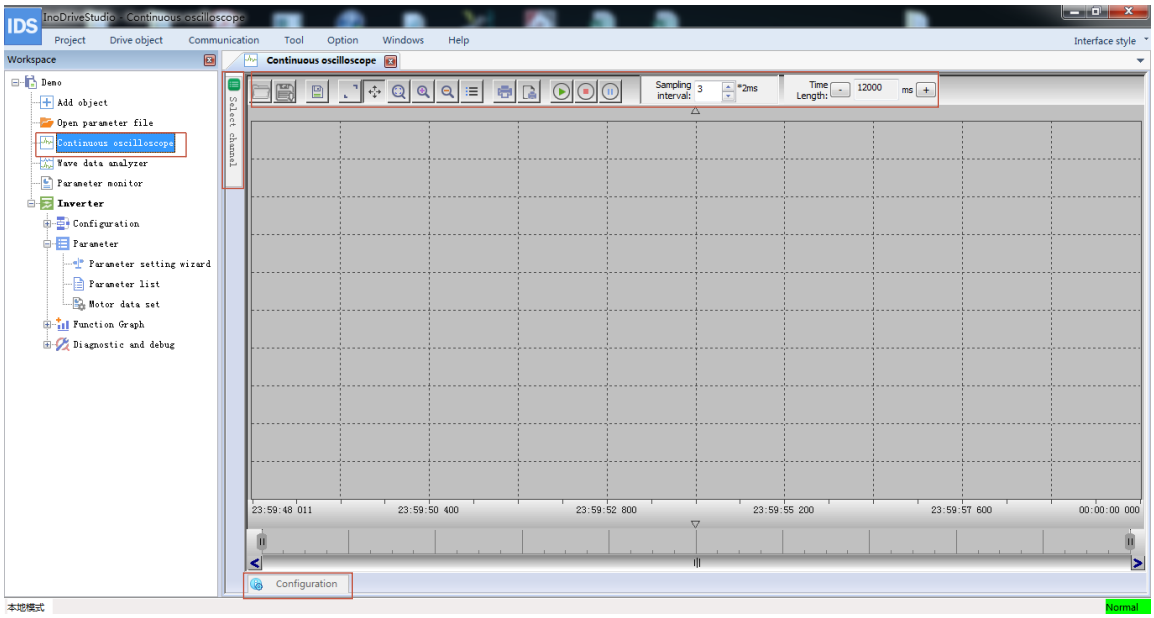


Figure 3-30 How to start a continuous oscilloscope

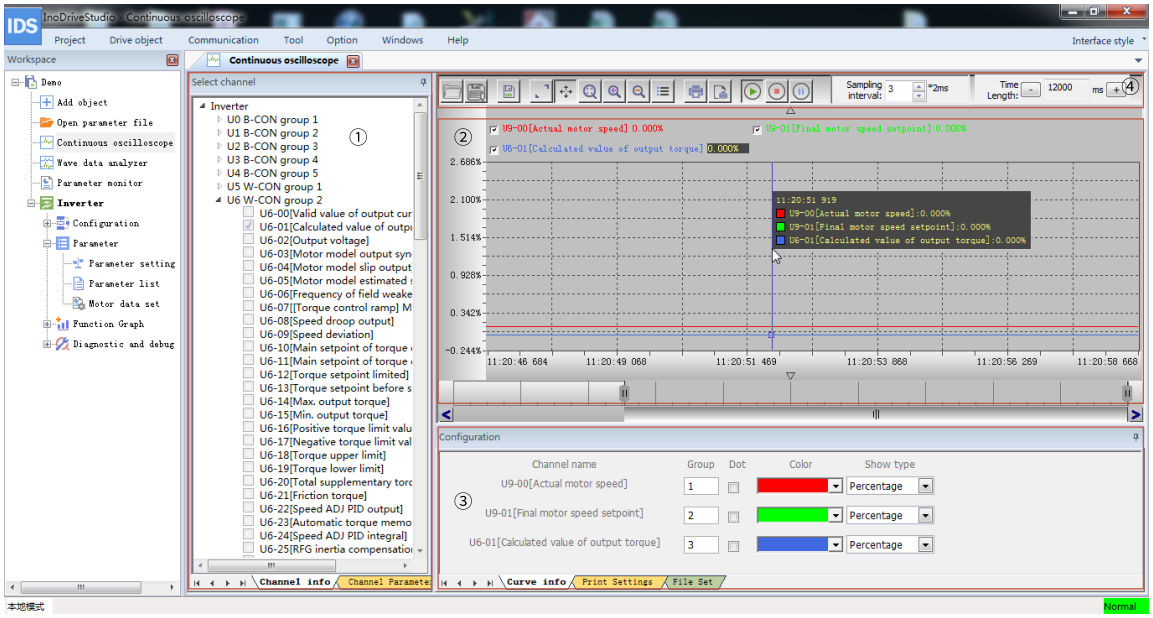


Figure 3-31 Continuous oscilloscope window

You can open only one continuous oscilloscope window for each project. In the continuous oscilloscope window, you can record and analyze waveforms of all devices in the current project. In this window, the part marked as ① is used for selecting channels, the part marked as ② is used for displaying the waveform, the part marked as ③ is used for configuring waveforms, and the part marked as ④ is the toolbar, where you can perform operations such as start, stop, pause, and zooming. In ③, input the same value in the field "Group" to display connectors with the same physical quantity meaning to the same coordinate system. Select the Stop icon in ④, click "Channel Parameter", and then select a channel. Then, you can delete the selected channel, as shown in *"Figure 3–32" on page 53*.

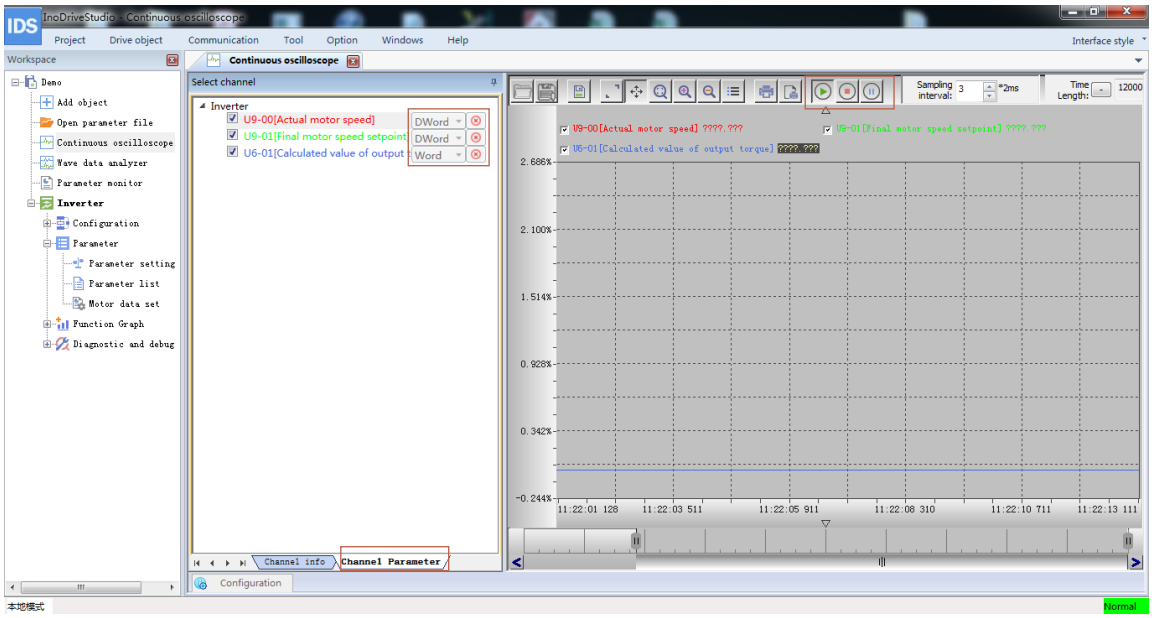


Figure 3-32 Deleting a continuous oscilloscope channel

In the "Select channel" section, select the data channel you want to monitor. All parameters in group U can be used as the data source for the recorded curve, among which:

- For (U5 to U8, U10 to U11, and U15), each piece of data occupies one recording channel;
- Parameters U9 and U19 use one recording channel for recording each data entry by default. To obtain waveforms of higher accuracy, you can modify single word to double word in the configuration to occupy two recording channels.
- Parameters U0 to U4 are used to record digital waveforms. Up to eight digital waveforms per device can be recorded. All digital waveforms of one device occupy only one recording channel.

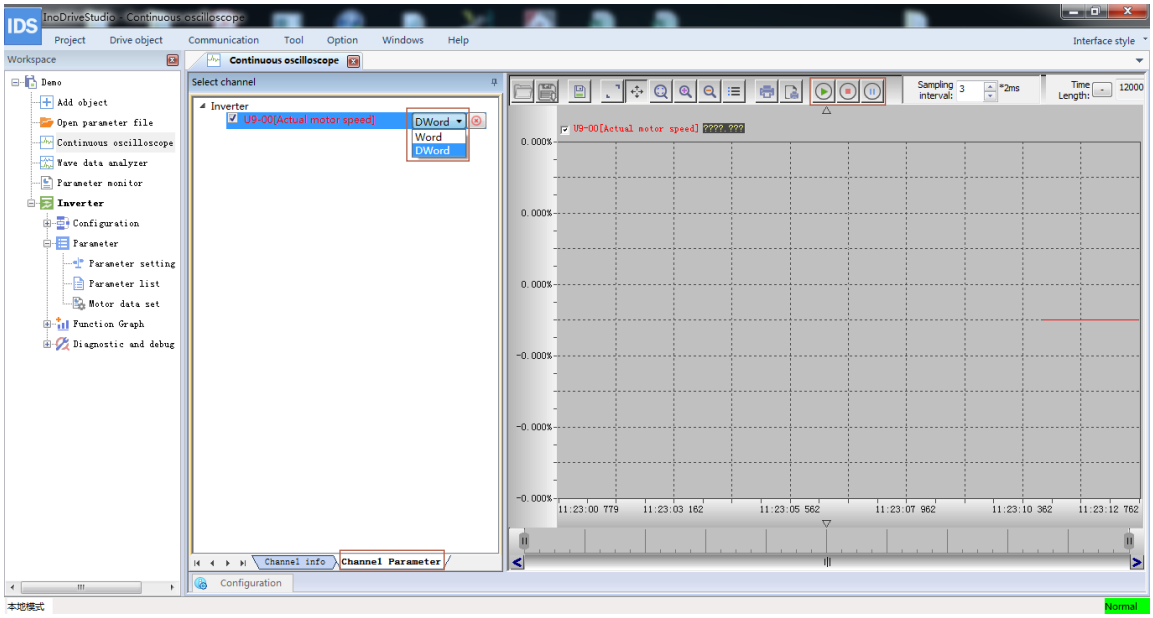


Figure 3-33 Single word and double word display of continuous oscilloscope connector

The channel number limit is related to the communication baud rate and sampling interval. Their relationship is shown in the following figure.

Baud Rate	Sampling Interval	Max. Number of Channels	Sampling Interval	Max. Number of Channels	Sampling Interval	Max. Number of Channels
115200 bps	2 ms	4	4 ms	7	> 4 ms	8
1 Mbps	2 ms	8	4 ms	8	> 4 ms	8
2 Mbps	2 ms	8	4 ms	8	> 4 ms	8
4 Mbps	2 ms	8	4 ms	8	> 4 ms	8

For how to configure the waveform and use the toolbar, see the help document delivered with the InoDriveStudio software.

Key operation method:

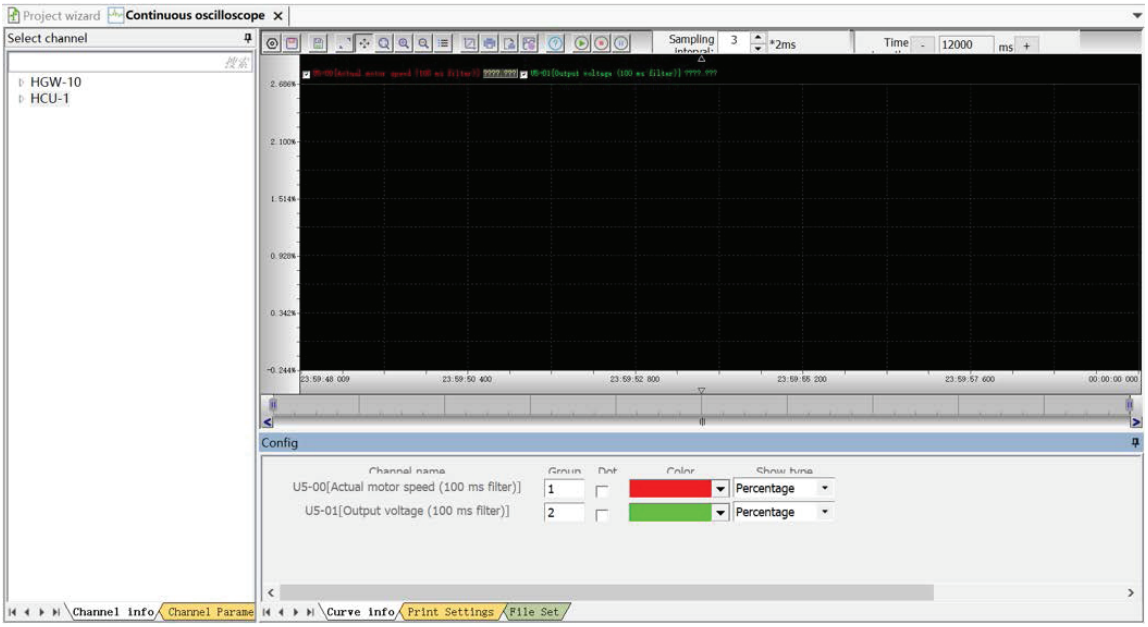


Figure 3-34 Continuous oscilloscope window

In part ① in the lower-left corner of the page, switch the tab to "Channel info", and then select a device, and configure the oscilloscope channel. Switch the tab to "Channel Parameter". The available channels and the configured oscilloscope channel are displayed. You can also select the record accuracy for the 32-bit connector. You can select double word to improve the record accuracy, but then two oscilloscope channels are occupied for each data entry recorded.

The following table lists functions of buttons in the toolbar in part ②:

Button	Description
	Saves the waveform. Waveforms generated during running of the continuous oscilloscope are automatically saved to the project directory. When the number of waveform files exceeds the limit, the earlier waveforms are automatically deleted. It is recommended to back up important waveforms to another directory manually.
	Automatically zooms in or out the horizontal coordinate. After this button is clicked, the horizontal coordinates of all curves are zoomed in or out according to the current display range to ensure that all curve points are within the current display range.
	Moves the curve. After this button is clicked, you can drag and drop the current curve by using the left mouse button.

Button	Description
	Zoom in an area. After this button is clicked, you can use the mouse to frame an area, and the area will be zoomed in and displayed in the current screen. Only when the vertical coordinate range of the current curve changes will the time axes of all curves change synchronously. You can zoom in or out a horizontal or vertical coordinate separately.
	Zooms in or out the coordinate. You can click this button to zoom in or out the curve to the next level. Only when the vertical coordinate range of the current curve changes will the time axes of all curves change synchronously.
	Shows or hides the verniers. You can use two verniers to measure the curve data.

On the "Curve info" tab page in part ③, modify the color of each curve and then select "Dot". Each sampling point on the curve is bold. When the group numbers of two curves are the same, these two curves share the same horizontal coordinate and are zoomed in and out synchronously.

You can modify the display type for some signals in part ④. For example, you can choose to display the speed per-unit value in percentage, frequency, or speed unit.

Table 3–5 Common shortcut keys

Shortcut Key	Description
Right mouse button	Click to automatically zoom in or out the horizontal and vertical coordinates of all curves.
Mouse roller	Zooms in or out curves. In the waveform area, both the horizontal and vertical coordinates are zoomed in or out. In the coordinate area, only the coordinate under operation is zoomed in or out. Only when the vertical coordinate range of the current curve changes will the time axes of all curves change synchronously.
Ctrl + Mouse roller	Moves the curves. In the waveform area, both the horizontal and vertical coordinates are moved. In the coordinate area, only the coordinate under operation is moved. Only when the vertical coordinate range of the current curve changes will the time axes of all curves change synchronously.
↑ or ↓	Moves the current curve up or down.
Alt	Forces to apply the operation to all curves. For example, Alt + ↑ or Alt + ↓ is used to move all curves up or down.
Shift	Forces an operation to zooming. For example, Shift + ↑ or Shift + ↓ is used to zoom in or out the vertical coordinate of the current curve.
Ctrl	Forces an operation to moving. For example, Ctrl + mouse roller is used to move a curve.

3.2.4.2 Trigger Oscilloscope

To trigger waveform recording based on alarm, fault, or other conditions, use the trigger oscilloscope function. The method is as follows:

① Open the fault alarm list to access the trigger oscilloscope page

Choose "Inverter > Diagnostic debugging > Diagnostic > Trigger oscilloscope":

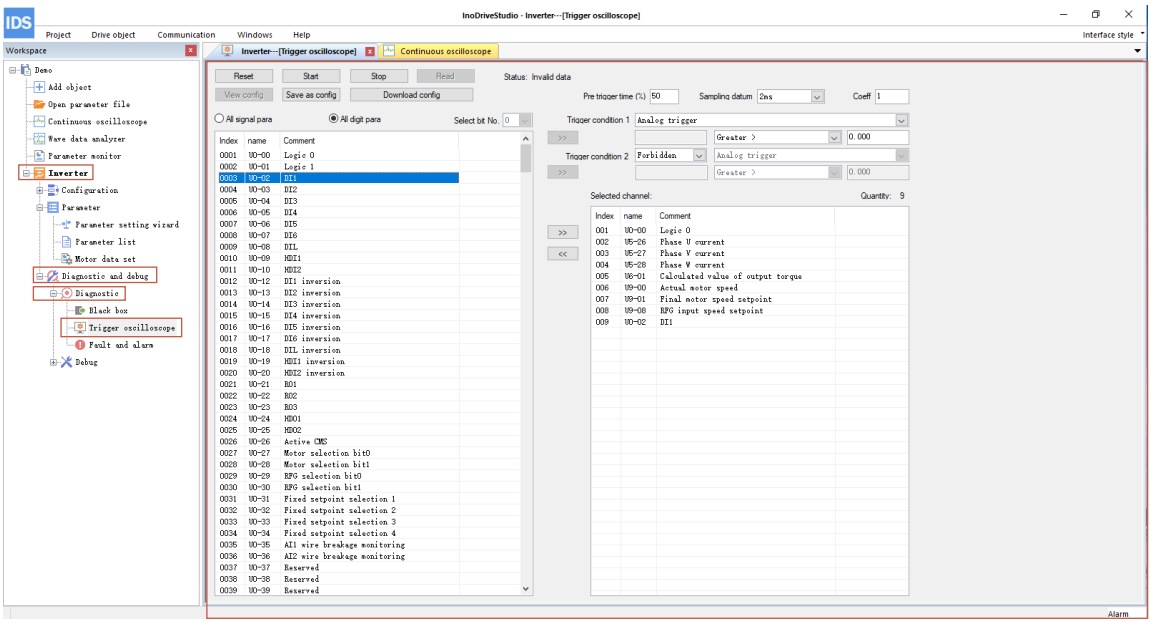


Figure 3-35 Trigger oscilloscope setting page

② Select the parameters you want to record

The recorded parameters can be analog or digital. If U5-26 (U phase current) is selected, check "All signal para" and select U5-26 and click >> to move U5-26 to the "Selected channel" list box, as shown in the following figure:

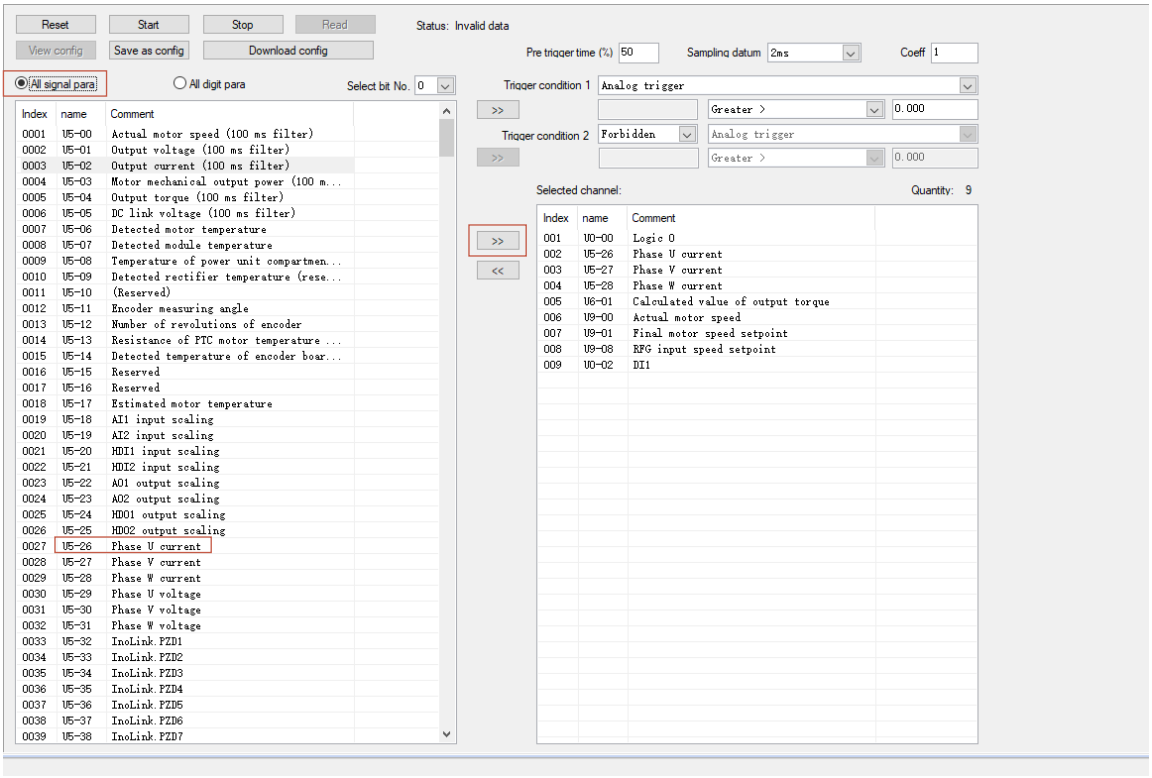


Figure 3-36 Recording parameters

You can also double-click the selected parameter to move it to the "Selected channel" list box. To remove a parameter from "Selected channel", double-click the parameter.

③ Trigger setting

Trigger conditions include:

- Sampling base value. Options are "Carrier period" and "2 ms" or its multiples.
- Pre-trigger time, which refers to the time when the trigger is ready to start. When it is set to 50%, the trigger waveform is recorded in the middle of the whole waveform time axis.
- Set trigger conditions and select the trigger quantity and its value. You can also set two trigger conditions. Only when both conditions are met will the trigger be effective. When only one condition is used, the trigger condition 2 is disabled.

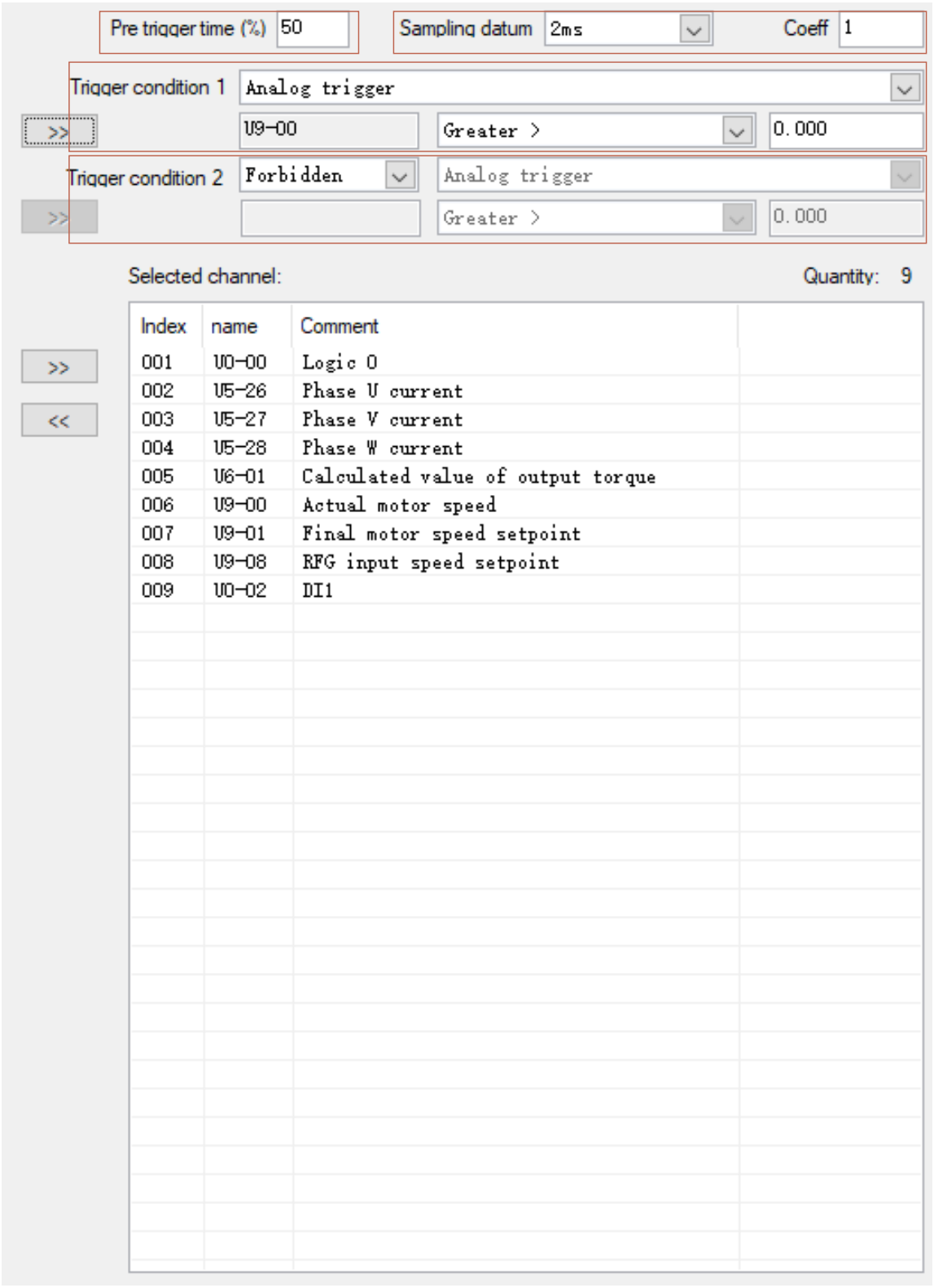


Figure 3-37 Trigger settings

When all settings (including parameter selection and trigger settings) are completed, the trigger settings can be "saved" into a file, which can be directly "downloaded" for use next time.

④ Start

After the setting is completed, click "Start". When the trigger conditions are met, you will be prompted the trigger is executed. After the waveform recording is completed, the status will change to ready. Select "Read" and save the file name, as shown in the following figure:

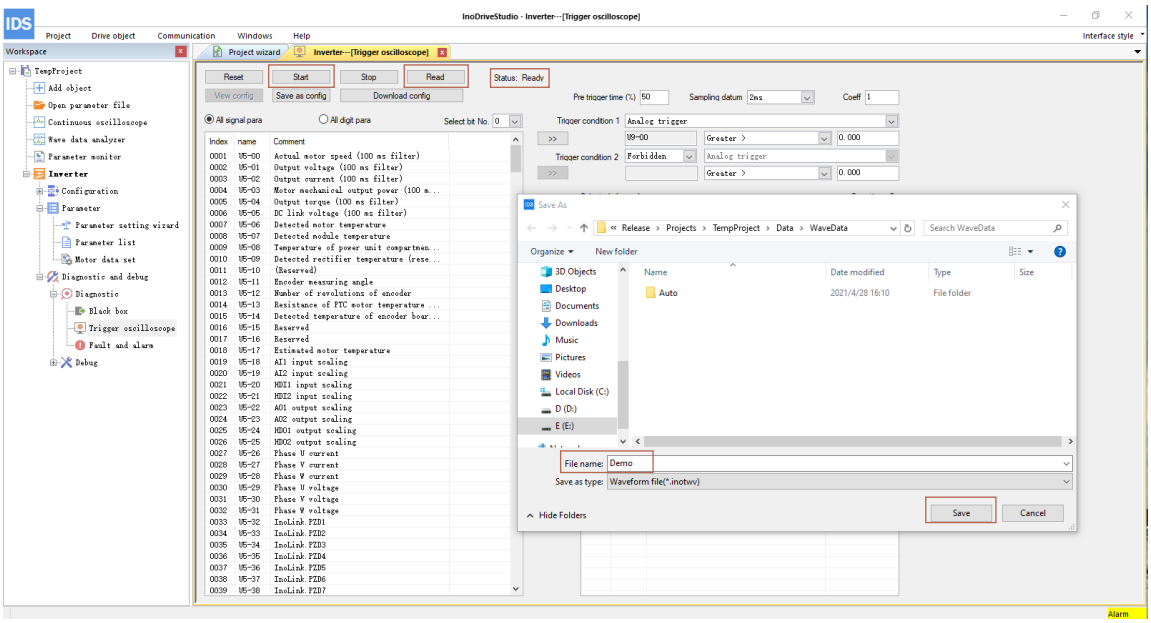


Figure 3-38 Saving file

When the saving is completed, the software will automatically open the recorded waveform and you can select the channel you want to view.

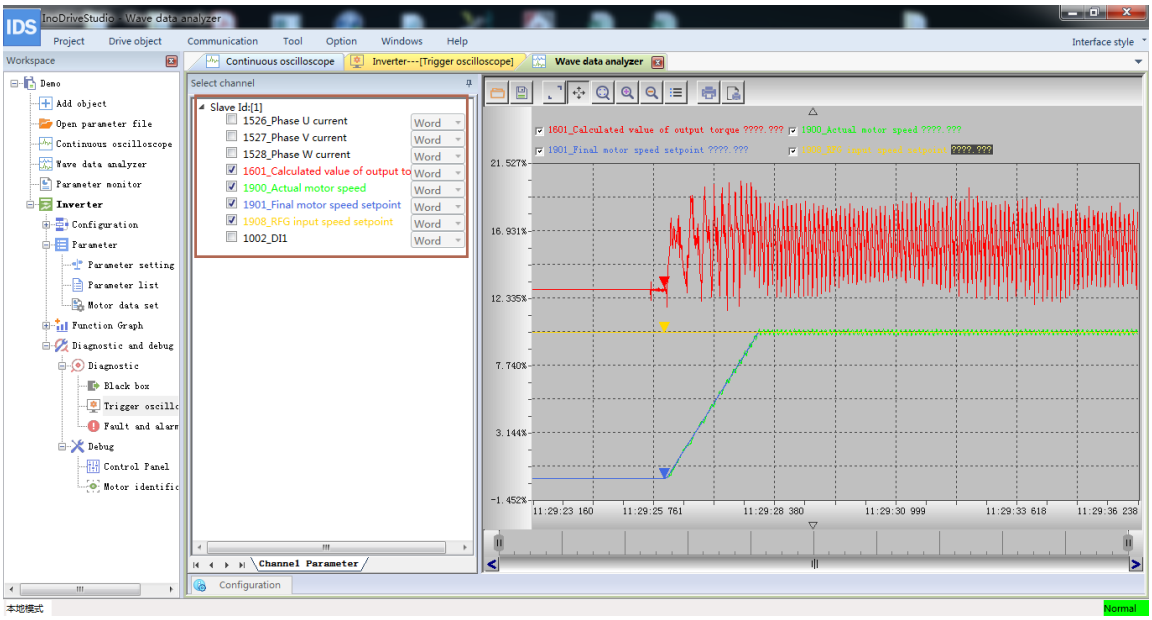


Figure 3-39 Waveform recorded by trigger oscilloscope

3.2.4.3 Black Box Function

When the device fails, MD880 controller will collect data 1.5 seconds before and 0.5 seconds after the fault, including 16 ADC interrupt internal data, 48 2ms-period internal data, and 16 2ms-period user-defined data. The collected data will be automatically saved to the SD card provided by HCU, which can store up to 1,000 recent fault data.

The black box supports automatic triggering of fault and user-defined instruction triggering, either of which will trigger the black box recording.

- Fault-based triggering: When the inverter module state changes from the no-fault to the fault state, a black box record is automatically generated.
- User-defined instruction trigger condition: You can set the parameter H0-06, and the black box recording will be triggered once on the rising edge. You can use the parameter H0-60 to set the black box fault recording conditions and choose to record faults in operation or faults at any time.

Para.	Name	Setpoint
H0-06	User-defined black box trigger command source	0: Disable Other: B connector
H0-40	Enable error detection 1	Ones position: OFF2/OFF3 activation alarm 0: Disable 1: Enable Tens position: HCU RTC battery voltage low alarm 0: Disable 1: Enable Hundreds position: Reserved 0: Disable 1: Enable Thousands position: SD card offline/error alarm 0: Disable 1: Enable Ten thousands position: SD card black box fault record condition 0: Fault occurring during running 1: Fault occurring at any time

① Access the black box page by choosing "Inverter > Diagnostic debugging > Diagnostic > Black box", and click "Refresh" to see the faults and time of the device.

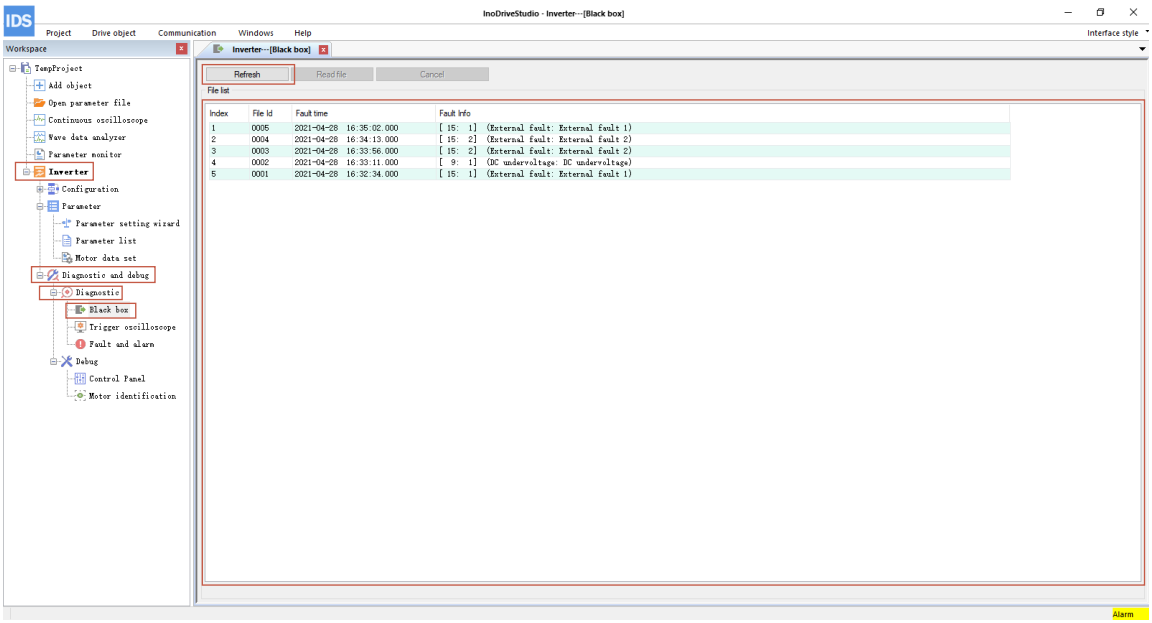


Figure 3-40 Black box opening page

② Select a fault, such as the second fault, click "Read file", name the file, and then click "Save" to save the file.

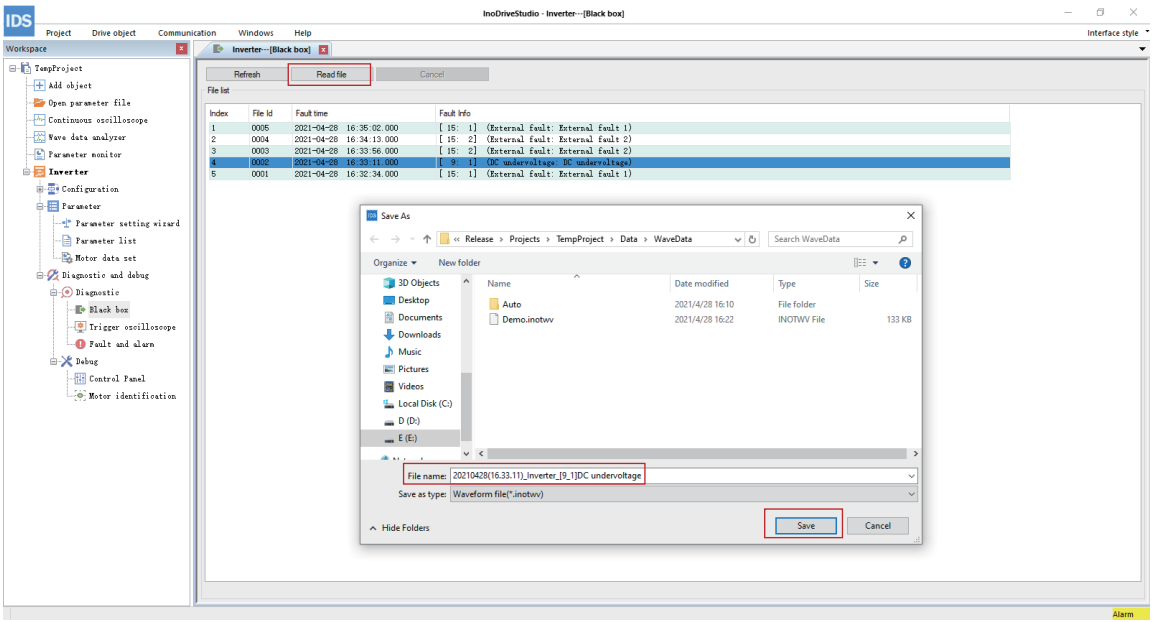


Figure 3-41 Saving black box fault data

③ After the file is saved, InoDriveStudio automatically displays the saved waveform. You can select the channel you want to view and the corresponding waveform is displayed.

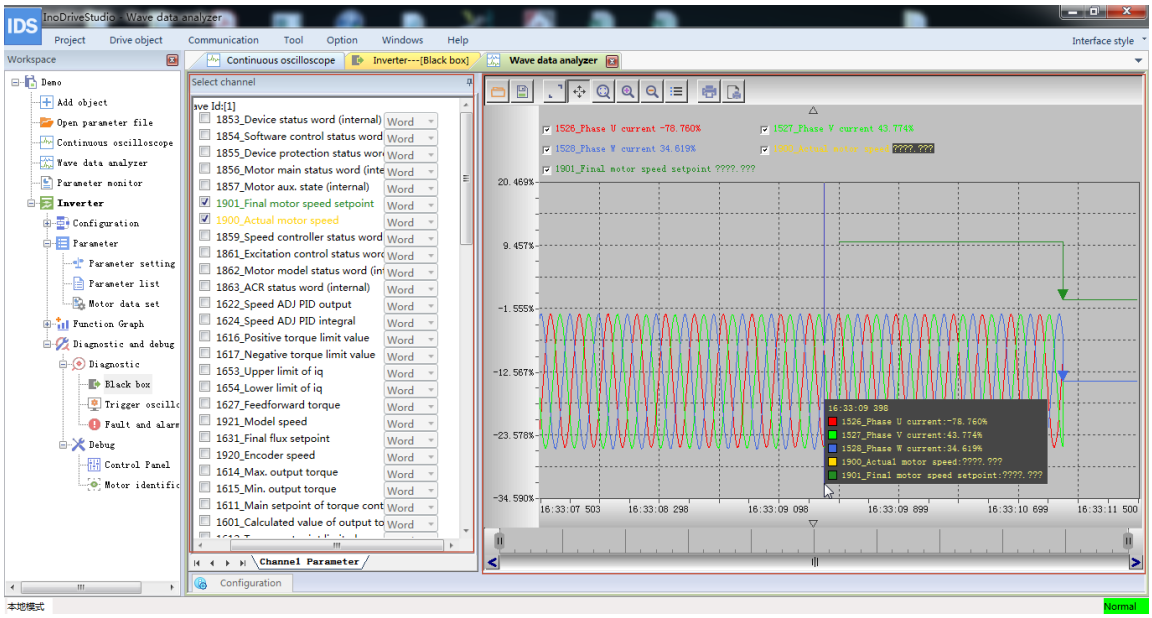


Figure 3-42 Black box opened waveform

4 System Introduction

4.1 Topology of MD880 system

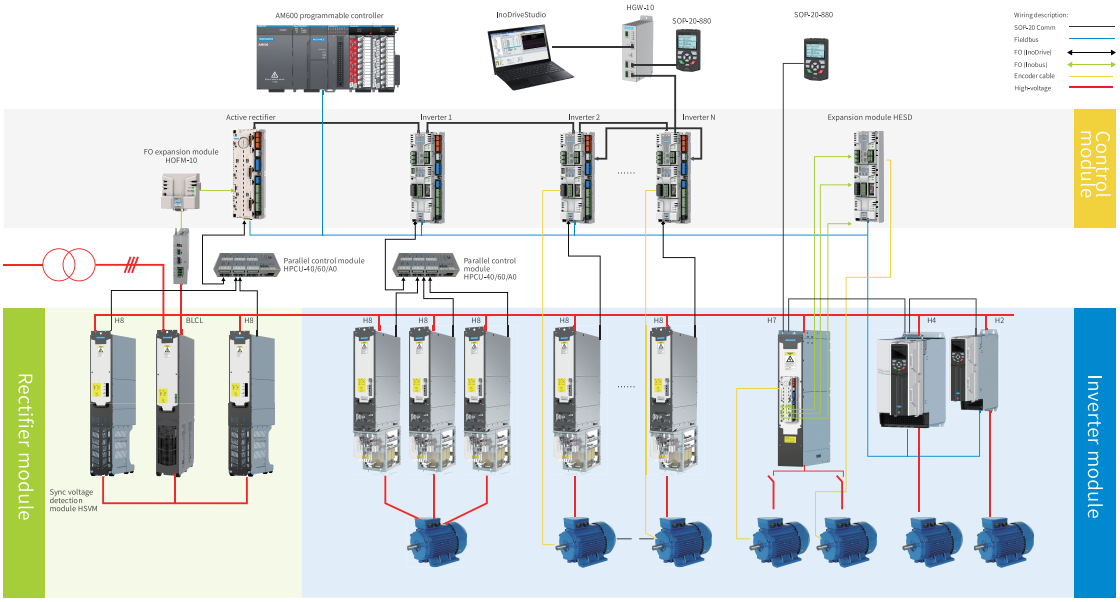


Figure 4-1 Topology of MD880 system

The typical topology of MD880 multi-drive system is shown in the preceding figure. It consists of a rectifier part (which can be a basic rectifier, a regenerative rectifier, or an active rectifier) and an inverter part. The expansion of the rectifier module and the inverter module can be realized in parallel through HPCU. The rectifier module and the inverter module HCUs are connected with PLC through fieldbus to realize centralized control. The HCU control modules can also realize centralized commissioning and monitoring through RS485 bus.

4.1.1 Description of Parallel Connection of MD880 Inverter Modules

MD880 inverter modules are connected in parallel through HPCU, and up to 10 modules can be connected in parallel. The electrical diagram of the parallel topology is as follows:

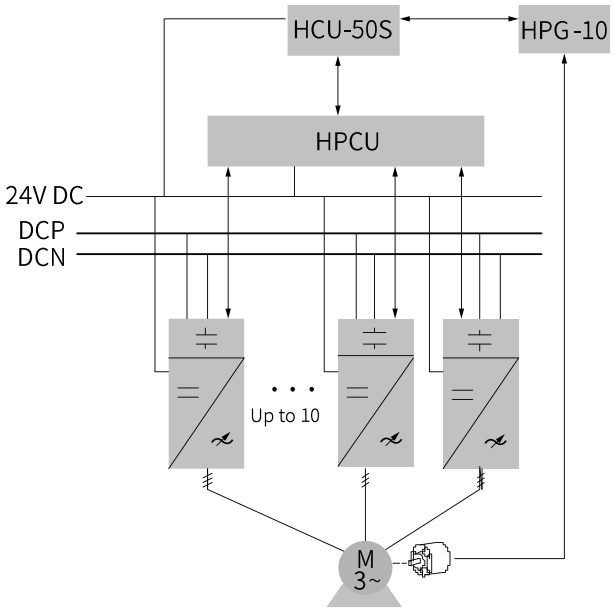


Figure 4-2 Parallel topology of inverter modules

When inverter modules are connected in parallel, output reactors must be installed. It is recommended that each inverter module use a separate cable to connect to the motor; a bus bar can also be used to short-circuit the outputs of all inverter modules and then connect them to the motor with a cable. For wiring requirements, see *MD880-50 Series Inverter Hardware User Guide*. For the setting of power module and parallel related parameters, see *"5.3.1 Setting Parameters for Single and Parallel Modules" on page 86*.

The simple information of the module can be viewed through the parameters in the following table.

Table 4–1 Viewing module information

Para.	Name	Description
A2-00	Product type	Current device type 0: Diode rectifier 1: Basic rectifier 2: Inverter 3: Regenerative rectifier 4: 3-phase braking 5: DC/DC
A2-01	Rated module power	Displays the rated power of the module.
A2-02	Rated module voltage	Displays the rated voltage of the module.
A2-03	Rated module current	Displays the rated current of the module.
A15-07	Number of online parallel modules	Displays online parallel modules. Agrees with A15-04.
A15-12	Total rated device power	Displays the total rated power of modules connected in parallel.
A15-13	Total rated device current	Displays the total rated current of modules connected in parallel.

For example: If two 500-kW power modules are connected in parallel, A2-01 displays 500 kW. The derating coefficient for parallel connection is 0.95, so the power of the two 500-kW parallel modules is 950 kW, and thus A15-12 should display 950 kW.

4.1.2 Use of the HCU Control Module

4.1.2.1 Indicators

HCU comes with three indicators:

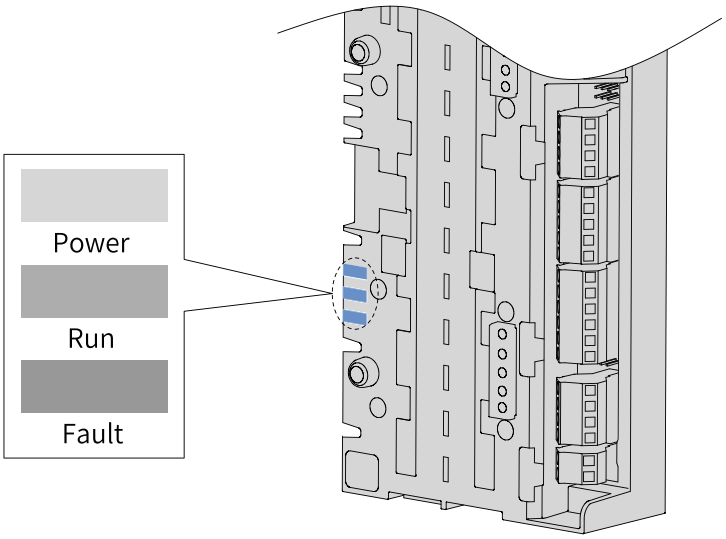


Figure 4-3 HCU indicators

Item	Name	Status	Description
1	Power	Steady on	The HCU power supply is normal.
		Off	The HCU is not energized or the power supply is faulty.
2	Run	Steady on	The power module is running.
		Off	The power module is not running.
3	Fault	Steady red	The system is faulty.
		Steady yellow	A system alarm is reported.
		Off	The system is normal
		Flashing in red	The HCU auxiliary power supply is faulty. Check the 24 V power supply and other power supplies for short circuit or overload.
4	Fault and Run	Fault (yellow) and Run (green) both on	PC or SOP-20-880 selects the HCU and ends after 10s.
		Fault (yellow) and Run (green) flashing alternatively	FPGA of HCU is abnormal.

4.1.2.2 Standard Peripheral Terminals and Their Parameter Settings

See the *HCU Control Module Guide* for the use of HCU standard peripheral terminals. This guide only describes the terminals and corresponding parameter groups. The following table lists the terminals and parameters.

Name	Parameter Group	Remarks
RS485	A10	Sets the communication speed and address.
DI	F0	Shows DI status, and switch-on/off delay settings.
RO	F1	Selects an output source. The selection is indicated by U0-21 to U0-23.

Name	Parameter Group	Remarks
AI	F2	The final results are displayed in U5-18 or U5-19.
AO	F3	Selects an output source. The selection is indicated by U5-22 or U5-23
HDI	F4	Sets high-speed DI.
HDO	F5	Sets high-speed DO.
InoLink	n0	Transmits data between HCUs. U5-32 to U5-39 display the data of receive words PZD1 to PZD8. U2-32 to U2-47 display bit0 to bit15 data of receive word PZD1.

4.1.2.3 Expansion Modules of HCU and Usage

For detailed information on the hardware of an expansion module, see the guide specific for this module. There are 3 steps when using the expansion module:

1. Determine the module type.
2. Select the slot to which you want to insert the module. Up to three input/output modules or encoder detection modules can be used at a time. You need to configure each module separately.
3. Set other parameters of the module. In the case of a communication expansion module, you also need to set the fieldbus adapter parameters in group n1/n2=. See *"6.9.1 Fieldbus Adapter" on page 204*.

Table 4–2 List of common expansion modules

Model	Module Name	Type	Parameter Group	Related Parameter Group
HPG-10	HTL incremental encoder signal detection module	Encoder detection module	n4/n5/n6	/
HPG-40	Resolver encoder signal detection module			/
HPG-50	TTL incremental encoder signal detection module			/
HIO-10/20/30	Digital and analog expansion module	I/O module	n7	n23/n24/n25
			n8	n26/n27/n28
			n9	n29/n30/n31
HMBA-10	Modbus RTU fieldbus adapter module	Fieldbus module	n10	n1/n2/n3
HDP-10	PROFIBUS-DP fieldbus adapter module		n16	n1/n2/n3
HCAN-10	CANopen fieldbus adaptation module		n12	n1/n2/n3
HETC-10/HETC-20	EtherCAT industrial Ethernet module	Industrial Ethernet module	n14	n1/n2/n3
HPFN-10	PROFINET IO industrial Ethernet module		n17	n1/n2/n3
HMBT-10	Modbus TCP industrial Ethernet module		n18	n1/n2/n3
HETN-10	Ethernet test module	Ethernet module	n13	n1/n2/n3

Model	Module Name	Type	Parameter Group	Related Parameter Group
HSVM-10	Sync voltage detection module	Voltage detection module	n19	/
HOFR-50	OF routing data exchange control module	Optical fiber routing control module	n22	/
HIBA-10	Data conversion module	Data conversion module	n18	n1/n2/n3

The A2 group parameters display the type of the currently inserted expansion module and software version number.

Table 4–3 Parameters for viewing expansion module information

Expansion Slot	Module Type Parameter	Software Version Parameter	Expansion Slot	Module Type Parameter	Software Version Parameter
SLOT1_1	A2-24	A2-25	SLOT2_1	A2-30	A2-31
SLOT1_2	A2-26	A2-27	SLOT2_2	A2-32	A2-33
SLOT1_3	A2-28	A2-29	SLOT2_3	A2-34	A2-35
SLOT3_1	A2-36	A2-37	-	-	-

4.2 Backing Up and Restoring Parameters

4.2.1 Restoring Factory Defaults

Parameters in group A8 (Environment setting) are used to restore parameters to factory defaults as needed. For this purpose, select an operation through A8-00 and set A8-01 to confirm.

4.2.1.1 All Parameters

Set the following parameters in sequence:

1. Set A8-00 to 2 (Restore all parameters to factory defaults).
2. Set A8-01 to 1 to confirm the operation specified in A8-00.
3. All parameters (including parameters of group d) are restored to factory defaults (parameters such as motor power and current are restored to the values corresponding to the model).

Note

Parameters related to the power module model will be restored to the default value instead of the factory value, such as carrier frequency reference A4-02. The record parameters of H1 to H8 parameter groups will not be restored.

4.2.1.2 Some Parameters (Motor Parameters Not Restored)

Set the following parameters in sequence:

1. Set A8-00 to 1 (Restore some parameters to factory defaults). In this case, motor parameters in group d will remain unchanged.

2. Set A8-01 to 1 to confirm the operation specified in A8-00.
3. Parameters are restored to factory defaults, excluding parameters in group d.

Note

Parameters related to the power module model will be restored to the default value instead of the factory value, such as carrier frequency reference A4-02. The record parameters of H1 to H8 parameter groups will not be restored. The device name is not recoverable.

4.2.1.3 Record Parameters

Set the following parameters in sequence:

1. Set A8-00 to 3 (Clear fault records).
2. Set A8-01 to 1 to confirm the operation specified in A8-00.
3. Parameters in groups H1 to H8 are cleared, and other parameters are not affected.

4.2.1.4 Clearing SD Card Record Parameters of HCU

Set the following parameters in sequence:

1. Set A8-00 to 4 (Clear black box records).
2. Set A8-01 to 1 to confirm the operation specified in A8-00.
3. The parameter file backed up on the SD card of HCU is deleted, and all parameters are not affected.

4.2.1.5 Clearing Time Statistics Information

Set the following parameters in sequence:

1. Set A8-17 to select the time record information to be cleared.
2. Set A8-18 to 1 to confirm the operation specified in A8-17.
3. The selected time record information will be cleared.

4.2.2 Backing Up Parameters on the SD Card of HCU

In the A8 group (environment setting) parameters, select the operation to be performed through A8-05 and set A8-06 to confirm the selection. Then the values of all parameters can be saved to the SD card or parameters saved in the SD card can be restored to the HCU.

4.2.2.1 Saving Parameters to the SD Card

Set the following parameters in sequence:

1. Set A8-05 to 1 to back up all parameters of HCU to the SD card.
2. Set A8-06 to 1 to confirm the operation specified in A8-05.
3. Parameters of HCU can be saved in the SD card, which is convenient for spare parts replacement. Only one backup parameter file is allowed. The backup record will be overwritten by the next backup.
4. If backup is successful, A8-07 will display status 2 "Parameter saved".

4.2.2.2 Restoring Parameters from the SD Card to HCU

Set the following parameters in sequence:

1. Set A8-05 to 2 to restore all HCU parameters from the backup file in the SD card.
2. Set A8-06 to 1 to confirm the operation specified in A8-05.
3. Use the parameters backed up in the SD card to overwrite the current parameters of the HCU. When using a new HCU, you can use this function to quickly restore the parameters from the SD card of the old HCU.
4. If the recovery is successful, you are supposed to read status 5 "Parameter recovery completed" in A8-07; otherwise there may be no backup file in the SD card, or the SD card is currently being used by other processes.

4.2.2.3 Checking the Parameter File

Set the following parameters in sequence:

1. Set A8-05 to 3 to select parameter verification.
2. Set A8-06 to 1 to confirm the operation specified in A8-05.
3. The program will check the parameters backed up in the SD card against the current parameters in HCU. If the parameters are consistent, status 9 "Parameters are consistent" is displayed in A8-07. Otherwise, status 10 "Parameters are inconsistent" is displayed, indicating that the backup parameters in the SD card are different from those in the HCU.

4.2.2.4 Deleting Record Files on the SD Card of HCU

Set the following parameters in sequence:

1. Set A8-00 to 4 (Clear black box records).
2. Set A8-01 to 1 to confirm the operation specified in A8-00.

The parameter file backed up on the SD card is deleted, and all parameters are not affected.

4.2.3 Backing Up Parameters Using SOP-20-880

On the SOP-20-880, select the target device and log in to the system. Then, access 07 Operations > 01 Copy parameter to back up or restore parameters.

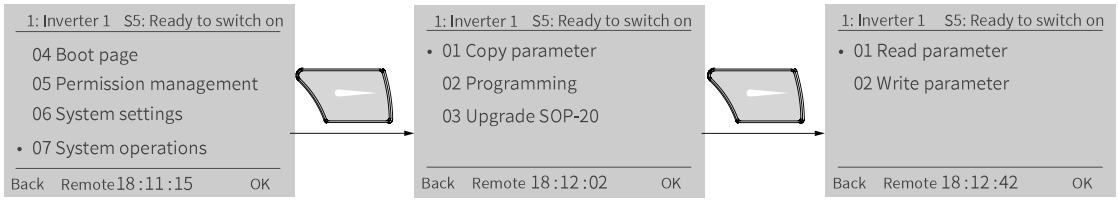


Figure 4-4 After logging in, access the parameter copy page

4.2.3.1 Saving Parameters to an SOP-20-880 File

When the parameter read operation is selected, all parameters of the device will be read and saved to a file on the SD card of SOP-20-880.

After selecting the parameter read operation, set the user-defined part (five characters) of the parameter file name. Press the leftward and rightward keys to select the character to be set, and press the upward and downward keys to set the character value. The value range is 0 to 9 and A to Z. The file name is in the format of "Device name-User-defined name of five characters.ipv".

Example: Inverter 1-12ABC.ipv,

which means the device is inverter 1, and the user-defined name is 12ABC.

After the file name is set, press to read the parameters. After the parameters are read, a prompt indicating successful parameter copy is displayed on the screen. If the operation fails, the failure reason is displayed on the screen.

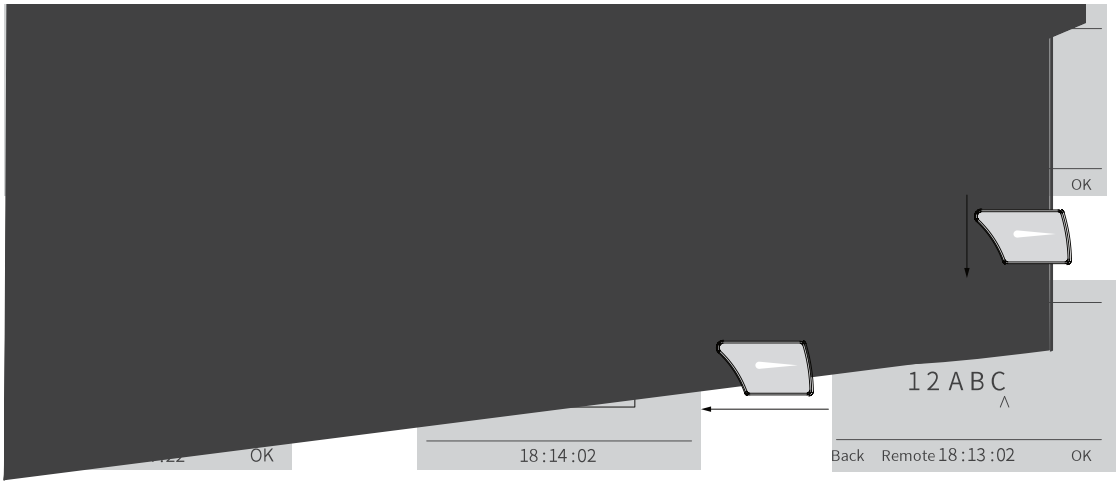


Figure 4-5 Parameter reading example

4.2.3.2 Restoring Parameters from an SOP-20-880 File

To download parameters saved in an SOP-20-880 file to the HCU, select "Write parameter".

Then, select a parameter file in the SD card, and select "Complete" to restore all parameters in the HCU to those in the file.

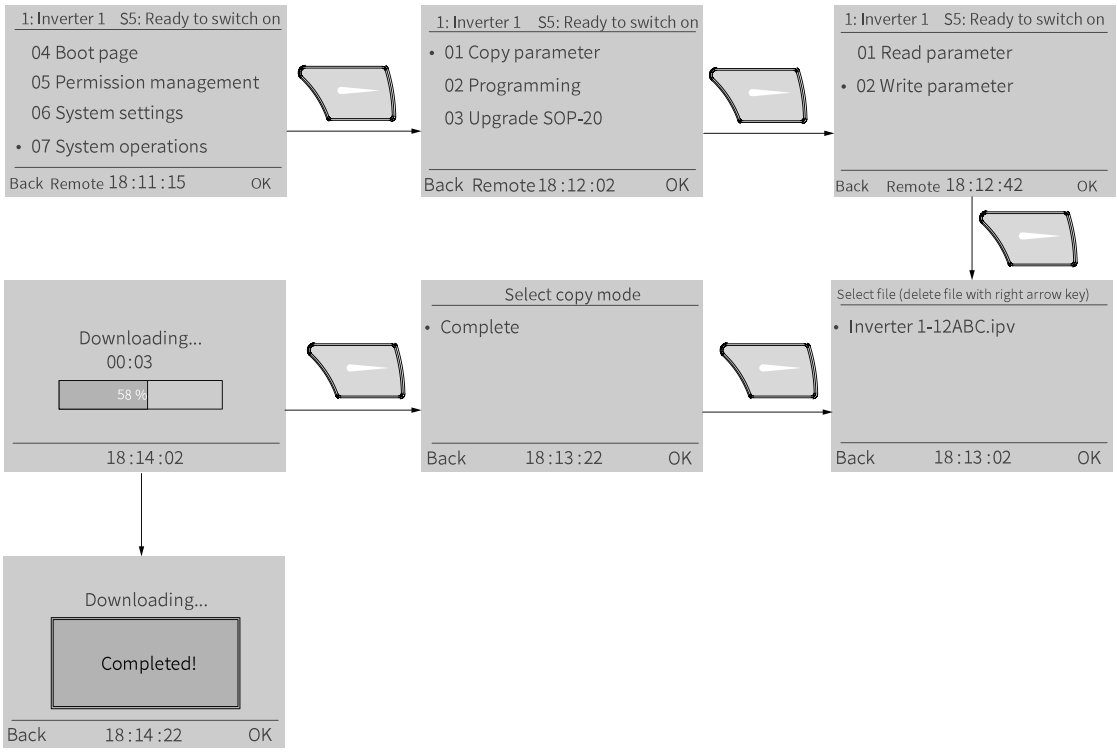


Figure 4-6 Example of writing parameters

Note

Files saved and read by using the parameter copy function are stored in the SD card of SOP-20-880. Before using the parameter copy function, ensure that the SD card of SOP-20-880 is properly installed.

4.2.3.3 Backing Up Parameters with InoDriveStudio

Using InoDriveStudio, you can back up the parameters of HCU to a computer through the "Upload" function on the "Parameter table" page. You can also restore the parameter file in the computer to the HCU through the "Download" function. For details, see *"3.2.3.5 Backing Up and Downloading Parameters" on page 46*.

4.3 Drive Object Configuration Information

4.3.1 Station Number and Baud Rate

When SOP-20-880 or InoDriveStudio connects to HCU, you must set the station number and communication rate correctly. When multiple HCUs are cascaded in the same network, the station number and communication rate of each HCU must be set separately through SOP-20-880/ InoDriveStudio. Before cascading, ensure that the communication rates of all devices in the same network are the same but the station numbers are different.

Method 1: Connect the SOP-20-880 to HCU, and set the communication rate and station number by choosing "Men > 01 Parameter Setting > A System > A10 SOP-20/Relay Communication > A10-03 SOP-20/Relay Communication Address" and "A10-04 SOP-20/Relay Communication Rate".

Method 2: Directly change the baud rate and station number of a device after it is detected when you are creating a project in InoDriveStudio, as shown in the following figure.

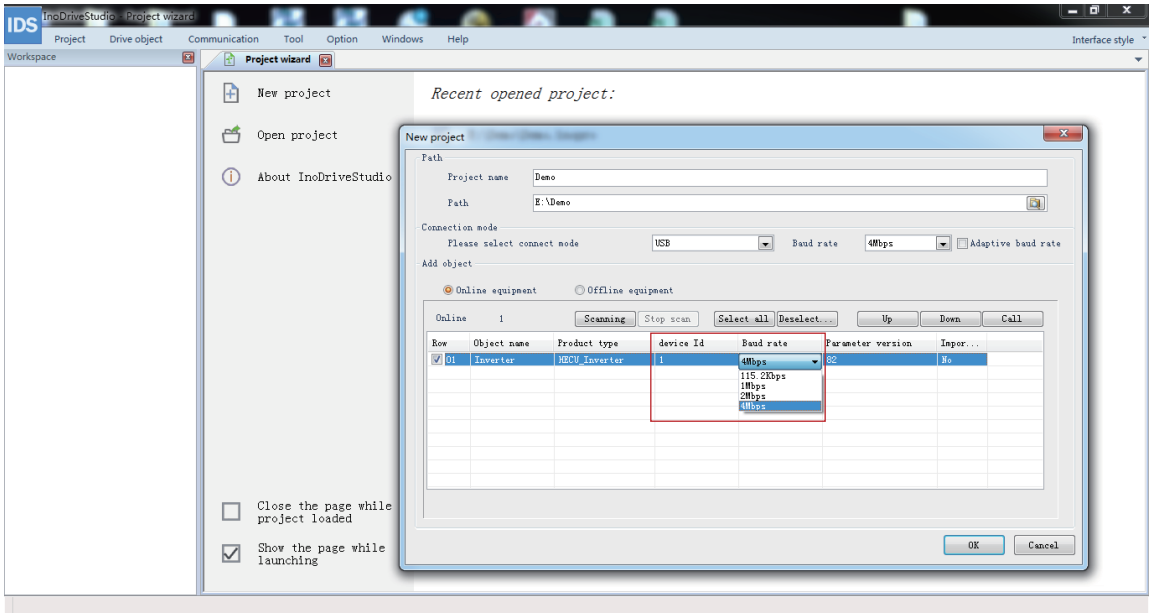


Figure 4-7 Changing the station number and baud rate

Method 3: Connect InoDriveStudio to the device and then change the station number (A10-03) and baud rate (A10-04) in the parameter list.

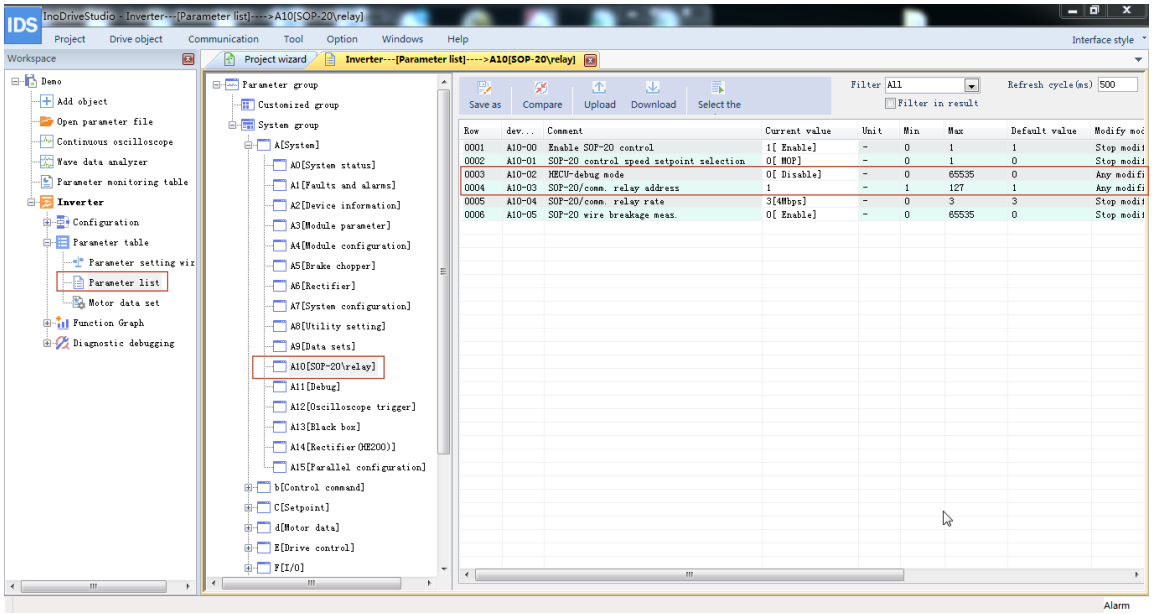


Figure 4-8 Changing the station number and baud rate in the parameter list

Method 4: In the drive object configuration page of InoDriveStudio, directly change the station number and baud rate.

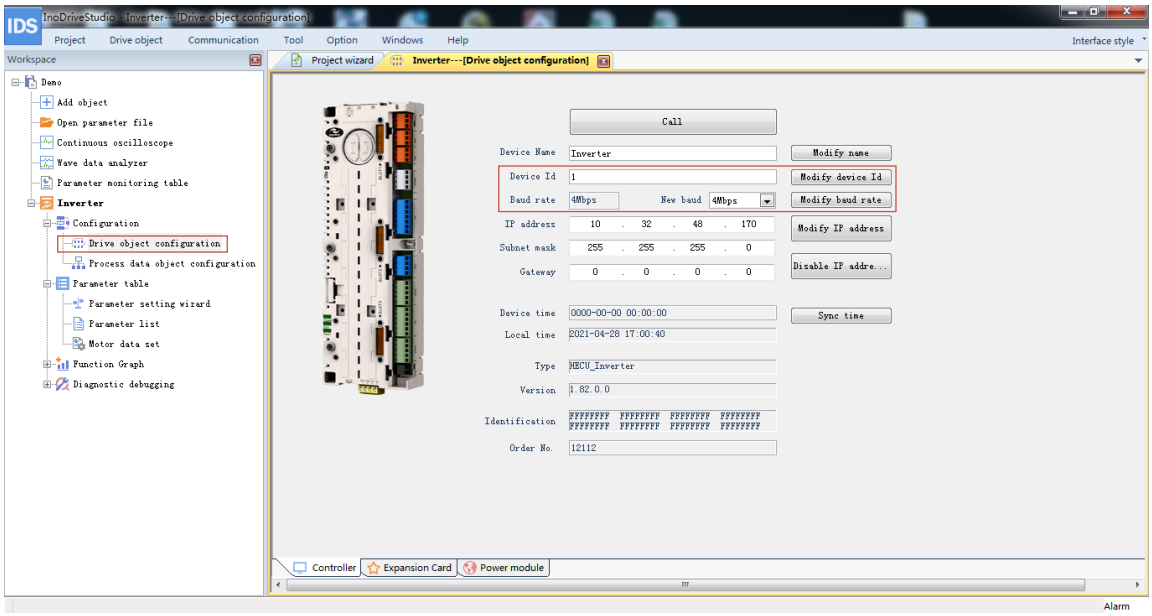


Figure 4-9 Changing the station number and baud rate on the configuration page

4.3.2 Viewing System Date and Time Through Parameters

Access the A2 group parameter list and view the system date and time parameters.

Para.	Name
A2-44	Current year
A2-45	Current date
A2-46	Current time

4.3.3 System Time

The built-in RTC of HCU MCU supports recording of the system date and time. You can view and modify the system date and time through SOP-20-880 and InoDriveStudio.

4.3.3.1 Viewing and Changing System Date and Time Using SOP-20-880

Method 1: Choose "Menu > 06 System Settings > 04 Date/Time > 02 Device Object Time". On the interface that appears, view and change the current system date and time.

Method 2: Choose "Menu > 06 System Settings > 04 Date/Time > 03 Sync Device Time". Then, synchronize the date/time of SOP-20-880 with that of HCU.

4.3.3.2 Viewing and Changing System Date and Time Using InoDriveStudio

In InoDriveStudio, choose "Configuration > Drive object configuration" to view the HCU system time (object time) and PC time (local time). Click the "Sync time" button to synchronize PC time to HCU.

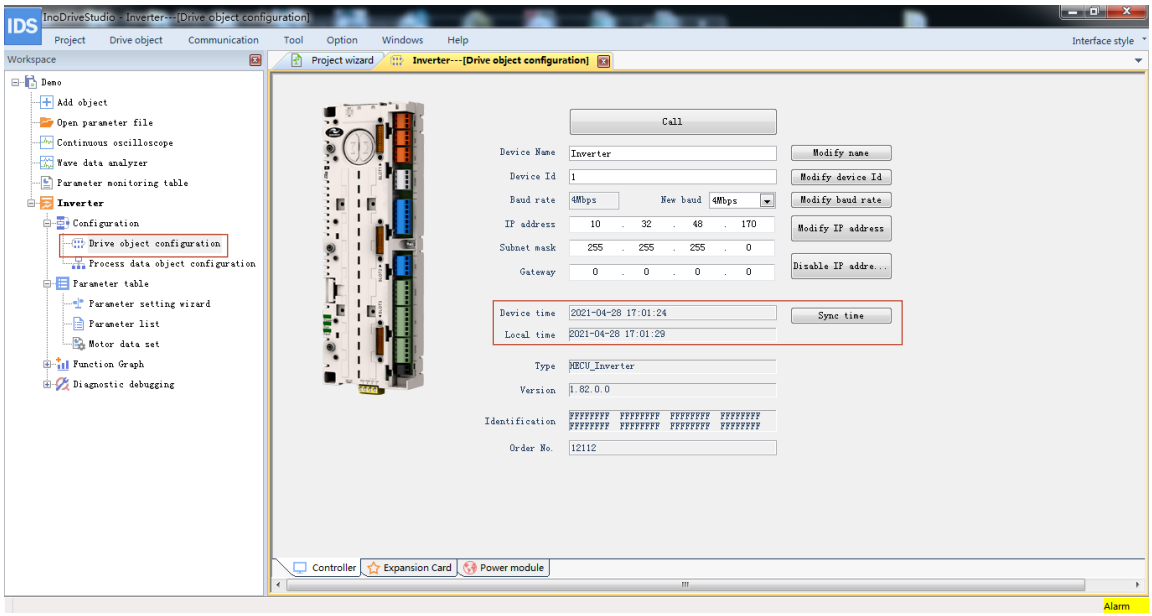


Figure 4-10 InoDriveStudio system time

4.3.4 Device Name

HCU allows you to define the device name. A user-defined device name is retained at power failure. During restoration of some parameters to factory defaults (A8-00 set to 1), the device name is not reset. During restoration of all parameters to factory defaults (A8-00 set to 2), the device name is reset to the factory default. HCU supports three methods of viewing and changing device names.

Method 1: When creating a project on InoDriveStudio, after a device is scanned, change the device name, as shown in the following figure.

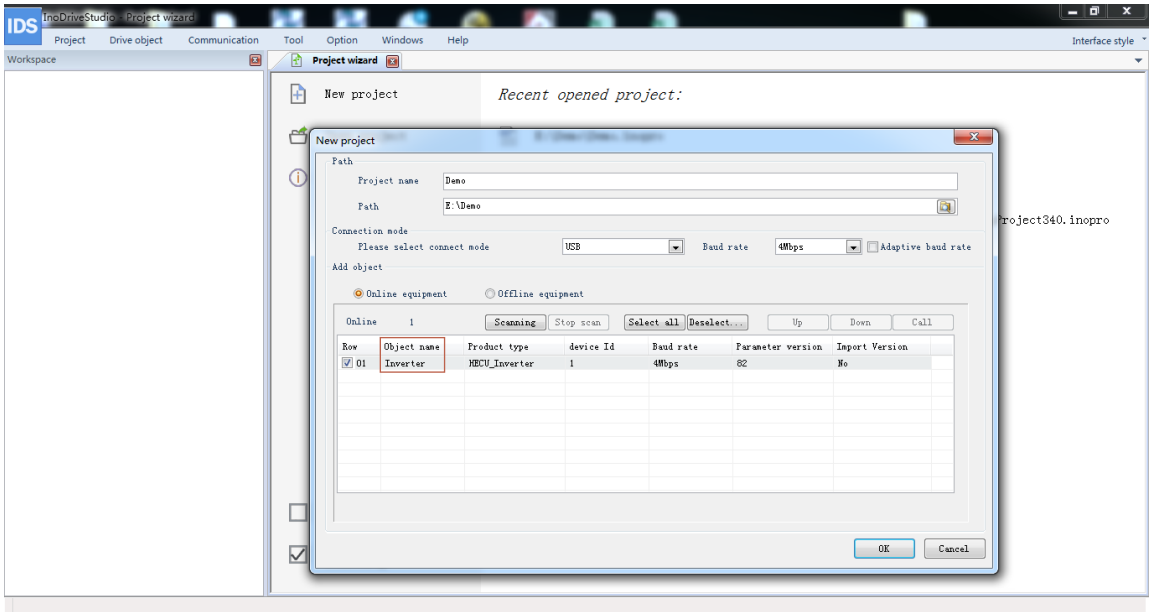


Figure 4-11 Directly changing the device name on InoDriveStudio

Method 2: In the Workspace section of InoDriveStudio, right-click the device and choose "Rename" to change the device name.

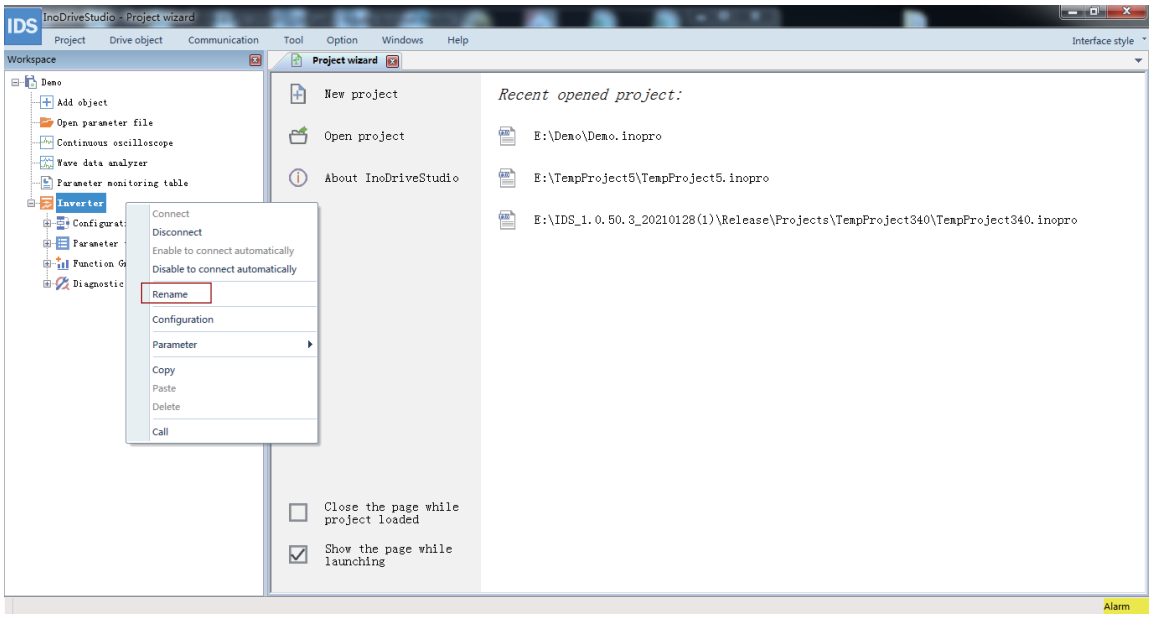


Figure 4-12 Changing the device name by right-clicking the device

Method 3: On InoDriveStudio, choose "Configuration > Drive object configuration". On the "Inverter—[Drive object configuration]" tab page, change the device name, as shown in the following figure.

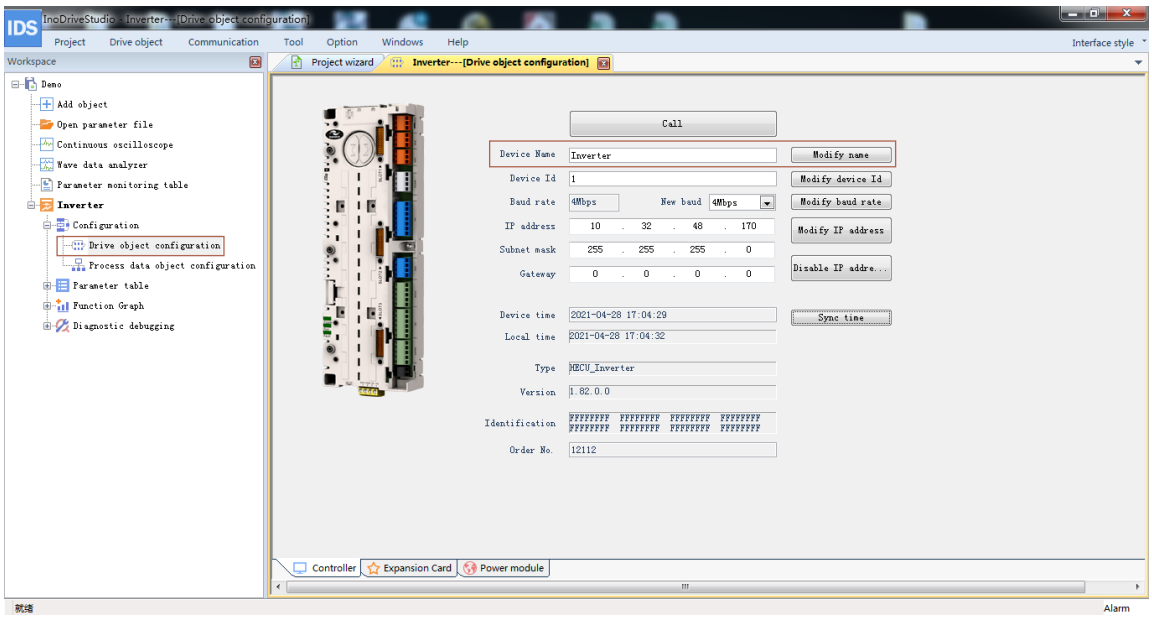


Figure 4-13 Changing the device name on InoDriveStudio

Note

When multiple devices are cascaded by InoDriveStudio on the same monitoring network, ensure that each device name is unique.

4.4 Per-Unit Value System

In general circuit calculation, the units of current, voltage, power, and impedance are expressed as A, V, W, and Ω, respectively. This method of expressing physical quantities in actual named units is called the named unit system.

When the named unit system is used for calculation, even parameters for motors of the same type are completely different due to difference in capacities, causing inconvenience in parameter calculation. On that account, the per-unit value system is typically used in engineering to simplify calculation and facilitate analysis on physical status changes.

The per-unit value is a common way to mark numerical values in engineering calculation. It indicates the relative value of each physical quantity and parameter. A per-unit value is relative to a base value. For the same named value, per-unit values vary with base values. The conversion between per-unit values and named values is as follows:

Per-unit value = Named value/Base value

In motor control systems, the rated value of the motor is typically used as the base value of the per-unit system. For example, assume that the rated motor current is 100 A and the no-load current is 40 A. When the rated motor current 100 A is used as the base value, the per-unit value of the motor no-load current 40 A is 40%.

4.4.1 Per-Unit Base Value Selection

To facilitate motor control, set rated parameters of the motor to per-unit values for the detection and control volume in the HCU control module.

Name	Base Value
AC voltage	The base value is the RMS value (d0-02) of the motor line voltage. This parameter can be viewed through d3-00.
AC current	The base value is the RMS value (based on d0-03) of the motor current. This parameter can be viewed through d3-01. If the rated current of the AC drive under a heavy load is greater than 4 times the rated motor current, use 1/4 of the rated current of the AC drive under a heavy load as the base value.
Motor speed	The base value is the motor synchronous speed (calculated based on d0-04, rather than the rotor speed). This parameter can be viewed through d3-02.
Output frequency	The base value is the rated motor frequency (based on d0-04). This parameter can be viewed through d3-03.
Motor torque	The base value is the rated motor torque, which is automatically calculated based on the basic parameters input by users and does not need manual setting.
Motor power	The base value is the rated power of the motor (based on d0-01. If the input deviation of d0-01 is large, it is calculated according to d0-02 and d0-03). This parameter can be viewed through d3-04.

4.4.2 Per-unit Value Formats

In the HCU control module system, parameter values are integers expressed in the 16-bit or 32-bit format, depending on accuracy requirements. The following rules apply to expression of per-unit values.

- When the per-unit value is expressed in the 16-bit format, 4096 (hexadecimal 0x1000) indicates 100%, with the accuracy being 0.0244%, and the value range is –799.9% to +799.9%. Typically, this format is used for the per-unit value of current, voltage, and torque.
- When the 32-bit format is used, 100% is expressed as hexadecimal 0x1000 0000, the accuracy is higher than that in the 16-bit format, and the value range is –799.99% to +799.99%. Typically, this format is used for the per-unit value of motor speed.

The 16-bit and 32-bit numerical values can be automatically converted to each other in the system. A 32-bit value can be used as a 16-bit value when its low 16 bits are removed. A 16-bit value can be used as a 32-bit value when 16 zeros are added to its low bits.

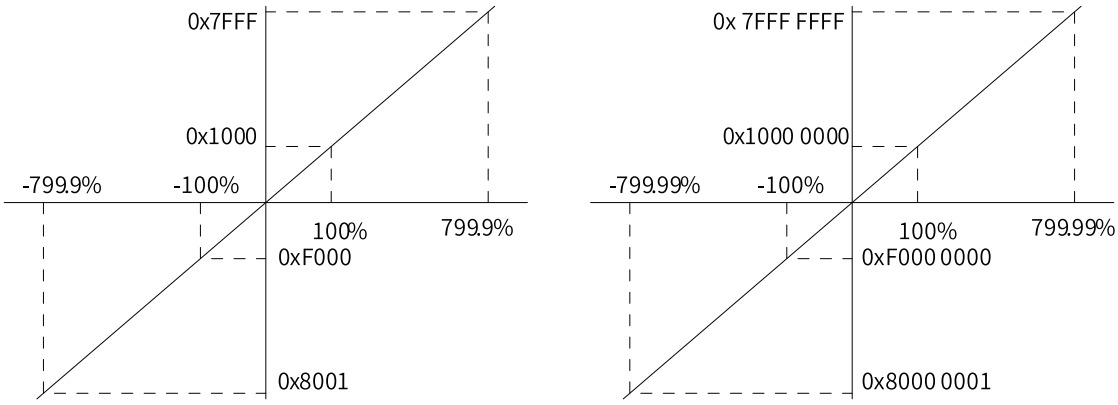


Figure 4-14 Per-unit value expressed in the 16-bit and 32-bit numerical value formats

4.4.3 Per-Unit Value Range

In the HCU control module, 16-bit and 32-bit per-unit values are all in the range of –799. 9% to +799. 9%. However, 32-bit values have more valid digits, indicating numerical values with higher precision. The following table lists the data error of 16-bit and 32-bit per-unit values when they are both 123.45%.

Value Mode	Stored Numerical Value	Per-Unit Value	Absolute Error	Relative Error
16-bit per-unit value	5056	123.4375%	–0.0125%	0.010126%
32-bit per-unit value	331383570	123.44999984%	–0.00000016%	< 0.0001%

4.5 Parameter Interconnection System

To set an HCU parameter, first find the parameter corresponding to the function, and then set the parameter to select a reference source. Example:

- To implement the user-defined OFF1 command (start/stop command) by using DI1 input, set b0-01 to U0-02. In this case, the U0-02 parameter stores the input status of DI1 and is known as a connector parameter (for details, see *"4.5.1 Connector Parameter" on page 78*). The b0-01 parameter is used to select the function source and is known as a reference source parameter. The input source of a reference source parameter can be set to any connector parameter.

Example:

- A9-00 = U0-04: U0-04 stores the input status of DI3, while A9-00 controls channel selection. The setting indicates that DI3 is used for the control channel switchover. When DI3 is inactive, control channel 1 is enabled. When DI3 is active, control channel 2 is enabled.
- C0-00 = U5-45: U5-45 stores the value of process data PZD2 received by fieldbus adapter A, and C0-00 is the main speed reference source of the reference channel 1. The setting indicates that the main speed reference of reference channel 1 is sourced from process data PZD2 received by fieldbus adapter A.

4.5.1 Connector Parameter

Parameters in group U are read-only, which only store the calculation data of each module during the AC drive running process. These parameters are connector parameters, which can be viewed by users or read or used by other parameters.

Connector parameters can be divided into two categories based on signal types:

- Bit connectors: includes DI, DO, a bit of a communication word, a bit of a control word or a state word, and status information of a hardware board or a fault. Bit connectors are located in groups U0 to U4 and U10 to U11.
- Word connectors: includes the calculated values (speed, voltage, current, and torque) related to AC drive control, as well as the data received through communication or the AI and AO signals for hardware detection. Word connectors are located in groups U5 to U9, U15, U16, U19, and U29. Where U5 to U8, U15, and U16 are single-word connectors and U9, U19, and U29 are double-word connectors.

Note

When continuous oscilloscope, triggering oscilloscope, and black box data recording functions of the InoDriveStudio are used, connector parameters are also required. Only connector parameters are available for continuous oscilloscope and black box recording.

4.5.2 Reference Source Parameters

Parameters used to read connector parameters are reference source parameters, which are divided into two categories according to connector types.

- Bit reference source parameter: Set a parameter number for a bit connector and read the value of the bit connector as the reference source parameter output.
- Word reference source parameter: Set a parameter number for a word connector and read the value of the word connector as the reference source parameter output.

All parameters can be set by using numbers only. When setting reference sources, use 1000 to 1999 to indicate the connectors U0-00 to U9-99 and 2000 to 2999 to indicate connectors U10-00 to U19-99.

One connector parameter can be read by multiple reference source parameters. However, one reference source parameter can read only one connector parameter each time.

4.6 Command Channel and Local Control

4.6.1 Local and Remote

The terms "local" and "remote" in this guide are defined based on the HCU-50S/51S control module. Controlling device start/stop through the control channel is defined as "remote control", and through SOP-20-880 or InoDriveStudio is defined as "local control".

Some cabinet manufacturers may add start/stop buttons and potentiometers on drive cabinet doors to implement operations with the cabinet doors, and define such control as local control and the PLC control as remote control. This is not the case in this guide. As for the HCU-50S/51S control module, "remote control" covers cabinet door, PLC and other host controller control. Two control channels are used for switching. The "LOC/REM" control button on the cabinet door should be connected to the HCU-50S/51S control module through a DI, which must be set as the source of A9-00 (control channel selection).

In some production sites, the operation cabinet beside the machine will be defined as local control, while PLC will be defined as centralized control or remote control, which is equivalent to switching between two control channels in HCU-50S/51S. Configure the I/O signals of the operation box and the PLC communication protocol into two control channels, and set A9-00 for switchover, implementing separate control.

4.6.2 Local and Remote Control

Controlling the start/stop of the inverter module through control channel is called remote control, which is the most commonly used mode. During commissioning, using SOP-20-880 or InoDriveStudio to control the start/stop of the inverter module is called local control. Local control mainly applies to commissioning and maintenance. When local control is enabled, the start/stop control word of control channel reference and the reference for the reference channel are inactive.

- The local control of InoDriveStudio has the highest commissioning priority. Once InoDriveStudio local control is enabled, the command channel and the SOP-20-880 control are disabled. The switchover between local control and remote control is allowed only in the stop state.
- The local/remote control status is indicated by U1-78. The value 0 indicates that local control is activated and the command channel is inactivated. The value 1 indicates that remote control is activated, that is, the command channel is activated.
- Command channel switchover is implemented by the A9-00 parameter, and the status is indicated by U0-26. The value 0 indicates that command channel 1 is active. The value 1 indicates that command channel 2 is active.

The following table lists the actually activated control sources and the connector states.

A9-00	SOP Local/Remote	IDS Local/Remote	U1-78	U0-26	Actual control source
0	0	0	1	0	Command channel 1
0	1	0	0	0	SOP-20-880
0	0	1	0	0	InoDriveStudio
0	1	1	0	0	InoDriveStudio

A9-00	SOP Local/Remote	IDS Local/Remote	U1-78	U0-26	Actual control source
1	0	0	1	1	Command channel 2
1	1	0	0	1	SOP-20-880
1	0	1	0	1	InoDriveStudio
1	1	1	0	1	InoDriveStudio

4.6.2.1 SOP-20-880 Local Control

After SOP-20-880 and HCU-50S/51S are properly connected, pressing Loc/Rem on SOP-20-880 can switch the control permission. The switchover is valid only when the AC drive is in the stop state. When Loc is displayed at the lower left corner of SOP-20-880, SOP-20-880 has obtained the control permission, and the start/stop control through control channels and reference through reference channels is inactive. To restore the control channel function, press Loc/Rem on SOP-20-880 again.

You can use A10-00 to prevent SOP-20-880 from taking control. After local control is disabled, the Loc/Rem button of the SOP-20-880 is unavailable.

When SOP-20-880 obtains the local control permission, the start/stop command source can only be the keys of SOP-20-880, but the speed reference source can be set through the A10-01 parameter.

- When A10-01 is set to 0, the speed reference is controlled by group C4 (output of motor-driven potentiometer), and the increase or decrease command of the motor-driven potentiometer comes from the up and down keys of SOP-20-880.
- When A10-01 is set to 1, the speed reference still comes from the speed reference channel.

When SOP-20-880 is used, you can start and stop the device with the "RUN" and "STOP" keys. For detailed use of SOP-20-880, see *SOP-20-880 Smart Operating Panel User Guide*.

Note

When the drive unit is running, the Loc/Rem key is disabled and cannot be used to switch control permissions.

4.6.2.2 Start/Stop Control with InoDriveStudio

For how to control stop and start of InoDriveStudio through the control panel, see *"3.2.3.2 Control Panel" on page 41*.

4.6.2.3 Start/Stop Control with Control Channel

For details, see *" Terminal Start/Stop Module" on page 148*.

4.6.3 Control Channel and Reference Channel

HCU-50S/51S has two command channels, which are also called channels. Each channel includes a group of control channels and a group of reference channels:

- The control channel implements the reference of the AC drive control instruction for the AC drive start/stop and other relevant control. Groups b0 and b1 are for control reference of channel 1, while

groups b2 and b3 are for control reference of channel 2. The control reference mainly includes the start/stop control word reference and other control word reference.

- The reference channel is used to set the motor speed and torque demand value to change the running status of the motor. Groups C0 and C1 correspond to setpoint of channel 1 and groups C2 and C3 correspond to setpoint of channel 2.

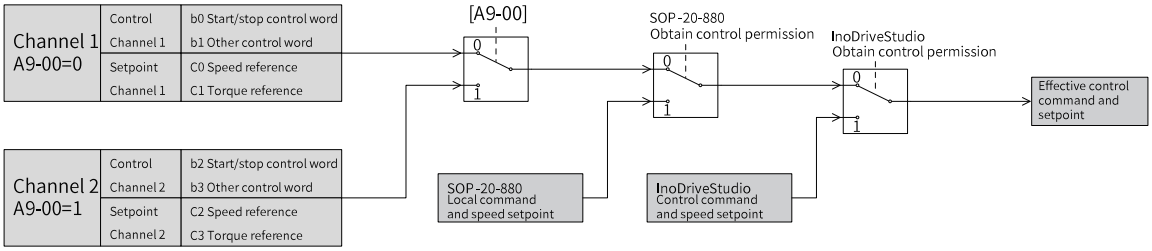


Figure 4-15 Control command data flow diagram

In remote control, set the control channel parameters for start/stop command word reference and the speed and torque reference.

You can select control channel 1 or 2 to switch between two different control modes, dynamically changing the RUN command source. For example, you can select channel 1 for terminal-based start/stop control and analog speed reference, or select channel 2 for speed reference and start/stop command execution through PLC communication.

Set A9-00 to the current active control channel. The parameters in groups b0, b1, C0, and C1 are enabled when channel 1 is selected. The parameters in groups b2, b3, C2, and C3 are enabled when channel 2 is selected. Other parameters in groups b and C are always enabled.

A9-00	b0-00	b0-01 to b0-08	Group b1	b2-00	b2-01 to b2-08	Group b3	Group b4	U5-44	U5-60
0	0	-	Enable	-	-	-	Enable	-	-
	1	-	Enable	-	-	-	-	Enable	-
	2	-	Enable	-	-	-	-	-	Enable
	3	Enable	Enable	-	-	-	-	-	-
1	-	-	-	0	-	Enable	Enable	-	-
	-	-	-	1	-	Enable	-	Enable	-
	-	-	-	2	-	Enable	-	-	Enable
	-	-	-	3	Enable	Enable	-	-	-

4.6.4 Control Channel Switchover

The switchover between local control and remote control is allowed only in the stop state.

The switchover between the two remote control channels is allowed in any state. After switchover, if the OFF1 command is 0, the device stops. If the OFF1 command is 1, the device remains in the status before the switchover. The following table lists the inverter unit statuses after the control channel switchover.

Status Before Switchover	OFF1 Before Switchover	OFF1 After Switchover	Status After Switchover
Switch-on inhibited	1	0	Ready to switch on
Switch-on inhibited	1	1	Switch-on inhibited
Ready to switch on	0	0	Ready to switch on
Ready to switch on	0	1	Switch-on inhibited

Status Before Switchover	OFF1 Before Switchover	OFF1 After Switchover	Status After Switchover
Running	1	0	Ready to switch on
Running	1	1	Running

Note

- If the state machine is in the ready-to-switch-on state (OFF1 set to 0) before the control channel switchover, and OFF1 becomes 1 after the switchover, the state machine enters the switch-on-inhibited state. In this case, the state machine can return to the ready-to-switch-on state only after OFF1 is reset to 0.
- When the same DI signal is configured for A9-00 command channel selection and start/stop control commands, the DI signal is active and the state machine enters the switch-on-inhibited state (S4).
- The control channel switchover helps to implement the control permission switchover of two different control GNDs. For example, after the operation box channel DI on the field is enabled, devices can be switched to centralized control on the PLC, or the devices in centralized control on the PLC can be switched to the operation box on the field for manual operation.
- In the switch-on-inhibited state, the OFF1 start command is not accepted. The machine can be started only in the ready-to-switch-on state. For details about each status of the state machine, see *"6.1.9 State Machine" on page 138*.

4.7 Motor Data Set

4.7.1 Switching Motor Data Sets

The HCU-50S/51S control module can store up to four different motor data sets (MDSs). Each MDS contains motor parameters (group d) and corresponding motor control parameters (group E).

The A9-02 and A9-03 parameters can be set to switch between active MDSs. MDSs can be switched over only in the stop state. MDS switchover during running is inactive.

Para.	Name	Description
A9-02 (bit0)	MDS 0 source	bit1 bit0: 00: Motor parameters of group 1 01: Motor parameters of group 2 10: Motor parameters of group 3 11: Motor parameters of group 4
A9-03 (bit1)	MDS 1 source	

Group d and group E contain parameter values of active MDSs. Parameters of different MDSs have different communication addresses.

The communication addresses of parameters with the same functions in the four MDSs are sorted in ascending order. Communication addresses in the guide correspond to motor parameters of group 1, which need to be manually calculated for other groups. The following description takes the rated motor current as an example.

Para.	Name	Current Range (A)	Change Level	Default	Address
d0-03	Rated motor current	0.1 to 6553.5	At stop	9.0	245

According to the table:

- The communication address of the rated motor current parameter of motor 1 is 245.

Based on motor 1, the communication addresses of parameters of motors 2, 3, and 4 can be derived, are as follows:

- The communication address of the rated motor current parameter of motor 2 is 246.
- The communication address of the rated motor current parameter of motor 3 is 247.
- The communication address of the rated motor current parameter of motor 4 is 248.

Note

- The MDS function allows an AC drive to run with different motors or a motor to run in different control modes.
- After MDS switchover, ensure that the motor control parameters match the motor parameters.
- If a drive unit drives different motors, perform parameter auto-tuning on every motor during commissioning.

4.7.2 Viewing Multiple Motor Data Sets

4.7.2.1 Viewing and Setting Parameters with SOP-20-880

When using SOP-20-880 to view different motor data, you need to switch the currently activated motor data group through A9-01/A9-02. After switching, the parameters corresponding to the currently activated motor can be viewed in group d and group E.

4.7.2.2 Quick View Using InoDriveStudio

When using InoDriveStudio, you can view the currently active motor parameters in the same way as SOP-20-880. You can also view all motor parameters by choosing "Inverter > Parameter table > Motor data set".

As shown in the following figure, the list contains all parameters related to motor switchover. When you select different motors from the drop-down list "Select data set", parameters displayed in the list are switched to those corresponding to the selected motor.

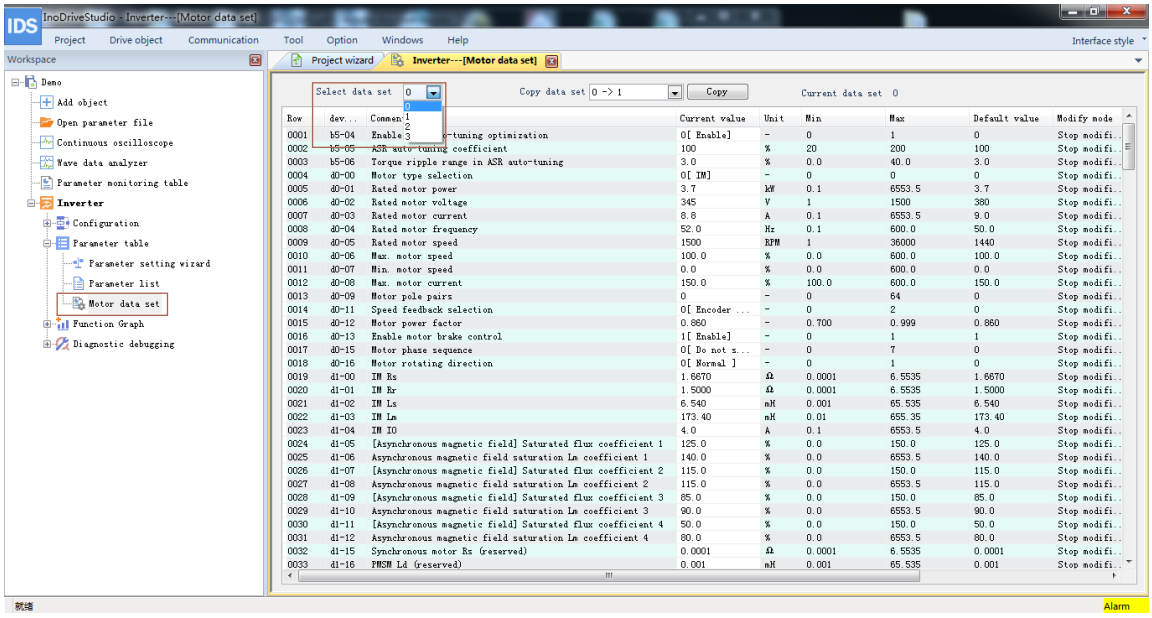


Figure 4-16 Quickly viewing motor parameters

4.7.3 Motor Data Set and Motor Control Data Set

The motor data set (group d) and the motor control data set (group E) each have four groups of communication addresses, which are switched based on the settings of A9-01 and A9-02. In actual use, group d and group E both can be considered as motor data sets.

Group d differs from group E in restoration to factory defaults. Specifically, when A8-00 is set to 1, parameters of group d are not restored while parameters of group E are restored.

4.7.4 Copying a Motor Data Set

If you need two groups of identical motor parameters, you can choose "Inverter > Parameter table > Motor data set" in InoDriveStudio to access the motor data set, select the copy mode through "Copy data set", and click the "Copy" button, as shown in the following figure.

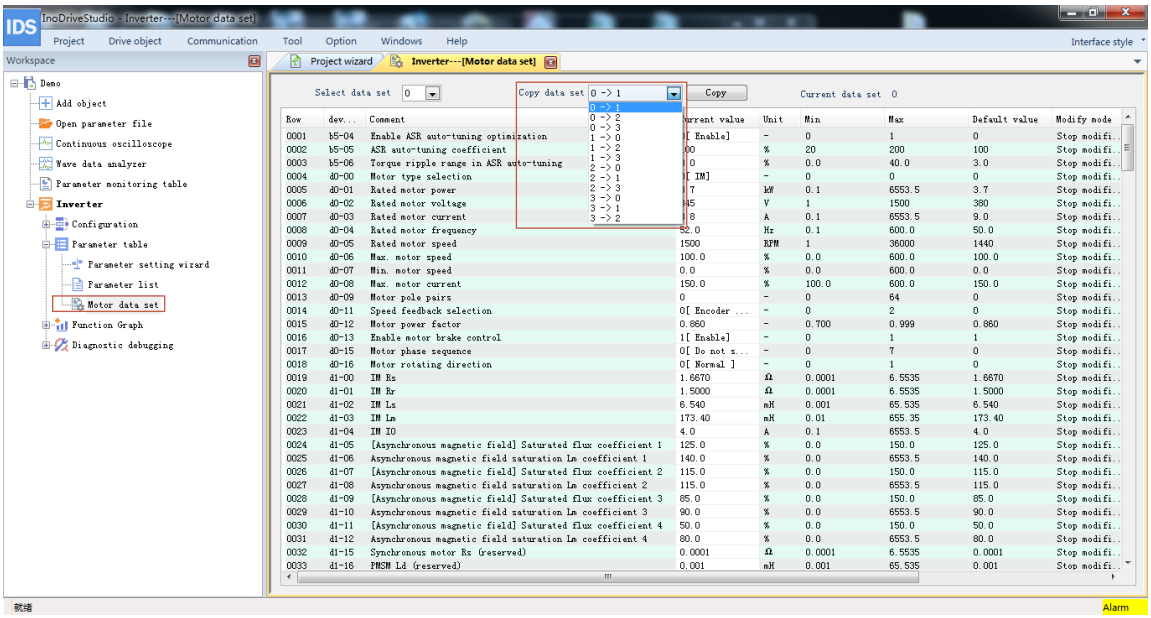


Figure 4-17 Copying a motor data set

Note

In the "Copy data set" drop-down list, digits 0 to 3 correspond to motor data sets 1 to 4, respectively.

5 Quick Commissioning Guide

This chapter introduces the basic commissioning steps of MD880-50/MD880-01S series products, including instructions for power-on, trial run, and commissioning of the inverter module. If you use Inovance HE200-011 series AC drives, see *" HE200-011 Rectifier Parameters Configuration" on page 89* for the details on the rectifier module.

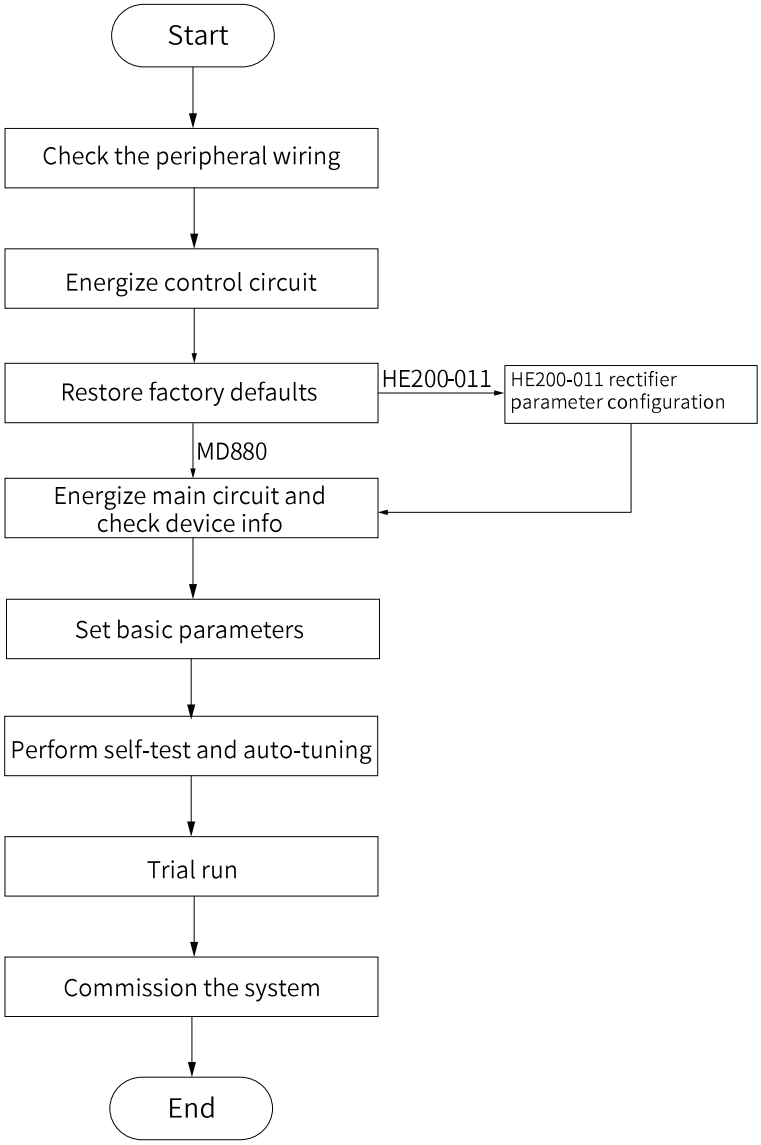


Figure 5-1 Flowchart of commissioning for initial power-on

Note

The preceding system power-on commissioning process includes the basic steps for normal use of MD880 series products. You should carefully read the relevant sections and follow the commissioning steps.

5.1 Checking Peripheral Connection

Before powering on and commissioning the control system, ensure that the preparation for power-on has been completed, and check each item in the table.

Table 5–1 Checklist before running

Item	Check Item	Compliance	Completed or Not
1	The power input of the main circuit must be correctly connected according to terminal (R, S, and T) labels.	☐	☐
2	The connection phase sequence of the main circuit output terminals (U, V, and W) matches that of the motor cables (U, V, and W).	☐	☐
3	The power input terminals (R, S, and T) and output terminals (U, V, and W) of the main circuit must not be connected inversely, especially that the power input cable must not be connected to the output side.	☐	☐
4	The AC drive and motor must be grounded reliably.	☐	☐
5	The encoder cable must be correctly connected, and the shield must be properly handled.	☐	☐
6	The power input of the auxiliary circuit must be correctly connected according to terminal (L1, L2, L3, and N) labels.	☐	☐
7	The communication cable must be correctly connected.	☐	☐
8	External ports such as I/O must be correctly connected.	☐	☐

Note

For details about encoder connection and shield handling, see each encoder module user guide.

5.2 Restoring Factory Defaults

After initial power-on of the control circuit, restore factory defaults first. Restore factory defaults in the following two steps:

1. Set A8-00 to 2 (Restore all parameters to factory defaults).
2. Set A8-01 to 1 to confirm the restoration.

After the operations, the state machine A0-00 enters the S20 parameter restoration state machine and then exits the state machine after restoration ends.

Note

For details about restoring factory defaults, see *" Restoring Factory Defaults" on page 67*.

5.3 Checking and Setting the Power Module

5.3.1 Setting Parameters for Single and Parallel Modules

The following table shows parameter settings for single and parallel modules.

Item	Para.	Description	Remarks
1	A15-00	Parallel function selection	0: Single 1: Parallel
2	A15-01	HPCU online flag	0: Offline 1: Online Read-only
3	A15-02	Parallel module enable 1	Ones to ten thousands correspond to the enabling of modules 1 to 5 0: Disable 1: Enable
4	A15-03	Parallel module enable 2	Ones to ten thousands correspond to the enabling of modules 6 to 10 0: Disable 1: Enable
5	A15-04	Number of enabled parallel modules	Read-only After A15-02 and A15-03 are set, the value of this parameter is automatically calculated.
6	A15-05	Parallel module online display 1	Read-only
7	A15-06	Parallel module online display 2	Read-only
8	A15-07	Number of online parallel modules	0 to 10
9	A15-66	HINT module for monitoring	Monitoring modules 1 to 10
10	A15-67	HINT module ID	Read-only
11	A15-68	HINT software version	Read-only
12	A15-94	HINT module DI/DO status	Meaning of HINT module DI/DO status bits bit00: DO1 bit01: DO2 bit02: DO3 bit03: DO4 bit04: DI1 bit05: DI2 bit06: DI3 bit07: DI4 bit08: DI5 bit09: DI6 bit10: DI10 bit11 to bit15: Reserved HE200 series: complete correspondence MD880-50 series: KIN1 corresponds to DI4, KIN2 corresponds to DI5, and KOUT corresponds to DO3. DI being 1 means the feedback point is open and DI being 0 means the feedback point is closed. DO being 1 means that the output is normal, and DO being 0 means that the output is inverted.

Note

- For the parallel module enable setting, the parallel modules 1 to 10 correspond to CH1 to CH10 on the HPCU.
- Taking the paralleling of two inverter modules as an example, the power module is connected to CH1 and CH2 of HPCU:
  - Set A15-00 to 1 to enable the parallel mode.
  - Set A15-02 to 00011 and A15-03 to 00000 to enable the CH1 and CH2 ports.
- The display of A15-67, A15-68, and A15-94 corresponds to the monitoring module selected by A15-66.
- The connector for A15-94 is U7-80.

After the parameter setting is completed, check whether the read-only parameters A15-04 to A15-07 are consistent with the actual situation.

5.3.2 Checking Device Information

The following table lists the parameters used for checking device information.

Para.	Name	Description
A2-00	Product type	Current device type 0: Diode rectifier 1: Basic rectifier 2: Inverter 3: Regenerative rectifier 4: Three-phase brake 5: DC/DC
A2-01	Rated module power	Displays the rated power of a single module.
A2-02	Rated module voltage	Displays the rated voltage of the module.
A2-03	Rated module current	Displays the rated current of the module.
A2-04	Total rated device power	Displays the total rated power of modules connected in parallel.
A2-05	Total rated device current	Displays the total rated current of modules connected in parallel.
A2-08	HCU-MCU function software version	-
A2-09	HCU-MCU function software subversion	-
A2-10	HCU-MCU performance software version	-
A2-11	HCU-MCU performance software subversion	-
A2-16	HCU-FPGA software version	-
A2-19	HINT software version	-
A2-22	HPCU software version	-

Note

If the power module information such as the rated power, rated voltage, and rated current is inconsistent with that on the module nameplate, contact the service personnel for technical support.

5.3.3 Pre-Charge Resistor Detection

- When MD880-50 series products are not equipped with a DC pre-charge unit, set A4-11 to 0 to disable power-on pre-charge detection.
- When MD880-50 series products are equipped with a DC pre-charge unit, it is necessary to check the wiring of the unit. (See relevant sections in MD880-50 Series Inverter Hardware Guide to determine the model of the external power supply) and ensure that A4-11 is set to 1 (the detection function is enabled by default). When the feedback signal of the pre-charge contactor is not detected within a period of time after the bus is energized, "ERR82-1 DC pre-charge error" will be reported.
- For MD880-01S series products with internal pre-charge contactor, when the feedback signal of the pre-charge contactor is not detected within a period of time after the bus is energized, "ERR73-3 pre-charge contactor feedback error (single drive)" will be reported. At this time, it is necessary to check the DC pre-charge circuit inside the AC drive.

5.3.4 Module Overload Protection

For more description of load modes, see the relevant sections in the *MD880-50 Series Inverter Hardware Guide*.

The controller automatically records the real-time output current of the power module and calculates the load ratio. When the module load exceeds the limit, ERR10-1 (Drive overload) is reported. In this case, check whether the AC drive matches the load and whether the output current exceeds the limit.

Typical working conditions:

- Non-overload mode: The maximum output current never exceeds the non-overload current of the AC drive, and the AC drive can run in this mode for a long time.
- Light overload mode: The AC drive runs with 1.1 times of the light overload current for a long time for no more than 60s.
- Heavy overload mode: In every 300s, the AC drive runs for 240s within the AC drive heavy-overload current and then be overloaded for 60s within 1.5 times the heavy-overload current. The AC drive can run in this mode in cycles of 300s.

5.3.5 HE200-011 Rectifier Parameters Configuration

For parameters of the HE200-011 rectifier, see A14 HE200 rectifier parameters in *"7.2.1 Group A: System" on page 312*.

5.3.5.1 Setting the Rectifier Operation Mode

For the HE200 series, HCU needs to control the operation of both rectifier and inverter. There are two types of HE200 series devices: single module and two parallel modules. According to the device type, the relevant parameters of rectification mode are set.

Device Type	Para.	Name	Setpoint
Single	A14-36	HINT expansion card selection	0: Single-HINT expansion card 1 is active
	A14-37	HINT expansion card 1 slot selection	Depending on to the actual setting
Two parallel modules	A14-36	HINT expansion card selection	1: Parallel-HINT expansion cards 1\2 are active
	A14-37	HINT expansion card 1 slot selection	Depending on to the actual setting
	A14-38	HINT expansion card 2 slot selection	Depending on to the actual setting

After the device type parameters are set, set A14-42 to select the rectifier and braking unit modes based on actual working conditions.

Para.	Name	Description
A14-42	Rectifier and braking unit mode selection	0: Enable rectifier, disable braking unit 1: Enable rectifier and brake 1 in the single mode 2: Enable rectifier and brake units 1/2 in the parallel mode 3: Only braking unit for single - disable the rectifier, enable braking unit 1 4: Only braking unit for parallel - disable rectifier, enable both braking units 1 and 2

Set the parameters A14-00 and A14-01 to monitor the online status of the current rectifier module.

5.3.5.2 Setting the Source of Switch-On/Off Commands

Para.	Name	Description
A14-41	Rectifier switch-on/off command source	0: Cabinet door 1: Reserved 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector

A14-41 sets the rectifier switch-on/off command source:

- When A14-41 is set to 0 (cabinet door), the switch-on/off of the rectifier is controlled by the cabinet door button. The rising edge of the start button (green) triggers the start command, and the rising edge of the switch-off button (red) triggers switch-off.

- When A14-41 is set to other options, the start button and the switch-off button on the cabinet door do not work. The start/stop of the rectifier can be controlled through DI terminal of HCU or communication. The rising edge of the selected signal source A14-41 triggers the start command. After start, the signal must be kept at high level. The rectifier switches off at low level.

Set the parameters A14-20 and A14-21 to monitor the power-on status of the rectifier modules 1/2.

Para.	Name	Description
A14-20	[Rectifier unit 1] Power-on status	0: Wait for power-on 1: Pre-charge power-on 2: Wait for completion 3: Power-on completed
A14-21	[Rectifier unit 2] Power-on status	0: Wait for power-on 1: Pre-charge power-on 2: Wait for completion 3: Power-on completed

Note

No matter what control command source is set in A14-41, the rectifier will switch off when the following faults occur. The faults include: rectifier module over-temperature, bus overvoltage, rectifier slot number conflict, rectifier disconnection, charging timeout, and abnormal feedback of main circuit breaker.

5.4 Setting Basic Parameters

5.4.1 Setting Basic Motor Parameters

Set motor parameters according to the S1 duty ratings indicated on the motor nameplate.

Item	Para.	Name	Setting
1	d0-00	Motor type	Select a motor type.
2	d0-01	Rated motor power	Set the rated motor power.
3	d0-02	Rated motor voltage	Set the rated motor voltage.
4	d0-03	Rated motor current	Set the rated motor current. For a drive motor group, calculate the sum of output current of all the motors in the group.
5	d0-04	Rated motor frequency	Set the rated motor frequency, which must match the rated motor voltage.
6	d0-05	Rated motor speed	Set the rated motor rotor speed. The speed of an asynchronous motor is the rotor speed rather than the synchronous speed.
7	d0-06	Max. motor speed	Set the maximum speed of the motor, which is set based on a percentage of the rated synchronous speed of the motor and depends on the settings of E2-04 to E2-07. See function diagram H312.
8	d0-07	Min. motor speed	Set the minimum speed of the motor. For motors that cannot run at a low speed, set this parameter. For other motors, ignore this parameter.
9	d0-08	Max. motor current	Set the maximum current of the motor. Set this parameter to a percentage of the rated motor current.
10	d0-09	Number of motor pole pairs	The number of motor pole pairs is automatically calculated by the inverter module.

Item	Para.	Name	Setting
11	d0-10	Number of motors in parallel	For induction motors, one AC drive can drive multiple motors in parallel. In this case, d0-01 to d0-03 can be set based on parameter settings on the nameplate of a single motor, but the number of motors in parallel must be filled in this parameter.
12	d0-11	Speed feedback selection	0: Encoder feedback signal comes from encoder detection module 1 set by group n4.
13	d0-12	Motor power factor	Set this parameter according to the motor nameplate.

5.4.2 Configuring the Encoder

HCU supports up to 3 encoder detection modules, which are configured in n4/n5/n6 respectively. Take the encoder detection module 1 as an example. The setting of n4 group parameters is as follows.

5.4.2.1 Incremental Encoder Setting

Item	Para.	Name	Setting
1	n4-00	Expansion slot	Set according to the used encoder module slots
2	n4-02	Encoder type	Sets the type of the encoder detection module. The value 1 means the ordinary ABZ encoder.
3	n4-01	Module online/offline state	When n4-00 and n4-02 are set correctly, "Online" should be displayed here; otherwise, you should check hardware problems or setup errors.
4	n4-03	Input A/B phase sequence	Sets the input A/B phase sequence, corresponding to the incremental encoder. If the detection speed is inverse to the actual speed, modify this parameter.
5	n4-04	Speed test mode	Usually, A pulse speed measurement should be used. When the low-speed response is required, you can try to choose quadruple frequency to measure the speed. But if the encoder signal is not favorable, fluctuation can easily occur.
6	n4-07	Encoder resolution (pulses/revolutions)	Sets the incremental encoder pulses per revolution according to the encoder nameplate.
7	n4-08	Enable PG quadrature interlock	To improve the anti-interference capability of the incremental encoder, it should be set to 1 (enable).
8	n4-10	Disconnection detection mode for ABZ encoder	Tests the wiring of the incremental encoder. Set it according to the actual wiring of the encoder. For example, for any A/B signal encoder, 4 (AB single-ended positive signal) should be selected, and the encoder cable should be connected to the A/B terminal of the detection module. If the wiring is incorrect, or 2 (AB differential signal) is selected, an encoder disconnection fault may occur.
9	n4-11	PG disconnection detection time during speed feedback	Sets a delay before an encoder disconnection fault is reported. Set it to 0 to disable encoder disconnection detection.
10	n4-17	Filter time of encoder speed test	It is usually 4 ms (the default value), which can filter out certain signal interference and maintain fast response.

5.4.2.2 Resolver Setting

Item	Para.	Name	Setting
1	n4-00	Expansion slot	Set according to the used encoder module slots
2	n4-02	Encoder type	Sets the type of the encoder detection module. The value 3 means the resolver.
3	n4-01	Module online/offline state	When n4-00 and n4-02 are set correctly, "Online" should be displayed here; otherwise, you should check hardware problems or setup errors.
4	n4-03	Input A/B phase sequence	Sets the input A/B phase sequence. For the resolver, if the detection speed is inverse to the actual speed, modify this parameter.
5	n4-15	Resolver pole pairs	Set according to the actual pole pairs of the resolver. The number of pole pairs of synchronous motors must be an integer multiple of that of resolvers; otherwise, the device cannot run normally.
6	n4-25	Resolver type	Set according to the actual type of the resolver. Resolves exceeding the setting range cannot be recognized.
7	n4-26	Resolver excitation signal frequency	Set according to the actual type of the resolver. Resolves exceeding the setting range cannot be recognized.
8	n4-12	Encoder installation position angle	Identifies the position of PMSM. The value is obtained automatically through motor auto-tuning. The installation position angle should be updated each time the resolver is reinstalled; otherwise, PMSM runaway will occur.
9	n4-27	Resolver disconnection detection time	Sets a delay before an encoder disconnection fault is reported. Set it to 0 to disable encoder disconnection detection.
10	n4-17	Filter time of encoder speed test	It is usually 4 ms (the default value), which can filter out certain signal interference and maintain fast response.

5.4.3 Basic Control Parameters

5.4.3.1 Selecting Motor Control Methods

Para.	Name	Description	Application Scenarios
E0-00	Control method	0: SVC SVC	Speed open loop control
		1: FVC FVC	Refers to feedback vector control. Encoder must be installed on the motor side. MD880-50 supports ABZ encoder and resolver. This mode is applicable to high-accuracy speed control and torque control.
		2: VF Speed open loop control	This mode is applicable to scenarios with moderate requirements on load control performance or scenarios where one inverter module needs to drive multiple motors, such as fans and pumps.

5.4.3.2 Selecting Motor Control Modes

Para.	Name	Description
E0-01	Control mode	0: Speed control
		1: Torque control

Note

- In the V/f control mode, only speed control is supported, whereas settings of torque control are inactive.
- If the torque control mode is used during normal operation, for motor parameter auto-tuning upon initial commissioning, set the control mode to speed control. After motor parameter auto-tuning is completed, change the control mode back to torque control.

5.4.4 Automatic Calculation of Motor Parameters

MD880-50 supports automatic calculation of motor parameters. Before commissioning, motor parameters can be calculated first, and relevant identified motor parameters can be auto-tuned to empirical values converted according to motor parameters.

Steps of calculating motor specifications:

1. Set b5-02 to 1 to select motor parameter calculation.
2. Set b5-03 to 1 to confirm b5-02 motor parameter calculation.
3. After automatic calculation of motor parameters is completed, the following parameters are updated.

Table 5–2 Asynchronous motor

Para.	Name
d1-02	Motor stator resistance
d1-04	Rotor resistance of asynchronous motor
d1-06	Asynchronous motor leakage inductance
d1-08	Asynchronous motor mutual inductance
d1-10	Asynchronous motor no-load current
E1-02	Pre-excitation time
E1-13	Demagnetization time
E7-04	Flying start time

Table 5–3 Permanent magnet synchronous motor

Para.	Name
d1-22	Motor stator resistance
d1-24	D axis inductance of synchronous motor
d1-25	Q axis inductance of synchronous motor
d1-26	Synchronous motor back EMF voltage

5.5 Self-Test and Auto-tuning

Before self-test and auto-tuning of a motor, check the following items:

1. Check for construction around the motor.
2. Check for obstacles around the motor shaft that affect shaft rotation.
3. Check whether the motor brake is closed. If yes, open the brake.
4. Check whether the motor fan works properly.

5. Check whether the device (if any) connected to the motor meets the running conditions, for example, whether the device needs lubrication.

Self-test and auto-tuning can be performed only after the brake closing command is provided. The source of the switch-on command during auto-tuning is the same as that of the start/stop command during normal operation. Under normal circumstances, self-test and auto-tuning can be started and stopped by local control. For details, see *"4.6.1 Local and Remote" on page 79*.

This section illustrates commissioning using SOP-20-880 as an example. The commissioning with InoDriveStudio is basically the same. Moreover, the "Control Panel" and "Commissioning Wizard" functions provided by the software make commissioning easier.

Before using SOP-20-880, ensure that SOP-20-880 has taken control. "Local" is supposed to display at the bottom left of the screen. Press the "Loc/Rem" button of SOP-20-880 to switch between local and remote control. For details, see *"4.6.1 Local and Remote" on page 79*.

5.5.1 System Self-Test

It is recommended that system self-test be performed when the device is used for the first time to check whether internal wiring and external wiring are correct.

In the ready-to-switch-on state, set auto-tuning as follows:

1. Check that SOP-20-880 has taken control.
2. Check that the AC drive is free of faults and in the S5 ready-to-switch-on state.
3. Set b5-01 to 1 to bring the AC drive into the S16 ready-for-self-test state.
4. Press the green RUN key to let the AC drive enter the S17 self-test state and output current. The AC drive enters the S4 switch-on-inhibited state after self-test. When the RUN command is canceled, the AC drive enters the S5 ready-to-switch-on state.

The jump flow of the state machine in the self-test process is as follows:



Self-test items include IGBT short circuit, IGBT open circuit, output phase loss, current sensor error, inter-phase unbalance, short-circuit to ground, and phase loss and output unbalance in the parallel mode.

Self-test can be started in the following four modes:

- Manually start self-test: Set b5-01 to 1. Then, the system enters self-test after startup and stops after self-test is completed. In this mode, all self-test items are detected and the whole process takes about 10 seconds.
- Power-on self-test: The system performs self-test once upon power-on. This mode is not enabled by default. To enable this mode, set parameters E8-15/16/17/20/21 to select the self-test item.

- Self-test before running: The system performs self-test once upon startup. This mode is not enabled by default. To enable this mode, set parameters E8-15/16/17/20/21 to select the self-test item. Do not enable this mode if flying start is required. Do not enable current sensor self-test in E8-17 because it takes a long time. The time for E8-16/20/21 should be controlled within 100 ms.
- Self-test before auto-tuning: When b5-00 is set to 1, 2, or 3, self-testing is performed before auto-tuning. Self-test items include IGBT short circuit, IGBT open circuit, output phase loss, and current sensor error. You can disable this mode in b5-07.

Note

Self-test may fail if the rated motor current is much smaller than the rated current of the AC drive. Therefore, it is recommended to start self-test when the rated motor current is 0.2 times the rated current of the AC drive. Do not start self-test when the motor is rotating. If self-test is started when the motor still has back EMF, a false fault may be reported. If the rear end of the AC drive is connected to a short-circuited reactor, self-test may also fail if the difference between the rated motor current d0-03 and the total device current A2-05 is too large.

Self-test parameters

Para.	Name	Setpoint
b5-01	Self-test request	0: None 1: Self-test b5-01 is restored to 0 after self-test is completed.
E8-15	VI self-test mode	Ones position: Perform VI self-test before power-on Tens position: Perform VI self-test before running
E8-16	Bridge arm self-test mode	Ones position: Perform bridge arm self-test before power-on Tens position: Perform bridge arm self-test before running
E8-17	Detection mode of current sensor CM	Ones position: Perform current sensor self-test before power-on Tens position: Perform current sensor self-test before running
E8-20	Detection mode of short-circuit to ground	Ones position: Perform short-circuit to ground self-test before power-on Tens position: Perform short-circuit to ground self-test before running
E8-21	Detection mode of output phase loss	Ones position: Perform output phase loss self-test before power-on Tens position: Perform output phase loss self-test before running
b5-07	Enable self-test before auto-tuning	0: Enable 1: Disable

Para.	Name	Setpoint
E8-48	Self-test (b5-01) mode selection	bit00: VI self-test 0: Disable 1: Enable
E8-48	Self-test (b5-01) mode selection	bit01: Bridge arm self-test mode 0: Disable 1: Enable bit02: Output current sensor CM detection 0: Disable 1: Enable bit03: Reserved 0: Disable 1: Enable bit04: Reserved 0: Disable 1: Enable bit05: Short-circuit-to-ground detection 0: Disable 1: Enable bit06: Output phase loss detection 0: Disable 1: Enable bit07: Current output unbalance detection 0: Disable 1: Enable bit08 to bit15: Reserved

When the grid is an IT system, short-circuit to ground cannot be detected during self-test. To enable this function, install an insulation monitor to the IT system. The following figures show different types of grids:

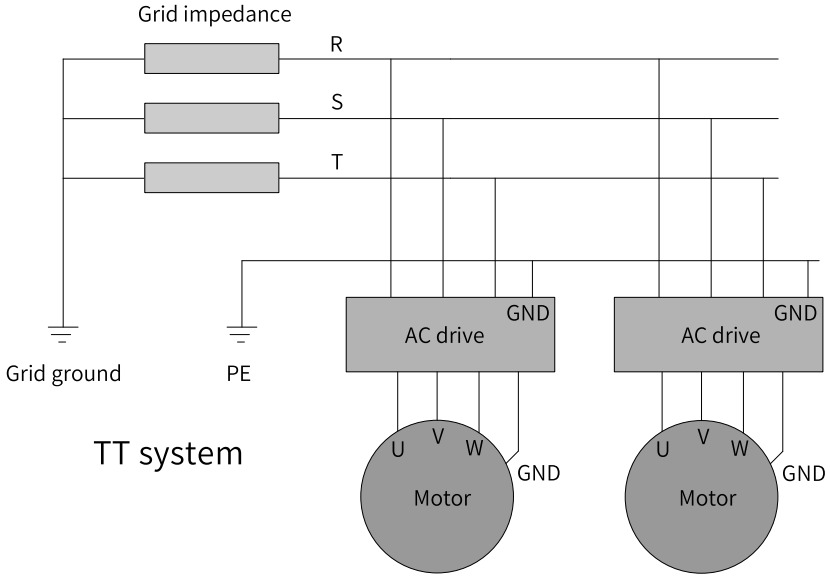


Figure 5-2 TT system

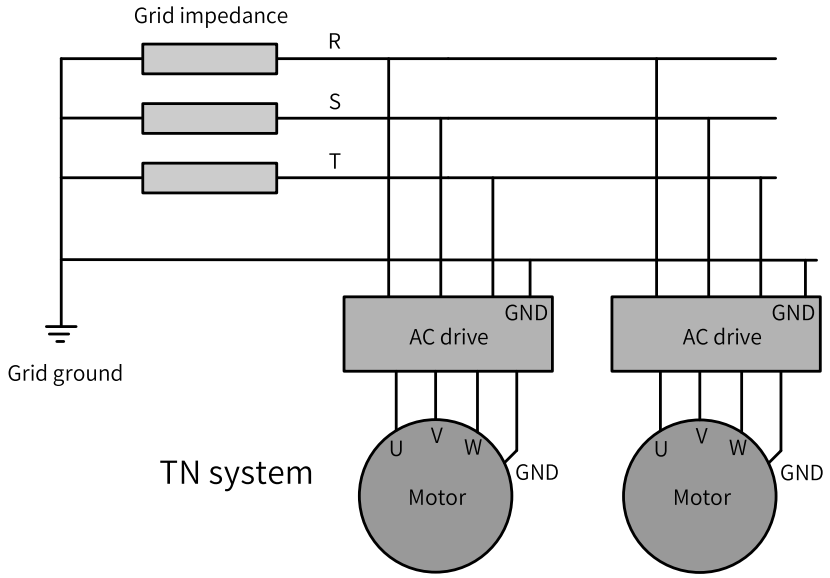


Figure 5-3 TN system

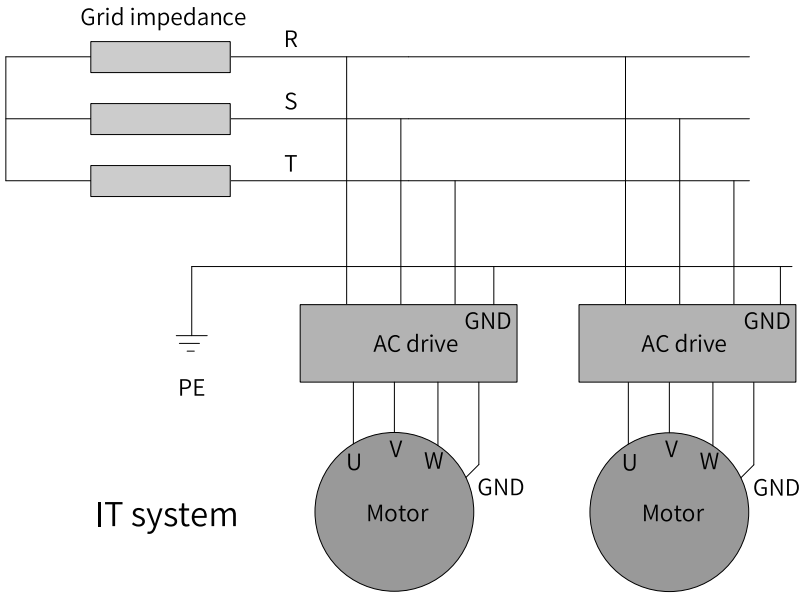


Figure 5-4 IT system

5.5.2 Motor Parameter Auto-tuning

Motor auto-tuning is the process by which the AC drive obtains the parameters of the controlled motor.

Motor auto-tuning modes include:

- Static auto-tuning (b5-00 set to 1): This mode is applicable to asynchronous motors and permanent magnet synchronous electrical motors (PMSM). The motor does not rotate during auto-tuning. Basic motor parameters are obtained in this mode. Select this mode only when the motor has load and cannot rotate. Parameters such as mutual inductance, no-load current, mutual inductance characteristic curve, and inertia speed loop cannot be obtained in this mode. Accuracy of motor parameters obtained in this mode is slightly lower than that in the no-load complete auto-tuning mode. When the asynchronous motor is in the SVC mode, set b5-00 to 2 or 3 to perform auto-tuning.
- No-load complete auto-tuning (b5-00 set to 2): This mode is applicable to asynchronous motors and PMSM. The motor rotates during auto-tuning. Therefore, prevent the motor from causing any physical injury or device damage during this process. This mode is applicable to scenarios where the motor has no load and can rotate. The most accurate motor parameters are obtained in this mode.
- Static auto-tuning of all parameters of asynchronous motor (b5-00 set to 3): This mode is applicable to asynchronous motors only. The motor does not rotate during auto-tuning. Basic motor parameters are obtained in this mode. Select this mode only when the motor has load and cannot rotate. Parameters such as mutual inductance characteristic curve and inertia speed loop cannot be obtained in this mode. Accuracy of motor parameters obtained in this mode is slightly lower than that in the no-load complete auto-tuning mode. The accuracy of this mode is higher than that when b5-00 is set to 1.

In the ready-to-switch-on state, set auto-tuning as follows:

1. Check that SOP-20-880 has taken control.

2. Check that the AC drive is free of faults and in the S5 ready-to-switch-on state.
3. Set b5-00 (Auto-tuning mode): For motors that can rotate without load, set b5-00 to 2 (No-load auto-tuning) to obtain accurate motor parameters. After this parameter is set, the AC drive enters the S18 ready-for-auto-tuning state.
4. After receiving the RUN command, the AC drive enters the S19 auto-tuning state to auto-tune parameters and outputs current. The motor first remains stationary and then rotates. When the auto-tuning process is complete, the motor comes to a standstill. The AC drive enters the S4 switch-on-inhibited state. When the RUN command is canceled, the AC drive enters the S5 ready-to-switch-on state.

The following figure shows the state machine changes during auto-tuning.

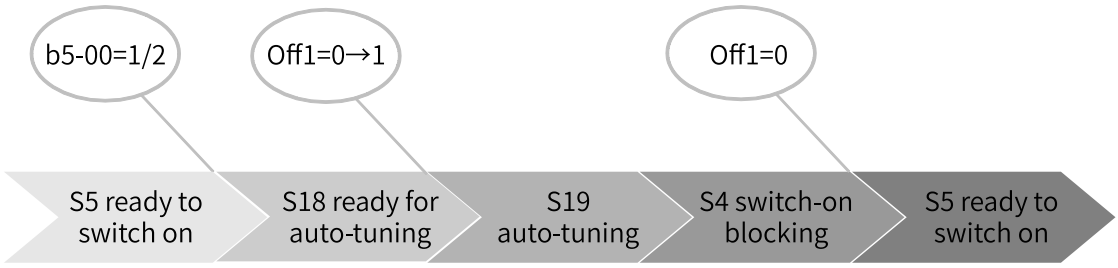


Figure 5-5 State machine changes during motor parameter auto-tuning

After auto-tuning, the obtained motor parameters are automatically saved to corresponding parameters. The obtained parameters vary with the auto-tuning mode, as shown in the following table.

Table 5–4 Parameters auto-tuned for asynchronous motor

Para.	Name	b5-00 = 1	b5-00 = 2	b5-00 = 3	b5-00 = 5<2>	b5-00 = 8<4>	b5-00 = 9
d1-02	Motor stator resistance	√	√	√	-	-	-
d1-04	Rotor resistance of asynchronous motor	√	√	√	-	-	-
d1-06	Asynchronous motor leakage inductance	√	√	√	-	-	-
d1-08	Asynchronous motor mutual inductance	√<3>	√	√<3>	-	√<3>	√<3>
d1-10	Asynchronous motor no-load current	√<3>	√	√<3>	-	√<3>	√<3>
d1-12	Asynchronous magnetic field saturated flux coefficient 1	-	√	-	-	√	√
d1-13	Mutual inductance coefficient 1 for asynchronous magnetic field saturation	-	√	-	-	√	√
d1-14	Asynchronous magnetic field saturated flux coefficient 2	-	√	-	-	√	√

Para.	Name	b5-00 = 1	b5-00 = 2	b5-00 = 3	b5-00 = 5<2>	b5-00 = 8<4>	b5-00 = 9
d1-15	Mutual inductance coefficient 2 for asynchronous magnetic field saturation	-	√	-	-	√	√
d1-16	Asynchronous magnetic field saturated flux coefficient 3	-	√	-	-	√	√
d1-17	Mutual inductance coefficient 3 for asynchronous magnetic field saturation	-	√	-	-	√	√
d1-18	Asynchronous magnetic field saturated flux coefficient 4	-	√	-	-	√	√
d1-19	Mutual inductance coefficient 4 for asynchronous magnetic field saturation	-	√	-	-	√	√
n4-03 n5-03 <1> n6-03	Input A/B phase sequence	-	√	-	-	√	√
d2-02	Inertia ratio	-	√	-	√	-	-
d2-00	Inertia	-	√	-	√	-	-
d2-05	Electromechanical time constant	-	√	-	√	-	-
d2-03	Friction torque	-	√	-	√	-	-
E1-02	Pre-excitation time	√	√	√	-	√	√
E1-13	Demagnetization time	√	√	√	-	√	√
E7-04	Flying start time	√	√	√	-	√	√
E4-02	FVC speed loop Kp	-	√	-	√	-	-
E4-03	FVC speed loop Ti	-	√	-	√	-	-
E4-04	SVC speed loop Kp	-	√	-	√	-	-
E4-05	SVC speed loop Ti	-	√	-	√	-	-

Note

- <1>: If the encoder detection module corresponding to d0-11 is enabled, the corresponding encoder phase sequence will be detected, and the detection result will be written into n4-03/n5-03/n6-03.
- <2>: Inertia auto-tuning will only be carried out in FVC or SVC mode. It is inactive in V/f mode.
- <3>: Synchronous motor with-load auto-tuning is used to auto-tune the encoder installation position angle, instead of the system moment of inertia. Synchronous motor with-load auto-tuning can be performed only in FVC mode and the AB phase sequence must be correct.
- <4>: b5-00 setting to 8 means the encoder must be used by professionals only after static auto-tuning (b5-00 set to 1) is completed. The motor rotates during auto-tuning.

When b5-00 is set to 2, the motor will rotate at a high speed. Set this parameter to 2 only when the mechanical safety is ensured. Besides, keep the load torque close to no load as much as possible when the motor rotates at a constant speed. Lower load means more accurate auto-tuning results. Heavy load may cause drive overload or overcurrent.

When the motor has no load can travel in a limited range, set b5-00 to 9 to obtain accurate parameters of asynchronous motors. For details about asynchronous motor with-load rotate auto-tuning, see the section *"5.5.5 With-Load Auto-Tuning of Asynchronous Motor" on page 104*.

Table 5–5 Parameters auto-tuned for synchronous motor

Para.	Name	b5-00 = 1	b5-00 = 2	b5-00 = 5<2>	b5-00 = 7<3>	b5-00 = 8<4>
d1-22	Motor stator resistance	√	√	-	√	-
d1-24	D axis inductance of synchronous motor	√	√	-	√	-
d1-25	Q axis inductance of synchronous motor	√	√	-	√	-
d1-26	Synchronous motor back EMF voltage	√	√	-	√	√
n4-03 n5-03 <1> n6-03	Input A/B phase sequence	-	√	-	-	√
n4-12 n5-12 <1> n6-12	Encoder installation position angle	-	√	-	√	√
d2-02	Inertia ratio	-	√	√	-	-
d2-00	Inertia	-	√	√	-	-
d2-05	Electromechanical time constant	-	√	√	-	-
d2-03	Friction torque	-	√	√	-	-
E4-02	FVC speed loop Kp	-	√	√	-	-
E4-03	FVC speed loop Ti	-	√	√	-	-
E4-04	SVC speed loop Kp	-	√	√	-	-
E4-05	SVC speed loop Ti	-	√	√	-	-

Note

- <1>: If the encoder detection module corresponding to d0-11 is enabled, the corresponding encoder phase sequence will be detected, and the detection result will be written into n4-03/n5-03/n6-03. The detected encoder installation position angle will be written into n4-12/n5-12/n6-12.
- <2>: Inertia auto-tuning will only be carried out in FVC or SVC mode. It is inactive in V/f mode.
- <3>: Synchronous motor with-load auto-tuning is used to auto-tune the encoder installation position angle, instead of the system moment of inertia.
- <4>: b5-00 setting to 8 means the encoder must be used by professionals only after static auto-tuning (b5-00 set to 1) is completed. The motor rotates during auto-tuning.

When b5-00 is set to 2, the motor will rotate at a high speed. Set this parameter to 2 only when the mechanical safety is ensured. Besides, keep the load torque close to no load as much as possible when the motor rotates at a constant speed. Lower load means more accurate auto-tuning results. Heavy load may cause drive overload or overcurrent.

When b5-00 is set to 2, the motor will rotate at a high speed. Set this parameter to 2 only when the mechanical safety is ensured. Besides, keep the load torque close to no load as much as possible when the motor rotates at a constant speed. Lower load means more accurate auto-tuning results. Heavy load may cause drive overload or overcurrent.

Note

In FVC control mode, before starting a synchronous motor, correctly set and auto-tune the installation position angle of the encoder. If no-load auto-tuning on all parameters (b5-00 set to 2) cannot be performed because the load cannot be disengaged, set b5-00 to 7 for synchronous motor with-load auto-tuning. See *"5.5.4 Auto-Tuning Encoder Position Angle When Synchronous Motor Having Load" on page 103*.

5.5.3 Auto-Calculation of Speed Loop Parameters

When the moment of inertia cannot be identified, you can also manually input the inertia of the load, and the control module can automatically calculate the appropriate speed controller control parameters. The speed controller parameter calculation is performed in the following three steps:

1. Manually adjust d2-02 to obtain the correct inertia value in d2-00.
2. Set b5-02 to 2 to select speed loop parameter calculation.
3. Set b5-03 to 1 to confirm the selection of b5-02.

The calculation of speed loop parameters can only be triggered in the shutdown state. The parameters are automatically calculated upon confirmation and you do not need to run the motor. After automatic calculation of speed loop parameters is completed, the following parameters are updated.

Para.	Name
E4-02	FVC speed loop Kp
E4-03	FVC speed loop Ti
E4-04	SVC speed loop Kp
E4-05	SVC speed loop Ti

Note

- d2-00 represents the moment of inertia J of the motor in $kg \cdot m^2$, which should be distinguished from the flywheel torque GD^2 commonly used in engineering. The conversion relationship between them is $J = GD^2/4\ g$.
- d2-05 is the electromechanical time constant of mechanical systems commonly used in engineering, which indicates the time required for a standstill motor to accelerate to rated speed at rated torque, in seconds. For the same motor, the electromechanical time constant has a fixed proportional relationship with the moment of inertia, which can be adjusted by d2-02.

5.5.4 Auto-Tuning Encoder Position Angle When Synchronous Motor Having Load

If the synchronous motor is in FVC control mode, auto-tune the encoder position angle before running the motor. Complete auto-tuning (setting b5-00 to 2) is recommended. If complete auto-tuning cannot be performed because the synchronous motor has load, set b5-00 to 7 to perform synchronous motor with-load auto-tuning.

Para.	Name
b5-11	[With-load auto-tuning of all synchronous motor parameters] Running speed
b5-12	[With-load auto-tuning of all synchronous motor parameters] Running direction
b5-15	[With-load auto-tuning of all synchronous motor parameters] Acceleration time
b5-16	[With-load auto-tuning of all synchronous motor parameters] Deceleration time

When with-load auto-tuning of all synchronous motor parameters is performed for a resolver, the motor is completely standstill during auto-tuning. When an ABZ encoder is used, the motor needs to rotate several turns during auto-tuning of the encoder installation position angle. In this case, to perform with-load complete auto-tuning in FVC mode, open the motor brake if any and then close the brake after auto-tuning is completed. Set the parameters for with-load auto-tuning of all synchronous motor parameters properly to avoid accidents during motor running.

With-load auto-tuning of all synchronous motor parameters can be performed only in FVC mode. Before performing auto-tuning, check whether the input AB phase sequence of the encoder is correct; if not, the auto-tuned encoder installation position angle may be inaccurate. If the input AB phase sequence of the encoder cannot be confirmed, after with-load auto-tuning of all synchronous motor parameters is completed in FVC mode, observe the motor running status. If motor locked-rotor or serious jitter during motor forward and reverse running occurs, change the encoder input AB phase sequence in n4-03/n5-03/n6-03 or change any phases of the power cable, and then perform with-load auto-tuning of all synchronous motor parameters in FVC mode again.

5.5.5 With-Load Auto-Tuning of Asynchronous Motor

No-load rotate auto-tuning

No-load rotate auto-tuning can be performed only after the motor coupling is removed. In cases such as metallurgy, paper, and other large production lines, large motors of multiple types are used and the removal of motor coupling is difficult. With-load rotate auto-tuning of asynchronous motor can auto-tune the load without the need of removing the coupling. It can be applied to most of lifting, fans, pumps, inertia load (rollers), oil, and metallurgy scenarios.

- With-load rotate auto-tuning of asynchronous motor can dynamically auto-tune the motor with half-load or in the following motoring or regenerative states.
- In the full-load mode, it can recognize mutual inductance, no-load current, and encoder errors.
- Items that can be auto-tuned in the with-load mode depend on the load.

Auto-tuning Item	Output Below 50% Rated Torque	Output Above 50% Rated Torque
Mutual inductance and no-load current	Enable	Enable
Mutual inductance saturation curve	Enable	X
Signal feedback of encoder, encoder pulses per revolution, encoder direction reverse automatic adjustment, and encoder signal interference	Enable	Enable

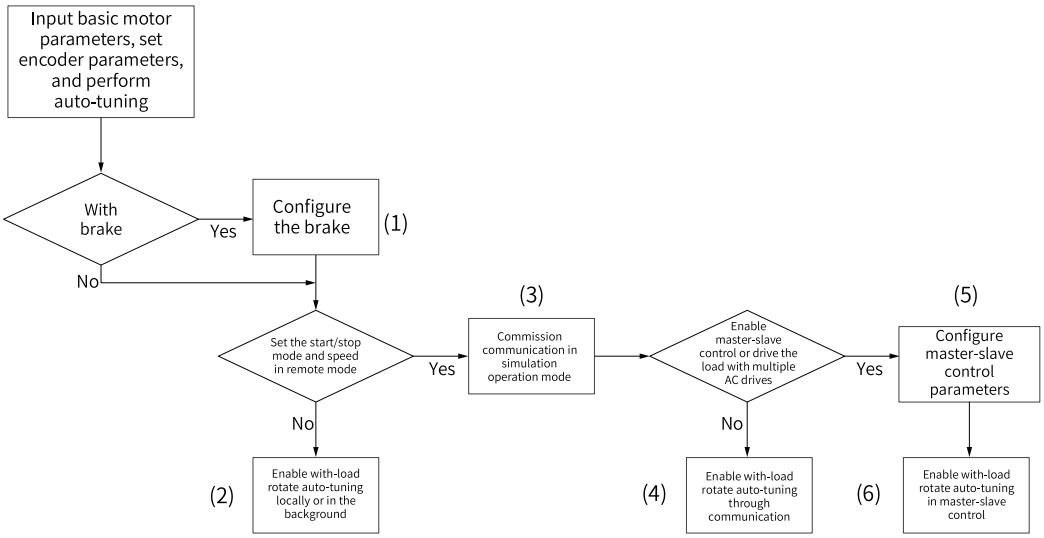
- Auto-tuning can be performed when the speed is above 25% of the rated speed. Low-speed auto-tuning can reduce risks to mechanical devices, and make auto-tuned load of the fan water pump below the half load, ensuring the success of dynamic auto-tuning.

- The auto-tuning frequency reference source can be either the program or the operation room, applicable to scenarios with limits. Based on industrial configuration, you can reduce the auto-tuning time or set the auto-tuning speed limit to reduce the auto-tuning travel.
- With-load rotate auto-tuning can avoid oscillation caused by no-load rotate auto-tuning.
- To run the motor in the SVC mode, accurate no-load current and mutual inductance are required. If possible, perform no-load rotate auto-tuning for the motor when its coupling is removed. If with-load auto-tuning is allowed, perform with-load rotate auto-tuning. If motor operation is not allowed, perform static complete auto-tuning to obtain the accurate no-load current and mutual inductance, which is very important to subsequent operation.

Before performing with-load rotate auto-tuning for an asynchronous motor:

- Set basic motor parameters in group d0 correctly. If the number of motor pole pairs is less than 12, you do not need to input the value. If the motor power factor is marked on the motor nameplate ($\cos\Phi$), input the power factor accurately. If one AC drive is connected to multiple same motors, input the parameters on the motor nameplate and the number of paralleled motors (d0-10).
- If an encoder card is used, activate the encoder card and input the encoder parameters correctly. Select the encoder detection module in d0-11. The default is encoder module 1. Then, activate the corresponding encoder slot in group n4, select the encoder type, and set other parameters. The online status of the encoder card can be viewed in n4-01. After the encoder card is online, connect the encoder cables. For more information about encoder card configuration, see encoder parameter settings.
- Select static auto-tuning to obtain accurate stator resistance, rotor resistance, and leakage inductance.
- Minimize the load during auto-tuning. For example, do not hang heavy articles on the crane, do not feed articles to the extruder, and reduce the load to the half of the rated load or below. In case of small friction, inertia load does not affect auto-tuning results.
- If the motor has passive load and has no brake control, such as roller of the fan water pump, with-load rotate auto-tuning can be performed after static auto-tuning.

Check items according to the following flowchart before auto-tuning:



Brake configuration

Brake control is applicable to the HCU50S-CS/51S-CS controller. Set RO3 (long-service-life relay) to brake output. For details, see *" Brake Control" on page 154*.

Auto-tuning with speed set locally or by the software

In the case of cranes and other position restrictions, reserve a sufficient travel space. Take the RTG hoisting motor of the port field bridge as an example. The duration of with-load rotate auto-tuning of an asynchronous motor (200 kw) is about 40s, the auto-tuning speed is set to 30%, the lifting rated speed is 22 m/min, and the lifting speed during auto-tuning is 6.6 m/min. After the motor runs 40s, the lifting or descending height is 4.4 m (without taking into account the impact of acceleration and deceleration time. To reduce the auto-tuning travel, set the acceleration and deceleration time to a small value).

The target speed (either positive or negative) set by the software control panel or multi-speed reference should be greater than 25% of the rated speed. Set the auto-tuning mode to 9 (With-load rotate auto-tuning of asynchronous motor), and set to start auto-tuning by control panel or terminal. After the parameter (tens position of b5-08) is auto-tuned, the motor automatically stops by default.

Commission communication in simulation operation mode

In some scenarios, it is inconvenient to remove the motor coupling and the motor cannot be started by the software and must be started by professionals. In such cases, with-load rotate auto-tuning can be performed. The motor may not run before with-load rotate auto-tuning and thus the auto-tuning command should be sent through remote communication. Therefore, ensure first that the motor can run normally. You can commission the running command and reference in the simulation operation mode as follows:

1. Configure the communication card parameters.
2. Check the communication status with the PLC.
3. When the bus has no voltage, set A8-22 to 1 to select the simulation operation mode, and communicate with the PLC to check the data. In the simulation operation mode, the bus voltage must be smaller than 48 V. In such case, IGBT has no output and the brake does not act.
4. Control the motor through simulation operation, and check whether the motor start/stop and speed are normal through the software or PLC.
5. Check that the emergency stop signal is responded. During the test, set the emergency stop mode to OFF2 instead of OFF3 to avoid stop failure.
6. After checking that the motor runs normally, set A8-22 to 0 to disable the simulation mode and energize the bus.

With-load rotate auto-tuning

With preceding communication and brake configurations, the operation room can realize basic motor control. If a single motor drives the load and master-slave control or droop control is not supported, set the maximum auto-tuning speed in b5-10 and set b5-00 to 9 to enable with-load rotate auto-tuning of asynchronous motor. Then, start the motor. The target speed must be greater than 25%; otherwise, auto-tuning will fail.

Master-slave control configuration for with-load rotate auto-tuning

Commissioning of remote multi-AC-drive master-slave control with-load auto-tuning:

1. If possible, disconnect other motors and perform auto-tuning on only one motor.
2. If the multiple AC drives must be started together, commission the master-slave control. In master-slave control mode, parameter auto-tuning can be performed on only one motor in principle.
3. The master-slave control configuration is complex. To simply the auto-tuning procedure, droop is recommended for load distribution during auto-tuning. Set b5-10 to 100% to remove speed limit during auto-tuning. Set the speed reference to be a value within the range of 30% to 70%. To balance the load among all motors, set E4-14 to 1 to enable the droop function.

$$E4\text{-}16 = \text{Rated slip} = 1 - \frac{\text{Rated speed} \times \text{Number of poles}}{\text{Rated frequency} \times 60} = 2.6\%$$

The following takes as an example that the rated frequency is 50 Hz, the rated speed is 1460 RPM, and the number of poles is 2.

4. If master-slave control has been configured, use master-slave control for auto-tuning, or use the un-configured master-slave control for auto-tuning.

With-load rotate auto-tuning in master-slave control

- Set motor parameters for each AC drive and complete static auto-tuning.
- Configure brake and communication parameters for each AC drive, and ensure that each AC drive can receive commands and run normally in the simulation mode.
- Auto-tuning can be performed on only one AC drive at a time, and other AC drives must run normally. If other motors support the encoder FVC mode, set the mode to SVC. The motor may not run normally if the encoder signal is inverted or interfered or the encoder is not connected properly.
- For the AC drive for which you want to perform auto-tuning, set b5-00 to 9 to enable with-load rotate auto-tuning of asynchronous motor, and set the tens position of b5-08 to 1. After auto-tuning is completed, the motor continues to run until stopped by the user. Then, start and run the motor for a period of time and check whether the state machine of A0-00 is changed from 19 to 12; if yes, stop the motor.
- After auto-tuning is completed, write the auto-tuned with-load current mutual inductance and saturation curve to other AC drives for which with-load rotate auto-tuning is not performed (on the premise that the motor to which they connect is the same).

Para.	Name
d1-08	Asynchronous motor mutual inductance
d1-10	Asynchronous motor no-load current
d1-12	Asynchronous magnetic field saturated flux coefficient 1
d1-13	Mutual inductance coefficient 1 for asynchronous magnetic field saturation
d1-14	Asynchronous magnetic field saturated flux coefficient 2
d1-15	Mutual inductance coefficient 2 for asynchronous magnetic field saturation
d1-16	Asynchronous magnetic field saturated flux coefficient 3
d1-17	Mutual inductance coefficient 3 for asynchronous magnetic field saturation
d1-18	Asynchronous magnetic field saturated flux coefficient 4
d1-19	Mutual inductance coefficient 4 for asynchronous magnetic field saturation
E1-02	Pre-excitation time

- You can auto-tune other motors in the same way to check the encoders of other motors.

The following table lists parameters for with-load rotate auto-tuning of asynchronous motor:

Para.	Name	Setpoint
b5-00	Auto-tuning request	9: With-load rotate auto-tuning of asynchronous motor
b5-08	Auto-tuning function selection	Tens position: Stop selection after with-load rotate auto-tuning of asynchronous motor 0: Auto stop 1: Manual stop. This mode is applicable for auto-tuning in master-slave control to stop multiple motors at a time.
b5-09	Speed reference source for with-load rotate auto-tuning of asynchronous motor	0: Set by user. The speed is set by the user through such as the software, communication, and AI. 1: Internal command. The speed set by internal command is 40% by default. When the hundreds position of b5-08 is set to 1 and b5-00 is set to 2, the speed is set by the internal command by default.
b5-10	[With-load rotate auto-tuning of asynchronous motor] Speed limit	The default value is 40%. The speed does not exceed this limit during auto-tuning.

Note

The torque limit must be applied during with-load rotate auto-tuning. For example, if the torque limit for communication is set to 0, the motor under auto-tunning cannot accelerate and thus auto-tuning failed.

5.6 Trial Run

5.6.1 Starting a Device by Local Control and Default Terminal

It is recommended to use InoDriveStudio control panel or SOP-20-880. For details, see *" Introduction to InoDriveStudio" on page 34* and *SOP-20-880 Smart Operation Panel User Guide*. The motor control mode is V/f speed control. The default values are used for the speed reference and ramp. The following table lists relevant parameters. Check them before trial run.

Table 5–6 Using InoDriveStudio or SOP-20-880 to check parameters

Para.	Name	Setpoint (Default)	Description
A9-00	Command channel source selection	0	Channel 1
A9-01	MDS 0 source	0	First group of motor parameters
A9-02	MDS 1 source	0	
E0-00	Control method	2	V/f control mode
E0-01	Control mode	0	Speed control
E1-00	Start mode	0	Direct start
E1-14	OFF1 stop mode	1	Decelerate to stop
E3-00	V/f mode selection	0	V/f curve
E3-01	V/f curve selection	0	Linear V/f
C7-02	RFG ramp 1	0	Ramp 1 acceleration/deceleration time
C7-03	RFG ramp 2	0	
C7-04	Ramp 1 acceleration time	20	Ramp 1 acceleration time of 20s
C7-05	Ramp 1 deceleration time	20	Ramp 1 deceleration time of 20s

When using the default terminal start/stop mode, check the following parameters in addition to those in the preceding table.

Table 5–7 Parameters for running in the default terminal start/stop mode

Para.	Name	Setpoint	Description
b0-00	Start/stop control word source	0	Terminal start/stop module
b4-02	Terminal start/stop command 1/2 selection	0	Terminal start/stop command 1
b4-03	Terminal start/stop command 1 mode	1	IN1 start mode
b4-05	Terminal start/stop command 1 input	2	DI1 as the command source
C0-00	Speed control main reference selection	1	Multi-reference value 1 as the speed reference
C6-05	Multi-reference value 1	Speed reference	-

When the DI1 status changes on the rising edge from 0 to 1, the device is started, and the motor accelerates from a standstill to the speed indicted by C6-05. For more information about terminal start/stop, see *" Terminal Start/Stop Module" on page 148*.

5.6.2 Starting a Device Using Digital Input and Analog Input

Digital input can be used as the command sources for starting and stopping equipment. Analog input can be used as the speed reference to start equipment. For example, DI1 is used as the start command, DI2 as the quick stop command, DI3 as the fault reset command, and AI1 as the speed reference. Set the parameters listed in *"Table 5–8 Parameter setting examples for starting equipment using digital input and analog input" on page 109* based on *"Table 5–6" on page 108*.

Table 5–8 Parameter setting examples for starting equipment using digital input and analog input

Para.	Name	Setpoint	Description
b0-00	Start/stop control word source	3	User-defined start/stop control word
b0-01	User-defined OFF1 source 1	2	Selects DI1 as the OFF1 command source.
b0-03	User-defined OFF3 source 1	3	Selects DI2 as the OFF3 command source.
b0-04	User-defined running permission source	1	Running Permission
b0-05	User-defined fault reset source 1	4	Selects DI3 as the command source for reset upon fault.
C0-00	Speed control main reference selection	2	Selects AI1 as the speed reference source.

5.6.3 Starting a Device Using Fieldbus

This section only describes the source of start, stop, and reset commands for the device through the fieldbus and the reference source. See *"Table 5–6" on page 108* or *"6.5.2.1 Vector Control" on page 156* and *" V/f Control" on page 195* for the control mode and operation mode of the motor.

There are two ways to start the device through the fieldbus:

5.6.3.1 Pre-Configuration Method

When the preset value configuration mode is used, the command sources such as OFF1 and OFF2 of the device are all from the fieldbus process data PZD1, and the configuration is as follows:

Table 5–9 Start a device command source by using fieldbus pre-configuration mode

Command	Command Source
OFF1	PZD1.0
OFF2	PZD1.1
OFF3	PZD1.2
Running permission source	PZD1.3
Fault reset source	PZD1.7
JOG1 source	PZD1.8
JOG2 source	PZD1.9
Remote control request must be 1.	PZD1.10
Speed inversion source	PZD1.11

The pre-configuration mode only sets the command source, and the reference needs to be set separately. The reference can come from multi-reference values, analog quantities, and communication. For detailed settings, see *"6.2.1 Speed Reference" on page 140*.

5.6.3.2 User-Defined Method

To start the device using fieldbus communication, specify a data exchange protocol to use with the host controller system, and set parameters according to the protocol. The following parameter descriptions take the fieldbus adapter A configured as the PROFIBUS-DP bus to start the device as an example.

Data exchange protocol between MD880-50 and the host computer system

Word	Definition	Description
PZD1	Control word	For details, see the control word definition table.
PZD2	Speed reference	The speed ramp is determined by PLC. 4096 indicates the 100% rated motor frequency.

Table 5–10 Control word definition table

Bit	Meaning
bit0	0: Stopped 1: Start after closing at 0→1 rising edge
bit1	0: Coast to stop 1: Run necessary conditions
bit2	0: Quick stop 1: Run necessary conditions
bit3	0: Inhibiting output 1: Operation enable

Bit	Meaning
bit4	0: Ramp output disabled 1: Ramp output enabled
bit5	0: Ramp pause enabled 1: Ramp pause disabled
bit6	0: Ramp reference 0 enabled 1: Ramp reference 0 disabled
bit7	0: Disable 1: 0→1 fault reset enabled
bit8 to bit9	Reserved
bit10	0: PZD data disabled 1: PZD data enabled
bit11 to bit15	Reserved

Data sent by MD880-50 to the host computer system:

Word	Definition	Description
PZD1	Status word 1	For details, see the status word definition table.
PZD2	DC bus voltage	For base value calibration, see *"6.9.1 Fieldbus Adapter" on page 204* One decimal place: 1000 indicates that the voltage is 100.0 V.

Table 5–11 Status word definition table

Bit	Meaning
bit0	0: Not ready to switch on 1: Ready to switch on
bit1	0: Not ready to run 1: Ready to run
bit2	0: Not operating 1: Operating
bit3	0: No fault 1: Fault activated
bit4 to bit6	Reserved
bit7	0: No alarm present 1: Alarm activated
bit8 to bit15	Reserved

Parameter configuration

- Fieldbus adapter PROFIBUS-DP configuration:

Para.	Name	Setpoint	Description
n1-00	Bus type for fieldbus adapter	7	Sets the bus type for fieldbus adapter A to PROFIBUS-DP.
n1-01	Communication disconnection detection delay time	1.00	The communication fault is reported 1s after communication becomes disconnected.

Para.	Name	Setpoint	Description
n1-02	Communication mode for fieldbus adapter	0 [Standard mode]	Errors and faults of the fieldbus adapter communication card are detected by default.
n1-03	Detection setting for continuous CRC check errors in communication	0	The fieldbus adapter receives data without CRC.
n1-04	Process data output 1	U5-86 (1586)	Configures the status word using the bit-to-word function module 1.
n1-05	Process data output 2	U5-05 (1505)	U5-05 indicates the DC bus voltage (100 ms filter).
n1-20	Communication base value for process data output 1	0	The base value conversion is not required.
n1-21	Communication base value for process data output 2	0	The base value conversion is not required.
n1-36	Communication base value for process data input 1	0	The base value conversion is not required.
n1-37	Communication base value for process data input 2	0	The base value conversion is not required.
n16-00	Expansion slot	7	The PROFIBUS-DP communication module is at expansion slot 3_1.
n16-02	Expansion card ID	45	Sets the PROFIBUS-DP address to 45.
n16-10	DP data check bit	0	Set the PROFIBUS-DP data check bit to PZD1.bit10, indicating that the communication data is valid only when bit10 in PZD1 received by HCU is 1.

- PZD1 control word configuration:

Para.	Name	Setpoint	Description
b0-00	Start/stop control word source	3	User-defined start/stop control word (set by group b0)
b0-01	User-defined OFF1 source	U2-00 (1200)	Selects the fieldbus adapter A.PZD1.0 as the OFF1 command source.
b0-02	User-defined OFF2 source 1	U2-01 (1201)	Selects the fieldbus adapter A.PZD1.1 as the OFF2 command source.
b0-03	User-defined OFF3 source 1	U2-02 (1202)	Selects the fieldbus adapter A.PZD1.2 as the OFF3 command source.
b0-04	User-defined running permission source	U2-03 (1203)	Selects the fieldbus adapter A.PZD1.3 as the running permission command source.
b0-05	User-defined fault reset source 1	U2-07 (1207)	Selects the fieldbus adapter A.PZD1.7 as the fault reset command source.
b1-06	RFG prohibition source	U2-04 (1204)	Selects the fieldbus adapter A.PZD1.4 as the command source for enabling ramp output.
b1-07	RFG pause source	U2-05 (1205)	Selects the fieldbus adapter A.PZD1.5 as the ramp pause command source.
b1-08	Source of setting RFG reference to 0	U2-06 (1206)	Selects the fieldbus adapter A.PZD1.6 as the command source for ramp reference 0.
n16-10	DP data check bit	0	Selects the fieldbus adapter A.PZD1.10 as the command source for DP data check bits.

- Speed reference settings:

Para.	Name	Setpoint	Description
A9-00	Command channel source selection	0	Selects command channel 1.
C0-00	Speed control main reference selection	U5-45 (1545)	Selects the fieldbus adapter A.PZD2 as the speed reference source.

- Output of bit-to-word function 1 for status words:

Para.	Name	Setpoint	Description
L0-10	Bit-to-word function 1 - Bit00 selection	U1-00 (1100)	Ready to switch on
L0-11	Bit-to-word function 1 - Bit01 selection	U1-01 (1101)	Ready to run
L0-12	Bit-to-word function 1 - Bit02 selection	U1-02 (1102)	Running
L0-13	Bit-to-word function 1 - Bit03 selection	U1-03 (1103)	Fault activation
L0-14	Bit-to-word function 1 - Bit04 selection	0	-
L0-15	Bit-to-word function 1 - Bit05 selection	0	-
L0-16	Bit-to-word function 1 - Bit06 selection	0	-
L0-17	Bit-to-word function 1 - Bit07 selection	U1-07 (1107)	Alarm/Limit activation
L0-18	Bit-to-word function 1 - Bit08 selection	0	-
L0-19	Bit-to-word function 1 - Bit09 selection	0	-
L0-20	Bit-to-word function 1 - Bit10 selection	0	-
L0-21	Bit-to-word function 1 - Bit11 selection	0	-
L0-22	Bit-to-word function 1 - Bit12 selection	0	-
L0-23	Bit-to-word function 1 - Bit13 selection	0	-
L0-24	Bit-to-word function 1 - Bit14 selection	0	-
L0-25	Bit-to-word function 1 - Bit15 selection	0	-

5.6.4 Control Using Modbus (Mailbox Data)

5.6.4.1 Continuous Address Control

HCU provides only a limited number of special communication addresses. Therefore, Modbus RTU and Modbus TCP support the write operation on process data n1-68 to n1-83 (n2-68 to n2-83). Then, the process data is converted using communication base values n1-36 to n1-51 (n2-36 to n2-51) and finally updated to the corresponding connectors U5-44 to U5-59 (U5-60 to U5-75).

Fieldbus adapter A:

Address	Written Parameter	Name	Description
33807	n1-68	Display of process data input 1	Written through Modbus communication, converted using base value n1-36, and updated to connector U5-44
33808	n1-69	Display of process data input 2	Written through Modbus communication, converted using base value n1-37, and updated to connector U5-45
33809	n1-70	Display of process data input 3	Written through Modbus communication, converted using base value n1-38, and updated to connector U5-46
33810	n1-71	Display of process data input 4	Written through Modbus communication, converted using base value n1-39, and updated to connector U5-47
33811	n1-72	Display of process data input 5	Written through Modbus communication, converted using base value n1-40, and updated to connector U5-48
33812	n1-73	Display of process data input 6	Written through Modbus communication, converted using base value n1-41, and updated to connector U5-49
33813	n1-74	Display of process data input 7	Written through Modbus communication, converted using base value n1-42, and updated to connector U5-50
33814	n1-75	Display of process data input 8	Written through Modbus communication, converted using base value n1-43, and updated to connector U5-51
33815	n1-76	Display of process data input 9	Written through Modbus communication, converted using base value n1-44, and updated to connector U5-52
33816	n1-77	Display of process data input 10	Written through Modbus communication, converted using base value n1-45, and updated to connector U5-53
33817	n1-78	Display of process data input 11	Written through Modbus communication, converted using base value n1-46, and updated to connector U5-54
33818	n1-79	Display of process data input 12	Written through Modbus communication, converted using base value n1-47, and updated to connector U5-55
33819	n1-80	Display of process data input 13	Written through Modbus communication, converted using base value n1-48, and updated to connector U5-56
33820	n1-81	Display of process data input 14	Written through Modbus communication, converted using base value n1-49, and updated to connector U5-57

Address	Written Parameter	Name	Description
33821	n1-82	Display of process data input 15	Written through Modbus communication, converted using base value n1-50, and updated to connector U5-58
33822	n1-83	Display of process data input 16	Written through Modbus communication, converted using base value n1-51, and updated to connector U5-59

Fieldbus adapter B:

Address	Written Parameter	Name	Description
33839	n2-68	Display of process data input 1	Written through Modbus communication, converted using base value n2-36, and updated to connector U5-60
33840	n2-69	Display of process data input 2	Written through Modbus communication, converted using base value n2-37, and updated to connector U5-61
33841	n2-70	Display of process data input 3	Written through Modbus communication, converted using base value n2-38, and updated to connector U5-62
33842	n2-71	Display of process data input 4	Written through Modbus communication, converted using base value n2-39, and updated to connector U5-63
33843	n2-72	Display of process data input 5	Written through Modbus communication, converted using base value n2-40, and updated to connector U5-64
33844	n2-73	Display of process data input 6	Written through Modbus communication, converted using base value n2-41, and updated to connector U5-65
33845	n2-74	Display of process data input 7	Written through Modbus communication, converted using base value n2-42, and updated to connector U5-66
33846	n2-75	Display of process data input 8	Written through Modbus communication, converted using base value n2-43, and updated to connector U5-67
33847	n2-76	Display of process data input 9	Written through Modbus communication, converted using base value n2-44, and updated to connector U5-68
33848	n2-77	Display of process data input 10	Written through Modbus communication, converted using base value n2-45, and updated to connector U5-69
33849	n2-78	Display of process data input 11	Written through Modbus communication, converted using base value n2-46, and updated to connector U5-70
33850	n2-79	Display of process data input 12	Written through Modbus communication, converted using base value n2-47, and updated to connector U5-71
33851	n2-80	Display of process data input 13	Written through Modbus communication, converted using base value n2-48, and updated to connector U5-72
33852	n2-81	Display of process data input 14	Written through Modbus communication, converted using base value n2-49, and updated to connector U5-73
33853	n2-82	Display of process data input 15	Written through Modbus communication, converted using base value n2-50, and updated to connector U5-74
33854	n2-83	Display of process data input 16	Written through Modbus communication, converted using base value n2-51, and updated to connector U5-75

For device start/stop, reset commands, and reference settings using continuous address control over Modbus communications, see *"5.6.3.1 Pre-Configuration Method" on page 110*.

5.6.4.2 Special Address Control

Modbus directly reads and writes parameters based on the communication address and does not generate any process data. However, b0-01 or b2-01 of the user-defined OFF1 source cannot be set to 1 to directly start the communication. You must select connector data.

To enable Modbus to control device start/stop, HCU-50S/51S provides several special communication addresses for Modbus access, and updates the written data to a specific connector which can be read by the reference source parameter.

Address	Write Connector	Name	Description
34196	U1-75	Start/stop command (Modbus)	Values: 0 and 1. Recommended for user-defined OFF1 commands
34230	U5-40	Modbus communication setpoint 1	Value range: –32768 to +32767, which can be used for speed reference
34231	U5-41	Modbus communication setpoint 2	
34232	U9-50	Modbus communication double-word setpoint	Value range: –2^31 to +2^31-1, which can be used for high-precision speed reference. The communication address 34232 is written to the high 16 bits, and the communication address 34233 is written to the low 16 bits.

Parameter configuration:

Para.	Name	Setpoint	Description
n1-00	Bus type for fieldbus adapter	1	Fieldbus adapter A selects Modbus RTU type.
n10-00	Expansion slot	7	The Modbus RTU module is inserted in the expansion slot 3-1.
n10-04	Modbus local address	4	The address of the Modbus RTU module is 4.
b0-00	Start/stop control word source	3	User-defined start/stop control word (set by group b0)
b0-01	User-defined OFF1 source	U1-75 (1175)	Selects Modbus start/stop command setpoint as OFF1 command source.
C0-00	Speed control main reference selection	U5-40 (1540)	The Modbus communication reference 1 is used as the speed reference source.

After setting, writing 0 to the communication address 34196 through Modbus can stop the device, and writing 1 to 34196 can control device operation; data written in 34230 is used as the main reference of speed control, data written in 4096 corresponds to 100% rated motor frequency, and data written in –4096 corresponds to –100% rated motor frequency.

5.7 Simulation Operation Mode

The HCU-50S controller provides a motor simulation model, which supports simulation operation when no motor is connected. The simulation operation mode is applicable to commissioning of communication protocol with the PLC.

When A8-22 is set to 1, HCU-50S generates a virtual bus voltage and the alarm 46-3, indicating that the current mode is simulation operation. In simulation operation mode, a motor control process is simulated after a RUN command is received, and the motor speed, torque, or even current can be recorded just like a physical motor is running. However, the IGBT is always disabled in this mode.

During simulation operation, ensure that the actual bus voltage is always lower than 48 V; otherwise, the fault 5-3 is triggered and the value of A8-22 is zeroed. In other modes, if the bus voltage is above 48 V, A8-22 cannot be set to 1.

Para.	Name	Description
A8-22	Simulation operation mode	1: The simulation operation mode is enabled. If the required conditions are not met, its value is automatically restored to 0. 0: Normal running The value is restored to 0 upon each power-on.
A8-23	Simulation operation load torque	During simulation operation, a virtual load torque is generated.

6 Function Modules

6.1 Control Channels and Start/Stop Commands

6.1.1 Start and Run

HCU-50S/51S involves two commands related to motor start/stop control. The commands can be set by using start/stop control words.

6.1.1.1 OFF1 Command

When OFF1 is set to 0, the OFF2 and OFF3 commands are inactive, and no fault occurs, the system enters the ready-to-switch-on state (S5). In this case, if the OFF1 value is changed from 0 to 1, the start command is delivered, and the system enters the pre-charge state (S6). When the DC bus voltage is detected to be normal, the system enters the ready-to-run state (S7) and waits for the running permission command. After the running permission command is active, the system enters detection before operation (S9). If detection before operation is not selected in group E8, the S9 state is skipped. According to different start modes indicated by E1-00, the system enters pre-excitation (S10), flying start (S11), or DC injection braking start (S15), and then enters the running state (S12).

If OFF1 is set to 0, the stop command is delivered. Then, the system exits the running state (S12) and enters OFF1 stopped state (S13). When the motor zero-speed conditions are met, the system enters the ready-to-switch-on state (S5).

6.1.1.2 Running Permission Command

The running permission command only controls IGBT triggering, which must be judged after OFF1 command is run to close the brake. If running permission is inactive, IGBT will not be triggered and will be in the ready-to-run state (S7) even if the OFF1 command is run to close the brake. Wait until the running permission signal is active before triggering IGBT to control motor running.

Keep the running permission command at a high level to directly run the OFF1 command to control running and stop.

Both the OFF1 and running permission commands are start/stop control words, which are affected by the switchover of command channels indicated by A9-00. For details, see *“4.6.1 Local and Remote” on page 79*.

Table 6–1 Start and running permission command sources

Command Channel	Command Word Source	OFF1 Command Source	Running Permission Command Source
[A9-00] = 0	[b0-00] = 0	Terminal start/stop module	Always active
	[b0-00] = 1	bit0 (U2-00) of U5-44	bit3 (U2-03) of U5-44
	[b0-00] = 2	bit0 (U2-16) of U5-60	bit3 (U2-19) of U5-60
	[b0-00] = 3	b0-01	b0-04
	SOP control	Local control with SOP-20-880	Always active
	IDS control	InoDriveStudio control panel	InoDriveStudio control panel
[A9-00] = 1	[b2-00] = 0	Terminal start/stop module	Always active
	[b2-00] = 1	bit0 (U2-00) of U5-44	bit3 (U2-03) of U5-44
	[b2-00] = 2	bit0 (U2-16) of U5-60	bit3 (U2-19) of U5-60
	[b2-00] = 3	b2-01	b2-04
	SOP control	Local control with SOP-20-880	Always active
	IDS control	InoDriveStudio control panel	InoDriveStudio control panel

6.1.2 Emergency Stop Command

HCU-50S/51S has two emergency stop modes:

- OFF2 emergency stop: The IGBT output is inhibited unconditionally when the command is received.
- OFF3 quick stop: After the command is received, the device decelerates to 0 according to OFF3 stop time configured in E1-16/E1-15, and then IGBT output is inhibited.

The emergency stop command is enabled at low level. When the corresponding parameter is set to 0, the device stops at emergency. For more information about OFF3 stop, see *"6.1.4.1 Stop Modes by Different Stop Commands" on page 122*.

The OFF2 and OFF3 commands have multiple sources. The current active parameters vary with the settings of control channels. Take OFF2 as an example. The following table lists the active parameters of the OFF2 command. The principle for OFF3 is similar.

Table 6–2 OFF2 command sources

Command Channel	Command Word Source	OFF2 Command Source									
		b0-02	b1-00	b0-00	b2-02	b3-00	b3-01	U2-01	U2-17	SOP	IDS
[A9-00] = 0	[b0-00] = 0	X	Enable	Enable	X	X	X	X	X	X	X
	[b0-00] = 1	X	Enable	Enable	X	X	X	Enable	X	X	X
	[b0-00] = 2	X	Enable	Enable	X	X	X	X	Enable	X	X
	[b0-00] = 3	Enable	Enable	Enable	X	X	X	X	X	X	X
	SOP control	X	Enable	Enable	X	X	X	X	X	X	X
	IDS control	X	Enable	Enable	X	X	X	X	X	X	Enable
[A9-00] = 1	[b2-00] = 0	X	X	X	X	Enable	Enable	X	X	X	X
	[b2-00] = 1	X	X	X	X	Enable	Enable	Enable	X	X	X
	[b2-00] = 2	X	X	X	X	Enable	Enable	X	Enable	X	X
	[b2-00] = 3	X	X	X	Enable	Enable	Enable	X	X	X	X
	SOP control	X	X	X	X	Enable	Enable	X	X	X	X
	IDS control	X	X	X	X	Enable	Enable	X	X	X	Enable

Note

- "X" in the table indicates that the corresponding command source is disabled.
- U2-01 and U2-17 can take effect with the parameters b1-00/b1-01/b3-00/b3-01 after being configured by them. This table only indicates whether they are active by default when they are not selected by these four parameters.
- When b0-00/b2-00 is set to 3, U2-01 and U2-17 can take effect with the parameters b0-02/b2-02 after being configured by them This table only indicates whether they are active by default when they are not selected by these two parameters.

6.1.3 Start Mode

Asynchronous motors can be started in three start modes. The start modes are set through E1-00 and affected by the setting of b1-09 and b3-09 (source of forced flying start and brake control). The following table shows parameter settings for different start modes.

Forced flying start [b1-09]/[b3-09]	Start mode [E1-00]	Brake control [L1-00]	Control method [E0-00]	Actual start mode
Enable	-	Enable	V/f	Direct start
			SVC/FVC	Pre-excitation
		Disable	FVC	Pre-excitation
			SVC/V/f	Flying start
Disable	Flying start	Enable	V/f	Direct start
			SVC/FVC	Pre-excitation
		Disable	FVC	Pre-excitation
			SVC/V/f	Flying start
	Start after DC injection braking	-	-	Start after DC injection braking
	Direct start	-	V/f	Direct start
			SVC/FVC	Pre-excitation

6.1.3.1 Direct Start (Pre-Excitation Start)

When the OFF1 start command is received in V/f control mode, the motor speed reference becomes the RFG output reference.

In SVC or FVC, the motor needs to enter the pre-excitation state before generating the rotor magnetic field to better control the output torque of the motor. You can select time or current-based excitation. After motor dynamic auto-tuning, the initial value of the excitation time will be set based on the rotor time constant.

Para.	Name	Description
E1-01	Pre-excitation mode	0: Time-based excitation, and the excitation time is set by E1-02. The excitation current is dynamically calculated according to the excitation time, and the pre-excitation is completed after the excitation time reaches. 1: Current-based excitation. E1-03 and E1-04 determine the magnitude of excitation current. Pre-excitation is completed when the motor magnetic field exceeds the minimum magnetic flux threshold when E6-03 starts.
E1-02	Pre-excitation time	The shorter the time, the greater the excitation current. Too short time may result in insufficient flux of the motor.
E1-03	Pre-excitation current reference source	0: Automatic. Excitation will be performed according to the maximum current output capacity to shorten the excitation time. 1: Numeric setpoint. The excitation current is determined by E1-04.
E1-04	Digital setting of pre-excitation current	Sets the excitation current used in the pre-excitation stage. 100% corresponding to the rated current of the motor.
E1-13	Demagnetization time	When the asynchronous motor is at non-zero speed (feedback speed > [E1-11]), the IGBT is inhibited, and it needs to wait at least the time indicated in E1-13 before starting again.

6.1.3.2 Flying Start

To restart the motor when it is running at a high speed, select the flying start mode. If E1-00 is not set to flying start, you can use b1-09 or b3-09 to enable forced flying start for once.

For details about flying start, see *"6.8 Flying Start" on page 203*.

6.1.3.3 Start after DC Injection Braking

Before the motor runs, start after DC injection braking applies a braking force to the asynchronous motor through a DC to ensure that the motor stops at zero speed.

Para.	Name	Description
E1-05	DC injection braking current	Current passing through the motor during DC injection braking, which corresponds to 100% of the rated motor current.
E1-06	DC injection braking active time	Duration of the DC injection braking stage. Long-term braking can ensure that the asynchronous motor is at the zero speed but may cause much motor heating.

6.1.4 Stop Mode

Stop commands are the command sources triggering stop, including OFF1, OFF2, OFF3, running permission commands, and faults.

Stop modes specify the actions upon corresponding stop commands, including coast to stop, stop at maximum capability, OFF3 decelerate-to-stop, and OFF1 decelerate-to-stop.

For HCU-50S/51S, each stop command corresponds to at least one stop mode, which can be configured by parameter settings. Under the default parameter settings, the stop mode is usually the same as the stop command, but there are exceptions: for example, the stop mode of V/f separation and torque control is coast to stop by default.

6.1.4.1 Stop Modes by Different Stop Commands

- Stop modes corresponding to the OFF1 stop command:

Control Mode	E1-14	E1-16	E1-18	Stop Mode
Speed control	0: Coast to stop	X	X	Coast to stop
	1: Decelerate to stop	X	X	OFF1 decelerate-to-stop
	2: Stop at maximum capability	X	X	Stop at maximum capability
Torque Control	0: Coast to stop	X	0: OFF1 stop	Coast to stop
	1: Decelerate to stop	X		OFF1 decelerate-to-stop
	2: Stop at maximum capability	X		Stop at maximum capability
	X	X	1: OFF2 stop	Coast to stop
	X	0: Decelerate to stop		OFF3 decelerate-to-stop
	X	1: Stop at maximum capability		Stop at maximum capability
V/f separation (E3-45 set to 0)	X	X	X	Coast to stop

Control Mode	E1-14	E1-16	E1-18	Stop Mode
V/f separation (E3-45 set to 1)	0: Coast to stop	X	X	Coast to stop
	1: Decelerate to stop	X	X	OFF1 decelerate-to-stop
	2: Stop at maximum capability	X	X	Stop at maximum capability

Note

In the torque control mode, the stop mode of the OFF1 stop command is relevant to E1-18.

- Stop modes corresponding to the OFF3 stop command:

Control Mode	E1-16	Stop Mode
Speed control	0: Decelerate to stop	OFF3 decelerate-to-stop
	1: Stop at maximum capability	Stop at maximum capability
Torque Control	0: Decelerate to stop	OFF3 decelerate-to-stop
	1: Stop at maximum capability	Stop at maximum capability
V/f separation (E3-45 set to 0)	X	Coast to stop
V/f separation (E3-45 set to 1)	0: Decelerate to stop	OFF3 decelerate-to-stop
	1: Stop at maximum capability	Stop at maximum capability

Note

When OFF3 is triggered during torque control, the system will switch to speed control and execute OFF3 decelerate to stop or stop at maximum capability. In torque control mode, the stop mode of the OFF3 stop command is independent of E1-18.

- Stop modes corresponding to the running permission command:

Control Mode	E1-14	E1-16	E1-18	Stop Mode
Speed control	0: Coast to stop	X	X	Coast to stop
	1: Decelerate to stop	X	X	OFF1 decelerate-to-stop
	2: Stop at maximum capability	X	X	Stop at maximum capability
Torque Control	0: Coast to stop	X	0: OFF1 stop	Coast to stop
	1: Decelerate to stop	X		OFF1 decelerate-to-stop
	2: Stop at maximum capability	X		Stop at maximum capability
	X	X	1: OFF2 stop	Coast to stop
	X	0: Decelerate to stop	2: OFF3 stop	OFF3 decelerate-to-stop
	X	1: Stop at maximum capability		Stop at maximum capability
V/f separation (E3-45 set to 0)	X	X	X	Coast to stop
V/f separation (E3-45 set to 1)	0: Coast to stop	X	X	Coast to stop
	1: Decelerate to stop	X	X	OFF1 decelerate-to-stop
	2: Stop at maximum capability	X	X	Stop at maximum capability

Note

In torque control mode, the stop mode of the running permission command is independent of E1-18.

- The stop mode of OFF2 and fault is always coast to stop.

6.1.4.2 Actions in Different Stop Modes

- Coast to stop
  When a motor coasts to stop, the IGBT output is directly inhibited and the motor rotates freely due to inertia and stops due to friction. For large-inertia devices, this process takes quite a long time. Most faults and OFF2 emergency stop can trigger the coast-to-stop mode.

  In V/f separation, the coast-to-stop mode is used on all occasions.

- OFF1 decelerate-to-stop
  OFF1 decelerate-to-stop is typically activated by the OFF1 command at a low level. After it is activated, the speed reference of the motor is forced to be 0. The motor decelerates to 0 within the RFG deceleration time. Pulses are inhibited or DC injection braking at stop is started when the speed approaches 0. For details about zero speed determination and DC injection braking at stop, see *"6.1.5.1 Zero Speed Determination" on page 125*.

  The OFF1 stop mode can be set through the E1-14 parameter. The default value is 1, which indicates that the motor decelerates to stop, that is, OFF1 decelerate-to-stop is activated.

- OFF3 decelerate-to-stop

After OFF3 decelerate-to-stop is activated, the speed reference of the motor is forced to be 0. The motor decelerates to 0 within the OFF3 stop duration specified by E1-15. There is no arc in the deceleration process and the IGBT is inhibited when the motor reaches zero speed.

- Stop at maximum capability
  After stop-at-maximum-capability is activated, the speed reference of the motor is forced to be 0. The motor decelerates to 0 based on the maximum output capability. During deceleration, the motor torque or current may reach the limit.

  The motor may stop at the maximum capability during OFF1 stop or OFF3 stop.

6.1.5 Zero Speed Determination and DC Injection Braking at Stop

6.1.5.1 Zero Speed Determination

Except for the coast-to-stop mode, all the other three stop modes need the motor speed to be reduced to zero before IGBT output inhibited. The determination of zero speed of the motor involves two parameters: the condition of zero speed is considered to be met only after the absolute value of the actual speed of the motor is less than [E1-11] and the duration exceeds [E1-12].

However, note that:

- If E1-12 is too small, the IGBT will be inhibited before the motor speed reaches the zero speed, which extends the duration between motor stop and the completely static state. Enlarging the time indicated by E1-12 can ensure that the IGBT is inhibited after the motor is in the completely static state.
- If E1-11 is too small, the stop conditions may fail to be met due to the speed detection error, causing constant output near the zero speed.
  If E1-11 is too large, the motor may coast to stop before a standstill.
- If brake control is enabled, the IGBT is inhibited only after the brake is closed when the zero speed conditions are met.

Therefore, set the zero speed determination conditions properly based on the actual running requirements, and increase E1-12 to ensure that the motor is in the completely static state.

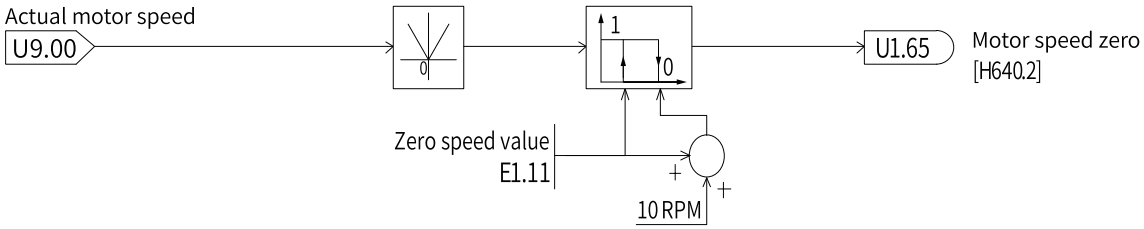


Figure 6-1 Motor zero speed determination conditions

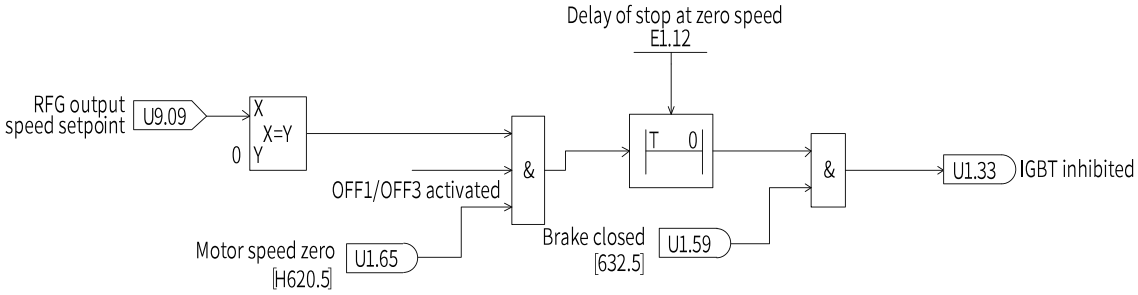


Figure 6-2 IGBT inhibited determination conditions

6.1.5.2 DC Injection Braking at Stop

Two more stops modes can be derived from the OFF1 decelerate-to-stop mode: one is normal stop ([E1-07] set to 0), in which the output of IGBT is inhibited after zero speed conditions are met. The other is DC injection braking at stop ([E1-07] > 0).

DC injection braking at stop in OFF1 decelerate-to-stop mode is triggered when the speed of an asynchronous motor is less than E1-10 (braking starting speed).

If E1-13 (demagnetization time) is not zero, the IGBT is inhibited; otherwise, the device will directly enter the DC injection braking state.

The DC injection braking current indicated by E1-05 is generated during DC injection braking and lasts for a duration indicated by E1-07 to ensure that the motor completely stops. Then, the IGBT is inhibited.

Para.	Name	Description
E1-05	DC injection braking current	The output current during DC injection braking. 100% corresponds to the motor rated current.
E1-07	Shutdown DC injection braking active time	E1-07 = 0: Disable DC injection braking at stop and stop the motor according to zero speed determination. E1-07 ≠ 0: Enable DC injection braking at stop and determine the braking duration.
E1-10	Braking starting speed	OFF1 decelerating to stop decelerates below this speed before DC injection braking starts. If DC injection braking is started at a high speed, the braking torque may be reduced.
E1-13	Demagnetization time	Wait for motor demagnetization before starting DC injection braking. During demagnetization, the motor rotates freely. When it is set to 0, skip this step and directly start DC injection braking at stop.

Note

DC injection braking takes effect only for asynchronous motors in the OFF1 decelerate-to-stop mode.

6.1.6 Start/Stop Control Words

6.1.6.1 Start/Stop Control Words

Start/stop control words are bit code commands controlling the running, stop, and fault reset of the drive. Drive control is performed to process start/stop control words according to the priority in the following function diagram.

Function diagram of start/stop control words

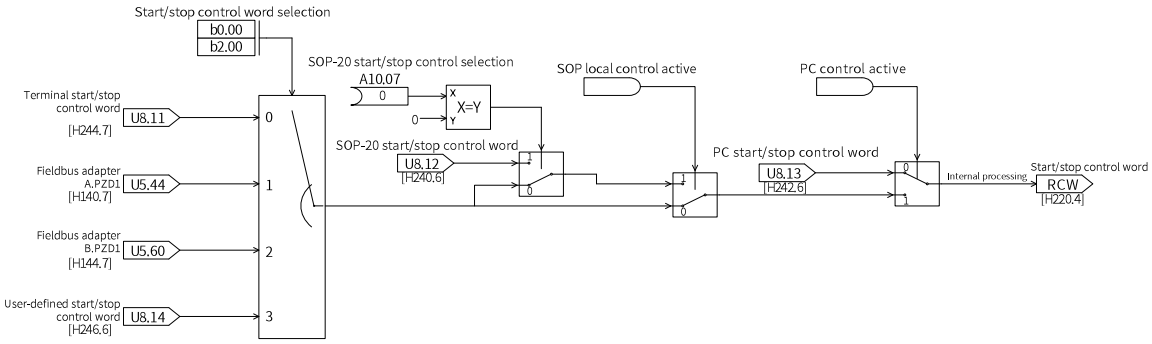


Figure 6-3 Function diagram of start/stop control words

As shown in the figure, InoDriveStudio, followed by SOP-20-880, has the highest priority, and when InoDriveStudio local control is active, other control sources will be ignored.

Only when local control is not enabled, a control channel is activated based on A9.00. There are four sources of control channels, and the corresponding configuration is activated according to the settings of b0.00/b2.00. No matter whether local control is enabled or not, the function of fault reset of SOP-20-880 and InoDriveStudio is enabled.

6.1.6.2 U8-11 Terminal Start/Stop Control

For details about configurations of U8-11 terminal start/stop control, see *" Terminal Start/Stop Module" on page 148*.

bits	Description
00	1 = Running 0 = OFF1
01	1 = Jog 1
02	1 = Jog 2
03	1 = Invert speed setpoint 0 = No operation
04	Reserved
05	Reserved
06	Reserved
07	Reserved
08	Reserved
09	Reserved
10	Reserved
11	Reserved
12	Reserved
13	Reserved
14	Reserved
15	Reserved

U8.11 Terminal start/stop control word [H248.1]

Figure 6-4 U8-11 terminal start/stop control diagram

6.1.6.3 User-Defined Start/Stop Control Word

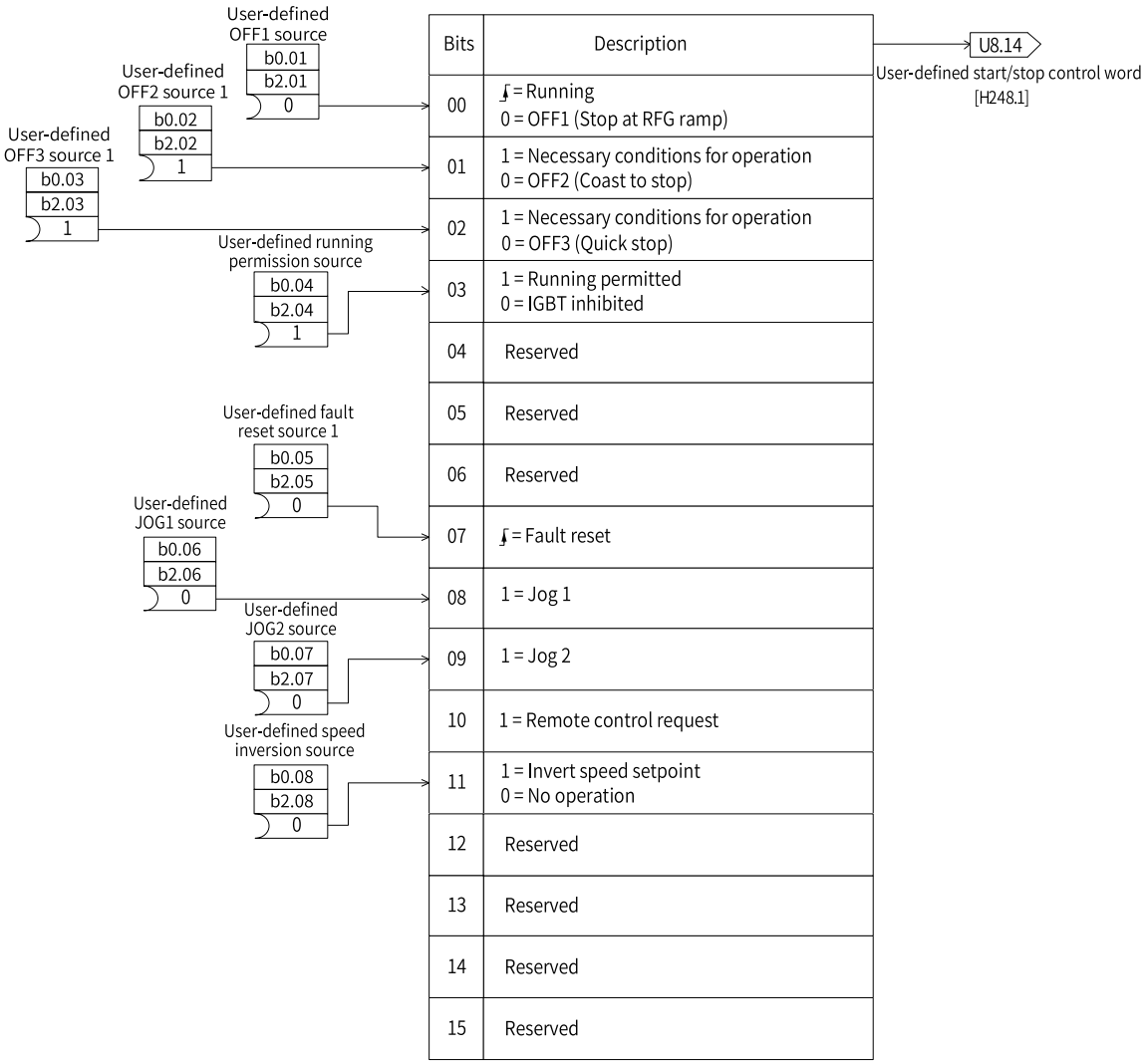


Figure 6-5 U18-14 terminal start/stop control diagram

6.1.6.4 Start/Stop Control Word from Fieldbus Adapter

When the source of the start/stop control word is the fieldbus adapter, the structure of the start/stop control word is basically the same as that of the user-defined start/stop control module, but each control bit no longer needs to be configured separately through the parameter, but is directly obtained from PZD1 of the process data by default.

When the start/stop control module comes from fieldbus adapter A, U5-44 is used as the start/stop control word, and the corresponding bits are U2-00 to U2-15.

When the start/stop control module comes from fieldbus adapter B, U5-60 is used as the start/stop control word, and the corresponding bits are U2-16 to U2-31.

Table 6–3 Start control word coming from the user-defined parameter setting equivalent to the field-bus adapter

Start/Stop Control Word Parameter of Channel 1	Start/Stop Control Word Parameter of Channel 2	Para. Name	Equivalent Parameter Setting When from Fieldbus Adapter A	Equivalent Parameter Setting When from Fieldbus Adapter B
b0-01	b2-01	User-defined OFF1 source	U2-00	U2-16
b0-02	b2-02	User-defined OFF2 source 1	U2-01	U2-17
b0-03	b2-03	User-defined OFF3 source 1	U2-02	U2-18
b0-04	b2-04	User-defined running permission source	U2-03	U2-19
b0-05	b2-05	User-defined fault reset source 1	U2-07	U2-23
b0-06	b2-06	User-defined JOG1 source	U2-08	U2-24
b0-07	b2-07	User-defined JOG2 source	U2-09	U2-25
b0-08	b2-08	User-defined speed inversion source	U2-11	U2-27

6.1.6.5 Setting Parameters

As shown in the following table, take control channel 1 as an example.

Table 6–4 Control channel 1 parameter setting

Para.	Name	Description	Command Source
b0-01	User-defined OFF1 source	Command source output: 0: Normal stop 0→1: Start	0: 0 1: Reserved 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector
b0-02	User-defined OFF2 source 1	Command source output: 0: Enable, IGBT inhibited, coast to stop 1: Disable	0: 0 1: 1 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector
b0-03	User-defined OFF3 source 1	Command source output: 0: Enable 1: Disable	

For example:

b0-00 = 3: User-defined (set in group b0)

b0-01 = 2: Select DI1 as the command source of OFF1. When DI1 changes from 0 to 1, the device is started.

b0-02 = 3: Select DI2 as the command source of OFF2. When DI2 becomes 0 (low level), the device coasts to stop.

b0-03 = 4: Select DI3 as the command source of OFF3. When DI3 is 0 (low level), the device decelerates to stop.

6.1.6.6 Running Permission and Fault Reset

Only when the running permission signal function is enabled, IGBT trigger pulses can be sent and the device can output current. If the drive is started but the running permission is disabled, IGBT cannot be triggered. The following table lists the parameters of running permission and fault reset.

Table 6–5 Parameters of running permission and fault reset

Para.	Name	Description	Command Source
b0-04/b2-04	User-defined running permission source	Command source output: 0: Running not permitted 1: Running permitted	0: 0 1: Reserved 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector
b0-05/b2-05	User-defined fault reset source 1	Command source output: 0: Disable 0→1: Fault reset	

6.1.6.7 Jog, Ramp Function Generator, and Speed Regulator Enable Parameter Setting

For details of the RFG and sped regulator function modules, see *" Ramp Function Generator" on page 152* and *"6.6.8 Speed Controller" on page 175*. The relevant parameter settings of the control channel are as follows:

Table 6–6 Jog, Ramp Function Generator, and Speed Regulator Enable Parameter Setting

Para.	Name	Description	Command Source
b0-06/b2-06	User-defined JOG1 source	Command source output: 0: Disable 1: Enable	0: 0 1: Reserved 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector
b0-07/b2-07	User-defined JOG2 source	Command source output: 0: Disable 1: Enable	
b0-08/b2-08	User-defined speed inversion source	Command source output: 0: Disable 1: Enable	0: 0 1: 1 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector
b1-06/b3-06	RFG prohibition source	Command source output: 0: RFG disable is active, RFG output is forced to 0 1: RFG outputs normally	
b1-07/b3-07	RFG pause source	Command source output: 0: RFG halt is active, RFG maintains current output value 1: RFG runs normally	
b1-08/b3-08	Source of setting RFG reference to 0	Command source output: 0: RFG input is forced to 0 1: RFG gets input normally	
b1-11/b3-11	Speed regulator enable source	Command source output: 0: Disable 1: Enable	

6.1.7 Control Word

A control word is a set of various control commands in the system, which is derived from the control channel parameter setpoints.

6.1.7.1 Control Word 1

Control word 1 can be viewed by using parameter U8-07. The following table lists bits of control word 1 and their corresponding parameters.

Bit	Name	Para.	Value	Description
0	Run/Stop (OFF1)	b0-01<1> b2-01<1>	0	Stop: The AC drive enters S5 ready-to-switch-on state in the OFF1 stop mode defined by E1-14.
			1	Running: At the rising edge, the AC drive's state changes from "Ready to switch on" to "Pre-charge" and then to "Ready to run". You can select self-test (b5-01), auto-tuning (b5-00), or normal operation after the AC drive starts running.
1	Coast to stop (OFF2)	b0-02<2> b1-00/b1-01<2> b2-02<2> b3-00/b3-01<2>	0	IGBT is inhibited and the AC drive enters the S4 switch-on-inhibited state.
			1	Normal
2	Quick stop (OFF3)	b0-03<2> b1-02/b1-03<2> b2-03<2> b3-02/b3-03<2>	0	The motor decelerates to 0 RPM according to the OFF3 stop mode defined in E1-16. Then, the IGBT is inhibited and the AC drive enters the S4 switch-on-inhibited state.
			1	Normal
3	Running permission	b0-04<3> b2-04<3>	0	In the OFF1 active state, the motor enters the S7 ready-to-run state according to the stop mode defined in E1-17 and the IGBT is inhibited.
			1	In the S7 ready-to-run state, the AC drive must receive the running permission signal before entering the normal running state.
4	Ramp output disabled	b1-06 b3-06	0	The output of the ramp function generator is forced to 0.
			1	Normal
5	Ramp output retained	b1-07 b3-07	0	The last output of the ramp function generator is retained.
			1	Normal
6	Ramp input being zero	b1-08 b3-08	0	The setpoint of the ramp function generator is forced to 0 and the output decelerates to 0 according to the set time.
			1	Normal
7	Fault reset	b0-05<4> b1-04/b1-05<4> b2-05<4> b3-04/b3-05<4>	0	Disable
			0→1	If the current fault disappears, the state machine changes from the S3 faulty state to the S4 switch-on-inhibited state during running. When OFF1 is set to 0, the state machine enters the S5 ready-to-switch-on state.
8	Jog 1 (JOG1)	b0-06 b2-06 b4-13	0	Disable
			1	1. Ready to switch on→Jog. C5-00 JOG1 setpoint is speed setpoint. 2. Jog switching is active during operation, and the current speed is C5-00 JOG1 setpoint.
9	Jog 2 (JOG2)	b0-07 b2-07 b4-14	0	Disable
			1	1. Ready to switch on→Jog. C5-00 JOG2 setpoint is speed setpoint. 2. Jog switching is active during operation, and the current speed is C5-01 JOG2 setpoint.
10	Remote control	/	0	Disable
			1	Receives control word command set by channel 1 or channel 2.
11	Invert speed setpoint	b0-08<5> b2-08<5>	0	The speed setpoint is used.
			1	The speed setpoint is negated and then used by the RFG.

Bit	Name	Para.	Value	Description
12	Motor-driven potentiometer increase	C4-05	0	C4-06 and C4-05 selection 00: Invalid, output value unchanged 01: Motor-driven potentiometer output increases at the predefined slope 10: Motor-driven potentiometer output decreases at the predefined slope 11: Invalid, output value unchanged
			1	
13	Motor-driven potentiometer decrease	C4-06	0	
			1	
14	External fault 1	H0-00	0	Invalid
			1	External fault 1 is triggered.
15	External fault 2	H0-01	0	Disable
			1	External fault 2 is triggered.

Note

- <1>: OFF1 command may come from the terminal start/stop module, fieldbus adapter or user-defined group setting. b0-01/b2-01 are only active when the user-defined start/stop control word is selected. See *" " on page* .
- <2>: OFF2/OFF3 command can be set in the start/stop control word and other control words. The settings in other control words are always active and not effected by the sources of start/stop control words. See *"6.1.2 Emergency Stop Command" on page 119*.
- <3>: b0-04/b2-04 are only active when a user-defined start/stop control word is selected; When terminal start/stop is selected, the running permission command is always active. When the fieldbus adapter is selected, the running permission command corresponds to the state of bit3 of PZD1.
- <4>: For details about reset upon fault, see *"10.1.3 Fault Reset Modes" on page 754*.
- <5>: b0-08/b2-08 are only active when a user-defined start/stop control word is selected; When terminal start/stop is selected, the speed setpoint inversion is determined by the configuration and input of the terminal start/stop module. When the fieldbus adapter is selected, the speed setpoint inversion corresponds to the state of bit11 of PZD1.

6.1.7.2 Control Word 2

Control word 2 can be viewed by using parameter U8-08. The following table lists bits of control word 2 and their corresponding parameters.

Bit	Name	Para.	Value	Description
0	External alarm 1	H0-02	0	Disable
			1	External alarm 1 is triggered.
1	External alarm 2	H0-03	0	Disable
			1	External alarm 2 is triggered.
2 to 3	Motor selection	A9-01 A9-02	0 to 3	A maximum of four motor groups and related control parameters (groups d and E) can be stored. A9-01 and A9-02 selection The values 0 to 3 correspond to motor data sets 1 to 4 in the active state. The currently active motor data is displayed by the parameters of motor parameter (group d) and motor control (group E).
4 to 7	Multi-reference data selection	C6-01 to C6-04	0	The values correspond to C6-01 to C6-04. One of the fixed values of C6-05 to C6-20 is selected as the multi-reference output value.

Bit	Name	Para.	Value	Description
8	Channel selection	A9-00	0	Channel 1 is activated, and b0, b1, C0, and C1 are selected as the command source and reference source.
			1	Channel 2 is activated, and b2, b3, C2, and C3 are selected as the command source and reference source.
9	Forced flying start	b1-09 b3-09	0	E1-00 sets whether to enable flying start.
			1	Flying start is forcibly enabled.
10	Speed regulator enable	b1-11 b3-11	0	The speed regulator output is forced to be 0, and the motor can rotate freely.
			1	The speed regulator works properly and ensures the switch-on speed.
11	Reserved	/	-	-
12	Forced torque control	b1-10 b3-10	0	The control mode is determined by E0-01.
			1	Vector control is forced in torque control mode.
13 to 15	Reserved	/	-	-

6.1.8 Status Word

A status word is a set of bit codes for the running states of the drive. Check the status word to determine the system status.

6.1.8.1 Status Word 1

Status word 1 is displayed in U8-09. Status word 1 indicates the main running states of the system. The following table lists bits of status word 1 and their corresponding bit connectors and meanings.

Bit	Name	Para.	Value	Description
0	Ready to switch on	U1-00	0	The AC drive is faulty or external conditions are not met. (See the description of switch-on inhibited.)
			1	Operation preparation is completed. The value is 1 regardless of whether there is a RUN (OFF1) command or not.
1	Ready to run	U1-01	0	There is no RUN command.
			1	The AC drive receives a RUN command and bus voltage is established. The value is fixed to 1 regardless of whether the running permission command is available.
2	Running	U1-02	0	There is no running permission signal.
			1	The value is 1 during normal running.
3	Fault activation	U1-03	0	No fault
			1	Fault activated
4	Coast to stop activation (OFF2)	U1-04	0	Coast to stop activated
			1	Coast to stop not activated
5	Quick stop activation (OFF3)	U1-05	0	Quick stop is activated.
			1	Quick stop not activated
6	Switch-on prohibited	U1-06	0	Normal
			1	External conditions are not met (OFF2 or OFF3 activated) or a fault occurs.

Bit	Name	Para.	Value	Description
7	Alarm/limit activation	U1-07	0	Normal
			1	An alarm or a limit is active.
8	No speed deviation	U1-08	0	The actual speed deviates from the speed reference.
			1	The actual speed follows the speed reference.
9	Remote control enabled	U1-78	0	IDS or SOP-20 local control is active, and the control channel is disabled.
			1	The control channel is enabled. This bit is automatically determined by the state machine and does not support manual setting.
10	Comparative speed achievement	U1-09	0	The actual speed is lower than the comparison value.
			1	The actual speed is higher than the comparison value.
11	Limit achievement	U1-10	0	The torque or current does not reach the limit.
			1	The torque or current reaches the limit.
12	Brake open	U1-11	0	Brake close
			1	Brake open
13	Speed direction	U1-12	0	Reverse
			1	Forward
14	Current reference channel	U0-26	0	Command channel 1 is active.
			1	Command channel 2 is active.
15	IGBT running	U1-13	0	IGBT is blocked.
			1	IGBT is triggered.

6.1.8.2 Status Word 2

Status word 2 can be viewed by using parameter U8-10. Status word 2 indicates the auxiliary status of the system.

Bit	Name	Value	Description
0	Ramp enable	0	The RFG is disabled and the output is 0.
		1	The RFG works properly.
1	Ramp running	0	The output of the RFG remains the same as the value during the past cycle
		1	The RFG works properly.
2	Ramp bypass	0	The input and output of the RFG are the same. The ramp time is invalid.
		1	The RFG works properly.
3	Normal running	0	The motor is not running or jogging.
		1	The AC drive starts running based on the RUN (OFF1) command.
4	Jogging	0	The motor is not running or jogging.
		1	The AC drive is started by the jog command.
5	Reserved	-	-
6	Parameter auto-tuning	0	Auto-tuning is not ongoing.
		1	Motor parameter auto-tuning is ongoing.
7	A limit is activated.	0	No limit is activated.
		1	A limit is activated.
8	An alarm is activated.	0	No alarm is activated.
		1	An alarm is activated.
9 to 10	Current motor selection	0 to 3	Motor data set that is currently activated

Bit	Name	Value	Description
11	SOP-20 local control is activated.	0	SOP-20 local control is not activated.
		1	SOP-20 local control is activated using the Loc/Rem button of the SOP-20, which controls AC drive operation on behalf of the control channel.
12 to 15	Reserved	-	-

The status word indicates the working state of HCU. The main status bits change with the control word as shown in the following figure.

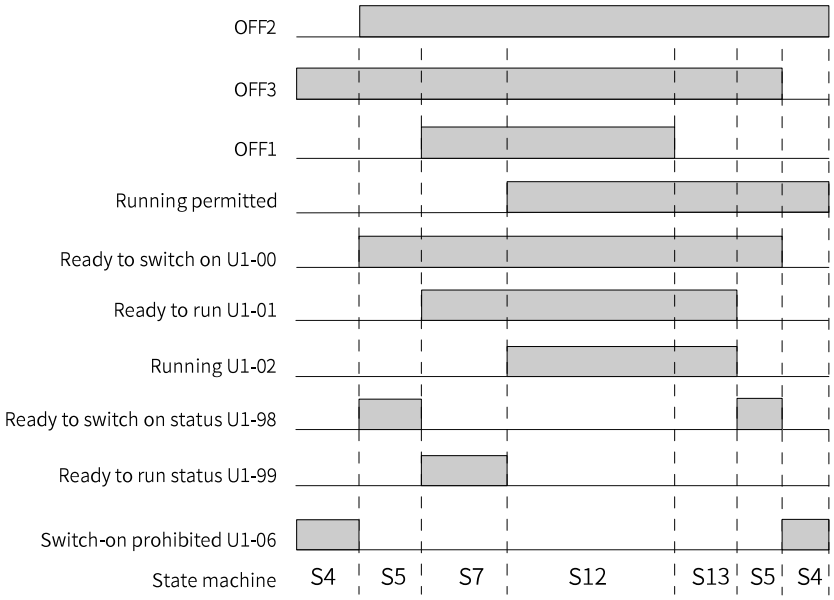


Figure 6-6 Status bit sequence diagram

6.1.9 State Machine

The following table describes different statuses of the state machine.

Status	Name	Description
S1	System initialization	The program is initialized and waits for control voltage build-up. The system enters S2 when conditions are met.
S2	Power-on check	If you select power-on self-test items, the system performs self-test after the bus voltage is established and then enters S4. The system directly enters S4 if no power-on self-test item is selected.
S3	Fault	The state machine enters S3 when a fault occurs in any state. After the fault is reset, the state machine enters S4.
S4	Switch-on inhibited	The state machine enters S5 when no OFF2, OFF3, STO, or OFF1 signal is received. Otherwise, the state machine waits for the corresponding command in this state.
S5	Ready to switch on	The state machine waits for the Run (OFF1) command and enters S6 at the rising edge of the command. The state machine enters S6 when the jog command is valid. The state machine enters S18 when the value of b5-00 is greater than 0. The state machine enters S16 when the value of b5-01 is greater than 0.

Status	Name	Description
S6	Pre-charge	The state machine waits for the establishment of the DC bus voltage and then enters S7. If [A6-00] is 0, the 64-1 pre-charge failure fault is reported if the bus voltage does not reach the normal level within 6 seconds. If [A6-00] is 1, and the bus voltage fails to become normal after the starting time set by [A6-01] has elapsed, the 64-1 pre-charge failure fault is reported, and the system enters S3 If the bus voltage is normal but HINT is not ready, the 64-2 pre-charge failure fault is reported and the system enters S3.
S7	Ready to run	The system enters S8 after receiving the running permitted signal.
S8	Waiting for demagnetiza-tion	When IGBT is inhibited for the first time, if the actual motor speed is greater than the zero speed threshold, the state machine has to wait until the interval is greater than the demagnetization time defined in E1-13. If the inhibition duration is longer than the demagnetization time, the state machine enters S9.
S9	Detection before running	The system executes the selected pre-running self-test items. If no item is selected, the system skips this state. The state machine enters S10, S11 or S15, depending on the startup mode.
S10	Pre-excitation	The state machine creates a magnetic field for the asynchronous motor and then enters S12.
S11	Flying start	The state machine searches for the current motor speed and then enters S12.
S12	Running	The state machine runs normally and can accept speed or torque references. The system enters S13 after receiving the stop (OFF1) command. The system enters S14 after receiving the quick stop (OFF3) command. The state machine enters S4 when the OFF2 or STO signal is activated.
S13	OFF1 stop	The IGBT is inhibited when the speed is reduced to 0 within the deceleration time specified by the RFG. Then the system enters S5.
S14	OFF3 stop	The IGBT is inhibited when the speed is reduced to 0 within the OFF3 stop time. Then the system enters S4.
S15	DC injection braking at startup	Before DC injection braking is enabled, a direct current is applied to the asynchronous motor to brake the motor to zero speed. The state machine enters S12 after the braking time is reached.
S16	Self-test preparation	The system enters S17 on the rising edge of the RUN (OFF1) command.
S17	Self-test	The system enters S4 after completion.
S18	Ready for auto-tuning	The system enters S19 on the rising edge of the RUN (OFF1) command.
S19	Auto-tuning	The state machine auto-tunes the motor parameters and then enters S4.
S20	Parameter restoration	The state machine restores the motor parameters to defaults and then enters S4.
S21	Parameter downloading	The state machine downloads the motor parameters in batch in software and then enters S4.
S22	Jogging	The system enters S23 after the jog command is canceled.
S23	Jog stop	The system enters S4 after completion. The system returns to S22 after the jog command is restored.
S24	Stop with running permission	The system enters this state when the running permitted command is canceled during operation. Then the system enters S7.

Status	Name	Description
S25	Stop by DC injection braking	The state machine supplies a DC current to the asynchronous motor to force the motor to stop and then enters S4 after a certain period of time.
S26	Wait for stop by DC injection braking	When the motor decelerates to a value smaller than the threshold for a period of time, the state machine enters S25.
S27	Stop at fault	The system enters this state if a fault is activated, and then decelerates to zero speed based on the fault level or stops directly. The system performs blocking or enters S3.

State diagram:

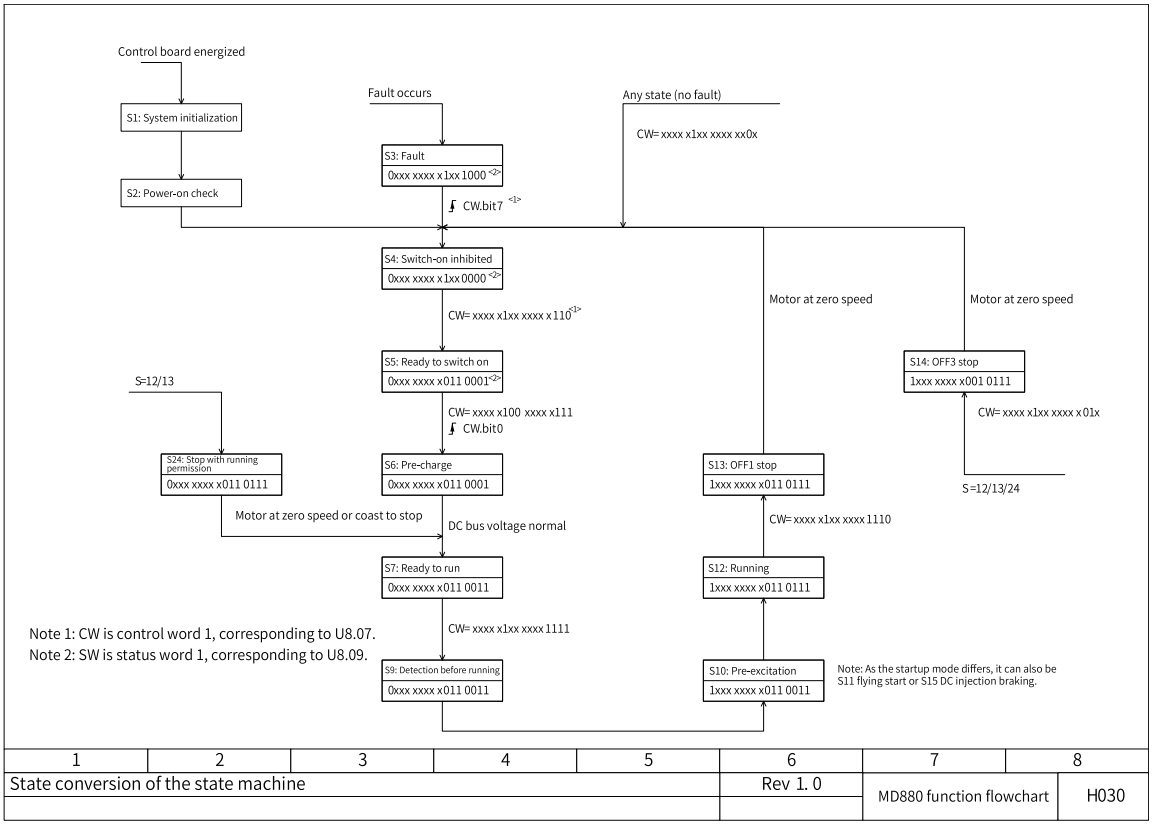


Figure 6-7 State conversion diagram of the state machine

6.2 Reference Channel

6.2.1 Speed Reference

Speed reference can be given through two channels: the primary reference channel and the secondary reference channel, as shown in the following figure *“9.4.9 H310 - Regular speed reference source” on page 723*.

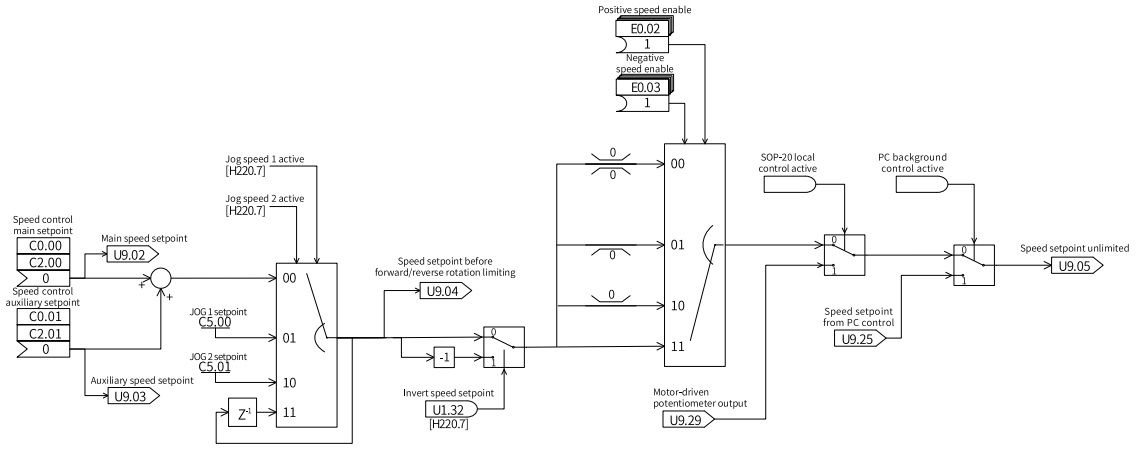


Figure 6-8 Function diagram of speed reference

The primary reference and secondary reference are added as the input of the ramp function generator. After the acceleration/deceleration time, the actual speed reference is generated.

Sometimes, a speed regulation reference that is enabled directly without acceleration/deceleration time is required for the process. The function diagram H328 provides an additional speed reference, which is enabled only during running. It is added to the RFG output speed when it is being enabled. The additional speed is enabled only in FVC and SVC control modes.

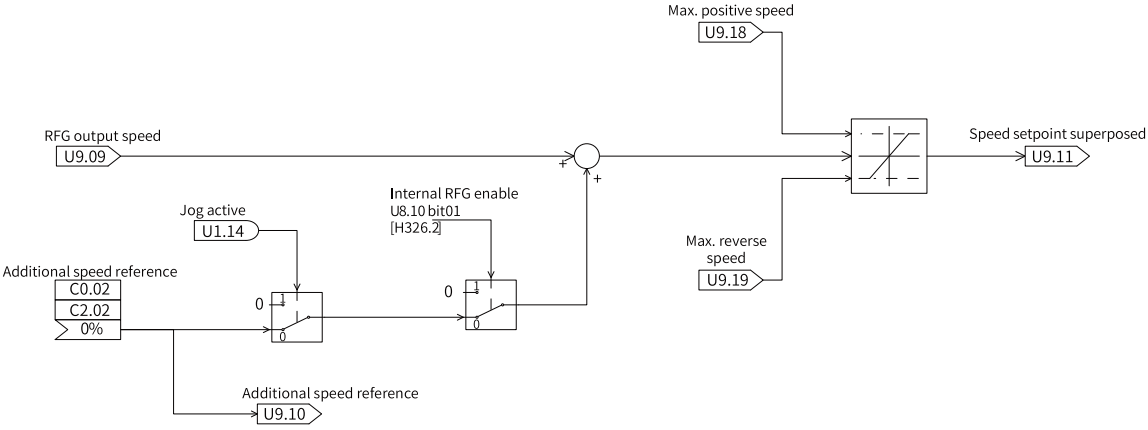


Figure 6-9 Additional speed reference function diagram

The speed reference source can be analog quantity, communication, and multi-reference values. Taking channel 1 as an example, the parameters are described as follows:

Para.	Name	Setpoint
C0-00	Speed control main reference selection	0: 0 1: Multi-reference value 1 2: AI1 3: AI2 4: HDI1 5: HDI2 6: Multi-reference value 7: Motor-driven potentiometer 8: Reserved 9: Process data 2 of fieldbus adapter A 10: Process data 2 of fieldbus adapter B Other: K connector
C0-01	Auxiliary speed control reference selection	
C0-02	Additional speed reference	

The speed reference is in percentage, and its base value (100%) is determined by d3-02 (per-unit -speed).

6.2.2 Torque Reference

The torque reference is shown in the following function diagram. When the torque control is active, the torque control main reference generates the actual torque reference after filtering and ramp acceleration and deceleration time, and then additional torque is superimposed to finally generate the torque reference unlimited.

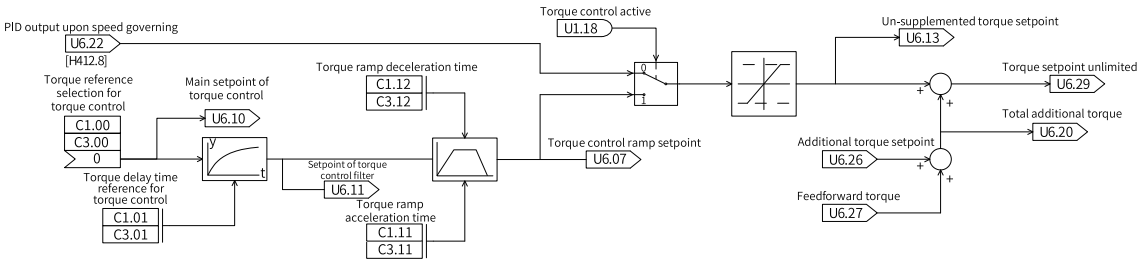


Figure 6-10 Torque reference channel in torque control

Two channels are available for torque reference. The following table describes the parameters of channel 1.

Para.	Name	Setpoint
C1-00	[Torque control] Torque reference selection	0: 0 1: Multi-reference value 2 2: AI1 3: AI2 4: HDI1 5: HDI2
C1-00	[Torque control] Torque reference selection	6: Multi-reference value 7: Motor-driven potentiometer 8: Reserved 9: Process data 3 of fieldbus adapter A 10: Process data 3 of fieldbus adapter B Other: K connector
C1-01	[Torque control] Torque filter time reference	0.00s to 10.00s
C1-02<1>	[Torque control] Speed window enable	0: Disable 1: Enable
C1-03<1>	[Torque control] Window speed selection	0: Speed reference for channel 1 1: Digital setting
C1-04<1>	[Torque control] Window speed digital setting	–600.0% to +600.0% 100.0% corresponds to rated motor frequency.
C1-05<1>	[Torque control] Speed window width	0.0% to 30.0% 100.0% corresponds to rated motor frequency.
C1-06	Additional torque reference 1 selection	0: 0 1: Digital setting Other: K connector
C1-07	Additional torque 1 digital setting	–400.0% to +400.0% 100.0% corresponds to rated motor torque.
C1-08	Additional torque reference 2	0: 0 Other: K connector
C1-09	Friction torque selection (additional torque reference 3)	0: 0 1: D2-03 digital setting Other: K connector
C1-10	RFG feedforward torque coefficient selection	0: 0% 1: 100% Other: K connector
C1-11<2>	Torque ramp acceleration time	0.000s to 60.000s
C1-12<3>	Torque ramp deceleration time	0.000s to 60.000s

Note

- <1>: Windowed torque control is detailed in section *"6.6.3 Windowed Torque Control" on page 165*.
- <2>: Acceleration time: Time for the motor torque to increase from 0 to the rated torque.
- <3>: Deceleration time: Time for the motor torque to decrease from the rated torque to 0.

6.2.3 Multi-Reference Value

When the multi-reference is selected, the multi-reference values 1 to 16 (U9-31 to U9-46) can be directly used as the setpoints, and when the multi-reference values 13 to 16 are selected, the accuracy is higher. You can also use the multi-reference value selection output (U9-30) as the setpoint, and C6-01 to C6-04 will determine the actual effective multi-reference values. The following table lists the parameter settings.

Para.	Name	Setpoint
C6-01 to C6-04	Multi-reference selection 1/2/3/4	0: 0 1: 1 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector
C6-05 to C6-16	Multi-reference values 1 to 12	–600.0% to +600.0%
C6-17 to C6-20	Multi-reference values 13 to 16	–300.00% to +300.00%

0000 (binary) to 1111 (binary) corresponding to C6-01 to C6-04 correspond to multi-reference values 1 to 16. Multi-reference values are displayed in C6-00.

Multi-reference value	[C6-04] bit3	[C6-03] bit2	[C6-024] bit1	[C6-01] bit0	Active Multi-Reference Value of U9-30	Connector Parameter Corresponding to Multi-Reference Value
Multi-reference value 1	0	0	0	0	C6-05	U9-31
Multi-reference value 2	0	0	0	1	C6-06	U9-32
Multi-reference value 3	0	0	1	0	C6-07	U9-33
Multi-reference value 4	0	0	1	1	C6-08	U9-34
Multi-reference value 5	0	1	0	0	C6-09	U9-35
Multi-reference value 6	0	1	0	1	C6-10	U9-36
Multi-reference value 7	0	1	1	0	C6-11	U9-37
Multi-reference value 8	0	1	1	1	C6-12	U9-38
Multi-reference value 9	1	0	0	0	C6-13	U9-39

Multi-reference value	[C6-04] bit3	[C6-03] bit2	[C6-024] bit1	[C6-01] bit0	Active Multi-Reference Value of U9-30	Connector Parameter Corresponding to Multi-Reference Value
Multi-reference value 10	1	0	0	1	C6-14	U9-40
Multi-reference value 11	1	0	1	0	C6-15	U9-41
Multi-reference value 12	1	0	1	1	C6-16	U9-42
Multi-reference value 13	1	1	0	0	C6-17	U9-43
Multi-reference value 14	1	1	0	1	C6-18	U9-44
Multi-reference value 15	1	1	1	0	C6-19	U9-45
Multi-reference value 16	1	1	1	1	C6-20	U9-46

Multi-reference values 1 to 4 (U0-31 to U0-34) are determined by multi-reference selection parameters 1 to 4 (C6-01 to C6-04).

Multi-reference selection	Connector Parameter Corresponding to Multi-Reference Selection
Multi-reference selection 1 C6-01	U0-31
Multi-reference selection 2 C6-02	U0-32
Multi-reference selection 3 C6-03	U0-33
Multi-reference selection 4 C6-04	U0-34

6.2.4 Motor-Driven Potentiometer

Motor-driven potentiometer function diagram H302:

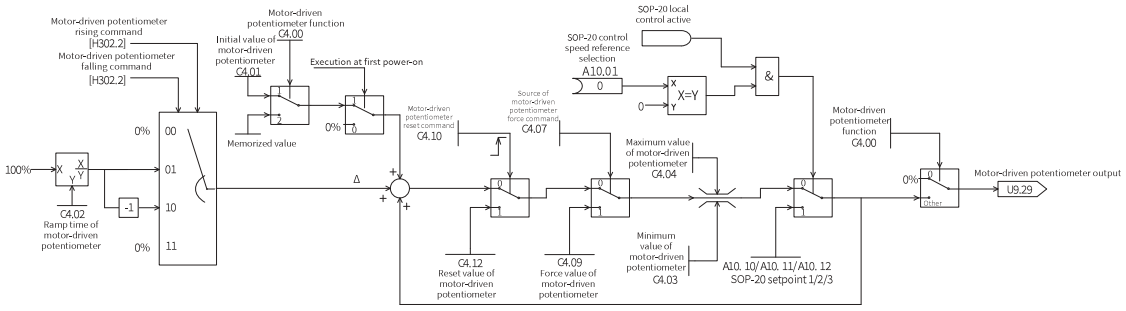


Figure 6-11 Function diagram of motor-driven potentiometer output

When an SOP-20-880 is used to control the device, local control is active and A10-01 is set to 0. The speed reference is from the motor-driven potentiometer output, and the increase and decrease of the potentiometer is controlled by the SOP-20-880.

The following table lists the function parameters of the motor-driven potentiometer.

Para.	Name	Description	Setpoint
C4-00	Motor-driven potentiometer function	0: Disable 1: Recover to initial value at power-on 2: Recover to memorized value at power-on	0: Disable 1: Not retentive at power failure 2: Retentive at power failure
C4-01	Initial value of motor-driven potentiometer	Initial value after power-on	–600.0% to +600.0%
C4-02	Ramp time of motor-driven potentiometer	Time for output to increase from 0% to 100% or decrease from 100% to 0%	0.1s to 1000.0s
C4-03	Minimum value of motor-driven potentiometer	Lower limit of output value decrease	–600.0% to +600.0%
C4-04	Maximum value of motor-driven potentiometer	Upper limit of output value increase	–600.0% to +600.0%
C4-05	Source of motor-driven potentiometer increase command	When increase or decrease is active, the output increases or decreases at the set rate. When increase and decrease are both active or inactive, the output value remains unchanged.	0: 0 1: 1 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector
C4-06	Source of motor-driven potentiometer decrease command		
C4-07	Source of motor-driven potentiometer force command	When it is 1, the motor-driven potentiometer output is forced to the force value selected by C4-08.	
C4-08	Source of motor-driven potentiometer force value	Sets the source of the force value.	0: 0 1: 100% 2: Digital setting Other: K connector
C4-09	Force value of motor-driven potentiometer	When C4-08 is set to 2, it is the forced value of numeric setpoint.	–600.0% to +600.0%

Para.	Name	Description	Setpoint
C4-10	Source of motor-driven potentiometer reset command	The rising edge of the reset command triggers a reset of the output value to the value selected by C4-11.	0: 0 1: 1 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector
C4-11	Source of motor-driven potentiometer reset value	Sets the source of the reset value.	0: 0 1: 100% 2: Digital setting Other: K connector
C4-12	Reset value of motor-driven potentiometer	Reset value of numeric setpoint when C4-11 is set to 2.	–600.0% to +600.0%

Note

When SOP-20 local control is active and A10.01 is set to 0 [motor-driven potentiometer], you can use any of parameters A10.10 to A10.12 to set the output of the motor-driven potentiometer to a fixed value.

6.2.5 Jog Speed Reference

The function diagram of jog speed reference is as follows:

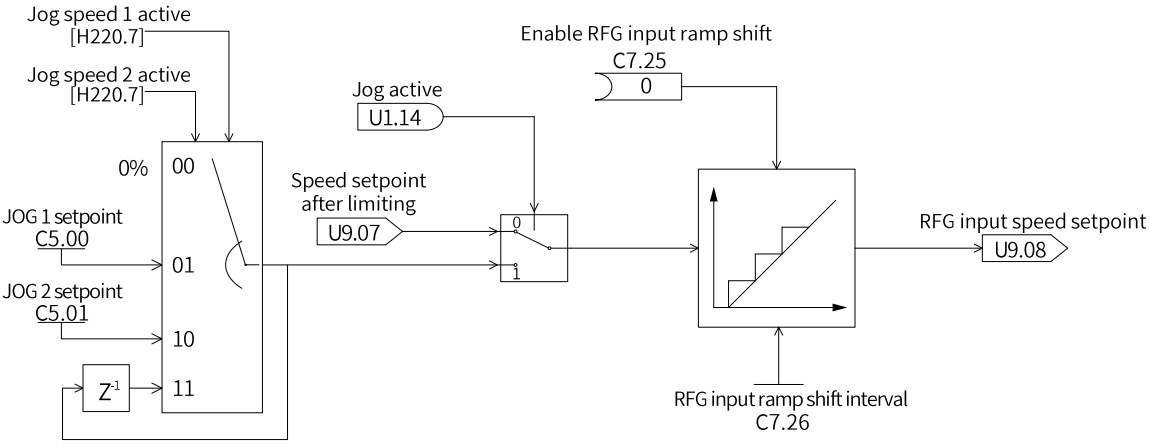


Figure 6-12 Function diagram of jog speed reference

The relevant parameters are described in the following table:

Para.	Name	Setpoint
C5-00	JOG1 setpoint	–50.0% to +50.0%
C5-01	JOG2 setpoint	–50.0% to +50.0%
C5-02	JOG acceleration time	0.1s to 1000.0s
C5-03	JOG deceleration time	0.1s to 1000.0s

Note

For detailed description of RFG ramp shift, see *"6.6.14 Acceleration Torque Compensation" on page 181*.

6.3 Terminal Start/Stop Module

Six different templates are provided to control motor running and stop and a maximum of three terminals are required for cooperation. The three terminals are separately defined as IN1, IN2, and IN3.

You can configure two different terminal start/stop modes for the terminal start/stop module. Parameters are provided to enable terminal start/stop command 1 or 2. When command 1 is selected, b4-03 to b4-07 take effect; when command 2 is selected, b4-08 to b4-12 take effect. The following table lists the input terminal parameters of the terminal start/stop module.

[b4-02] Terminal Start/Stop Command 1/2 Selection	IN1 Enabled Parameter	IN2 Enabled Parameter	IN3 Enabled Parameter
[0]: Terminal start/stop command 1	b4-05	b4-06	b4-07
[1]: Terminal start/stop command 2	b4-10	b4-11	b4-12

Confirm the terminal connection first. Ensure that the set parameters match the terminal connection. For example, if terminal start/stop command 1 is enabled, b4-05 corresponds to DI1. (DI1 corresponds to b4-05, DI2 corresponds to b4-06, and DI3 corresponds to b4-07, unless otherwise specified in this document). If terminal start/stop command 2 is enabled, set parameters b4-10 to b4-12.

The following table lists the parameters indicating six terminal start/stop modes (suffix P indicates that the command is active at the rising edge).

Para.	Name	Value Range	Default	Unit	User Setting	Remarks
b4-03/b4-08	Terminal start/stop mode	0: Disable 1: IN1 start 2: IN1 start, IN2 direction 3: IN1 forward start, IN2 reverse start 4: IN1P start, IN2 stop 5: IN1P start, IN2 stop, IN3 direction 6: IN1P forward start, IN2P reverse start, IN3 stop	The factory default of b4-03 is 1. The factory default of b4-08 is 0.	/	/	/

The following table lists the relationships between the input and start/stop command OFF1 and reference direction DIR.

Terminal start/ stop mode	IN1 Input	IN2 Input	IN3 Input	Start Command OFF1	Reference Direction DIR
0: Disable	X	X	X	0: Stop	0: Forward
1: IN1 start	0→1	X	X	1: Run	0: Forward
	0	X	X	0: Stop	0: Forward
2: IN1 start, IN2 direction	0	N	X	0: Stop	N = IN2
	0→11	N	X	1: Run	N = IN2
3: IN1 forward start, IN2 reverse start	0	0	X	0: Stop	Depending on the running direction before stop
	0→1	0	X	1: Run	0: Forward
	0	0→1	X	1: Run	1: Reverse
	1	1	X	0: Stop	Depending on the running direction before stop
4: IN1P start, IN2 stop	X	0	X	0: Stop	0: Forward
	0→1	1	X	1: Run	0: Forward
5: IN1P start, IN2 stop, IN3 direction	X	0	N	0: Stop	N = IN3
	0→1	1	N	1: Run	N = IN3
6: IN1P forward start, IN2P reverse start, IN3 stop	X	X	0	0: Stop	Depending on the running direction before stop
	0→1	0	1	1: Run	0: Forward
	0	0→1	1	1: Run	1: Reverse

Note

1 indicates high level. 0 indicates low level. N indicates 0 or 1, namely, a certain state. X indicates that the bit does not affect the output.

For example, if multi-functional input terminals DI1, DI2, and DI3 are used as external terminals, their functions are selected through b4-05 to b4-07 and b4-10 to b4-12.

6.3.1 Terminal Start/Stop Mode 1

It is the most commonly used single-wire mode. Terminal DI1 determines the start/stop of a motor.

K1	Operating command
Close	Run
Open	Stop

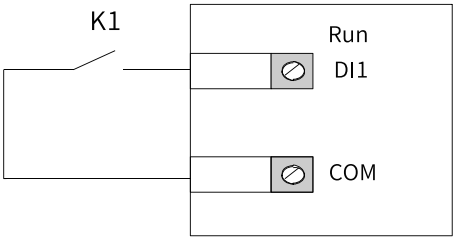


Figure 6-13 Terminal start/stop mode 1

As shown in the preceding figures, one terminal DI1 is used for terminal start/stop mode 1. The DI1 rising edge triggers the operating command. When DI1 is set to 0, the device stops.

6.3.2 Terminal Start/Stop Mode 2

In this mode, the DI1 terminal functions as the operation enable terminal, and the DI2 terminal determines the running direction.

K1	K2	Operation command
Close	Open	Forward
Close	Close	Reverse
Open	Open	Stop
Open	Close	Stop

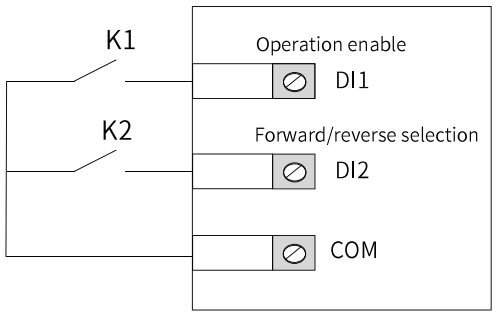


Figure 6-14 Terminal start/stop mode 2

As shown in the preceding figures, two terminals, DI1 and DI2, are used for start/stop and direction control in terminal start/stop mode 2. The start/stop logic of DI1 control in this mode is the same as that in mode 1, but the speed reference is inverted when DI2 is 1.

6.3.3 Terminal Start/Stop Mode 3

K1	K2	Operating command
Close	Open	Forward
Open	Close	Reverse
Close	Close	Stop
Open	Open	Stop

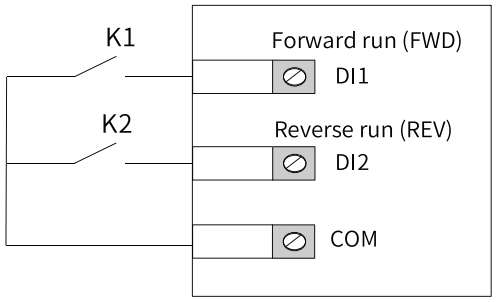


Figure 6-15 Terminal start/stop mode 3

As shown in the preceding figure, two terminals, DI1 and DI2, are used for start/stop and direction control in terminal start/stop mode 3. The DI1 rising edge triggers the RUN command and directly uses the speed reference. The DI2 rising edge also triggers the RUN command but the speed reference is inverted. When both DI1 and DI2 are set to 0 or 1, the device stops.

6.3.4 Terminal Start/Stop Mode 4

SW1	K	Operating command
X	Open	Stop
Open→Close	Close	Run

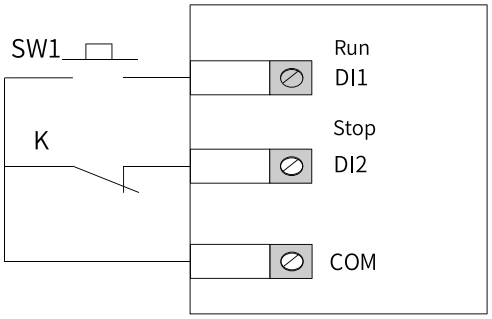


Figure 6-16 Terminal start/stop mode 4

As shown in the preceding figures, two terminals are used for terminal start/stop mode 4, with one controlling start while the other controlling stop. DI2 is set to 1 and the DI1 rising edge triggers the operating command. When DI2 is set to 0, the device stops.

6.3.5 Terminal Start/Stop Mode 5

SW1	K1	K2	Operating command
X	Open	X	Stop
Open→Close	Close	Open	Forward
Open→Close	Close	Close	Reverse

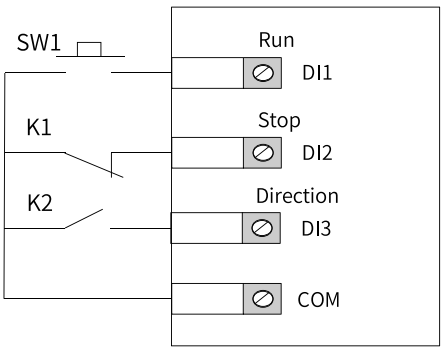


Figure 6-17 Terminal start/stop mode 5

As shown in the preceding figures, three terminals are used for start/stop and direction control. The start/stop logic of DI1 and DI2 control in this mode is the same as that in mode 4, but the speed reference is inverted when DI3 is 1.

6.3.6 Terminal Start/Stop Mode 6

SW1	SW2	K	Operating command
X	X	Open	Stop
Open→Close	Open	Close	Forward
Open	Open→Close	Close	Reverse

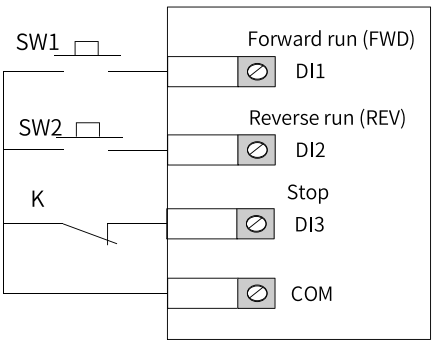


Figure 6-18 Terminal start/stop mode 6

As shown in the preceding figures, three terminals are used to control the start and direction in terminal start/stop mode 6. When DI3 is set to 1, DI1 and DI2 start logic is the same as that of mode 3. However, a running device can stop only when DI3 is set to 0, which is irrelevant to DI1 and DI2 statuses.

6.4 Ramp Function Generator

The group C7 parameters are used to set the characteristics of the ramp function generator (RFG). See function diagram H322/H326 for details. See *"6.6.14 Acceleration Torque Compensation" on page 181* for a detailed description of inertia compensation torque in H326.

6.4.1 Acceleration/Deceleration Time Setting and Selection

The ramp function generator is used to control the motor acceleration/deceleration time. Four groups of acceleration/deceleration time can be set and switched over by using external commands. When the arc time is set to 0, linear acceleration/deceleration is followed.

- Acceleration time: The time for a motor to accelerate from 0 to the speed indicated by d3-02 (per-unit speed base value).
- Deceleration time: The time for a motor to decelerate from the speed indicated by d3-02 (per-unit speed base value) to 0.
- Start arc time: The time when the motor starts to accelerate (or decelerate) from steady speed and the acceleration rate starts from 0 to the maximum acceleration rate (determined by acceleration/deceleration time).
- End arc time: The time when the motor transits from maximum acceleration rate (determined by acceleration/deceleration time) to steady speed before approaching steady speed (acceleration or deceleration process).

Through different combinations of C7-02/C7-03, different acceleration and deceleration curves can be selected, as shown in the following table:

Table 6–7 Acceleration/deceleration curve table

RFG Ramp Selection C7-03	RFG Ramp Selection C7-02	Acceleration Time	Deceleration Time	Start Arc Time	End Arc Time
0	0	C7-04	C7-05	C7-12	C7-13
0	1	C7-06	C7-07	C7-14	C7-15
1	0	C7-08	C7-09	C7-16	C7-17
1	1	C7-10	C7-11	C7-18	C7-19

6.4.2 Low-Speed Compensation Gain

When the V/f or SVC control mode is used, the control characteristics at a low speed are always low due to voltage drop of asynchronous motor stator resistance and parameter deviation, causing insufficient motor torque. However, the running is normal at a medium or high speed.

In case of a heavy load and a great acceleration rate, acceleration at a high speed is normal but locked-rotor occurs due to insufficient torque at a low speed. Alternatively, the acceleration rate is reduced to ensure stable running at a low speed, which causes longer acceleration time.

Set the C7-20 parameter (acceleration time gain at low speed) and the C7-21 parameter (low speed threshold) can be set in a proportion, so that the speed lower than C7-21 can be accelerated with a relatively slow acceleration rate, while the medium or high speed above C7-21 can be accelerated with a normal acceleration rate, as shown in the following figure.

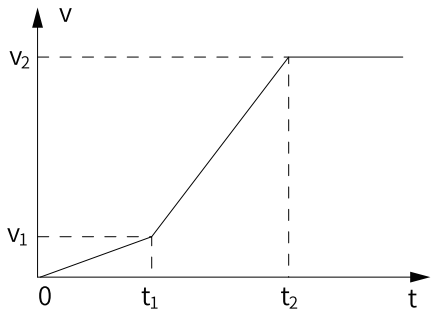


Figure 6-19 Low-speed compensation gain

*"Figure 6–19 Low-speed compensation gain" on page 153*In the preceding figure, v_1 indicates the speed indicated by C7-21. The motor accelerates from 0 to v_1 within the acceleration time Ta' = [C7-20] x Ta, in which Ta is the active acceleration time. The motor accelerates from v_1 to v_2 within the normal acceleration time Ta.

Note

The low-speed compensation gain is active only for acceleration. The motor decelerates according to the active deceleration time.

6.4.3 Arc Type Selection

In case of abrupt acceleration or deceleration, the output frequency of the ramp function generator is not smooth and the acceleration rate of the output frequency is discontinuous, which may cause motor torque oscillation and damage to mechanical gears.

C7-27 = 0 (continuous arc disabled): It will be executed immediately when the input value changes.

C7-27 = 1 (continuous arc enabled): During acceleration, even if the input value suddenly decreases, the motor will execute the end arc (causing overshoot) before deceleration. During deceleration, even if the input value suddenly increases, the motor will execute the end arc (causing overshoot) before acceleration.

Take sudden deceleration during forward acceleration as an example. As shown in Figure 4-20, the target frequency at t_0 is F_3 and the motor accelerates to frequency F_2 at t_1. At this time, the target frequency is set to F_1. The RFG output frequency will change with curve 3 (decelerate to run after acceleration rate a is reduced to 0 based on the increasing acceleration of the end arc in the acceleration range) rather than curve 2 (decelerate to run after the acceleration rate is set to 0 in the first period). This helps to solve abrupt change of the acceleration rate a at t_1 and reduces impact of the abrupt change response on the device.

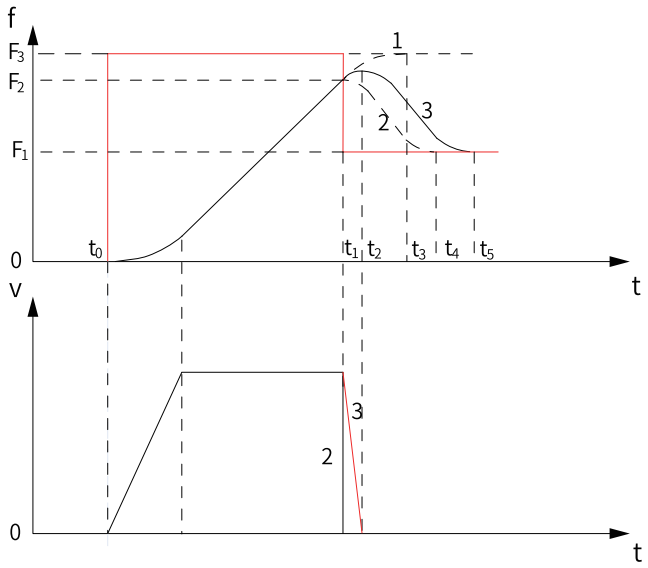


Figure 6-20 Arc type selection

6.5 Brake Control

Group L1 parameters are used to set the logic condition of brake control; See H630/H632 for the function diagram of brake control.

The RO3 relay of the HCU-50S-CS controller is optimized for the brake control of hoisting, so the RO3 relay is recommended for brake control output.

The motor and driven equipment are inhibited at zero speed using mechanical brakes when the drive module is not running. You can set L1-00 as needed to determine whether to enable brake control and whether the brake provides the feedback detection function. When brake control is enabled, set relevant parameters based on the actual working conditions and load of the device for effective control by the brake logic to achieve operation safety.

If L1-00 is set to 2, the brake with feedback is selected, and the system will detect the feedback state of the brake set by L1-15. If the feedback signal of brake opening is not obtained within 2s, the fault ERR84-1 brake opening failure will be reported.

If L1-00 is set to 1, the brake is controlled by the time reference and the actual status is not detected.

L1-23, L1-24, and L1-25 parameters indicate the brake opening conditions. The brake can open only when the output torque is greater than a specified value, ensuring that the gravity load does not slip at the moment the brake opens. In particular, the system speed loop does not act and no torque is output before the brake opens. Therefore, after setting the brake opening conditions, set L1-06 for a starting torque to meet the brake opening conditions. For the details on brake control, see *“6.5.2.1 Vector Control” on page 156*.

6.5.1 Typical Brake Configuration

You can configure the brake according to the following templates. (In the following tables, default values are used for parameters in group L1.)

- The brake has no feedback and only has the starting torque to avoid shorting stator during brake opening.

Para.	Name	Value
L1-00	Brake function selection	1: With brake but without detection information
L1-01	Brake opening time	Set the parameter according to the actual brake opening time.
L1-02	Brake closing time	Set the parameter according to the actual brake closing time.
L1-06	Starting torque source in vector control mode	2: L1-07 (digital setting)
L1-07	Digital setting of starting torque	Set according to the estimated load weight.

- The brake has no feedback and uses the retentive torque as the starting torque. After the brake is closed, the motor keeps outputting exciting current for 10s.

Para.	Name	Value
L1-00	Brake function selection	1: With brake but without detection information
L1-01	Brake opening time	Set the parameter according to the actual brake opening time.
L1-02	Brake closing time	10s, or (actual brake closing time + 10s). After the brake is closed, the motor must keep outputting a current for 10s.
L1-06	Starting torque source in vector control mode	1: Automatic retentive torque
L1-07	Digital setting of starting torque	Use the torque set by L1-07 as the retentive torque when the motor is started for the first time. You can also set the parameter according to the estimated load weight.
L1-08	Gain coefficient of auto torque memory	It is 100% in general cases. To adjust the proportion of the retentive torque, set L1-08.
L1-09	Upper limit setting of starting torque	Limit the retentive memory to avoid abnormal retentive memory caused by braking closing error. If L1-10 is set to 10% and L1-09 is set to 80%, the starting torque is limited to a positive value within the range of 10% to 80%.
L1-10	Lower limit setting of starting torque	
L1-22	Brake opening command source	This parameter specifies an external brake control condition. When it is set to 0, the brake cannot open. When the brake is open, setting L1-22 to 0 will not close the brake.
L1-23	Comparison value source of brake opening	This parameter specifies an additional condition for determining brake opening. If L1-23 is set to 0, the condition is inactive. If L1-23 is set to a connector, when brake opening determination starts, only when the connector is greater than the threshold for a duration indicated by L1-25 can the brake open.
L1-24	Comparison threshold of brake opening	
L1-25	Brake opening delay	

- The brake can be opened only when the brake has feedback and the output torque is 35% of the rated torque.

Para.	Name	Value
L1-00	Brake function selection	2: With brake and detection information
L1-01	Brake opening time	Set the parameter according to the actual brake opening time.
L1-02	Brake closing time	Set the parameter according to the actual brake closing time.
L1-03	Brake opening feedback point source	4: DI3 (when brake feedback is assigned to DI3, 1 means brake opening and 0 means brake closing)
L1-06	Starting torque source in vector control mode	2: L1-07 (digital setting)
L1-07	Digital setting of starting torque	40% (the value here must be greater than 35%)
L1-23	Comparison value source of brake opening	U6-01 (calculated output torque)
L1-24	Comparison threshold of brake opening	35%
L1-25	Brake opening delay	0.5s (you can decrease this value to avoid fluctuation of measured value and accelerate brake opening.)

6.5.2 Sequence Diagram

6.5.2.1 Vector Control

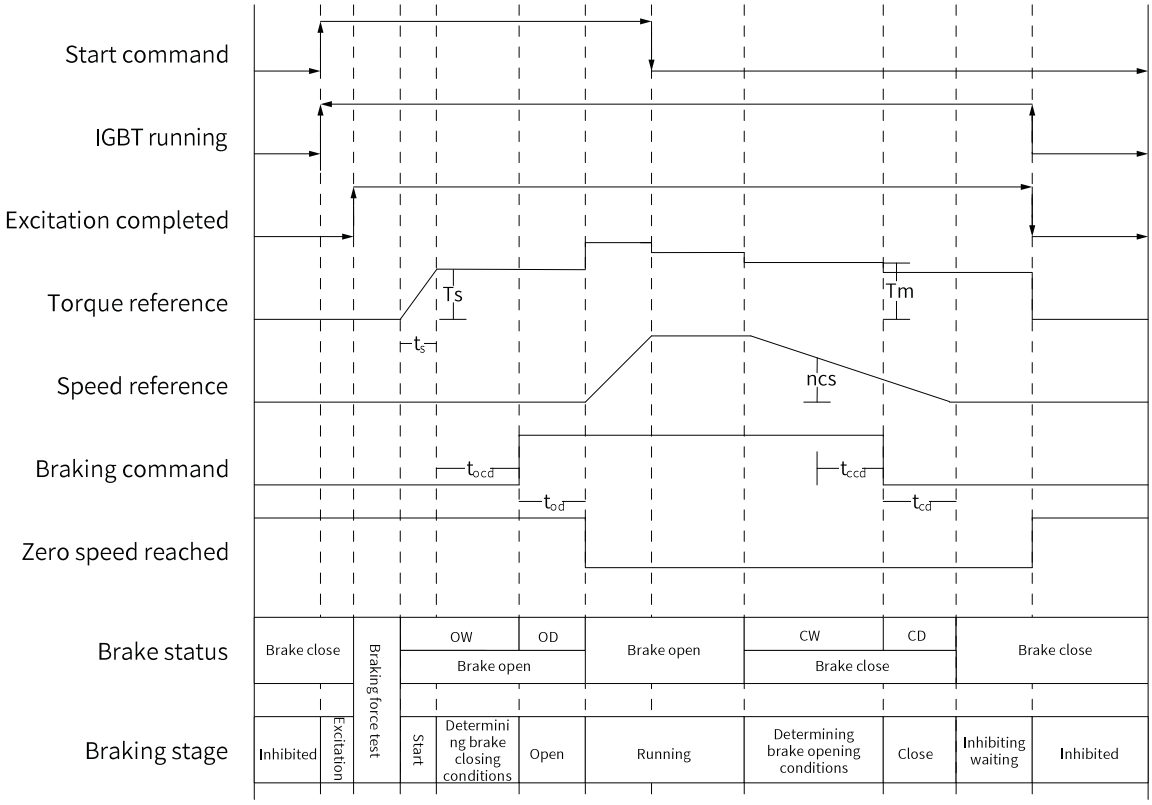


Figure 6-21 Vector control brake sequence diagram

T_s: Starting torque upon brake opening

n_{cs}: Speed threshold upon brake closing

t_s: Acceleration time reference upon brake opening

t_{ocd}: Comparison delay upon brake opening

t_{od}: Brake opening action time

t_{ccd}: Brake closing delay

t_{cd}: Brake closing action time

OW: Brake opening waiting time

OD: Brake opening delay

CW: Brake closing waiting time

CD: Brake closing delay

6.5.2.2 V/f Control

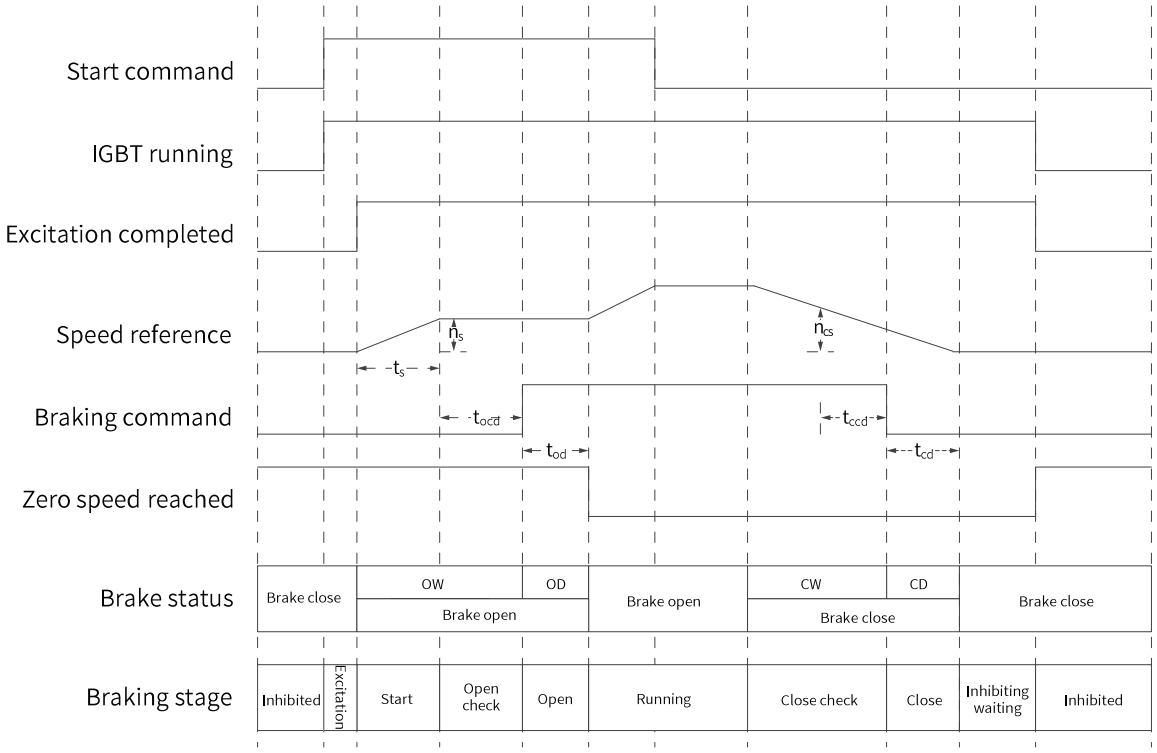


Figure 6-22 V/f control brake sequence diagram

n_s: Starting speed upon brake opening

n_{cs}: Speed threshold upon brake closing

t_s: Acceleration time reference upon brake opening

t_{ocd}: Comparison delay upon brake opening

t_{od}: Brake opening action time

t_{ccd}: Brake closing delay

t_{cd}: Brake closing action time

OW: Brake opening waiting time

OD: Brake opening delay

CW: Brake closing waiting time

CD: Brake closing delay

6.5.3 Overview of Braking Stages

All braking actions can be performed only after the RUN command is received and the motor is prepared. For asynchronous motors, braking starts after motor pre-excitation. For synchronous motors, braking starts after the motor magnetic pole angle is obtained.

In case of a fault or an emergency stop command, a brake that is being turned on immediately enters the closed stage and the brake closing command is output.

Brake turning on and off is generally triggered by RUN commands. When L1-14 is set to 1 and RFG input speed (U9-08) is set to 0, brake will not open even if a RUN command is received. After the brake is opened, if L1-14 is set to 1 and U9-08 is set to 0, the brake closing command is triggered and the device enters the brake closing preparation stage. You can set L1-14 to 0 to disable this feature.

In case of OFF2 emergency stop, coast to stop, or that L1-15 is set to 1 at any time, the brake module immediately outputs the closing signal (U1-11 set to 0).

Para.	Name	Description
L1-14	Brake zero-speed closing command source	0: Disable 1: Brake closing command automatically triggered when U9-08 is set to 0
L1-15	Forced brake closing command source	0: Disable 1: Immediately output brake closing signal (U1-11 set to 0)

6.5.3.1 Braking Force Test

This is optional and can be skipped if not activated.

The braking force may decrease after the brake is used for a long time. To check whether the detection braking force of the internal logic function is satisfactory, set L1-30 to 1 to enable braking force test before startup.

This function is active only when E0-00 is set to 1 (FVC). During the test, the AC drive continues to output the torque according to the setting of L1-32 and checks whether the feedback torque is normal. If the feedback torque is too low or the motor rotates, the braking force is insufficient and the fault 84-3 or 84-4 will be triggered.

Para.	Name	Description
L1-30	Enable brake self-test	You can use the connector to enable or disable self-test. When this parameter is set to 1, the test is performed when pre-excitation is completed but the brake is not opened.
L1-31	Brake test hold time	Defines the test duration.
L1-32	Max. experimental torque for brake test	During the test, the output torque increases gradually but the maximum torque cannot exceed the torque specified in this parameter.
L1-33	Torque direction for brake test	Defines the torque direction, which can be modified in the connector. The torque is output and tested in the forward direction by default.

Para.	Name	Description
L1-34	Slip speed threshold for brake test	During the brake test, if the motor speed exceeds the value of L1-34 for a time longer than that specified in L1-35, the motor rotates.
L1-35	Slip speed hold time for brake test	

6.5.3.2 Brake Opening Preparation Stage

Brake opening preparation includes three stages: starting torque establishment, brake opening condition determination, and brake opening.

- Starting torque establishment: This stage is active only in the vector control mode. To prevent shorting stator braking mode (for PMSM) upon brake opening due to gravity load, sufficient torque is output based on the setting of L1-06. Before brake opening, the speed loop does not act. If L1-06 is set to 0, no torque is output before brake opening.
- Brake opening condition determination: After the starting torque is established, you can set L1-22 and L1-25 to add two sets of additional start conditions. By default, there is no additional condition. After the starting torque is established, the brake opening action starts.
- Brake opening: The brake opening signal (U1-11 = 1) is output in this stage. In addition, the ramp function generator (RFG) is enabled. If L1-11 reference is active, the RFG starts to accelerate from the speed indicated by L1-12. If L1-11 is inactive, the RFG starts to accelerate from 0.

Para.	Name	Description
L1-06	Starting torque source in vector control mode	Selects the torque to be output before brake opening.
L1-07	Digital setting of starting torque	It is active when L1-06 is set to 2.
L1-08	Gain coefficient of auto torque memory	This parameter is active when L1-06 is set to 1, and it is used to adjust the torque memory value.
L1-09	Upper limit setting of starting torque	It is active when L1-06 is not set to 0. If L1-10 is set to 10% and L1-09 is set to 80%, the starting torque is limited to a positive value within the range of 10% to 80%.
L1-10	Lower limit setting of starting torque	
L1-11	Enable starting speed	L1-11 = 0: After the brake opens, the RFG accelerates from 0.
L1-12	Digital setting of starting speed	L1-11 = 1: After the brake opens, the RFG accelerates from the speed indicated by L1-12.
L1-22	Brake opening command source	This parameter specifies an external brake control condition. When it is set to 0, the brake cannot open. When the brake is open, setting L1-22 to 0 will not close the brake.
L1-23	Comparison value source of brake opening	This parameter specifies an additional condition for determining brake opening. If L1-23 is set to 0, the condition is inactive. If L1-23 is set to a connector, when brake opening determination starts, only when the connector is greater than the threshold for a duration indicated by L1-25 can the brake open.
L1-24	Comparison threshold of brake opening	
L1-25	Brake opening delay	

6.5.3.3 Brake Opening Action Stage

Brake opening includes the brake opening detection and brake-opened stages.

- Brake opening detection: When the value of U1-11 becomes 1, the system maintains the RFG output and waits until the brake is open. If L1-00 is set to 1, the system waits for a duration indicated by L1-01 as the delay before exiting this stage. If L1-00 is set to 2, whether the feedback indicated by L1-03 is at a high level will be detected at this stage. If it is at a high level, the stage ends. If the delay time indicated by L1-01 is reached but the feedback indicated by L1-03 is kept at a low level, a brake detection fault will be triggered. When the fault duration is longer than that indicated by L1-04, ERR84-1 indicating the brake opening failure will be triggered.
- Brake opened: The RFG is enabled and the RFG output speed is allowed to increase based on the time reference. The brake output remains at the opened state unless the stop or brake closing command is received. If L1-00 is set to 2, whether the feedback indicated by L1-03 is at a high level will be always detected.

6.5.3.4 Brake Closing Preparation Stage

When the brake closing command is received, the brake output is not immediately closed but enters the closing preparation stage.

- Determining the brake closing conditions: When the actual speed is lower than that indicated by L1-16 and the duration exceeds that indicated by L1-17, the brake closing conditions are met, and the retentive torque and brake output closing stage starts.
- Automatic retentive torque: When L1-06 is set to 1, the torque before brake closing is memorized as the torque output for the next startup.
- Brake closing: After the stage starts, the brake closing signal (U1-11 set to 0) is output and then the brake closing action stage starts.

6.5.3.5 Brake Closing Action Stage

Brake closing includes the brake closing detection and brake-closed stages.

- Brake closing detection: After the value of U1-11 becomes 0, the system waits until brake closing is completed. Before the brake is closed, the system holds the current output to prevent the shorting stator braking mode. If L1-00 is set to 1, the system waits for a duration indicated by L1-02 as the delay before exiting this stage. If L1-00 is set to 2, whether the feedback indicated by L1-03 is at a low level will be detected at this stage. If it is at a low level, the stage ends. If the delay time indicated by L1-02 is reached but the feedback indicated by L1-03 is kept at a high level, a brake detection fault will be triggered. When the fault duration is longer than that indicated by L1-04, ERR84-2 indicating the brake closing failure will be triggered.
- Brake closed: The brake output remains at the closed state unless the running and brake opening commands are received. If L1-00 is set to 2, whether the feedback indicated by L1-03 is at a low level will be always detected.

6.5.3.6 Inhibiting Waiting Stage

The inhibiting waiting stage of the brake logic starts from the time when the switch-on command takes effect to the time when the motor speed reaches zero.

When the motor feedback speed is continuously lower than the zero speed indicated by E1-11 for a period specified by E1-12, the motor speed is considered to reach zero and U1-65 becomes enabled,

and PWM output is blocked. The E1-12 value can be increased to keep a longer excitation time, eliminating the excitation process for the next switch-off process.

6.5.4 Common Problems

6.5.4.1 Automatic Memory of Starting Torque

When L1-06 is set to 1, the internal torque memory function of the AC drive is activated. Upon each stop, the torque before brake closing is recorded and will be used as the starting torque output upon next startup, reducing load drop during brake opening. The automatic torque memory function can well adapt to load changes during operation.

When the function is enabled, a torque fault may occur during the stop process due to external brake faults. In this case, you can set the upper and lower limits of starting torque in L1-09/L1-10 to avoid impact of the torque upon stop due to error on the next startup.

When the automatic torque memory function is activated for the first time, the initial value of the torque memory is sourced from L1-07.

L1-08 can be set to adjust the coefficient for automatic torque memory. If L1-08 is set to 80% and the memory torque during the stop process is 50%, the starting torque to be established is 40%.

6.5.4.2 Excitation Delay Disable Function

To improve the working efficiency of asynchronous motors, you may want to keep continuous output of motor exciting current for a period even if the brake is closed during the stop process. In this way, when you start motors again within a short period, the brake can directly run without need of motor excitation (excitation time for some motors may take 3s to 5s).

When the motor feedback speed is continuously lower than the zero speed indicated by E1-11 for a period specified by E1-12, the motor speed is considered to reach zero and U1-65 becomes enabled, and PWM output is inhibited. Therefore, if the time specified by E1-12 is increased, excitation can last longer after the motor reaches the zero speed, eliminating the need for excitation upon next brake opening.

In addition, if the brake close action time specified L1-02 is increased, the brake module can force the brake to output current, keeping excitation for a period after stop.

Para.	Name	Description
E1-12	Delay of stop at zero speed	PWM output can be inhibited only after the actual speed stays below the value of E1-11 for a period exceeding the time specified by E1-12.
L1-02	Brake closing time	PWM output can be inhibited only after the time specified by L1-02 elapses after the brake close signal is output (U1-11 set to 0).

6.5.4.3 Excitation upon Stop

To improve the working efficiency of asynchronous motors, you may want to keep continuous output of motor exciting current even if the brake is closed during the stop process. In this way, when you

start motors again, the brake can directly run without the need of motor excitation (excitation time for some motors may take 3s to 5s).

To enable excitation upon stop, you can enable both RFG input reset and brake zero-speed closing force.

Para.	Name	Description
b0-00	Start/stop control word source	3: User-defined
b0-01	User-defined OFF1 source	Connect the PLC excitation command. The value 1 means excitation is enabled.
b1-08	Source of setting RFG reference to 0	Connect the PLC running permission command. The value 1 means running is permitted.
L1-14	Brake zero-speed closing command source	U1-47 [RFG speed reference invalid]

The preceding table takes the running control of channel 1 as an example. After parameters are set according to the preceding table, if b0-01 is set to 1 and b1-08 is set to 0, the AC drive performs pre-excitation for asynchronous motors. After excitation, since b1-08 is set to 0, the RFG speed reference is forced to 0, and U1-47 is 1, the brake module is closed. If b0-01 and b1-08 are set to 1, since U1-47 changes to 0 (associated with b1-08), the brake opening command is automatically generated. During normal operation, when b1-08 is 0, RFG output decelerates. Since U1-47 is set to 1, the brake is automatically closed when the feedback speed reaches 0.

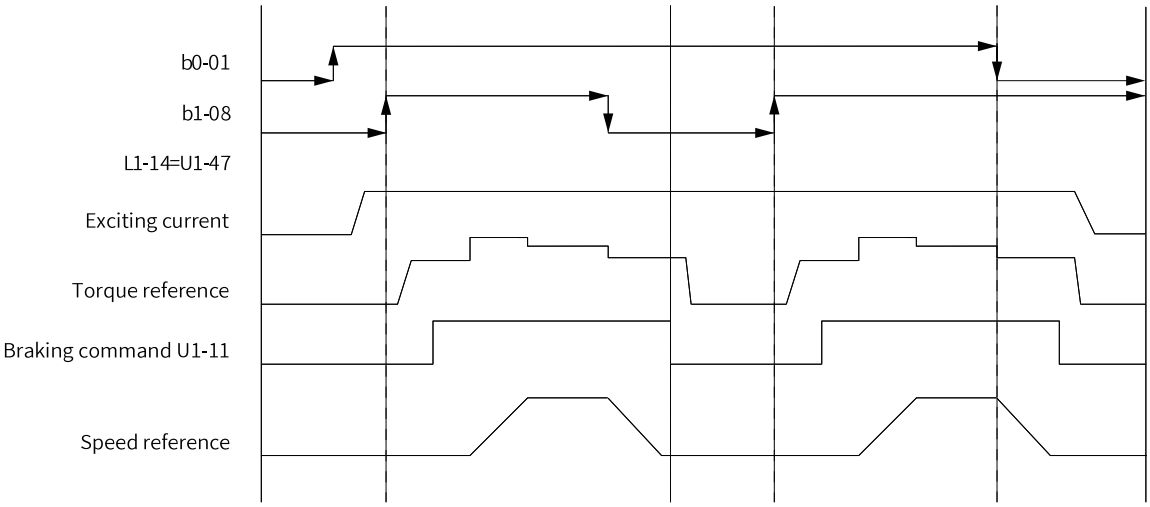


Figure 6-23 Excitation upon stop

6.5.4.4 Starting Torque Restriction

In some lifting load scenarios, the brake can open only when the load torque is greater than the threshold for security reasons. The speed loop does not act before the brake opens. Therefore, the torque cannot be output even if the speed is specified. In this case, set L1-06 for the starting torque. The torque can be measured by using two methods:

- Method 1: Use the comparison function of L1-24 for AC drive detection. Set the absolute value of L1-23 to a starting torque higher than the threshold, set L1-23 to the output torque indicated by U6-01, set L1-24 to the comparison threshold, and set L1-25 to a delay time. When the absolute value of L1-23 is greater than L1-24 and the duration exceeds the value indicated by L1-25, the AC drive enters the brake opening state.

- Method 2: The torque is detected on the PLC side. After the conditions are met, the PLC transmits a status bit to the AC drive through communication. Set L1-06 to a starting torque higher than the threshold, and then set L1-22 to the received PLC status bit. After the running command is received, the AC drive does not enter the brake opening state until the bit is 1. When the brake is open, setting L1-22 to 0 will not close the brake.

6.6 Vector Control

6.6.1 Speed Control

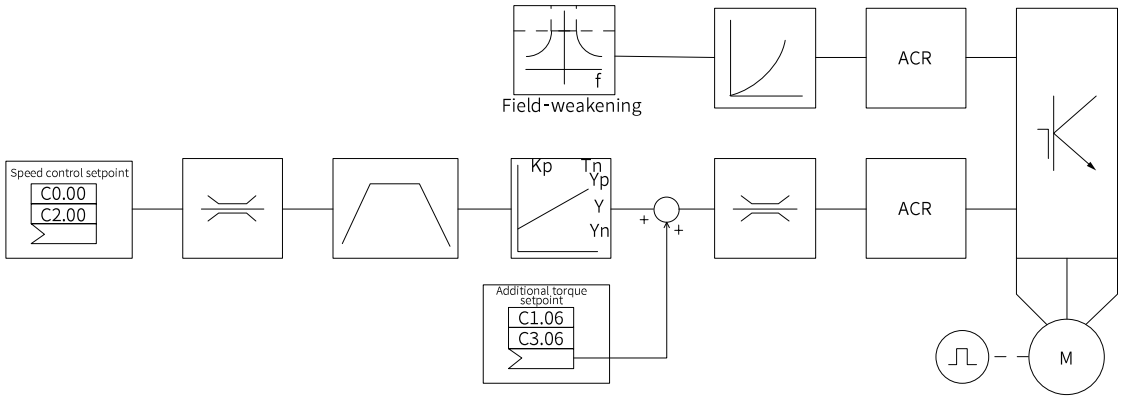


Figure 6-24 Typical block diagram of speed control

In the speed control mode, the speed setpoint is generated as shown in the function diagram H310/H312, and then processed by the ramp function generator (RFG-function diagram H322/H326) and superimposed by the additional speed setpoint (function diagram H328) to generate the actual running speed setpoint.

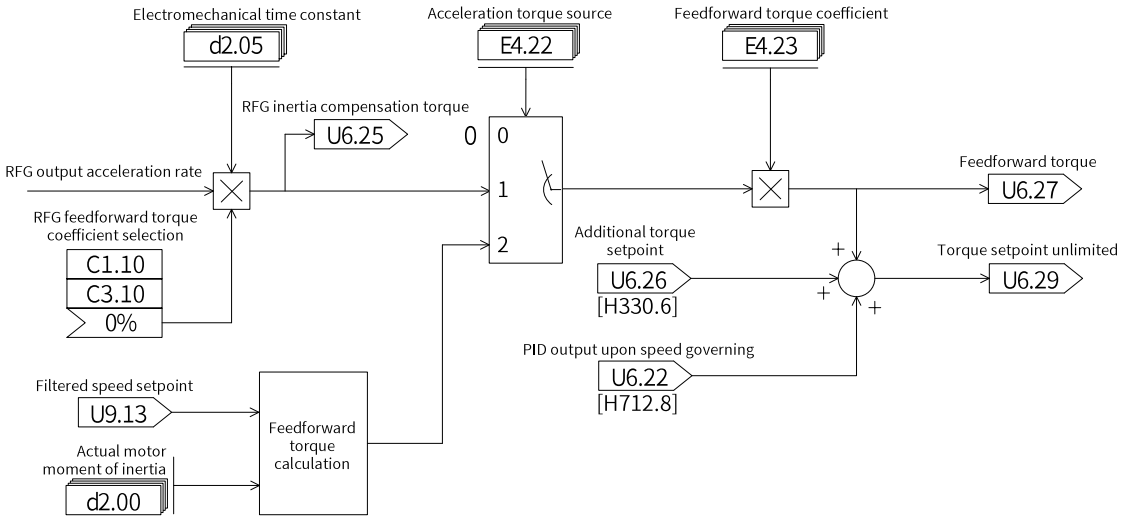


Figure 6-25 Speed setting channel in speed control mode

In the speed control mode, the superposition of the feedforward torque can be achieved by supplementary torque 1 (C1-06/C3-06) or supplementary torque 2 (C1-08/C3-08). The additional torque is superimposed on the output of the speed loop PI regulator and converted into a torque reference.

Speed control applies to all control modes (E0-00 is set to FVC, SVC, or V/f). The following table lists the switchover between the speed control and torque control modes.

Table 6–8 Actual motor control modes

E0-00	E0-01	b1-10 (b3-10)	Actual control mode
0: SVC; 1: FVC	0: Speed control	0: Disable	Speed control
0: SVC; 1: FVC	1: Torque control	0: Disable	Torque Control
0: SVC; 1: FVC	0: Speed control	1: Forced torque control	Torque control
0: SVC; 1: FVC	1: Torque control	1: Forced torque control	Torque control
2: V/f	-	-	Speed control

6.6.2 Torque Control

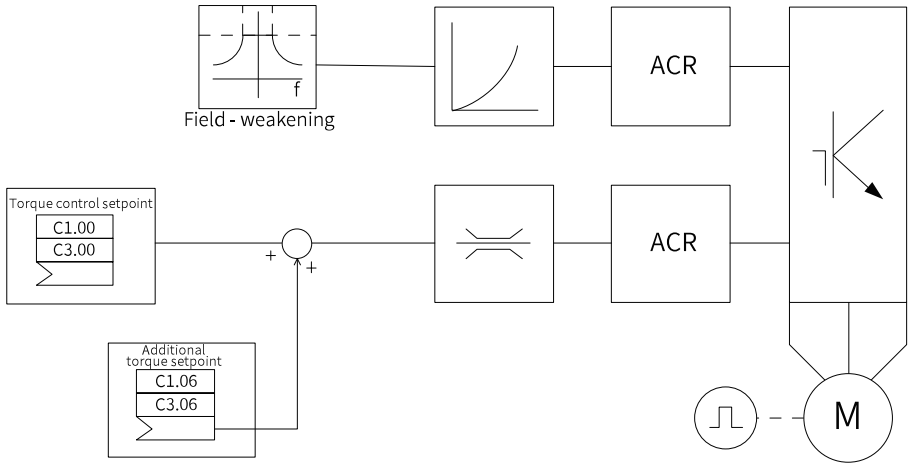


Figure 6-26 Torque control block diagram

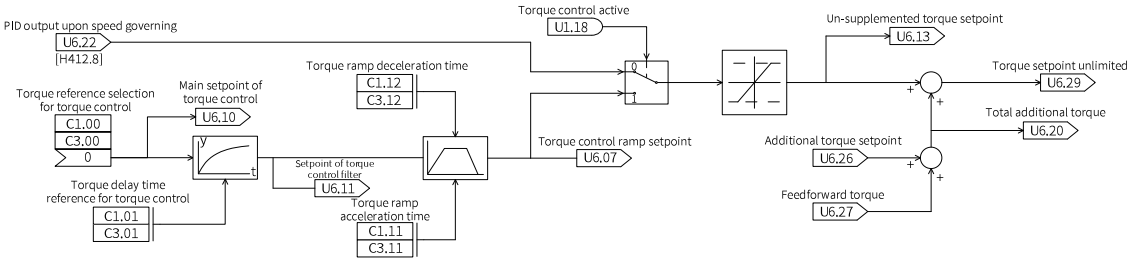


Figure 6-27 Torque reference channel in torque control

When the torque control takes effect, the output torque strictly follows the reference. If the load disappears, the motor may be accelerated to the maximum speed. At this time, the runaway protection control module is active, and the output torque is limited and not equal to the reference, ensuring that the actual speed of the motor will not exceed the maximum speed limit.

For the details of speed limit and runaway protection, see *"6.6.10 Speed Limit" on page 178*.

6.6.3 Windowed Torque Control

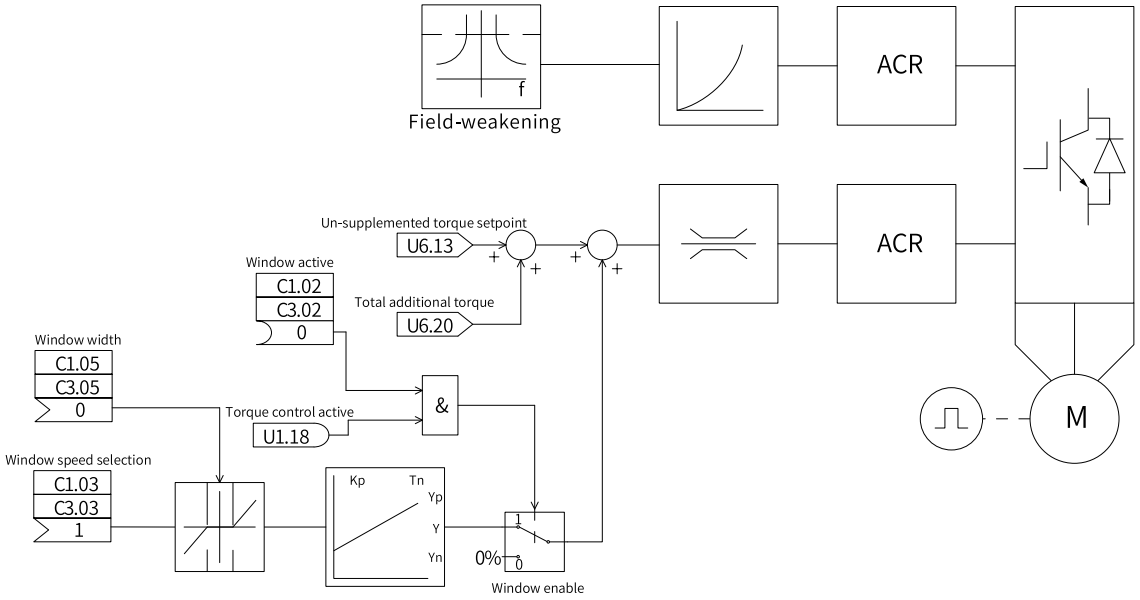


Figure 6-28 Windowed torque control block diagram

During torque control, if the load suddenly disappears, the motor will reach the maximum speed. Adding window control can avoid this situation. When the motor speed is in the window, it shows torque control externally. Even if the load disappears, the regulator controlled by the window will ensure that the actual speed will not exceed the limit of the window.

The window control is determined by the window center speed W and the window width H, and the actual active window is [W - H, W + H].

The window width H is set by the parameter C1-05 (control channel 1 is active) or C3-05 (control channel 2 is active).

There are two ways to set the center speed W of the window:

- Determined by parameter C1-04/C3-04 and takes effect after RFG. (parameter C1-03/C3-03 is set to 1 digital setting).
- Determined by the speed reference channel during speed control and takes effect after RFG. (parameter C1-03/C3-03 is set to 0 speed channel reference).

Note

The window width must be set properly to ensure that the speed during normal operation is always within the window range. Otherwise, it will lead to unexpected operating conditions.

6.6.4 Droop Control

Droop control is a control method that uses the output torque of the motor to reduce the motor speed reference by negative feedback. Droop control features good stability and simple application though low control accuracy. It is widely used in working conditions such as belt conveyor transmission, roller bed transmission, and conticasters.

When multiple motors drive the same load together, a slight deviation occurs between the motors even at the same speed reference due to different mechanical behaviors. In addition, the output torque is much different, and even motors may drive each other.

Droop control can be applied to all motors to enable automatic balanced load distribution between motors, requiring no communication between motors. Motors with higher speed bear higher torque. The negative feedback helps to automatically reduce self speed reference and distribute torque for other motors.

Droop control features:

- The application is simple, without need for communication between motor controllers.
- Multiple motors can be in rigid or flexible connection to drive the same load.
- When multiple motors need to implement redundant running, the faulty device can be stopped while other devices can properly run.
- The adjustment range of the speed is generally not greater than the rated motor slip.
- The speed cannot be exactly followed. The actual speed has a static difference with the reference, which is proportional to the load.
- Precise load distribution cannot be ensured during the dynamic process.

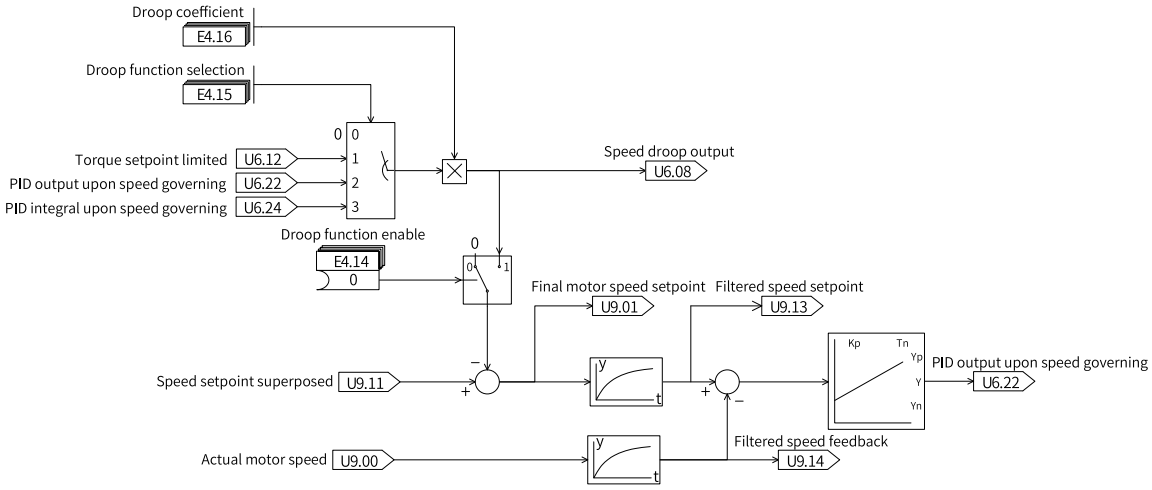


Figure 6-29 Droop control block diagram

To enable droop, only the following 3 parameters need to be set:

Para.	Name	Description
E4-14	Droop function enable	You can select any bit connector to control: Set [E4-14] to 0 to disable the function. Set [E4-14] to 1 to enable the function.
E4-15	Droop function selection	Select the input for droop calculation: 0: Disable Disable droop 1: Total torque setpoint, corresponding to U6-12 2: PID output upon speed governing, corresponding to U6-22 3: PID integral component upon speed governing, corresponding to U6-24
E4-16	Droop coefficient	Speed droop output [U6-08] = [E4-16] x [E4-15] x Rated motor frequency When [E4-15] is 10%, the speed setpoint is reduced by [E4-16] x 0.1 x Rated motor frequency.

There are three droop options available in HCU-50S/51S, and usually E4-15 is set to 3.

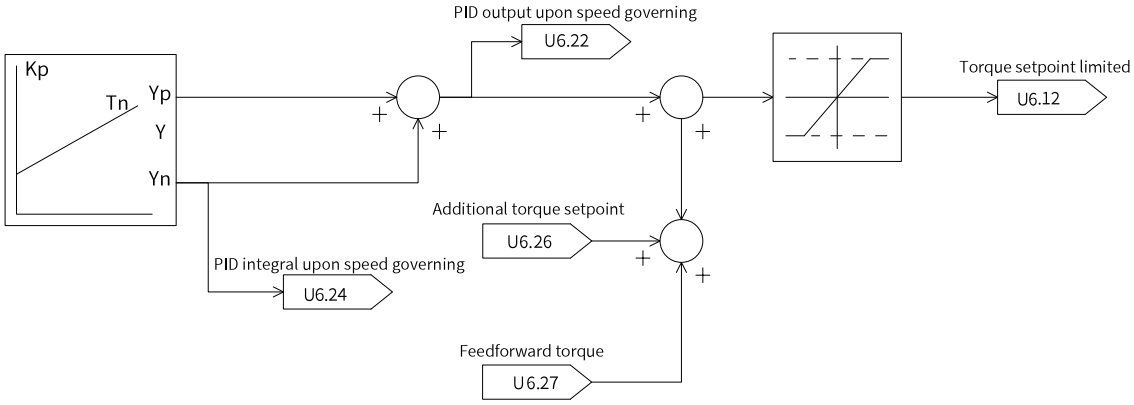


Figure 6-30 Three different droop sources

6.6.5 Master-Slave Control

Master-slave control is used in scenarios where multiple motors drive one equipment. Depending on the equipment, master-slave control can be implemented in multiple ways. The connection can be divided into rigid connection and flexible connection based on motor coupling modes.

- Rigid connection is typically implemented by gear matching, and the speeds of the master and slave are exactly the same in this case. Load torque must be well distributed upon control, which can implement higher dynamic response and even regard multiple motors as a high-power motor.
- Flexible connection is the most common way for belt-based transmission and is also used for roller bed transmission in the cold rolling processing line. It is also considered as soft connection upon steel belt connection. Soft connection cannot ensure complete speed synchronization between motors due to possible relative motion. Therefore, it cannot implement very highly dynamic response characteristics.

Droop control is applicable to scenarios without high accuracy requirements, especially to motor synchronization in soft connection, free of communication between control modules. However, it cannot accurately control the running speed and the dynamic response is poor. For better control

effect, these control modules can be combined into a master-slave control network to control that all devices run with a specified master.

The realization of master-slave control first requires a fast network for data transmission between devices. In HCU-50S/51S, InoLink communication network is usually used (see *"6.9.5 InoLink Communication Network" on page 209*), and data interaction between 16 sets of HCU-50S/51S can be realized in one network at most. If there is a high anti-interference requirement, optical fiber synchronization detailed in *"6.9.6 HOFR Optical Fiber Routing Network" on page 210* can also be selected. In this section, InoLink communication network is used as an example to illustrate. The configuration of optical fiber communication is similar.

In the master-slave control of HCU-50S/51S, the controlled master and slave have nothing to do with the node number of the InoLink network. After the InoLink communication network is created and data exchange is implemented, any device can be configured as the master. Assume that the InoLink communication network only contains nodes 1# and 2#, with node 1# as the master and node 2# as the slave.

When configuring master-slave control, ensure the same characteristics for the master and slave, including the acceleration/deceleration time, speed loop parameter, and current loop parameter.

The following sections list the typical master-slave control schemes.

6.6.5.1 Master Speed Control and Slave Torque Control

In master speed control, the slave speed always follows the master speed due to mechanical reasons. In slave torque control, the torque reference is obtained from the master, completing torque distribution.

Application scenarios: The connection between the master and slave must be rigid connection in gear matching mode generally.

Features: The slave torque always follows the master torque. The system runs according to the master speed loop, and the torque response is quick. However, when the connection between the master and slave is disconnected, the speed of the slave is not controlled and will reach the upper limit of the speed. Window control can be introduced to the slave to reduce this influence.

The following figure shows how it works.

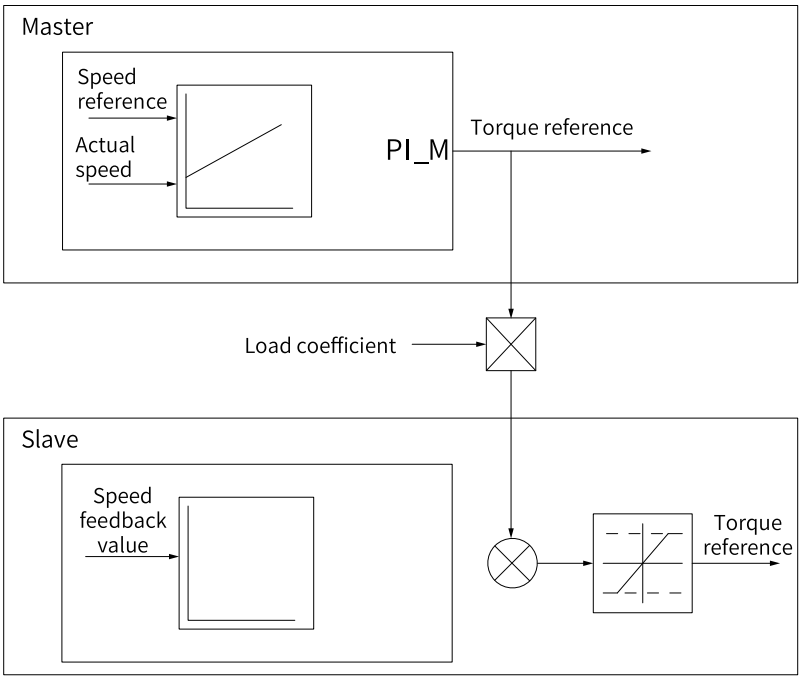


Figure 6-31 Block diagram of master speed and slave torque control

Common torque control or torque control with a window can be selected for the slave. When the torque control with a window is selected, the master needs to send the speed to the slave, ensuring that the master and slave acceleration/deceleration time is the same.

Take control channel 1 as an example. The following table lists the parameters to be set for the typical speed control and torque control.

Para.	Name	Master Setting<1>	Slave Setting<1>
E0-00	Control method	1: FVC	1: FVC
E0-01	Control mode	0: Speed control	1: Torque control<2>
b1-10	Forced torque control source	0: Disable	1: Enable<2>
b0-00	Start/stop control word source	3: User-defined setting (group b0 setting)	3: User-defined setting (group b0 setting)
b0-01	User-defined OFF1 source	1200 (U2-00)<3>	1232 (U2-32)<4>
C0-00	Speed control main reference selection	1545 (U5-45)<3>	-
C1-00	[Torque control] Torque reference selection	-	1533 (U5-33)
n0-00	InoLink communication enable	1: Enable	1: Enable
n0-01	Local node address	1	2
n0-03	Received data 1 source node	-	1
n0-04	Received data 1 data selection	-	1
n0-05	Received data 2 source node	-	1
n0-06	Received data 2 data selection	-	2

Para.	Name	Master Setting<1>	Slave Setting<1>
n0-27	Sent data 1 selection	1544 (U5-44)	-
n0-28	Sent data 2 selection	1612 (U6-12)	-

Note

- <1>: Other settings of the master and slave must be consistent, such as the acceleration/deceleration time, acceleration torque compensation, and speed loop parameters.
- < 2 >: E0-01 and b1-10 must both be 0 under speed control, and when any parameter is 1, the device works in torque control.
- <3>: Assume that the control command word is set by PZD1 of fieldbus adapter A, and that the speed reference is set by PZD2 of fieldbus adapter A.
- <4>: The slave command word can be set by the master or the fieldbus adapter.
- If the master needs to detect the fault state of the slave, set the slave to send the status word for the master to determine the fault status.

6.6.5.2 Master PI Control and Slave P Control

The master and slave both work in the speed control mode and accept the same speed reference. The speed regulator of the master is the PI controller, whereas that of the slave is the P control module. Add the integral component of the speed regulator of the master to the speed regulator output of the slave, completing torque distribution in the steady state.

Application scenarios: The connection between the master and slave motors can be rigid connection or flexible connection.

Features: The slave has its own speed regulator and accepts the master reference. Therefore, when the slave is applied to a rigid connection device, the control performance similar to the master speed control and slave torque control can be obtained. In addition, the slave speed control can be ensured upon rigid disconnection.

The following figure shows how it works.

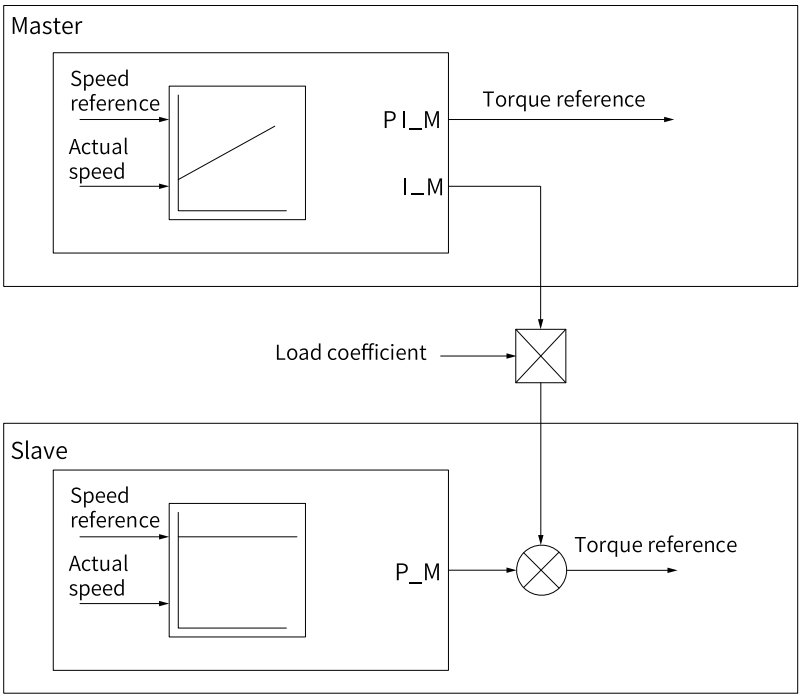


Figure 6-32 Block diagram of master PI and slave P control

Take control channel 1 as an example. The following table lists the parameters to be set for the master PI and slave P control.

Para.	Name	Master Setting<1>	Slave Setting<1>
E0-00	Control method	1: FVC	1: FVC
E0-01	Control mode	0: Speed control	0: Speed control
b1-10	Forced torque control source	0: Disable	0: Disable
b0-00	Start/stop control word source	3: User-defined setting (group b0 setting)	3: User-defined setting (group b0 setting)
b0-01	User-defined OFF1 source	1200 (U2-00)<3>	1232 (U2-32)<4>
C0-00	Speed control main reference selection	1545 (U5-45)<2>	1545 (U5-45)<3>
E4-18	Speed loop integral force source	0: Disable	1: Enable
E4-19	Source of speed loop integral force value	0	1533 (U5-33)
n0-00	InoLink communication enable	1: Enable	1: Enable
n0-01	Local node address	1	2
n0-03	Received data 1 source node	-	1
n0-04	Received data 1 data selection	-	1
n0-05	Received data 2 source node	-	1
n0-06	Received data 2 data selection	-	2
n0-27	Sent data 1 selection	1544 (U5-44)	-
n0-28	Sent data 2 selection	1624 (U6-24)	-

Note

- <1>: Other settings of the master and slave must be consistent, such as the acceleration/deceleration time, acceleration torque compensation, and speed loop parameters.
- <2>: Assume that the control command word is set by PZD1 of fieldbus adapter A, and that the speed reference is set by PZD2 of fieldbus adapter A.
- <3>: The slave command word and speed reference can be set by the master or the fieldbus adapter.
- <4>: If the master needs to detect the fault state of the slave, set the slave to send the status word for the master to determine the fault status.

6.6.6 Slave Speed Deviation and Torque Limit

Both the master and slave work in the speed control mode, and the PI controller is used as the speed regulator. However, the slave speed reference contains a speed deviation on the basis on the master speed reference, and the master torque reference is transmitted to the slave as the torque limit. The speed deviation is set based on the working condition, ranging from 5% to 10%. The additional speed and torque limit direction are related to the running direction.

Application scenario: Upon flexible connection between the master motor and the slave motor, the control effect is better.

Features: Since the slave has its own speed regulator, its speed control can be ensured (deviation from the speed reference does not exceed the additional speed, which is generally 5% to 10%) even upon disconnection between devices. Due to the additional speed, the slave accelerates to speed up the flexible connection upon startup. Then, due to saturation by the speed regulator, the torque limit is enabled to make the slave torque be the same as the master torque, implementing torque distribution.

The following figure shows how it works.

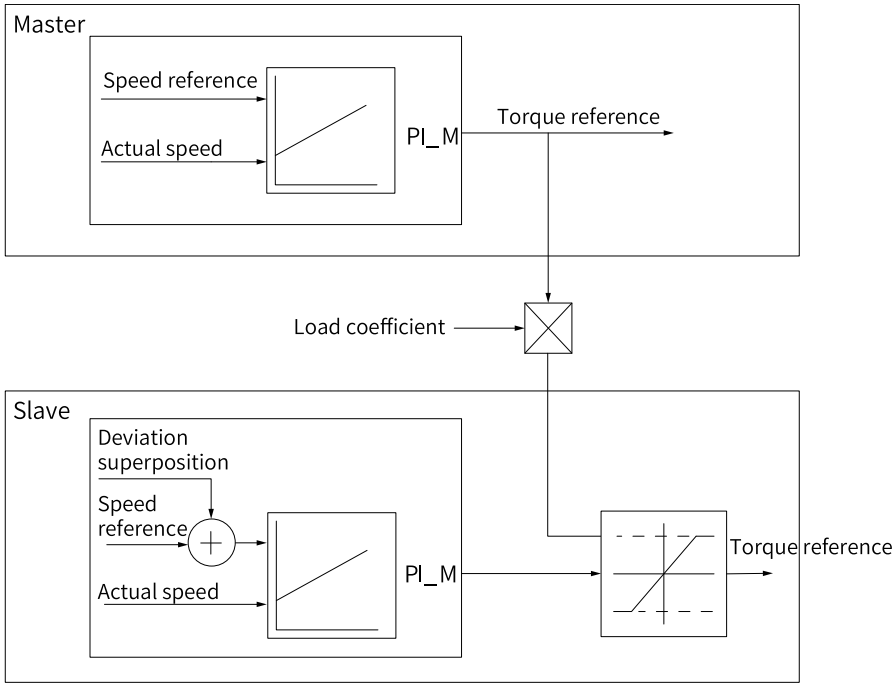


Figure 6-33 Block diagram of slave speed deviation and torque limit control

Take control channel 1 as an example. The following table lists the parameters to be set for the typical slave speed deviation and torque limit control.

Para.	Name	Master Setting<1>	Slave Setting<1>
E0-00	Control method	1: FVC	1: FVC
E0-01	Control mode	0: Speed control	0: Speed control
b1-10	Forced torque control source	0: Disable	0: Disable
b0-00	Start/stop control word source	3: User-defined setting (group b0 setting)	3: User-defined setting (group b0 setting)
b0-01	User-defined OFF1 source	1200 (U2-00)<2>	1232 (U2-32)<3>
C0-00	Speed control main reference selection	1545 (U5-45)<2>	1545 (U5-45)<3>
C0-03	Additional speed reference	0	1931 (U9-31)
C6-05	Multi-reference value 1	0	5%<4>
E2-10	Torque upper limit setpoint selection	400%	1533 (U5-33)<4>
E4-18	Speed loop integral force source	0: Disable	0: Disable
E4-19	Source of speed loop integral force value	0	0
n0-00	InoLink communication enable	1: Enable	1: Enable
n0-01	Local node address	1	2
n0-03	Received data 1 source node	-	1
n0-04	Received data 1 data selection	-	1
n0-05	Received data 2 source node	-	1
n0-06	Received data 2 data selection	-	2
n0-27	Sent data 1 selection	1544 (U5-44)	-
n0-28	Sent data 2 selection	1612 (U6-12)	-

Note

- <1>: Other settings of the master and slave must be consistent, such as the acceleration/deceleration time, acceleration torque compensation, and speed loop parameters.
- <2>: Assume that the control command word is set by PZD1 of fieldbus adapter A, and that the speed reference is set by PZD2 of fieldbus adapter A.
- <3>: The slave command word and speed reference can be set by the master or the fieldbus adapter.
- <4>: For forward running, supplementary 5% speed reference and the torque upper limit are required. For reverse running, supplementary –5% speed reference and torque lower limit are required.
- If the master needs to detect the fault state of the slave, set the slave to send the status word for the master to determine the fault status.

6.6.7 SVC

In some application scenarios where the encoder suffers large signal interference or installing an encoder is inconvenient or not cost effective, you can set E0-00 to 0 to enable the SVC mode for excellent vector control performance.

SVC control and FVC control differ from each other. The feedback speed of FVC is measured by the encoder, while the feedback speed of SVC is calculated based on back EMF and output current. In the case of low-speed running, the motor speed cannot be accurately calculated, affecting the control accuracy. For long-term running at zero speed with active load, enable the SVC speed open-loop control function (set E11-08 to 1). (This description has been revised to: For long-term running at zero speed with active load, install an encoder and run in the FVC mode.) In such working conditions, if the device must run in SVC mode, the SVC speed open-loop control function must be enabled (set E11-08 to 1).

- Active load refers to the load that can pull the motor into reverse, such as the lifting mechanism load.
- Passive load refers to the load that can be driven by the motor but cannot drive the motor, such as the fan, water pump, centrifuge, and extruder.

After the speed open-loop function is enabled, the motor will automatically switch to open-loop control after running to a low speed. The switching process is as follows:

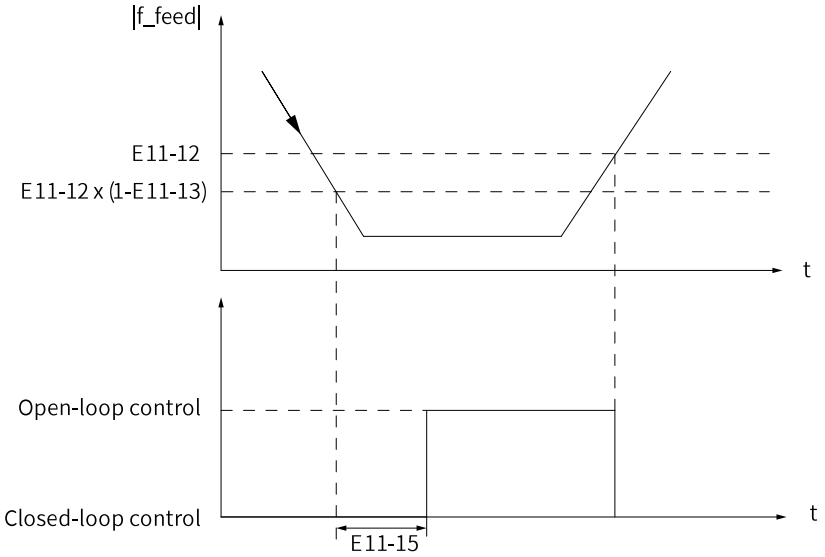


Figure 6-34 Closed-loop to open-loop switching conditions

Open-loop speed control is a speed control mode (E0-01 set to 0), which can ensure that the speed feedback of the motor follows a speed setpoint, but cannot guarantee the accuracy of torque in the torque control mode (E0-01 set to 1). The output torque current E11-09/E11-10 must be set according to the required maximum torque to prevent the motor from being towed away by the load. E11-09/ E11-10 represents the maximum torque output capacity. When the sum of E11-09 and E11-10 is 100%, the output current is the rated current of the motor, and when the sum of E11-09 and E11-10 is 0%, the output current is no-load current.

In the SVC speed open-loop state, no accurate torque can be output in torque control mode. For tension control at zero speed, install the encoder and run in FVC mode.

SVC speed open-loop control often works with low frequency and the torque current must be set according to the maximum torque required by the load, resulting in excessive current in the low-frequency region of speed open loop and excessive motor heating. Besides, the AC drive frequency is also derated. Therefore, the speed open-loop torque should be set properly to avoid motor overheat or overload at low frequency.

6.6.8 Speed Controller

The function diagram of the speed controller is as follows:

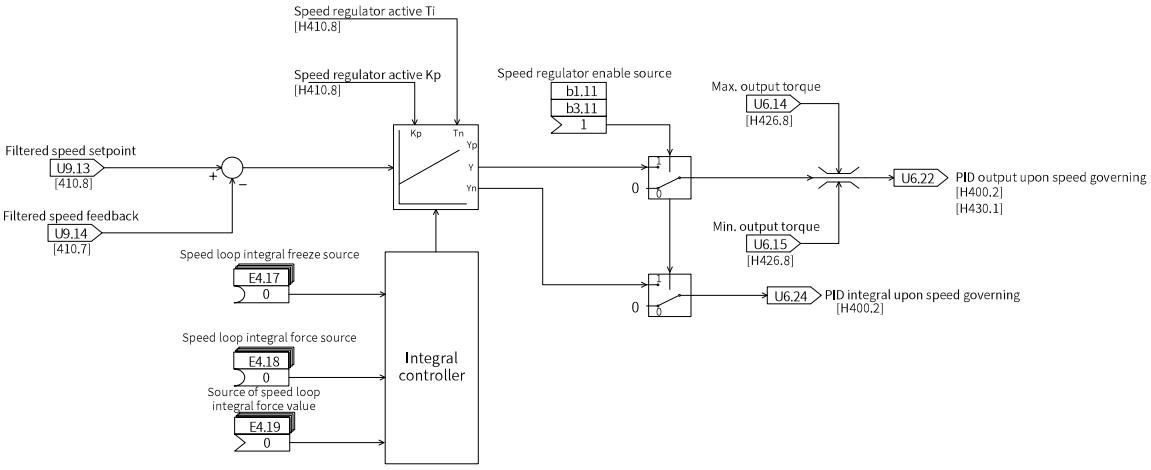


Figure 6-35 Speed controller function diagram

The speed controller obtains the speed setpoint from the reference channel, receives the feedback speed value in the feedback channel (FVC feedback speed is measured by the encoder and SVC is calculated by the motor model), and then generates the torque setpoint from the deviation of the reference and feedback through the PI controller, and sends it to the current controller. The most important parameters of speed regulator are regulator parameters Kp and Ti.

Because the dynamic response performances of FVC and SVC are different, different regulator parameters Kp and Ti are used: E4-02 and E4-03 for FVC, and E4-04 and E4-05 for SVC.

The parameters Kp and Ti of the speed loop PI regulator can be optimized by no-load complete auto-tuning (b5-00 set to 2). If the moment of inertia is known, set d2-02 (moment of inertia) and set b5-02 to 2 to calculate the speed loop parameters, and then set b5-03 to 1 to complete the calculation.

If the feedback speed still oscillates after optimization, it is necessary to manually optimize the controller parameters. When Kp is small, the feedback speed overshoot is large. When Kp increases, the adjustment will become faster and the overshoot will decrease. If Kp is too large, the output torque and feedback speed will oscillate. When Ti decreases, the adjustment of the controller accelerates, and if Ti is too small, the output torque and feedback speed oscillation will also occur.

The principles of manually adjusting the speed loop parameters Kp and Ti are as follows:

- Set a long integral time. For example, set Ti to 500 ms.
- Set a small Kp and a 5% speed step, and observe the feedback speed overshoot. When the overshoot is large, increase Kp to make speed step response again. When the feedback speed overshoot is controlled within 20%, the effect is considered acceptable.

- Reduce the integral time to eliminate the steady-state output deviation, and the torque output jitter in steady state cannot exceed 2% of the rated torque.
- If the controller parameters are too weak to eliminate jitter, the feedback speed filter can be increased (FVC: n4-17/n5-17/n6-17; SVC: E11-07).

Note

Step testing should be performed when mechanical devices permits.

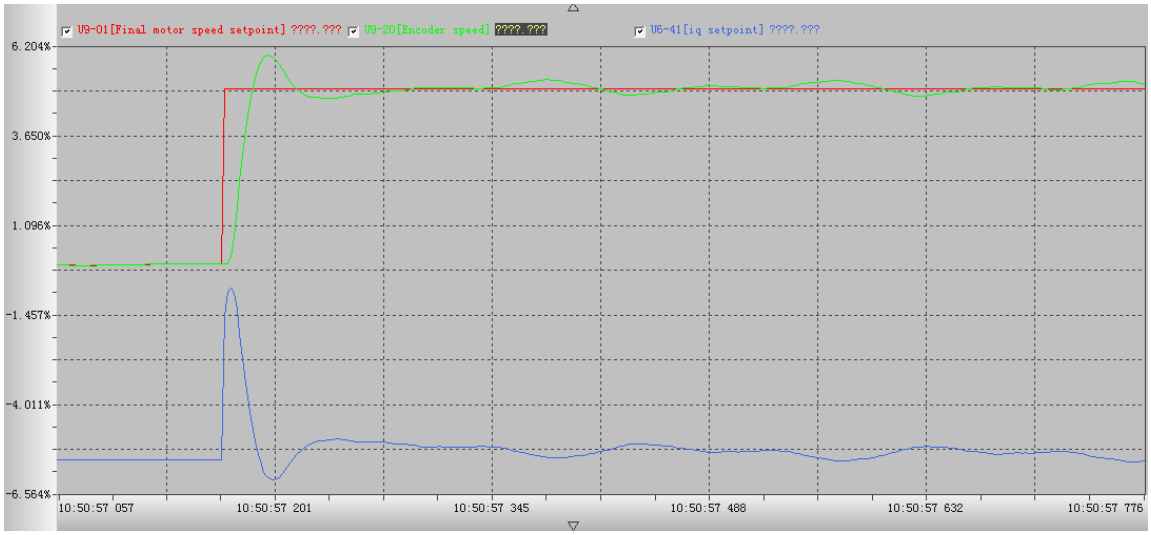


Figure 6-36 Ideal inverter waveform with 5% speed step response

When a PLC is used, the speed loop regulator needs the following three functions:

- Speed loop regulator enable: Controlled by b1-11 or b3-11. b1-11 and b3-11 are reference source parameters which can be controlled through the data from bit connectors. If the speed loop regulator is disabled, the speed loop output and torque setpoint will change to 0.
- Speed loop regulator integral freeze enable: Controlled by E4-17. After this function is enabled, the integral output value will be fixed and reset to the value of the previous cycle.
- Speed loop regulator integral forcing enable: Controlled by E4-18. E4-19 sets the integral forcing value, and the integral output value will be forced to the value of the word connector set by E4-19 after the integral forcing is enabled.

6.6.9 Speed Controller Adapter

The speed controller adapter can optimize the speed loop parameters under different operating conditions or process requirements, and the adapter includes speed adaptation and adaptive adaptation.

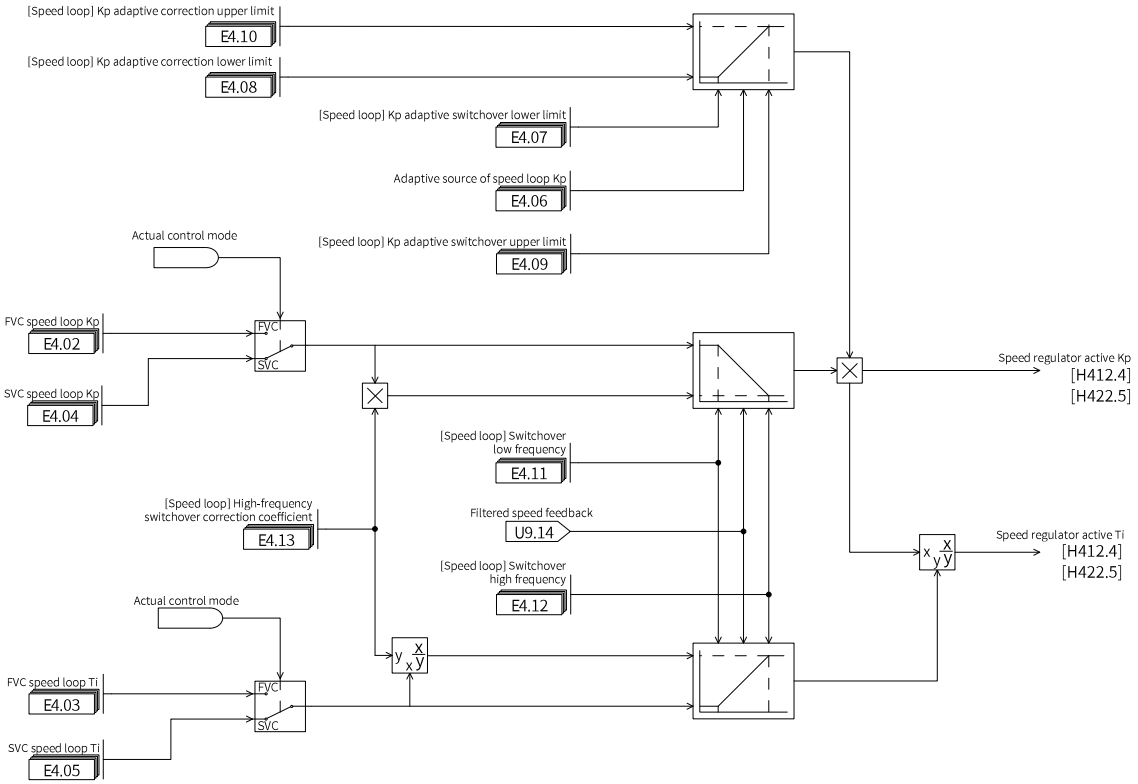


Figure 6-37 Speed controller adapter

Speed adaptation: At high speed, the current control capability becomes weak and the bandwidth of the speed loop decreases, which requires real-time adjustment of the active Kp and Ti parameters according to the feedback speed. After dynamic parameter auto-tuning, the base Kp and Ti (E4-02/E4-03/E4-04/E4-05) are obtained, and the speed adaptation output is obtained through the calculation in the above figure.

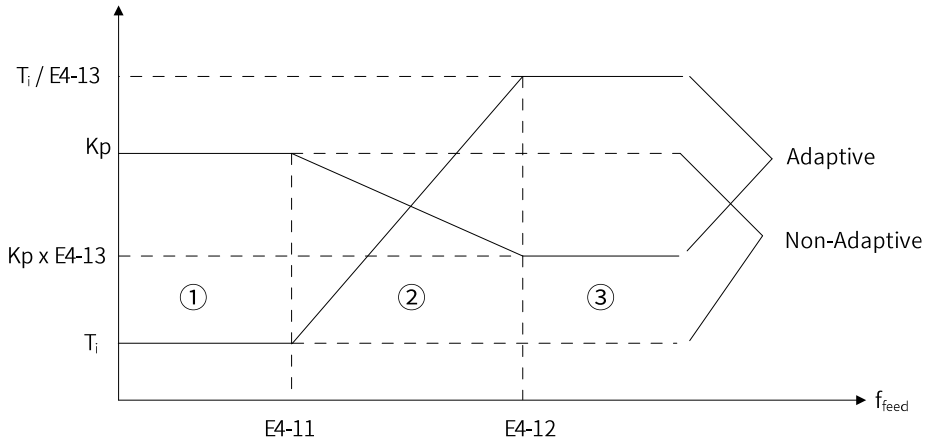


Figure 6-38 Speed adapter

① Constant low speed area ② Adaptation area ③ Constant high speed area

The principle of adaptive adaptation and speed adaptation is the same, but the adjustment reference value range of the speed adapter is wider. For example, if the speed loop controller needs to be modified when the roll diameter changes during winding and unwinding, the roll diameter can be used

as the adjustment reference. The adaptive adapter outputs an adjustment coefficient, which acts on Kp and Ti of the speed adaptation output. The adaptive correction coefficient is calculated as follows:

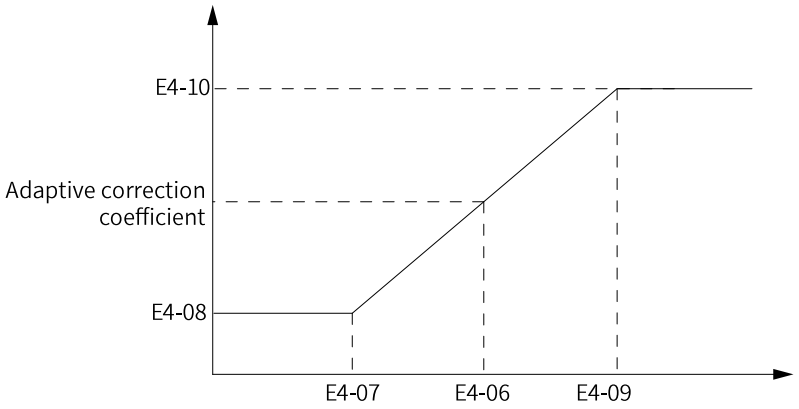


Figure 6-39 Adaptive adapter

The final active Kp and Ti are calculated as follows:

K_p final active value = K_p speed adaptation output value x Adaptive correction coefficient

T_i final active value = T_i speed adaptation output value/Adaptive correction coefficient

6.6.10 Speed Limit

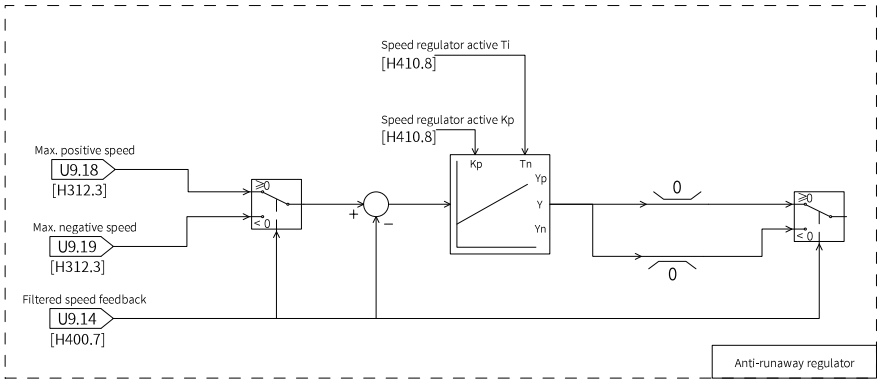
See function diagram [H312] for speed limit.

The upper limit of the motor speed is determined by d0-06, E2-04, and E2-06. The upper limit must not be negative and its minimum value is 0.

The lower limit of the motor speed is determined by d0-06, E2-05, and E2-07. The lower limit must not be positive and its maximum value is 0.

Para.	Name	Description
d0-06	Max. motor speed	The maximum motor speed cannot exceed the value of d0-06 in both the forward direction and the reverse direction. The value of 100% corresponds to the motor per-unit speed (synchronous speed) indicated by d3-02.
E2-04	Forward speed limit	The value indicates the maximum speed in the forward direction. The value of 100% corresponds to the motor per-unit speed (synchronous speed) indicated by d3-02.
E2-05	Reverse speed limit	The value is negative and indicates the maximum speed in the reverse direction. The value of –100% corresponds to the motor per-unit speed (synchronous speed) indicated by d3-02.
E2-06	Forward speed limit selection	The value is restricted by d0-06 and E2-04. The connector is used to restrict the maximum speed in the forward direction. The value of 100% corresponds to the motor per-unit speed (synchronous speed) indicated by d3-02.
E2-07	Reverse speed limit selection	The value is restricted by d0-06 and E2-05. The connector is used to restrict the maximum speed in the reverse direction. The value of –100% corresponds to the motor per-unit speed (synchronous speed) indicated by d3-02.

Speed limit works in all control modes. Once the speed exceeds the upper and lower limits of the speed, the runaway protection function is automatically activated to ensure that the motor speed does not exceed the limits. See function diagram [H422].



6.6.11 Current Limit

When a motor runs properly, the current cannot exceed the maximum motor current indicated by d0-08.

In the V/f control mode, the overcurrent suppression function needs to be enabled to ensure that the current is lower than the maximum current.

In the FVC or SVC control mode, the current regulator automatically controls the current, ensuring that the total current output does not exceed the value of d0-08.

When the maximum motor current is limited, the overload capacity of the motor may be affected and the motor torque output will be reduced.

6.6.12 Torque Limit

The torque limit of a motor is active only in vector control modes (including FVC and SVC). It is inactive in V/f mode.

The actual limit of motor torque will be affected by current limit, torque limit, and power limit at the same time. See the description of function diagrams H330, H420 and H422 for details.

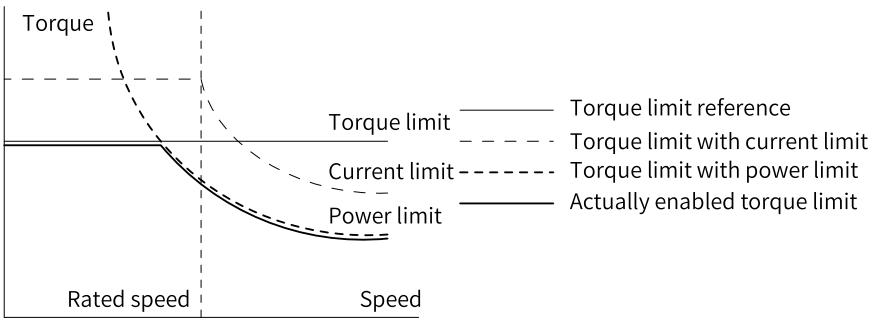


Figure 6-40 Torque limit diagram

The preceding figure takes the motoring working condition as an example to illustrate the impact of the three limits on the actual torque limit. The actual torque limit is determined by the most restrictive

conditions among the limits. In the figure, to facilitate comparison, the active torque limit is slightly moved down, and the curve of the actually active torque limit reference is coincident with the curve of the power-limiting torque limit.

The following table lists the torque limit reference.

Para.	Name	Description
E2-08	Digital setting of torque upper limit	The forward direction of the motor is also that of the torque, and the smaller of E2-08 and [E2-10] is taken as the torque upper limit setpoint. The torque limit is a signed value.
E2-10	Torque upper limit setpoint selection	
E2-09	Digital setting of torque lower limit	The reverse direction of the motor is also that of the torque, and the larger of E2-09 and [E2-11] is taken as the torque lower limit setpoint. The torque limit is a signed value.
E2-11	Torque lower limit setpoint selection	

In terms of the process, the output torque of the speed regulator may need to be separately limited.

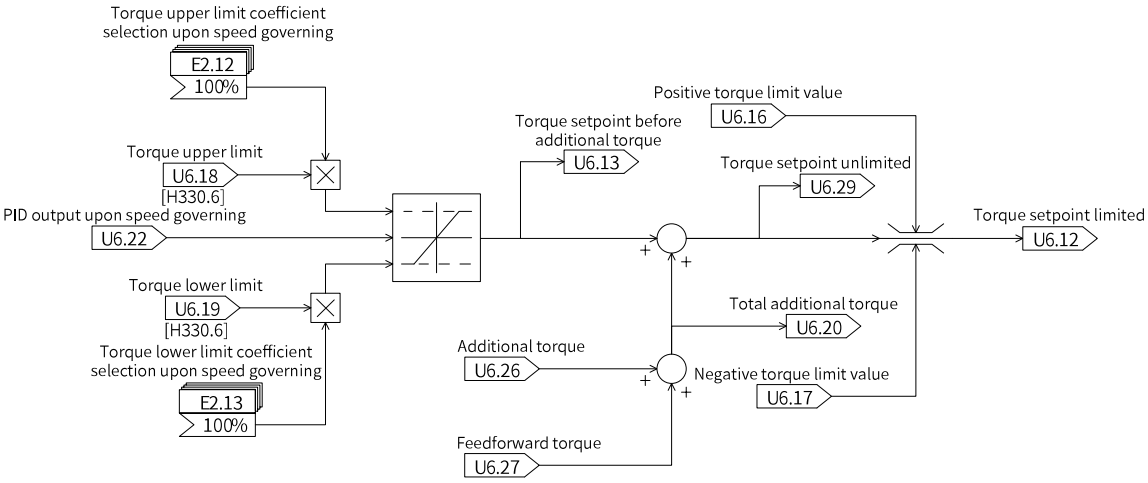


Figure 6-41 Speed regulator output torque limit diagram

Para.	Name	Description
E2-12	Torque upper limit coefficient selection upon speed governing	The default value is 100%. [E2-12] x U6-18 is used to limit the upper limit of PID output torque upon speed governing.
E2-13	Torque lower limit coefficient selection upon speed governing	The default value is 100%. [E2-13] x U6-19 is used to limit the lower limit of PID output torque upon speed governing.

6.6.13 Power Limit

The torque limit of a motor is active only in vector control modes (including FVC and SVC). It is inactive in V/f mode.

The power limit can restrict the total power output by the motor. The output torque limit decreases as the motor speed increases due to the power limit. The power limit is determined by the power limit value and the power limit coefficient. See the following figure:

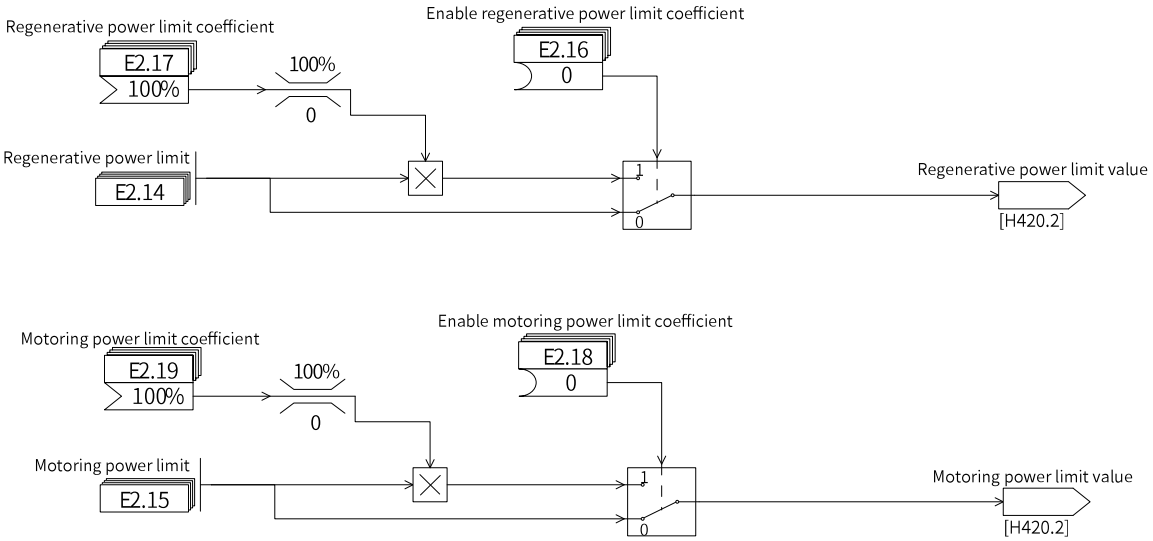


Figure 6-42 Power limit diagram

Para.	Name	Description
E2-14	Regenerative power limit	The maximum allowable regenerative power in regenerative mode. When prohibited by E2-16, the regenerating power limit is determined by E2-14. When E2-16 is Enable, the regenerating power limit is determined by the result of E2-14 x E2-17.
E2-16	Enable regenerative power limit coefficient	
E2-17	Regenerative power limit coefficient	
E2-15	Motoring power limit	Maximum allowable power output during motoring. When E2-18 is disabled, the motoring power limit is determined by E2-15. When E2-18 is enabled, the motoring power limit is determined by the result of E2-15 x E2-19.

6.6.14 Acceleration Torque Compensation

Motor motion equation:

$$T_e - T_L = J\frac{d\omega}{dt}$$

In the above equation:

T_e: motor electromagnetic torque

T_L: load torque and friction torque

J: moment of inertia, displayed in parameter d2-00 after auto-tuning. The per unit value is equal to the electromechanical time constant d2-05.

$\frac{d\omega}{dt}$: motor speed change rate

To enable the motor to accelerate and decelerate according to a given RFG curve, the motor must have an appropriate acceleration torque $T_a = T_e - T_L$. It is usually not easy to obtain a very satisfactory effect

by relying completely on the speed regulator, and it is easy to generate overshoot at the end of acceleration and speed lag at the beginning of acceleration.

Acceleration torque compensation is the answer to this problem. Using the auto-tuned moment of inertia and the expected acceleration rate, the required acceleration torque is directly calculated and superimposed on the output of the speed regulator (function diagram H430) to avoid the adjustment of the speed regulator and improve the speed following characteristics.

Using acceleration torque to calculate the output acceleration rate of RFG can obtain accurate acceleration torque when a given speed curve is only generated by RFG. Taking the control channel 1 as an example, after E4-22 is set to 1, c1-10 is ser to 1, and E4-23 is set to 100%, accurate acceleration torque can be obtained, and the current acceleration torque value can be viewed through U6-25/U6-27.

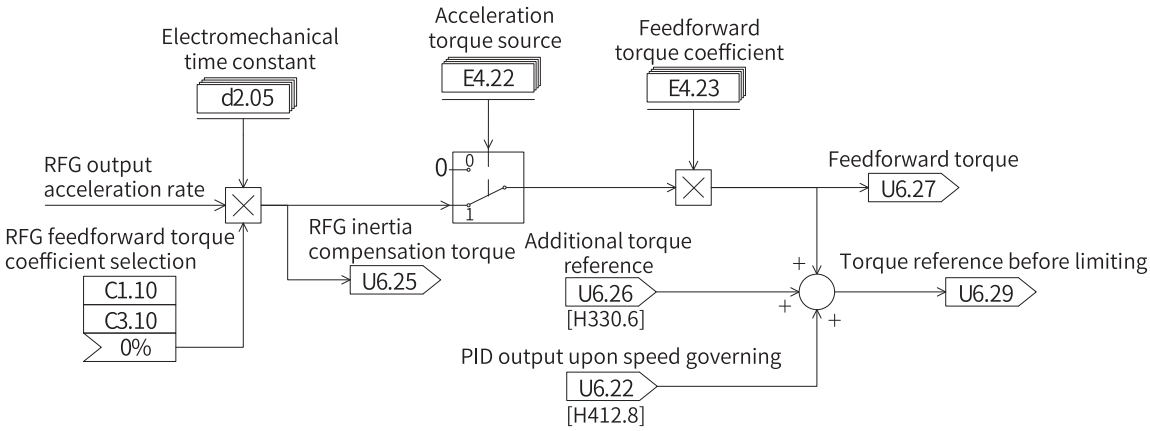
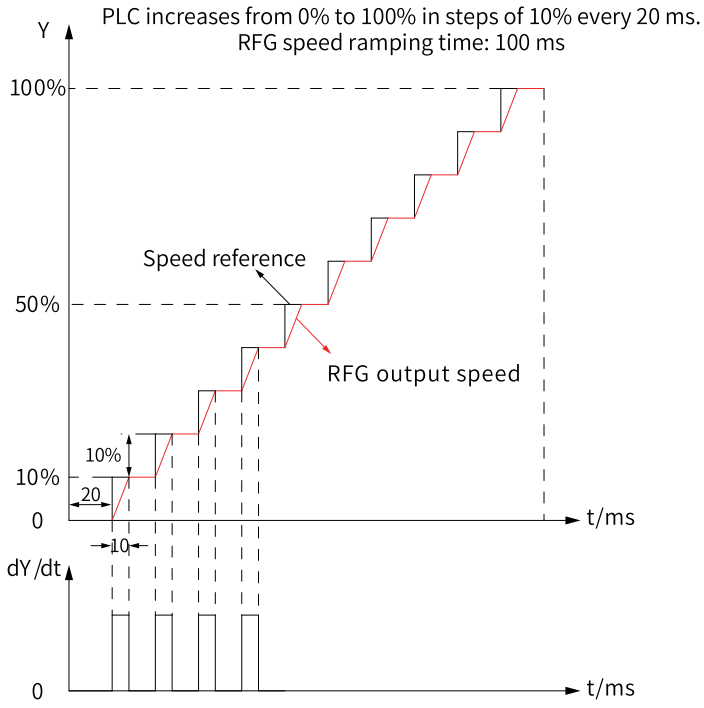


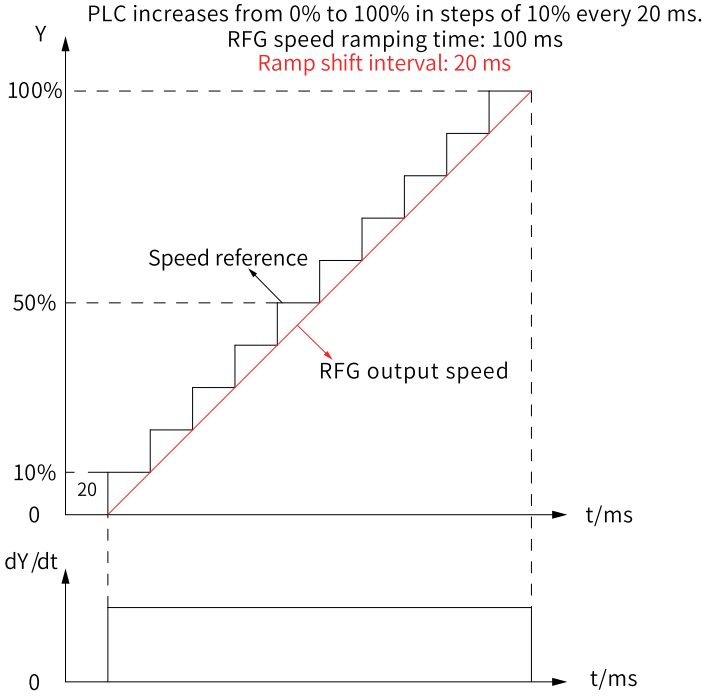
Figure 6-43 Feedforward torque

Note

If the speed reference is set through PLC communication, the speed reference is discontinuous due to the long communication period between PLC and AC drive. This will result in unsmooth RFG output speed and will further result in discontinuous calculated acceleration. The jumping feedforward torque calculated using the acceleration torque compensation function will lead to motor output torque oscillation, which may damage the rigid structure connected by gears.



The slope of the speed ramp is controlled during the change of the speed setpoint, resulting in a continuous variable slope change rate. When the signal update time interval of the external control system (PLC issuing time interval) is consistent with the slope change rate C7-26, the RFG output speed of U9-09 is given as a straight line.



To enable the RFG ramp shift function, only the following two parameters need to be set:

Para.	Name	Description
C7-25	Enable RFG input ramp shift	You can select any bit connector to control: Set [C7-25] to 0 to disable the ramp shift function. Set [C7-25] to 1 to enable the ramp shift function.
C7-26	RFG input ramp shift interval	Sets speed setpoint change rate during slope change.

6.6.15 Field Weakening Control

6.6.15.1 Asynchronous Motor Field Weakening Control

When the motor speed increases, the motor back EMF also increases. When the motor back EMF exceeds the maximum output voltage, the AC drive loses the ability to regulate the current, and the motor will run out of control. Reducing the magnetic flux can reduce the back EMF, preventing the motor from running out of control, so that the motor speed can rise to a higher level.

The maximum available voltage is calculated from the bus voltage, and a voltage reserve (E6-02) is provided to ensure the current regulation capability. The maximum output voltage is calculated as follows:

$$Vmax = \frac{\text{Bus voltage}}{\sqrt{2}} (100\%\text{-}[E6\text{-}02])$$

The voltage reserve (E6-02) can be manually adjusted when the output voltage capability is insufficient.

When the output frequency enters the field weakening region, the back EMF is reduced by setting the magnetic flux according to the following curve, thus ensuring that the motor does not lose control at high speed.

$$\psi_{set} = \begin{cases} \psi_N & \cdots\cdots f_{syn} < f_N \\ \psi_N \dfrac{f_N}{f_{syn}} & \cdots\cdots f_{syn} \geqslant f_N \end{cases}$$

ψ_N and ψ_{set}: Rated magnetic flux and magnetic flux setpoint;

f_N and f_{syn}: Rated frequency and output frequency.

As shown in the following figure, after entering the field weakening region, the magnetic flux starts to decrease and the output voltage does not increase. The reserved voltage reverse (E6-02) cannot be set too large; otherwise it will affect the high-speed load capacity of the motor.

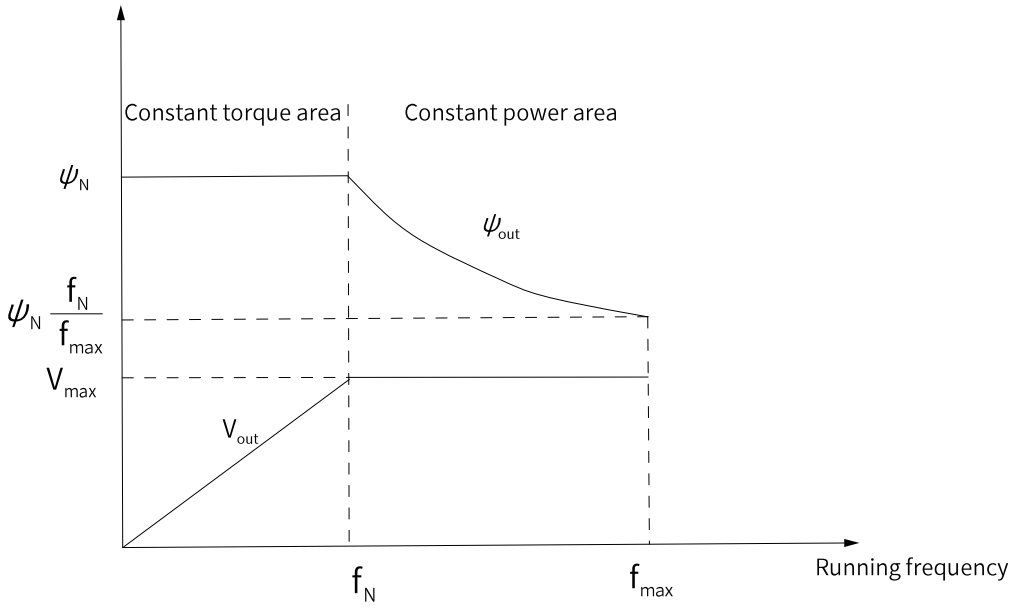


Figure 6-44 Schematic diagram of magnetic flux and voltage output of asynchronous motor during operation

6.6.15.2 Synchronous Motor Field Weakening Control

A synchronous motor's back EMF increases with its running speed. When the back EMF exceeds the maximum voltage that can be output by the AC drive, the synchronous motor enters the field weakening control state. In the field weakening control mode, the synchronous motor increases the demagnetization current to reduce the magnetic chain of the motor stator and then to reduce the motor back EMF voltage. A higher demagnetization current means a higher output current and speed. The synchronous motor's demagnetization current consists of two parts: demagnetization current obtained through maximum output voltage control of the AC drive and demagnetization current obtained from the field weakening curve similar to that of the asynchronous motor.

Note

The synchronous motor field weakening curve is set in E6-11. It is disabled by default. You can manually enable the curve in E6-11 for scenarios with high requirements on dynamic performance in the synchronous motor field weakening area.

6.6.16 Vdc Control in Vector Control Mode

When the power supply lacks the regenerative capability, the Vdc control function can be activated upon overvoltage or undervoltage in the DC bus. Vdc control consists of the VdcMax control and the VdcMin control.

VdcMax control and VdcMin control use the same PI controller. The controller parameter gain is automatically calculated. When parallel inverters are added to the bus, the gain adjustment coefficient of Vdc control in E9-06 vector control can be adjusted based on the power percentage.

6.6.16.1 Overvoltage in DC Bus

The voltage of the DC bus increases when the motor generates electricity. The direct way is to reduce the power generation torque to suppress the rise of the DC bus voltage. After the Vdcmax control is activated, if the motor power generation torque is too large or the regenerative energy is too much, this function will automatically reduce the power generation torque to adjust the DC bus voltage. If the voltage rises too quickly, the motor may enter the motoring state to consume excessive energy in the bus through motoring torque. This function intuitively extends the motor deceleration time.

Pay attention to the following aspects during using:

- Use the Vdcmax control function only when the power supply lacks the regenerative capability.
- When using a braking resistor, set the braking voltage to a value less than the Vdcmax trigger voltage or disable the Vdcmax function.
- In the case of common bus, enable the Vdcmax control function on only one AC drive, typically the drive unit with the largest inertia, and disable this function on other units.
- In the torque control mode, exert caution about enabling the Vdcmax function. A torque that cannot adjust the system bus may be adjusted to the torque limit.
- In case of proactive load such as the lifting load, disable the Vdcmax control function. It is because Vdcmax will restrict the power generation torque, which may cause motor driven by the load, resulting in serious consequences such as heavy object falling.

The following figure shows the Vdcmax control process.

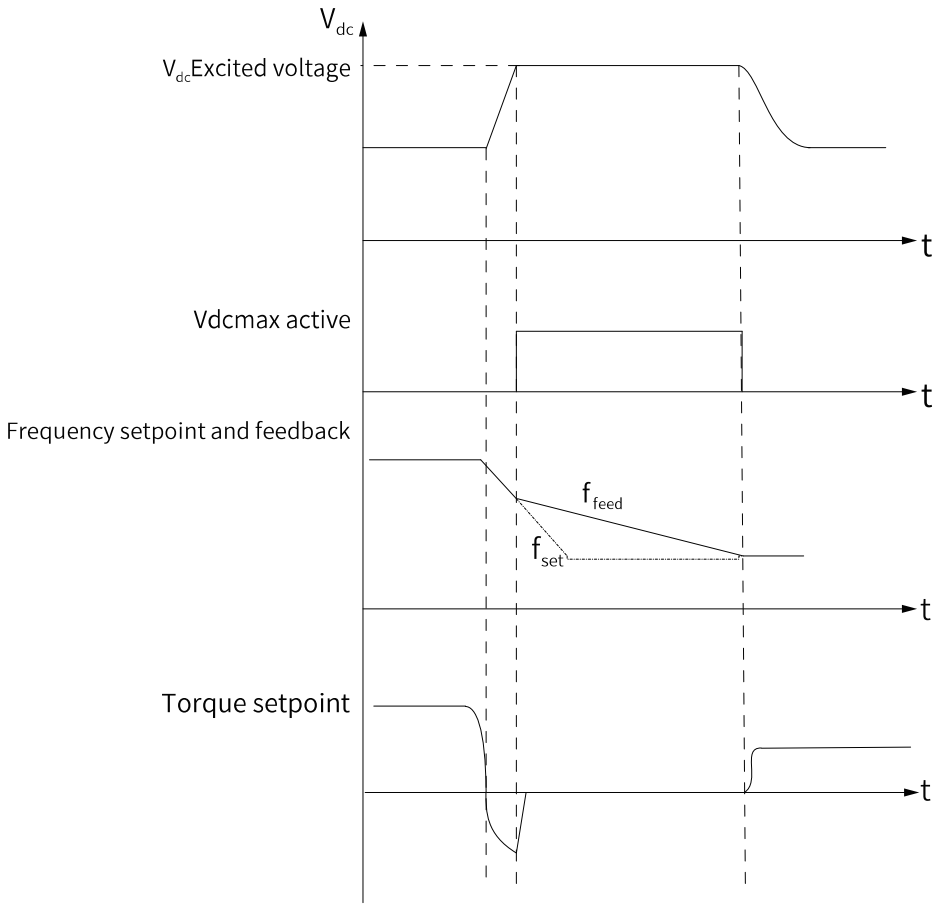


Figure 6-45 Vdcmax control process diagram

6.6.16.2 Undervoltage in DC Bus

The motor may coast to a stop due to undervoltage if no measure is taken in the case of a short-term blackout or DC bus power failure. Vdcmin control can suppress undervoltage within a short time to prevent shutdown due to a momentary power failure. In the case of a long-term blackout or DC bus power failure, you need to enable Vdcmin control for electricity generation to compensate for bus energy loss until all motors stop reliably. When detecting that the bus voltage is lower than the permitted value, Vdcmin control enables the motor to generate electricity to compensate for energy loss until the DC bus voltage is stabilized.

The following figure shows the Vdcmin control process.

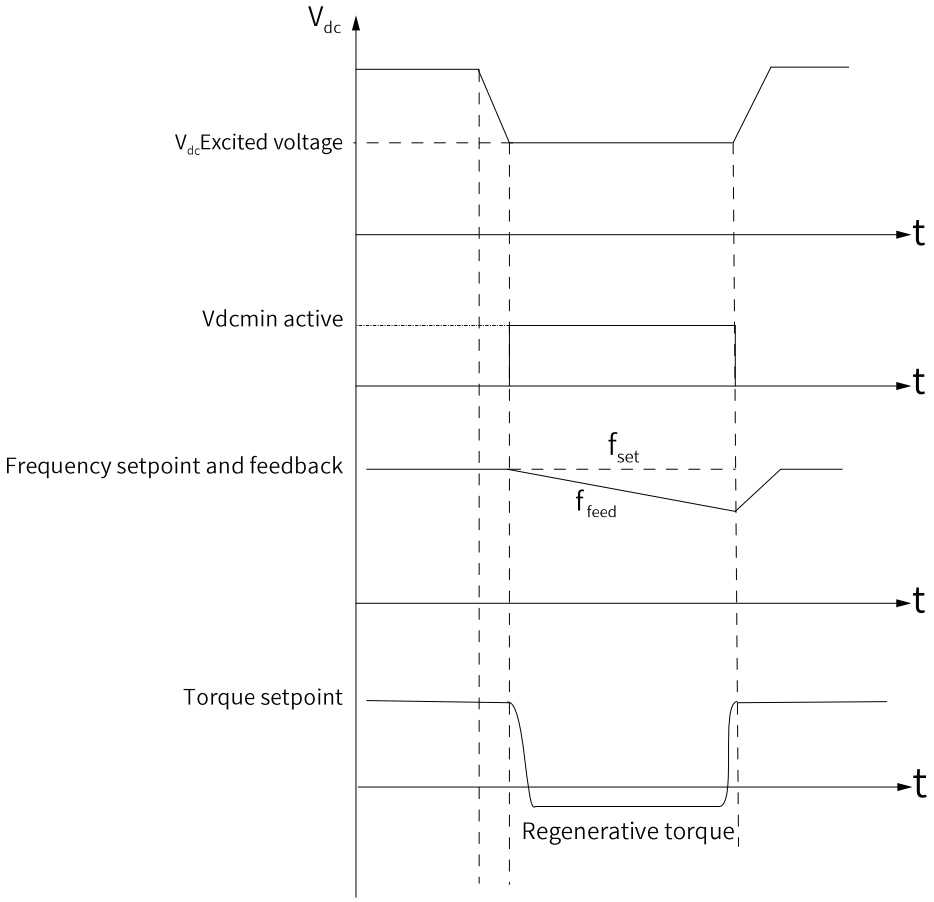


Figure 6-46 Vdcmin control process diagram

Related parameters

Para.	Name	Description	Setpoint
E9-00	Auto calculate Vdc excited voltage in VC mode	Set by parameter: Vdc excited voltage is set by E9-02 and E9-05 Auto calculation: Vdc excited voltage is calculated based on the bus undervoltage and overvoltage thresholds Vdcmin excited voltage = Bus undervoltage threshold + 50 V Vdcmax excited voltage = Bus overvoltage threshold - 50 V	0: Parameter setting 1: Auto calculated
E9-01	Vdc_max control switch in VC mode	0: Vdcmax control is disabled 1: Vdcmax control is enabled	0: Disable 1: Enable
E9-02<1>	Vdc_max excited voltage in VC mode	Vdcmax excited voltage in vector control takes A2-02 as reference. When A2-02 is 400 V, the default Vdcmax excited voltage is calculated as follows: Vdcmax excited voltage = E9-02 x A2-02 x 1.414 = 650 V	110% to 140%
E9-03	Vdc_min control switch in VC mode	0: Vdcmin control is disabled 1: Vdcmin control is enabled	0: Disable 1: Enable
E9-04	Vdc_min control cut-off frequency in VC mode	The Vdcmin control cut-off frequency in vector control is the frequency when Vdcmin control is exited because the running frequency is smaller than the value of E9-04.	0.0 Hz to 50.0 Hz
E9-05<2>	Vdcmin excited voltage in VC mode	Vdcmin excited voltage in vector control takes A2-02 as reference. When A2-02 is 400 V, the default Vdcmin excited voltage is calculated as follows: Vdcmin excited voltage = E9-05 x A2-02 x 1.414 = 452.4V	60% to 90%
E9-06	Vdc control gain adjustment coefficient in VC mode	E9-06 is used to adjust controller performance dynamically.	1% to 1500%
E9-07	Bus capacitance ratio	Controller performance is affected by the number of capacitors connected to the bus when multiple drives share the same bus. The capacitance of the inverter module of the bus is typically proportional to the module power. The aggregate power of all inverters of the bus is 2000 kW if the power of the inverter module is 500 kW. In this case, set this parameter to 400%.	100% to 1500%

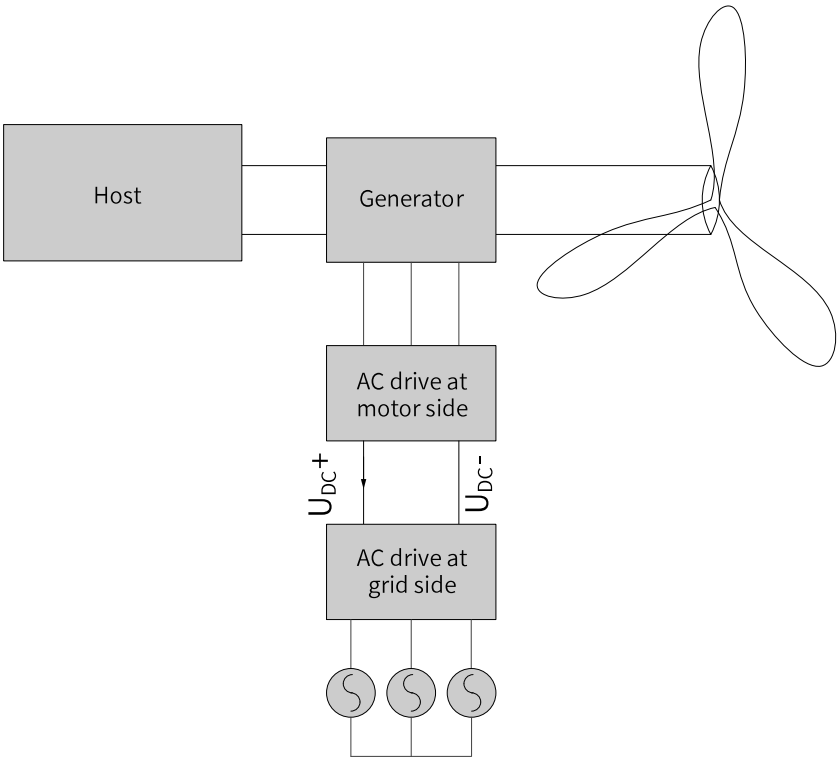
Note

- <1>: Set E9-02 for Vdcmax control to a relatively large value to prevent incorrect trigger in the case of large grid voltage fluctuations. It is better to verify this trigger voltage during application.
- <2>: Set E9-05 for Vdcmin control to a relatively small value to prevent incorrect trigger in the case of large grid voltage fluctuations. It is better to verify this trigger voltage during application.

6.6.16.3 DC Regulator Control Mode

The DC regulator control mode is applicable to power generation scenarios that do not support V/f control. After this mode is enabled, the motor is in the regenerative mode. The control mode set in E0-01 (speed mode/torque mode) is inactive and the controller uses the bus voltage as the closed loop to control the regenerative torque to maintain the bus voltage at a constant value, and outputs energy through the bus. In such applications, the speed of the unit is controlled by the prime mover. The generator will start after having a certain speed. Therefore, you need to set E1-00 to flying start and set the stop mode to coast to stop.

Typical application 1: The shift shaft belt generator system uses power from the ship motor to drive the generator to the ship's grid. The system topology is shown in the following figure. The ship motor provides prime power for the propeller and generator. The motor-side AC drive runs in the constant bus voltage control mode, and the grid-side AC drive inverts power from the bus and feeds it to the grid.



Note that, the motor-side AC drive can start only when the bus voltage is above the undervoltage threshold. You can establish the bus voltage as follows:

- Use the motor back EMF uncontrolled rectifier to establish the bus voltage. In this method, the motor must be a PMSM. Use the motor to drive the generator. When the motor back EMF passes through the uncontrolled rectifier, the bus voltage is automatically established when the speed is high enough and the bus voltage is above the undervoltage threshold.
- Use an external device to provide bus voltage. When the PMSM back EMF is low or the speed does not meet the requirement, back EMF cannot establish sufficient bus voltage. Excitation is unavailable before an asynchronous motor runs and thus back EMF cannot establish bus voltage. In such cases, you need to use an external device to provide bus voltage to meet the startup condition. For example, in the current case, you can enable the grid-side AC drive to run in the rectifier mode to provide bus voltage. After the motor-side AC drive has been started, enter the grid-

connected mode. The asynchronous motor must be pre-excited before start, which must draw some active power from the bus. Therefore, the capacity of the external device must be greater than the rotor/stator resistance loss power of the asynchronous motor and a certain margin should be reserved; otherwise, undervoltage will occur during pre-excitation or the external device is damaged. After the motor is started, the bus voltage comes from the energy generated by the generator, instead of the external device.

The DC regulator control mode supports switchover between the running mode and the speed mode. If DC regulator control function is enabled by E9-10 in the speed mode, the motor enters the regenerative mode without impact. If this function is disabled during DC regulator running, the speed reference enters the speed mode from the current speed to switch between the motoring mode and the regenerative mode. This function is applicable for charging and discharging scenarios, such as internal combustion engine startup and power generation, and flywheel energy storage devices.

Typical application 2: The flywheel energy storage devices uses motor to drive a flywheel with large inertia to rotate at a high speed to store mechanical energy and converts mechanical energy into electrical energy when needed. To charge the flywheel, the motor must run in the motoring speed mode to increase the mechanical energy by accelerating. To discharge the flywheel, enable the DC regulator control function by E9-10. Then, the motor mode changes from speed to constant bus voltage, providing power for external devices.

Startup and power generation applications: Common generator units generally consists of an internal combustion engine as the prime mover and a generator outputting electrical energy. The internal combustion engine cannot start by itself and must be driven by external force to a certain speed to ignite the engine. The internal combustion engine outputs energy after start. Therefore, use the speed mode to make the generator work in the motoring status to start the internal combustion engine. After the internal combustion engine is started, change to the constant bus voltage mode to generate energy.

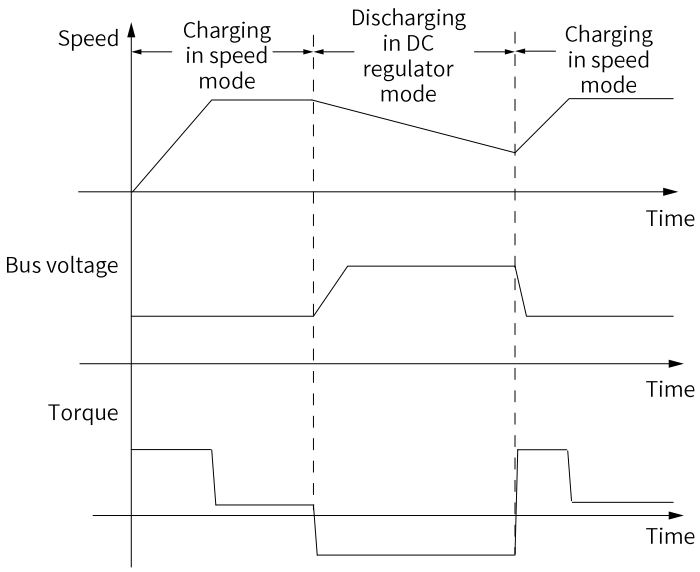


Figure 6-47 Diagram of switching between constant bus voltage control and speed control

Para.	Name	Setpoint	Description
E9-10	DC regulator control enable	0: Disable 1: Enable	0: DC regulator control is disabled 1: DC regulator control is enabled
E9-11	DC regulator control voltage loop enable	0: Disable 1: Enable	0: Bus voltage loop is not enabled 1: Bus voltage loop is enabled
E9-14	Voltage reference source in DC regulator mode	0: Digital setting E9-15 Other: Connector	0: Digital setting E9-15 Other: Connector
E9-15	Voltage digital setting in DC regulator mode	410.0 V to 1200.0 V	The bus voltage setpoint in DC regulator mode
E9-16	Voltage digital setting upper limit in DC regulator mode	60% to 150%	The upper limit of bus voltage setpoint in DC regulator mode. The percentage corresponds to the bus voltage base value <1>
E9-17	Voltage upper limit source in DC regulator mode	Other: Connector	The smaller of the upper limit of bus voltage setpoint in DC regulator mode and the value of E9-16. When it is set to 0, the limit is inactive.
E9-18	Voltage digital setting lower limit in DC regulator mode	60% to 150%	The lower limit of bus voltage setpoint in DC regulator mode. The percentage corresponds to the bus voltage base value <1>
E9-19	Voltage lower limit source in DC regulator mode	Other: Connector	The smaller of the lower limit of bus voltage setpoint in DC regulator mode, the upper limit of bus voltage setpoint in DC regulator mode, and the value of E9-18. When it is set to 0, the limit is inactive.
E9-20	Voltage upper limit in DC regulator mode		Display the final active upper limit of the bus voltage setpoint
E9-21	Voltage lower limit in DC regulator mode		Display the final active lower limit of the bus voltage setpoint
E9-22	Voltage setpoint change reference time	0.0s to 2000.0s	The ramp time for the bus voltage setpoint to change from 0 V to the bus voltage reference
E9-26	Min. operating frequency in DC regulator mode	0.0% to 200.0%	When the motor speed is lower than this frequency, the bus voltage loop does not work and the torque setpoint is always zero
E9-27	Kp adjustment coefficient in DC regulator mode	1.0% to 1000.0%	The Kp coefficient for adjusting the bus voltage loop in DC regulator mode
E9-28	Ki adjustment coefficient in DC regulator mode	1.0% to 1000.0%	The Ki coefficient for adjusting the bus voltage loop in DC regulator mode

Para.	Name	Setpoint	Description
E9-29	Dynamic Kp adjustment in DC regulator mode	10.0% to 1000.0%	When the deviation between the bus voltage in DC regulator mode and the setpoint exceeds the value set in E9-30, this coefficient is used to increase the voltage loop Kp to improve the dynamic and anti-load disturbance performance.
E9-30	Dynamic Kp activation threshold in DC regulator mode	5.0 V to 100.0 V	When the deviation between the bus voltage in DC regulator mode and the setpoint exceeds this value, the voltage loop Kp is adjusted dynamically to improve the dynamic and anti-load disturbance performance.

Note

<1>: The bus voltage reference is determined by the voltage class of the model, which is 540 V for the 400 V model and 975 V for the 690 V.

6.6.17 MTPA Control

For embedded PMSM whose salient pole ratio is not 1, enabling MTPA control can effectively utilize the motor reluctance torque and maximize the output torque of the motor shaft at the same output current.

Para.	Name	Setpoint
E11-41	Enable MTPA control for synchronous motor	This function is enabled by default.
E11-42	MTPA control adjustment coefficient of synchronous motor	Adjust the current calculation for MTPA control. Increase or decrease of this value will change the MTPA control effect and affect the output torque size. By default, it is set to 100%, indicating no adjustment.

6.6.18 Output Voltage and Over-Modulation

In air compressor, fan pump, and belt conveyor applications, output voltage is one of the core metrics. A larger output voltage at the same load means smaller output current and less heat generation from motors, cables, and inverters. The output voltage is related to the grid voltage/grid capacity, rectifier, and inverter. Generally, the grid and rectifier determine the base of the output voltage, and the small capacity of the grid will lead to a large voltage drop after heavy load, after the grid gets the bus voltage after rectification, the maximum reference voltage is determined. From the SVPWM modulation relationship in the linear region, the relationship between the bus voltage and the maximum output voltage of the AC drive can be deduced as:

$$V_{\text{Max. output voltage}} = \frac{1}{\sqrt{2}} U_{dc}$$

For control stability, a voltage reserve (E6-02) of 3% is reserved. Therefore, the stable output voltage is:

$$V_{\text{Max. output voltage}} = \frac{1-([E6\text{-}02])}{\sqrt{2}} U_{dc} = \frac{0.97}{\sqrt{2}} U_{dc}$$

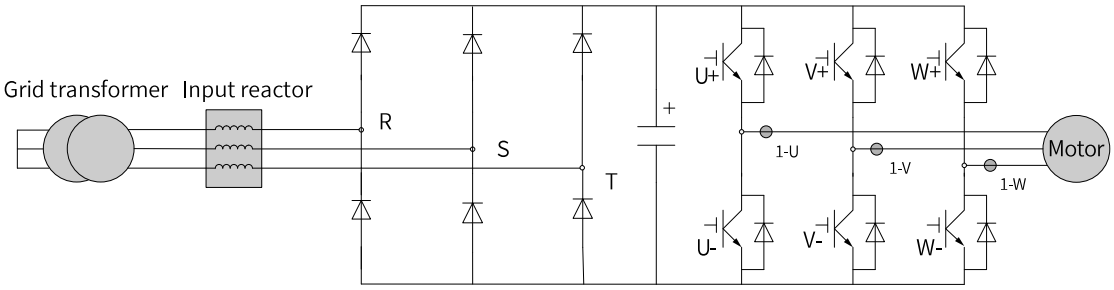
In some sites, due to the low input voltage and low bus voltage, the output voltage can be increased by over-modulation, and the output current can be reduced by about 15% at rated current output under full load. When over-modulation is enabled for inverter software (A4-07 set to 1, A4-32 set to 106%), the output voltage can be increased up to about 6% (the motor runs normally and the harmonic wave is small). Over-modulation is disabled by default. After over-modulation is enabled, the maximum steady-state output voltage is about:

$$V_{\text{Max. output voltage}} = \frac{1-([E6\text{-}02]) \times A4\text{-}32}{\sqrt{2}} U_{dc} = \frac{1.03}{\sqrt{2}} U_{dc}$$

Note

When the motor output voltage in non-field weakening area cannot reach the maximum steady-state voltage, enabling over-modulation in no-load or light-load mode cannot decrease the output current. Enabling over-modulation in light-load mode may make the motor exit the field weakening state and increase the output current. When the over-modulation coefficient exceeds 106%, the output harmonic wave increases, which will increase the torque ripple. Higher values are not recommended.

Therefore, the output voltage is closely related to the bus voltage. The MD880 series rectifiers can be divided into rectifiers that can be controlled by AFE/DC-DC bus, basic rectifiers (diodes/thyristors), and smart rectifiers that cannot be controlled by bus. The bus voltage of rectifiers that can be controlled by AFE/DC-DC bus can be set. A higher bus voltage can obtain a higher output voltage. The output voltage generally can meet the site requirements, which is not detailed in this guide. The bus voltage of basic rectifiers and smart rectifiers is determined by the grid voltage strength. The following figure shows a simple topology.



When the inverter outputs no load, both the grid transformer and the input reactor have no voltage drop, and the grid voltage corresponds to the voltage at the rectifier input side. If the grid voltage is 380 V, the rectifier input voltage is 380 V, and the bus voltage obtained after rectification by diode is:

$$U_{dc} = 1.414\ V_{\text{Rectifier input}} = 1.414\ V_{\text{Reactor input}} = 1.414\ V_{\text{Transformer input}}$$

If the output is full load, the transformer and input reactor have current, and thus have obvious voltage drop, which is determined by the load size. Therefore, the voltage of the input transformer is slightly increased to eliminate voltage drop of the transformer and reactor after the motor has load.

In full load, the output bus voltage relationship of the MD880 basic rectifier is as follows:

$$U_{dc} = 1.35\ V_{\text{Rectifier input}}$$

Under output full load

$$V_{\text{max. output voltage_non-overmodulation}} \approx 0.93\ V_{\text{Rectifier input}}$$

$$V_{\text{max. output voltage_overmodulation}} \approx 0.98\ V_{\text{Rectifier input}}$$

The over-modulation function can increase the maximum output voltage of the AC drive when the bus voltage is given, so as to reduce the with-load motor current in the field weakening region and improve the with-load limit capacity at saturated output voltage. Note that, in over-modulation mode, increase of output voltage at the expense of voltage THD and increase of current harmonic wave. A too large over-modulation coefficient will cause motor oscillation.

Para.	Name	Description	Setpoint
A4-07	PWM modulation mode	0: Without over-modulation 1: With over-modulation	0: Disable 1: Enable
A4-32	Over-modulation depth	The over-modulation depth. A large coefficient causes a larger maximum output voltage but also a larger voltage harmonic component.	100.0% to 110.0%

6.6.19 Motor Model Temperature Self-Adaptation

Due to motor heating during motor running or change to the motor ambient temperature (for example, large temperature different in summer and winter when the motor runs outdoor in Northeastern China), the motor stator resistance and rotor resistance change greatly and has a certain deviation on the model, affecting the control accuracy. With default parameter settings, the motor model does not adapt to the temperature. The MD880 model compensates the temperature change in the following three ways:

- Use the temperature sensor to obtain the accurate motor temperature. Select the motor temperature detection source in E8-22 and set E11-29 to 1 to set the motor temperature model source to motor temperature sensor. Then, you can use the temperature sensor to adjust the motor model to adapt to the motor temperature change. Note that, motor model error may occur due to incorrect temperature caused by temperature sensor feedback error (such as signal interference).
- If no temperature sensor is installed and the motor temperature changes greatly but you still want to obtain accurate motor model, you can set E11-29 to 0 to select the estimation mode, set E11-30 to 1 to select the temperature model 1, and set the temperature model parameters E11-31 to E11-36. Accurate setting of temperature model parameters can improve the control accuracy. E11-35 are E11-36 important parameters for the estimation model, which can be test through experiments or by empirical estimation.

Para.	Name	Setpoint
E11-29	Source of motor temperature model temperature	0: Estimation 1: Temperature sensor
E11-30	Motor temperature model type	0: None 1: Model 1
E11-31	Ambient temperature	Ambient temperature of the environment where the motor is placed. The default value is 20°C.
E11-32	Steady state load	The temperature rise coefficient base under rated load. The default value is 100%.
E11-33	Zero speed load	The load required to generate temperature rise at zero speed that is same to that in the steady state load. If the motor cooling mode is forced air cooling or water cooling, the coefficient is 100%. If the motor is cooled by fan driven by shaft, the temperature rises faster at low speed, and the load per temperature rise will be smaller. In this case, the coefficient can be set to 50%.

Para.	Name	Setpoint
E11-34	Frequency at breakover point	Breakover point at which the load is within 0 and the steady state load per temperature rise.
E11-35	Motor temperature rise under rated load	The temperature change for the motor temperature rises from the ambient temperature to the steady state temperature under rated load.
E11-36	Motor temperature rise time constant	The time taken for the temperature rises to 63% of E11-35.

- E11-45 (stator resistance optimization): If this function is enabled, the stator resistance is auto-tuned upon startup, and the stator resistance can be calibrated after the temperature changes. This can keep the stator resistance error within the allowable range and improve the SVC low-speed with-load performance. This function is applicable when 1) the motor starts and stops frequently and the motor temperature changes greatly; and 2) the ambient temperature changes greatly and the motor heating is not serious.

Note

It takes some time to stator resistance auto-tuning. If the pre-excitation time is too short, auto-tuning may fail.

6.7 V/f Control

V/f control is applicable to universal load such as fans and water pumps, and application scenarios where one device drives multiple motors or where the device power differs greatly from the motor power. In the V/f control mode, the drive runs in open loop control, without the need for speed feedback. With low dependence on motor parameters and high robustness, this mode is typically suitable for occasions with low dynamic requirements.

6.7.1 Curve Selection

V/f control modes include the V/f curve mode and V/f separation mode. The following table lists the parameters related to the V/f curve mode.

Para.	Name	Setpoint
E3-00	V/f mode selection	0: V/f curve 1: V/f separation
E3-01	V/f curve selection	0: Linear V/f 1: Multi-point V/f 2: Square V/f 3: 1.2-power V/f 6: 1.6-power V/f 8: 1.8-power V/f
E3-02	Multi-point V/f curve frequency point 1	0.0% to 100.0%
E3-03	Multi-point V/f curve voltage point 1	0.0% to 100.0%
E3-04	Multi-point V/f curve frequency point 2	0.0% to 100.0%

Para.	Name	Setpoint
E3-05	Multi-point V/f curve voltage point 2	0.0% to 100.0%
E3-06	Multi-point V/f curve frequency point 3	0.0% to 100.0%
E3-07	Multi-point V/f curve voltage point 3	0.0% to 100.0%
E3-45	V/f separation mode selection	0: Frequency without ramp/voltage ramp acceleration 1: Frequency/voltage independent ramp acceleration/ deceleration
E3-46	V/f separation voltage reference	0: [0] 1: [100.0%] 2: [AI1] 3: [AI2] 4: [HDI1] 5: [HDI2] Other: [K connector]
E3-47	V/f separation voltage acceleration time	0.0s to 1000.0s
E3-48	V/f separation voltage deceleration time	0.0s to 1000.0s

The V/f separation mode is generally used in induction heating, inverter power supply, and torque motor control. This mode can be selected by parameter E3-00. In this mode, the voltage output by the AC drive is independent of the frequency. The output frequency is determined by the frequency source, and the output voltage source is set by the parameter E3-46. If the set separation voltage changes, the V/f separation voltage change time can be set through E3-47/E3-48 to prevent voltage sudden change.

The V/f curve has several modes:

- 0: Linear V/f. When the motor runs at a rated frequency, a linear relationship is kept between the output voltage and the frequency. It is applicable to common constant-torque load.
- 1: Multi-point V/f. It is applicable to special load such as dehydrator and centrifuge. Users can set parameters E3-02 to E3-07 to define the V/f curve frequency and voltage. Multi-point V/f needs to be set according to the load characteristics of the motor. Note that the relationship between the three voltage points and frequency points must meet the requirements of V1 ≤ V2 ≤ V3 and F1 < F2 < F3. The figure also shows a schematic diagram of multi-point V/f setting.
- 2: Square V/f. It is applicable to centrifugal load such as the fan and water pump. Voltages vary squarely with frequencies.
- 3/6/8: 1.2-power V/f, 1.6-power V/f, and 1.8-power V/f. The voltage changes with frequency to the power of 1.2, 1.6, and 1.8, respectively. It is between the linear mode and the square V/f curve mode.

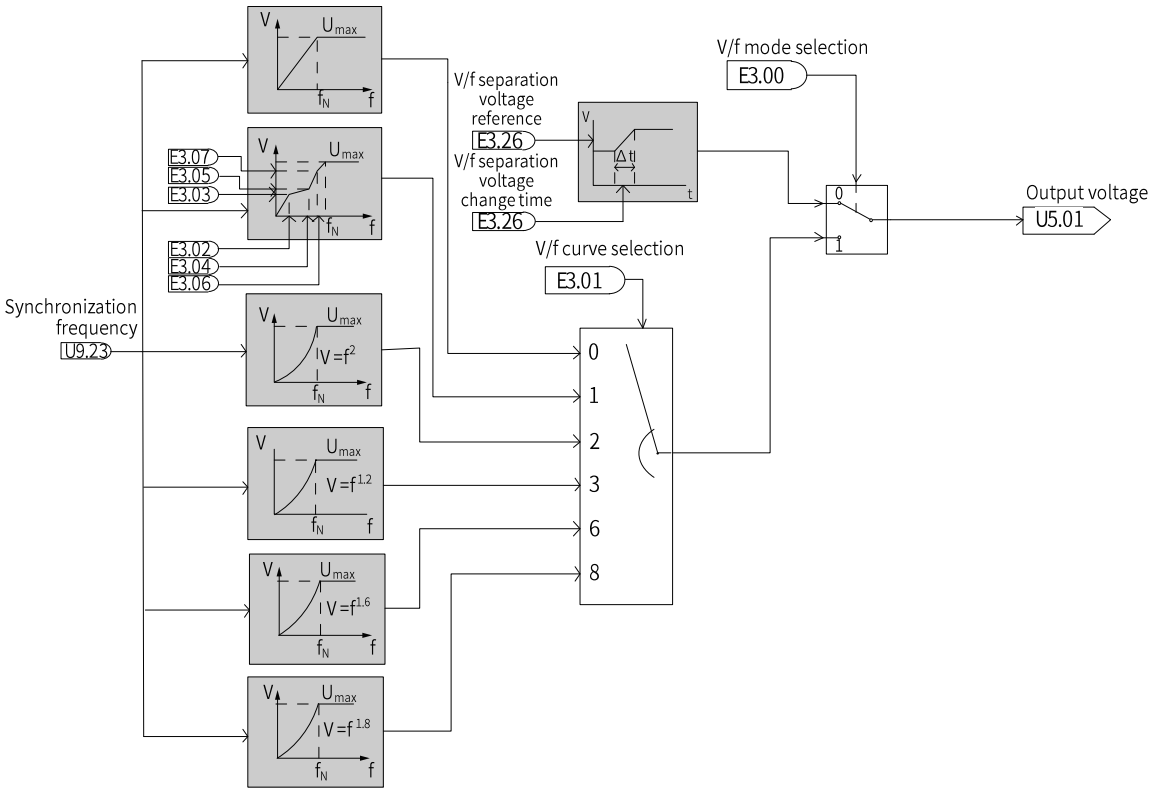


Figure 6-48 V/f mode selection

6.7.2 V/f Low-Speed Torque Boost

When the motor adopts V/f control, the voltage drop on the stator resistor will lead to small motor output torque, and even poor load capacity of the motor at low speed. The torque boost function can be used to compensate the voltage loss on the stator resistor, improving the load capacity of the motor at a low speed.

Setting E3-13 enables this function and selects the torque boost mode. In the case of manual torque boost, the voltage compensated by torque boost can be set by E3-14. When the load is heavy and the starting torque of the motor is insufficient, the value of E3-14 can be increased. However, if the setting is too large, it is easy to cause overheating of the motor and overcurrent of the AC drive.

To further improve the acceleration capability of the motor at low speed, the voltage increase during the acceleration process of the motor can be set through E3-15, and this part of the increase voltage only takes effect during the acceleration process.

E3-16 sets the cut-off frequency of torque boost, that is, the active frequency of torque boost. If the frequency is lower than this frequency, the boost is active; otherwise, it is inactive. The following figure shows the diagram of the V/f curve after manual torque boost.

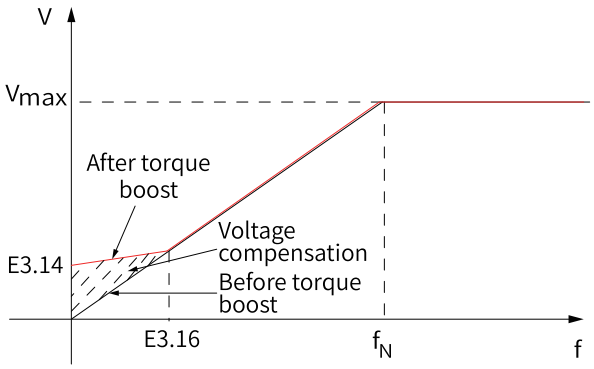


Figure 6-49 Comparison of V/f curves before and after manual torque boost

When auto torque boost is applied, the AC drive automatically calculates the voltage compensation amount according to the motor parameters, so there is no need to set E3-14 and E3-16. Note that before using this function, be sure to perform motor auto-tuning to ensure the accuracy of motor parameters.

Table 6–9 Parameters related to V/f low-speed torque boost

Para.	Name	Setpoint
E3-13	V/f torque boost mode	0: Disable 1: Manual 2: Auto
E3-14	V/f manual constant-speed torque boost	0.0% to 25.0%
E3-15	V/f manual acceleration torque boost	0.0% to 20.0%
E3-16	Cut-off frequency of V/f torque boost	0.0% to 100.0%

6.7.3 Slip Compensation

V/f slip compensation can compensate the decrease of speed of an asynchronous motor when the load increases, so that the motor speed can basically remain unchanged when the load changes.

The compensation frequency is adjusted by setting E3-17. When the coefficient is set to 100%, it means that when a rated load is applied to the motor, the compensated slip is the rated slip of the motor. When the coefficient is set to 0, the slip compensation function is disabled. When adjusting the V/f slip compensation gain, confirm that the motor speed under the rated load is the same as the target motor speed. If they are different, slightly adjust the parameter.

E3-18 can set the V/f slip compensation filter time. The smaller the setting, the faster the response speed of slip compensation, but a too small value will also cause oscillation or instability in the dynamic process of the motor.

E3-19 sets the startup frequency of V/F slip compensation. When the operation frequency is higher than this frequency, slip compensation takes effect; otherwise it is inactive.

Para.	Name	Setpoint
E3-17	V/f slip compensation coefficient	0.0% to 300.0%
E3-18	Filter time of V/f slip compensation	0.000s to 2.000s
E3-19	V/f slip compensation startup frequency	0.0 Hz to 50.0 Hz

6.7.4 V/f Overcurrent Suppression

After the Imax control function is enabled, if the output current of the AC drive reaches the overcurrent suppression threshold of the motor during the acceleration process of the motor, the output frequency of the AC drive starts to decrease, and the frequency does not start to accelerate to the target frequency again until the current returns below the overcurrent suppression threshold, so the actual acceleration time is automatically lengthened. If the actual acceleration time cannot meet the requirements, the value of E3-11 can be appropriately increased.

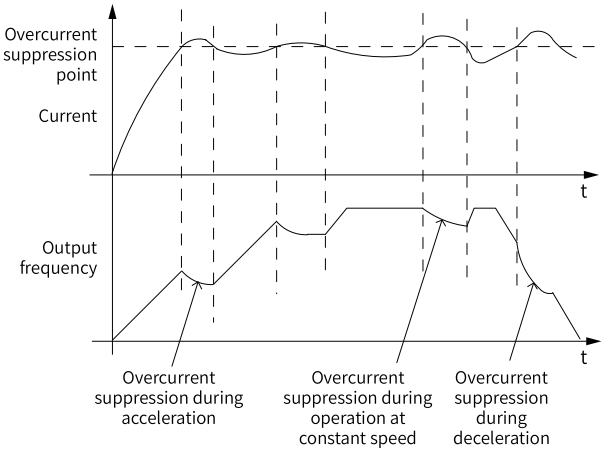


Figure 6-50 V/f overcurrent suppression

Table 6–10 V/f overcurrent suppression parameters

Para.	Name	Description
E3-10	Imax control enable	0: Disable 1: Enable
E3-11	Imax control frequency modulation proportional coefficient	0 to 100
E3-12	Imax control field weakening coefficient	0 to 200

6.7.5 V/f Oscillation Suppression

During motor operation, mechanical resonance causes system oscillation. E3-20 can be set to enable oscillation suppression for a better control effect. E3-21, which is the V/f oscillation suppression gain, should be as small as possible to reduce its influence on normal operation, provided that the oscillation can be effectively suppressed. When the oscillation is obvious, it is necessary to increase the gain. The greater the gain, the more obvious the suppression effect.

Table 6–11 Parameters related to V/f oscillation suppression

Para.	Name	Setpoint
E3-20	V/f oscillation suppression mode	0: Disable 1: Enable
E3-21	V/f oscillation suppression gain	0% to 2000%
E3-23	Cut-off frequency of V/f oscillation suppression	0.5 Hz to 50.0 Hz

Note

- When the oscillation suppression function is enabled, the rated current and no-load current of the motor must be as accurate as possible to ensure the V/f oscillation suppression effect.
- If oscillation cannot be effectively suppressed after this function is enabled, ensure that the cut-off frequency E3-23 is lower than the frequency of motor oscillation.

6.7.6 V/f Droop Control

V/f droop is generally used for load distribution when two or more motors drive a load together. When two or more motors drive the same load, uneven load distribution occurs due to the difference in speed of the motors. The motor and AC drive with higher speed bear heavier load, thus affecting the stability of the whole drive system. V/f droop can alleviate this problem.

You can set the parameter E3-08 to enable the droop function and adjust the original frequency setpoint, thus softening the mechanical characteristics of the motor. The parameter E3-09 is the droop coefficient, and the frequency of V/f droop is proportional to the droop coefficient and the motor load torque.

Table 6–12 V/f droop parameters

Para.	Name	Description
E3-08	Enable V/f droop	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector
E3-09	V/f droop coefficient	0.0% to 50.0%

Note

The V/f droop frequency is dependent on the rated motor frequency. Motor droop adjustment = (–1) x Motor output torque x Motor rated frequency x [E3-09].

6.7.7 V/f Energy-Saving Control

Energy-saving control is applicable to scenarios where a motor runs with light load for a long time. After the function is enabled by parameter E3-25, when the motor load is light, the AC drive will continuously reduce the output voltage, thus reducing the excitation current to save power.

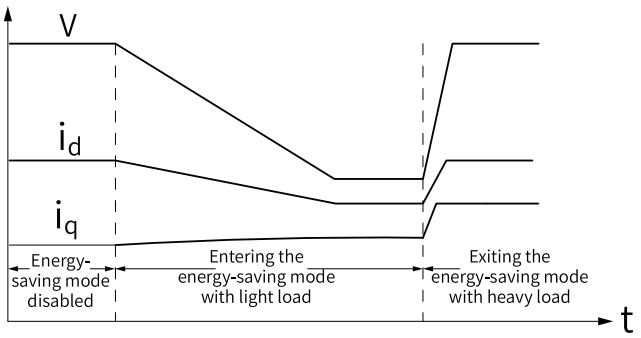


Figure 6-51 V/f energy-saving control

Table 6–13 V/f energy-saving control parameters

Para.	Name	Description
E3-25	V/f energy-saving control	0: Disable 1: Enable

Note

The energy-saving mode does not cause decrease in motor speed. When the motor load increases, the AC drive restores the original output voltage and automatically exits the energy-saving mode.

6.7.8 Vdc Control in V/f Control

The Vdc function under V/f control is similar to that under vector control. You can enable Vdc control when the power supply is not regenerative and the DC bus has overvoltage or undervoltage. Vdc control consists of the VdcMax control and the VdcMin control.

VdcMax control and VdcMin control adopt a common PI controller. The parameter gain of the PI controller is automatically calculated. The internal PI parameters can be modified by adjusting E3-28 and E3-29 on the basis of the default values. If overshoot is serious during bus voltage regulation, the proportional gain E3-28 can be increased.

VdcMax control and VdcMin control share the same E3-34 Vdc control oscillation suppression gain, E3-35 Vdc control feedforward gain, and E3-40 Vdc control dynamic coefficient. If the bus voltage oscillates during Vdc control, you can adjust the oscillation suppression gain in E3-34. If overshoot is serious during bus voltage regulation, the feedforward gain E3-35 can be increased. E3-40 Vdc control

dynamic coefficient can affect the PI controller proportion coefficient and integral coefficient at the same time. Set this coefficient based on the ratio of the bus voltage capacity to the capacitor capacity of the power module.

6.7.8.1 Vdcmax Function

When the motor is in a deceleration regenerative state, if the power supply is not regeneration-enabled, energy will be fed into the bus, resulting in voltage rise and overvoltage of the bus, which is especially obvious when the motor inertia is large and the deceleration time is short.

After setting E3-30 to enable the Vdcmax function, when the bus voltage rises to the setpoint (bus overvoltage threshold - Vdcmax voltage reserve E3-31), the AC drive will adjust the output frequency to maintain the bus voltage stability and inhibit the voltage rise.

Parameter E3-33 can set the upper limit of frequency adjustment. After the function is enabled, the actual deceleration time will be automatically lengthened. If the actual deceleration time cannot meet the requirements, E3-24 (V/f over-excitation gain) can be appropriately increased. If the bus voltage overshoot is too large, E3-32 (voltage regulation gain coefficient) can be increased. Increasing E3-35 Vdc control feedforward gain can also suppress bus voltage overshoot.

6.7.8.2 Vdcmin Function

When detecting that the bus voltage is lower than the permitted value (underload threshold + Vdcmin voltage reserve E3-38), Vdcmin control enables the motor to generate electricity to compensate for energy loss until the DC bus voltage is stabilized. When the power supply or DC bus incurs short-term power-off, undervoltage will occur if the fault is not handled in time, causing coast to stop.

Set E3-36 to enable the Vdcmin function to suppress undervoltage in a short period, preventing stop upon instantaneous power-off. In the case of a long-term blackout or DC bus power failure, you need to enable Vdcmin to compensate for bus energy loss until all motors stop reliably.

The relevant parameters of Vdc control under V/f control mode are as follows:

Para.	Name	Setpoint
E3-28	Proportional coefficient of frequency modulation for Vdc control in V/f control mode	1 to 100
E3-29	Vdc control frequency modulation integral coefficient in V/f control mode	10 to 8000
E3-30	Vdc_max control switch in V/f control mode	0: Disable 1: Enable
E3-31	Vdc_max voltage reserve in V/f control mode	20.0 V to 300.0 V
E3-32	Vdc_max voltage modulation gain coefficient in V/f control mode	0 to 100
E3-33	Vdc_max frequency increase limit in V/f control mode	1.0 Hz to 30.0 Hz
E3-34	Vdc control oscillation suppression gain in V/f control mode	0% to 500%

Para.	Name	Setpoint
E3-35	Vdc control feedforward gain in V/f control mode	0% to 500%
E3-36	Vdc_min control switch in V/f control mode	0: Disable 1: Enable
E3-37	Vdc_min operation frequency in V/f control mode	0.0 Hz to 50.0 Hz
E3-38	Vdc_min voltage reserve in V/f control mode	20.0 V to 300.0 V
E3-39	Vdc_min voltage rise evaluation time in V/f control mode	0.1s to 100.0s
E3-40	Vdc control dynamic coefficient in V/f control mode	0% to 300%

6.8 Flying Start

If a rotating motor is started in direct start mode, an overcurrent fault may be caused due to inrush current upon startup. The flying start function is applicable when no encoder is used to measure the motor speed and the startup and running of motors in rotation must be tracked. In this case, the AC drive can automatically track the motor speed and direction to start the rotating motor smoothly without impact.

The following figure shows the motor flying start diagram. After startup, the motor synchronous frequency tracks the motor speed, after which the motor enters the normal operation mode.

- In FVC control, when flying start is enabled, the encoder obtains the feedback speed to start the motor.
- In V/f and SVC control, the flying start module is needed to observe the motor running speed.

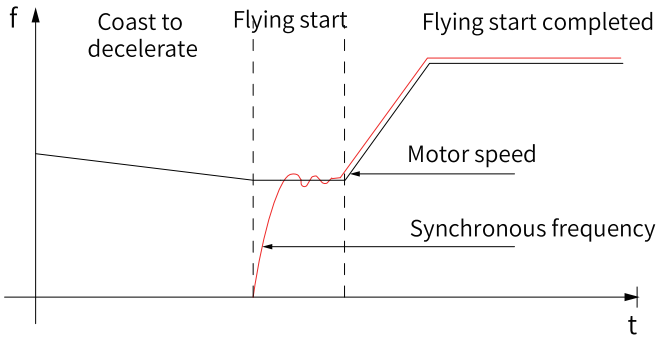


Figure 6-52 Diagram of the flying start process

The parameters related to flying start are as follows. The startup mode of the motor can be set through E1-00.

Para.	Name	Setpoint
E1-00	Start mode	0: Direct start 1: Flying start 2: Start after DC injection braking
E7-00	Flying start current Kp	0.5 to 2.0
E7-01	Flying start speed filter	5 ms to 50 ms
E7-02	Cut-off frequency of flying start filter	0.1 Hz to 50.0 Hz

Para.	Name	Setpoint
E7-03	Current setpoint of flying start	20.0% to 80.0%
E7-04	Flying start time	50 ms to 5000 ms
E7-05	Flying start carrier frequency of synchronous motor	1.2 kHz to 10 kHz
E7-06	Phase-locked loop proportional coefficient	0% to 400%
E10-37	Flying start mode of synchronous motor	0: HSVM 1: Model mode

E7-00, E7-01, E7-02, and E7-03 are valid only for asynchronous motors, while E7-05, E7-06, and E10-37 are valid only for synchronous motors. E1-00 and E7-04 are valid for both asynchronous motor and synchronous motor.

- E7-01 is the proportional coefficient that controls the output current during flying start. If the flying start fails at high speed, the filter cut-off frequency (E7-02) can be increased.
- E7-03 sets the current in the process of flying start, and 100% corresponds to the rated current of the AC drive. In most cases, there is no need to adjust the values of E7-00 and E7-03. If the speed is in the field weakening area and is difficult to track, the value of E7-03 can be reduced.
- E7-04 sets the time for flying start. If the AC drive cannot complete flying start within this time, it will report a fault.
- E7-05 sets the carrier frequency during synchronous motor flying start. For motors running at a high speed, the carrier frequency must be set to a high value to ensure successful flying start.
- E7-06 sets the phase-locked loop proportional coefficient during synchronous motor flying start. A higher value can accelerate the phase-locking time.
- E10-37 sets the flying start mode of a synchronous motor. The default value is HSVM. If HSVM is selected in E10-37 and flying start is enabled in E1-00, the HSVM sampling card must be installed and must be configured in group n19. Otherwise, the fault "HSVM card not connected or not enabled" is reported upon startup. If no HSVM sampling card is installed, the model mode can be enabled in E10-37. This mode is applicable to scenarios where the motor rotates freely at a lower frequency. The model mode will cause large current impact if the motor rotates at a high speed.

Note

The flying start function depends on motor-related parameters. Therefore, before using the function, use the auto-tuning function to ensure correctness of the motor parameters.

6.9 Communication Module

6.9.1 Fieldbus Adapter

Fieldbus adapters are used for communication between the fieldbus and drive control unit. Currently, three fieldbus adapters are supported, with two used independently and the remaining one used for redundancy.

The redundant adapter must be selected for fieldbus adapters A and B. The system automatically switches to the redundant adapter for receiving and sending data when fieldbus adapters A and B fail

due to an error. A fieldbus adapter supports a maximum of 16 pieces of 16-bit process data. The following figure shows how it works.

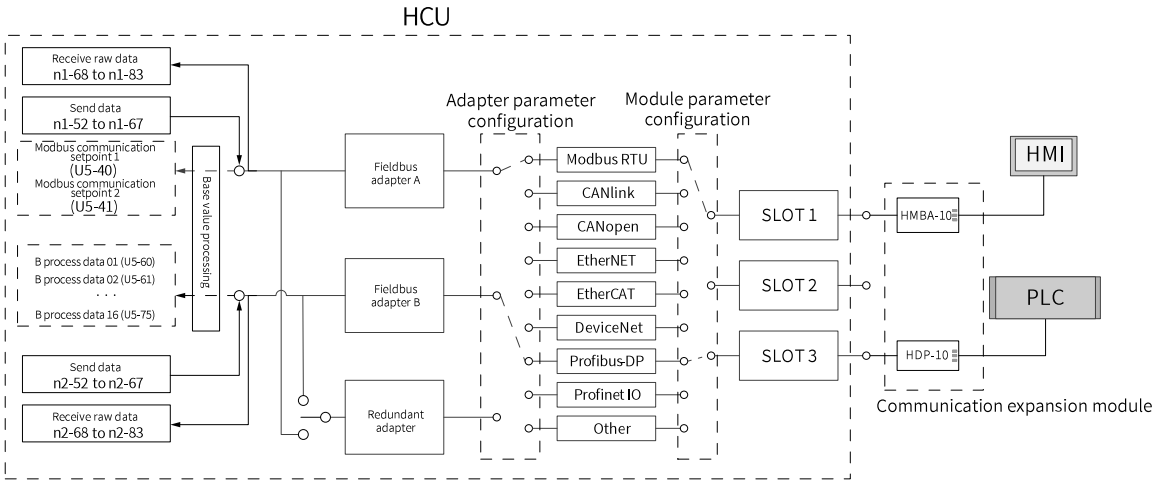


Figure 6-53 Working principle of fieldbus adapter

Fieldbus adapters currently support 9 communication modules: Modbus RTU fieldbus module, CanLink fieldbus module, CANopen fieldbus module, EtherCAT industrial Ethernet module, Profibus-DP fieldbus module, PROFINET IO industrial Ethernet module, and other customized communication modules.

Table 6–14 Fieldbus adapter A/B setting

Item	Fieldbus Adapter A	Fieldbus Adapter B	Description
1	n1-00	n2-00	Selects the required bus protocol type. 0: No fieldbus is selected.
2	n1-01	n2-01	Enables or disables communication timeout detection. 0.00: Communication timeout fault is not detected.
3	n1-02	n2-02	Communication fault detection enable switch 0: Communication faults are detected. 1: Communication faults are not detected.
4	n1-03	n2-03	Enables or disables communication CRC error verification. 0: CRC fault detection is disabled.
5	n1-04 to n1-19	n2-04 to n2-19	Selects the output source of the process data of fieldbus adapters.
6	n1-20 to n1-35	n2-20 to n2-35	Sets the base value for the output process data. The calculation formula is as follows: Sent data = Selected data x (n1-20 to n1-35)/4096. The value 0 equals to 4096.
7	n1-36 to n1-51	n2-36 to n2-51	Sets the base value for the input process data. The calculation formula is as follows: Used data = Received data x 4096/(n1-36 to n1-51). The value 0 equals to 4096.
8	n1-90	n2-90	Sets whether to save written parameters to EEPROM.
9	n1-91	n2-91	Sets whether to upload the current fault information of devices to the host controller.

Table 6–15 Redundant adapter settings

Item	Redundant adapter settings	Description
1	n3-00	Forces to bind the EtherNet commissioning module.
2	n3-03	Sets whether to save written parameters to EEPROM.

Data of fieldbus adapters includes mailbox data and process data.

Mailbox data is used for parameter read and write, start/stop, fault reset, status monitoring, and command delivery, which is non-periodically delivered.

Process data is used for command reference, status interaction, speed reference, and torque reference, which is subject to periodical data exchange.

6.9.2 Process Data Configuration

The process data can be configured when the communication card is working properly.

6.9.2.1 Reception of Verification Data

16 parameters of n1-68 to n1-83 correspond to 16 pieces of process data. When the PLC sends a piece of process data, for example, when PZD1 sends 0x0406, the corresponding data can be viewed in n1-68.

Received data must be converted using the base value before being saved to the 16 connector parameters U5-44 to U5-59. For details about base value conversion, see *"6.9.3 Adaptation to Communication Base Value" on page 207*.

Note that bit10 of PZD1 must be 1 for PROFIBUS-DP. Otherwise, the 16 parameters (U5-44 to U5-59) will maintain the last data, rather than being updated. However, n1-68 to n1-83 will reflect the received data.

The PZD1 data will be disassembled into 16 corresponding bits and stored in the bit connectors from U2-00 to U2-15.

The received process data is required to participate in the control, and the parameters of the corresponding control channel and reference channel must also be configured. See *"6.1.1.1 OFF1 Command" on page 118* and *"6.2.1 Speed Reference" on page 140*.

Note

When PROFIBUS-DP is used for communication, the check bit of process data PZD1 must be 1 (default is PZD1. bit10, and the check bit can be modified or disabled through n16-10). Otherwise, HCU considers the received process data invalid. U5-44 to U5-59 (or U5-60 to U5-75) will keep the data of the previous cycle, but n1-68 to n1-83 (or n2-68 to n2-83) will still display the actually received raw data.

6.9.2.2 Configuring Data to be Sent

The 16 reference source parameters from n1-04 to n1-19 can be used to select data to be sent to the PLC. This section takes the scenario in which all the base values of n1-20 to n1-35 are 0 as an example. For details about setting communication base values, see the next section.

When a connector is selected through n1-04 to n1-19, the n1-52 to n1-67 parameters will show corresponding data. Such data is the data sent to the PLC and must be exactly the same as that received by the PLC.

- If n1-04 is set to 1701 (that is, U7-01 is the per-unit value and 100% corresponds to hexadecimal 0x1000), [n1-52] is 0x1000.

- If n1-05 is set to 1702 (that is, U7-02 is the per-unit value and 200% corresponds to hexadecimal 0x2000), [n1-53] is 0x2000.

Typically, all the data, such as torque, speed, and current, to be received by the PLC can be found in connectors in group U.

6.9.3 Adaptation to Communication Base Value

Most of the connector data of the HCU-50S/51S control module are stored in a per unit value, the base value of which is the rated value of motor parameters. When the fieldbus adapter interacts with the PLC, data scaling may be inconsistent. A communication base value, that is, a completely matched numerical value, is provided for each process data channel in the fieldbus adapter. The communication base values can be changed to adjust the gain for the fieldbus adapter to send and receive data.

The communication base value of HCU-50S/51S is 0 by default, indicating no special processing upon data sending and receiving. The data sent and received by the PLC and the HCU-50S/51S is the same.

For data composed of multiple bits, base value conversion should not be performed, and the corresponding communication base value parameter should be set to 0. For example, the control word issued by PLC or the status word uploaded by HCU-50S/51S.

Formula for calculating the communication base value:

$$\text{Communication base value} = \frac{\text{Motor per-unit base value}}{\text{PLC per-unit base value}} \times \text{PLC communication base value}$$

The per-unit value of the motor is the rated value of the motor in the HCU-50S/51S system, corresponding to parameters d3-00 to d3-04.

The PLC communication base value and the PLC per unit base value are used for the data expression mode during PLC communication. For example, if 16384 indicates that the motor current is 50 A, the PLC per unit base value is 50 and the PLC communication base value is 16384. If the actual motor current multiplied by 10 is the transmission current, the PLC per unit base value is 50 and the PLC communication base value is 500.

The communication base value parameter is used to adjust the data format inside HCU-50S/51S to the same format as PLC communication.

When the communication base value needs to be modified, choose Inverter→Configuration→PDO Configuration→Adapter A input data configuration or Adapter A output data configuration→Calculate Datum value.

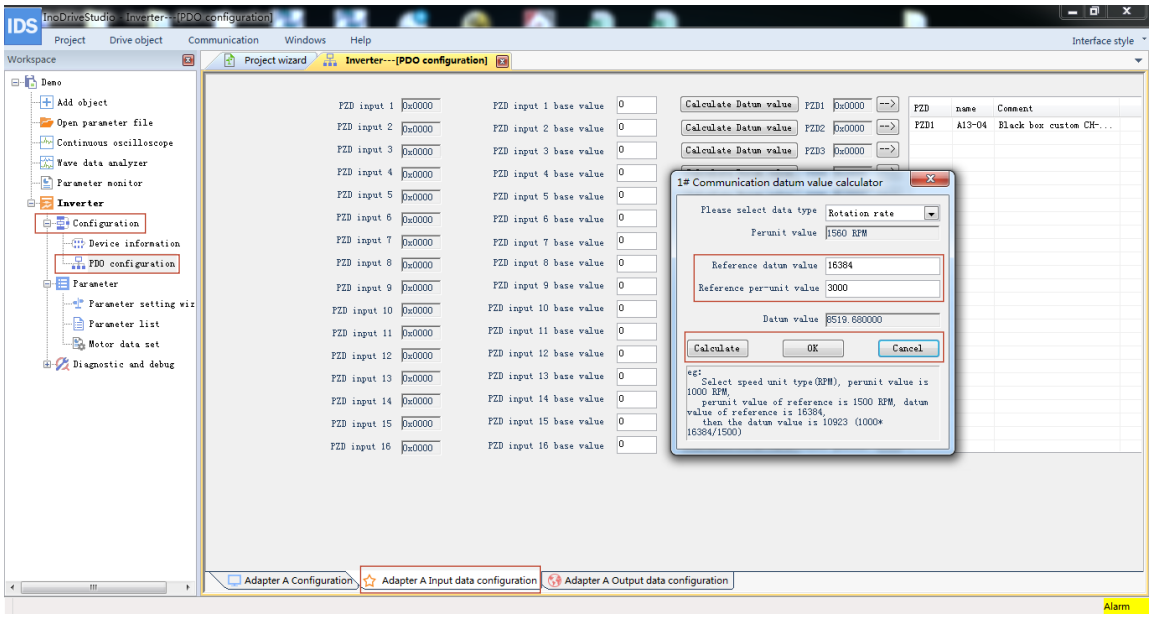


Figure 6-54 Base value calculation

As shown in the preceding figure, when the speed per unit base value of HCU-50S/51S is 1500 RPM (100% = 1500 RPM) and the PLC speed per unit base value is 3000 RPM (100% = 3000 RPM) in the PLC system, the communication base value of the HCU-50S/51S must be changed so that the HCU-50S/51S can run at the actual speed specified by the PLC. For example, when the PLC sends the 100% speed command for running, the actual running speed of the HCU-50S/51S is 3000 RPM rather than 1500 RPM.

Assuming that the PLC communication base value is 16384, that is, when the PLC sends the speed 100%, it actually transmits 16384 to HCU-50S/51S. If you input the communication base value of the other side (PLC communication base value) and the per unit value of the other side (PLC speed per unit value) in the communication base value calculator and click Calculate, you can obtain the communication base value of the corresponding speed transmission channel of HCU.

6.9.4 Communication Module Expansion

Table 6–16 Communication module expansion

Item	Expansion module	Description
1	Modbus RTU module	This module is used for the Modbus communication protocol, which is a standard communication protocol. For details, see the communication expansion card guide. Parameters of this module are set in group n10.
2	CANlink module	This module is used by the CANlink communication protocol, which is a custom protocol of Inovance. For details, see the communication expansion card guide. The CANlink communication expansion card supports seven communication rates. Parameters of this module are set in group n11.
3	CANopen module	This module is used for the CANopen communication protocol. For details, see the communication expansion module guide. The CANopen expansion card supports seven communication speeds. Parameters of this module are set in group n12.

Item	Expansion module	Description
4	EtherNet module	This module is used for the Ethernet communication protocol. For details, see the communication expansion module guide. The EtherNet communication expansion card supports automatic IP address assignment. Parameters of this module are set in group n13.
5	EtherCAT module	This module is used for the EtherCAT communication protocol. For details, see the communication expansion module guide. Parameters of this module are set in group n14.
6	HDVN module	Used by the DeviceNet communication protocol. For details, see the communication expansion module guide. Parameters of this module are set in group n15.
7	PROFIBUS-DP module	This module is used for the PROFIBUS-DP communication protocol. For details, see the communication expansion module guide. Parameters of this module are set in group n16.
8	PROFINET IO module	This module is used for the ProfibusNet communication protocol. For details, see the communication expansion module guide. Parameters of this module are set in group n17.
9	Customized communication module	This module is used by the communication protocol customized by a specific manufacturer or application. For details, see the communication expansion module guide. Parameters of this module are set in group n18.

6.9.5 InoLink Communication Network

InoLink is used for master/slave communication among multiple drive units. Master/slave communication means that the logic master station in a network sends information such as control bit or setpoints to logic slave stations. InoLink supports eight 16-bit data entries for communication.

Currently, the InoLink communication network supports a maximum of 16 controllers. The controller with station number 1 is the master controller that initiates InoLink communication, and the controllers numbered from 2 to 16 are slave controllers. The master controller initiates master/slave communication, and then the slave controllers respond in sequence. Data information sent by each controller is saved by other controllers in the network.

The master station in InoLink communication is not necessarily a logic master station. The logic master station sends data to logic slave stations (other controllers than the master controller), which then use the received data for control purposes. Each logic slave station can be configured with a data source, which can be one or more logic master stations.

One InoLink communication network can consist of one or more master/slave networks. A master/slave network is a communication network consisting of logic master and slave stations.

Currently, the InoLink communication baud rate is equal to 5 Mbps, and the communication cycle is 2 ms. All controllers in the InoLink communication network exchange data once during each 2-ms cycle.

If a controller receives no data from any other controller within 2 seconds, it reports an offline error. If the controller receives no data from the logic master station, it reports a master station offline error. If the station number of a new controller is the same as that of an existing controller, the new controller reports an address conflict error.

Table 6–17 InoLink communication settings

Item	InoLink Communication Settings	Description
1	n0-00	Enables an InoLink communication node.
2	n0-01	Sets the address of an InoLink communication node.
3	n0-02	Sets the InoLink communication mode.
4	n0-03, n0-05, n0-07, n0-09, n0-11, n0-13, n0-15, and n0-17	Sets the logic master station for a node, that is, from which node other that the current node in the network the current node has to receive data.
5	n0-04, n0-06, n0-08, n0-10, n0-12, n0-14, n0-16, and n0-18	Sets which data entry sent by the logic master station the node has to use. That is, which data entry sent by nodes other than the current node in the network the current node has to use.
6	n0-19 to n0-26	Sets the proportional coefficient of the received data, that is, the data finally used by this node is the data sent by the logic master station multiplied by the coefficient.
7	n0-27 to n0-34	Sets the data to be sent by the current node.

6.9.6 HOFR Optical Fiber Routing Network

The purpose of optical fiber synchronization is similar to InoLink communication network, that is, to realize data interaction between multiple drive devices, but the implementation is different. Optical fiber synchronization is achieved through the optical fiber synchronization expansion module. All HCU-50S/51S devices are connected to the optical fiber synchronization expansion module through an HOFM optical fiber module. The optical fiber synchronization expansion module resembles a data switch which allows data interaction between multiple drive devices. In addition, optical fiber synchronization does not involve any host, but a data switch.

The whole data network supports 11 nodes at most, and each node can send and receive 8 pieces of data. A node can select the data 1 to 8 of any other 3 nodes to form PZD1 to PZD8, thus further realizing various control operations. In addition, you can also customize the proportion of each received data, ranging from –8.000 to +8.000, which can meet the requirement of different applications.

Table 6–18 OF sync communication setting

Item	OF Sync Communication Setting	Description
1	n22-00, n22-01, n22 -05	Enables the communication node and the communication interruption judgment time, and sets the address of the node.
2	n22-02, n22-03	Sets the slot connected to the optical fiber synchronization expansion module and whether it is online.
3	n22-04	Displays the online nodes in the communication network. It is convenient to set its own node bit0 to bit10 corresponding to the node address 1 to the node address 11 respectively.
4	n22-06 to n22-08	Sets the 3 nodes that need to receive data.
5	n22-09 to n22-16	Sets which data (any one of data 1 to data 8) sent from which node (any one of the 3 nodes) is selected.
6	n22-17 to n22-24	Sets the proportional coefficient of received data. The data used by nodes is the received data multiplied by the coefficient.
7	n22-25 to n22-32	Sets the data to be sent by the current node.

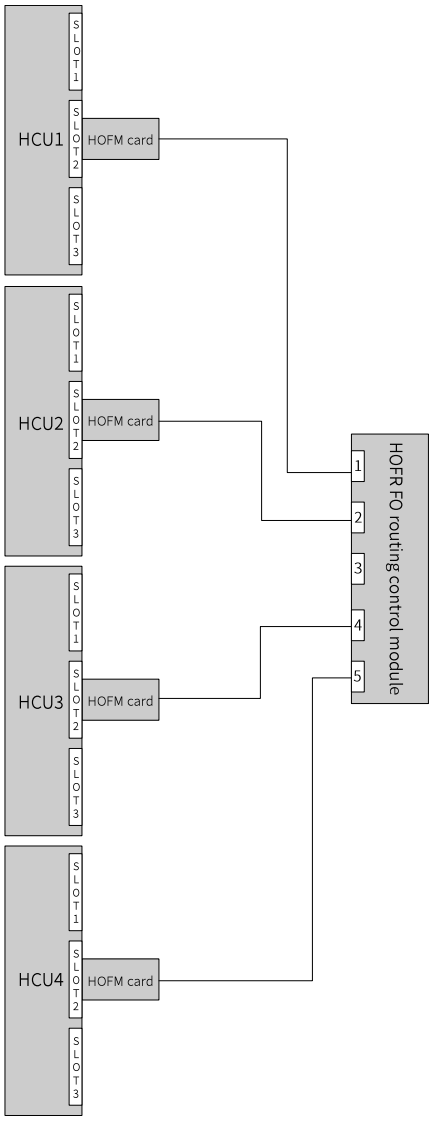


Figure 6-55 Connection diagram

6.9.7 Fieldbus Adapter Slot Configuration

Slot setting is required before inserting an expansion card.

For example, when installing a PROFIBUS-DP module in the SLOT3, set n16-00 to 7 to select the expansion slot 3_1. The following table lists the configuration of the expansion slot of the PROFIBUS-DP module.

Para.	Name	Value Range
n16-00	Expansion slot	0: Disable 1: Expansion slot 1_1 2: Expansion slot 1_2 3: Expansion slot 1_3 4: Expansion slot 2_1 5: Expansion slot 2_2 6: Expansion slot 2_3 7: Expansion slot 3_1

HCU contains three slots. See the following figure for details:

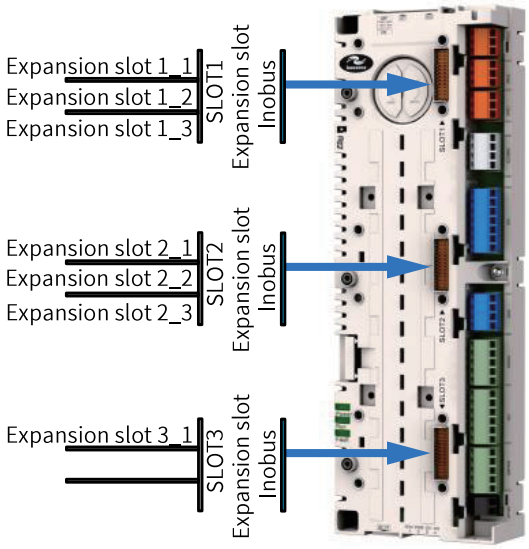


Figure 6-56 Description of expansion slots

When the expansion card is directly inserted into the SLOT on the HCU, such as SLOT2, its expansion slot selection parameter can be set to expansion slot 2_1. SLOT1 and SLOT2 slots can be expanded into three slots (one for HOFM and three for HESD) by installing HOFM module and HESD function module. Take slot SLOT2 as an example. When the expansion card is inserted into HESD function module, its expansion slot selection parameter should be set to one of expansion slot 2_1, expansion slot 2_2, and expansion slot 2_3. Note that the parameter configuration does not conflict with the expansion slot selection of the other two expansion cards (if existing). Taking SLOT2 as an example, the topology is as follows:

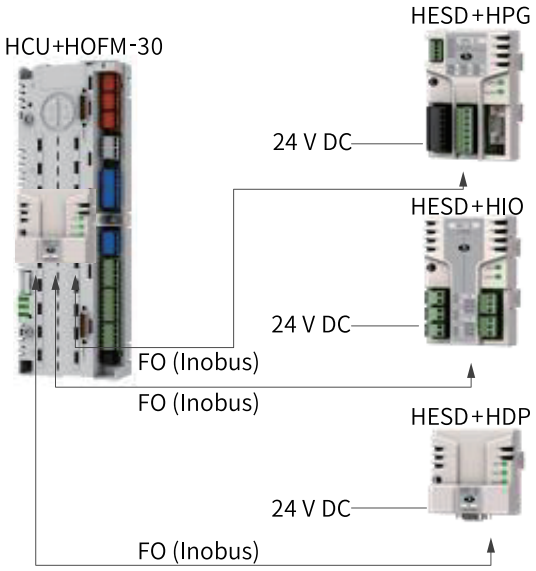


Figure 6-57 SLOT2 topology

When installing function modules in three slots, abide by the following principles:

- Each slot supports expansion of three expansion slots, but only one of the three expansion slots is allowed to connect with a communication expansion module, and the other two slots can connect with non-communication expansion modules, such as HIO modules.
- In this case, the HESD function module is not allowed to connect with optical fiber expansion module HOFM.
- The HDP-10 module can theoretically be installed in any slot, but due to the size limitation of its PROFIBUS bus terminal, when it is installed in the SLOT1, it will extend to the SLOT2 and thus no modules can be installed in the SLOT2 slot. It is recommended to insert HDP-10 to SLOT3.

6.10 AIO, DIO, and HIO Parameter Setting

The MD880 controller comes standard with 7 DIs (DI1 to DI6 and DIL), 2 high-speed HDIs, 3 ROs, 2 high-speed HDOs, 2 AIs, and 2 AOs. The parameters to be set are in group F.

The AI and AO combination can be used to measure the motor temperature. For details, see *"6.11.2 Motor Temperature Detection with AI/AO" on page 231*.

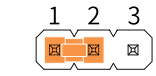
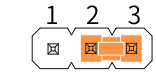
HCU-50S/51S supports the simultaneous use of up to 3 HIO input and output function modules to expand the input and output interfaces of HCU control modules. The HIO-10 module includes 2 DIOs, 2 AIs, 2 AOs, and 1 RO; the HIO-20 module includes 5 DIOs and 2 ROs; the HIO-30 module includes 6 DIs, 6 DIOs, 4 ROs, 3 AOs, and 3 AIs.

6.10.1 DI

The HCU-50S/51S control module comes standard with 7 DIs and 2 HDIs, which can be configured as DIs. The corresponding function diagrams are H110 and H114.

Before using DI terminals, configure the DI internal and external power supply selection jumper J16 based on the actual hardware connection, as shown in the following table.

Table 6–19 DI internal and external power supply selection jumper

Jumper J16: power supply selection	
	By shorting DGND and DICOM, DI is powered by the 24 VDC internal power supply.
	When DGND is disconnected from DICOM, DI is powered by the external power supply.

6.10.1.1 DI Force

The DI state supports the forcing function. F0-02 is used to select the DI to be forced, and F0-03 is used to set the status of the forced DI. One bit corresponds to the status of one DI. bit0 to bit5 correspond to DI1 to DI6, bit6 corresponds to DIL, bit7 corresponds to HDI1, and bit8 corresponds to HDI2. The forcing status correspondence table is as follows.

F0-02		DI1 (U0-02)	DI2 (U0-03)	DI3 (U0-04)	DI4 (U0-05)	DI5 (U0-06)	DI6 (U0-07)	DIL (U0-08)	HDI1 (U0-09)	HDI2 (U0-10)
bit0	0	Hard-ware DI1	x	x	x	x	x	x	x	x
	1	F0-03 (bit0)	x	x	x	x	x	x	x	x
bit1	0	x	Hard-ware DI2	x	x	x	x	x	x	x
	1	x	F0-03 (bit1)	x	x	x	x	x	x	x
bit2	0	x	x	Hard-ware DI3	x	x	x	x	x	x
	1	x	x	F0-03 (bit2)	x	x	x	x	x	x
bit3	0	x	x	x	Hard-ware DI4	x	x	x	x	x
	1	x	x	x	F0-03 (bit3)	x	x	x	x	x
bit4	0	x	x	x	x	Hard-ware DI5	x	x	x	x
	1	x	x	x	x	F0-03 (bit4)	x	x	x	x

F0-02		DI1 (U0-02)	DI2 (U0-03)	DI3 (U0-04)	DI4 (U0-05)	DI5 (U0-06)	DI6 (U0-07)	DIL (U0-08)	HDI1 (U0-09)	HDI2 (U0-10)
bit5	0	x	x	x	x	x	Hard-ware DI6	x	x	x
	1	x	x	x	x	x	F0-03 (bit5)	x	x	x
bit6	0	x	x	x	x	x	x	Hard-ware DIL	x	x
	1	x	x	x	x	x	x	F0-03 (bit6)	x	x
bit7	0	x	x	x	x	x	x	x	Hard-ware HDI1	x
	1	x	x	x	x	x	x	x	F0-03 (bit7)	x
bit8	0	x	x	x	x	x	x	x	x	Hard-ware HDI2
	1	x	x	x	x	x	x	x	x	F0-03 (bit8)
bit9 to bit15	x	x	x	x	x	x	x	x	x	x

6.10.1.2 DI Delay

Each DI of HCU-50S/51S can set the switch-on delay and switch-off delay separately. As shown in the following figure, both the switch-on and switch-off delays support DI filter. When the DI signal state holding time is less than the set time, the DI state will remain in the original state. Parameters F0-04 to F0-21 are used to set the switch-on delay and switch-off delay for each DI.

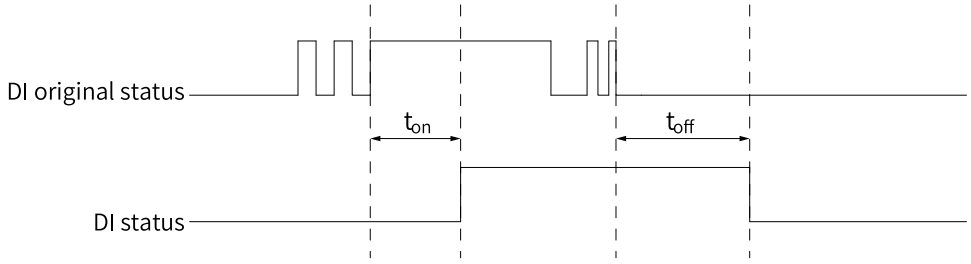


Figure 6-58 DI switch-on and switch-off delay sequence diagram

Switch-on delay can filter out high-level pulses with the period less than t_{on}. Therefore, the first two pulses of the signal source will be filtered out, while the third pulse of the signal source will be switched on after the delay time of t_{on} and changed to the high level.

The switch-off delay time is indicated by t_{off}, and low-level pulses with the period less than t_{off} are filtered out, as shown in the preceding figure. Switch-on delay and switch-off delay can filter out interference or control logic delay. The relevant parameters are F0-04 to F0-21.

6.10.1.3 DI Connector

When using DI for drive control or other functions, associate relevant parameters with the DI connector. Two sets of bit connectors are provided for DI status.

Para.	Meaning	Para.	Description
U0-02	DI1 status	U0-12	DI1 status inversion
U0-03	DI2 status	U0-13	DI2 status inversion
U0-04	DI3 status	U0-14	DI3 status inversion
U0-05	DI4 status	U0-15	DI4 status inversion
U0-06	DI5 status	U0-16	DI5 status inversion
U0-07	DI6 status	U0-17	DI6 status inversion
U0-08	DIL status	U0-18	DIL status inversion
U0-09	HDI1 status	U0-19	HDI1 status inversion
U0-10	HDI2 status	U0-20	HDI2 status inversion

6.10.2 DO

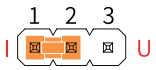
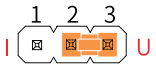
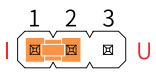
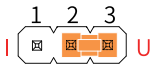
HCU-50S/51S supports 3 ROs, and 2 HDOs can also be used as DOs. The DO function is configured according to the function diagrams H112 and H116.

The 3 ROs and 2 HDOs (as DOs) support independent setting of switch-on delay and switch-off delay. They also support negative logic (set through F1-17). When the negative logic is enabled, logic 0 indicates that the output (normally open) is enabled, and logic 1 indicates that the output (normally open) is disabled.

F1-00 indicates the DO source signal status. F1-01 indicates the status after delay logic and negative logic processing.

6.10.3 AI

The HCU-50S/51S provides 2 AIs which support both current and voltage signals. Before using an AI, check the external signal is a current signal or a voltage signal and then set jumpers J14 and J15 correctly. Then, set parameters F2-04 and F2-05.

Jumper J14: AI1 current or voltage signal Input selection
 AI1 current signal input by shorting 1 and 2
 AI1 voltage signal input by shorting 2 and 3
Jumper J15: AI2 current and voltage signal selection
 AI2 current signal input by shorting 1 and 2
 AI2 voltage signal input by shorting 2 and 3

See the function diagram H120 for details. The function parameters are shown in the following table.

Para.	Name	Description
F2-00	AI1 input value	Displays AI1 input value in V or mA according to the setting of F2-04.
F2-01	AI1 input proportion	Displays the percentage corresponding to AI1 input, which is the final output after AI module processing.
F2-02	AI2 input value	Displays AI2 input value in V or mA according to the setting of F2-05.
F2-03	AI2 input proportion	Displays the percentage corresponding to AI2 input, which is the final output after AI module processing.
F2-04	AI1 type	Sets the input signal type of AI1 or AI2 through jumpers at the HCU side. See *HCU Control Unit Hardware Guide* for details. 0: −10 V to +10 V 1: 0 V to 10 V 2: −20 mA to +20 mA 3: 0 mA to 20 mA 4: 4 mA to 20 mA
F2-05	AI2 type	
F2-06	Min. input value of AI1 curve	Calibrates AI1. F2-06 and F2-08 together define the input range of AI1 (the unit is V or mA based on the setting of F2-04). Within the value range, convert the input into a value in percentage to output according to a straight line. When the input value is smaller than the value of F2-06, the value of F2-07 is output by default. You can also set to output 0.0% according to the setting of the ones position of F2-14.
F2-07	Min. input proportion of AI1 curve	
F2-08	Max. input value of AI1 curve	
F2-09	Max. input proportion of AI1 curve	
F2-10	Min. input value of AI2 curve	Calibrates AI2. F2-10 and F2-12 together define the input range of AI2 (the unit is V or mA based on the setting of F2-05). Within the value range, convert the input into a value in percentage to output according to a straight line. When the input value is smaller than the value of F2-10, the value of F2-11 is output by default. You can also set to output 0.0% according to the setting of the tens position of F2-14.
F2-11	Min. input proportion of AI2 curve	
F2-12	Max. input value of AI2 curve	
F2-13	Max. input proportion of AI2 curve	
F2-14	Setting for AI less than minimum input	Ones position: Setting for AI1 less than minimum input 0: Minimum input proportion 1: 0.0% Tens position: Setting for AI2 lower than minimum input 0: Minimum input proportion 1: 0.0%
F2-15	AI1 filter time	Defines the AI filter time, which can remove interference and generate a delay effect.
F2-16	AI2 filter time	
F2-17	AI1 denoising threshold	Defines the denoising threshold. When the AI input fluctuation is smaller than the threshold, the AI input proportion remains unchanged.
F2-18	AI2 denoising threshold	
F2-19	AI setting zero-crossing threshold	When the AI value is smaller than the threshold, the AI value is 0%.
F2-20	AI1 enable	Enables or disables AI1. When AI1 is disabled, its value is forced to be 0.
F2-21	AI2 enable	Enables or disables AI2. When AI2 is disabled, its value is forced to be 0.
F2-22	AI1 disconnection monitoring threshold	0.000 mA to 4.000 mA
F2-23	AI2 disconnection monitoring threshold	0.000 mA to 4.000 mA

Para.	Name	Description
F2-24	AI1 disconnection monitoring delay	0.00s to 10.00s
F2-25	AI2 disconnection monitoring delay	0.00s to 10.00s
F2-26	AI disconnection monitoring enable	Enables or disables disconnection monitoring. Monitoring is only enabled when the signal type is 4 mA to 20 mA. When the AI input value is smaller than the disconnection monitoring threshold and the monitoring delay is maintained, disconnection occurs. Ones position: AI1 disconnection monitoring enable 0: Disable 1: Enable Tens position: AI2 disconnection monitoring enable 0: Disable 1: Enable

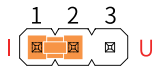
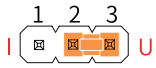
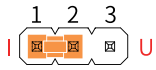
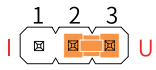
Note

When E8-22 is set to measuring motor temperature by AI1, the AI1 settings are inactive. When E8-22 is set to measuring motor temperature by AI2, the AI2 settings are inactive.

6.10.4 AO

The HCU-50S/51S control module provides two AOs and supports two signal types: voltage and current. Before using AO, set jumpers J18 and J19, and configure parameters F3-06 and F3-07.

Table 6–20 AO output signal selection jumper

Jumper J19: AO1 current and voltage signal selection	
	AO1 current signal output by shorting 1 and 2
	AO1 voltage signal output by shorting 2 and 3
Jumper J18: AO2 current and voltage signal selection	
	AO2 current signal output by shorting 1 and 2
	AO2 voltage signal output by shorting 2 and 3

See the function diagram H122 for details. The function parameters are shown in the following table.

Para.	Name	Description
F3-00	AO1 output value	Displays the AO1 output value, which is set through F3-06, in V or mA.
F3-01	AO1 output proportion	Displays the percentage of AO1 output, corresponding to [F3-04].
F3-02	AO2 output value	Displays the AO2 output value, which is set through F3-07, in V or mA.
F3-03	AO2 output proportion	Displays the percentage of AO2 output, corresponding to [F3-05].

Para.	Name	Description
F3-04	AO1 signal source	Sets the signal source of AO1 output.
F3-05	AO2 signal source	Sets the signal source of AO2 output.
F3-06	AO1 type	Sets the signal type output by AO1 or AO2, which requires proper wiring. See *HCU Control Unit Hardware User Guide* for details. 0: 0 V to 10 V 1: 0 mA to 20 mA 2: 4 mA to 20 mA
F3-07	AO2 type	
F3-08	Min. output proportion of AO1 curve	Sets the scale factor of AO1. F3-08 and F3-10 restrict the range of the AO1 output percentage. Within the range, the output numerical value is calculated according to the line (the unit is V or mA, depending on the setting of F3-06).
F3-09	Min. output value of AO1 curve	
F3-10	Max. output proportion of AO1 curve	
F3-11	Max. output value of AO1 curve	
F3-12	Min. output proportion of AO2 curve	Sets the scale factor of AO2. F3-12 and F3-14 restrict the range of the AO2 output percentage. Within the range, the output numerical value is calculated according to the line (the unit is V or mA, depending on the setting of F3-07).
F3-13	Min. output value of AO2 curve	
F3-14	Max. output proportion of AO2 curve	
F3-15	Max. output value of AO2 curve	

Note

When E8-22 is set to measuring motor temperature by AI1, the AO1 settings are inactive. When E8-22 is set to measuring motor temperature by AI2, the AO2 settings are inactive.

6.10.5 HDI

The HCU-50S/51S control module supports 2 HDI signals, which are described in detail in the *HCU Control Unit Hardware Guide*. For software functions, see the function diagram H114.

- HDI can be used as DI. For details about relevant parameter settings in this case, see *" DI" on page 213*.
- HDI1 is forced to be used as DI, and is used as the reactor over-temperature detection signal.

6.10.6 HDO

The HCU-50S/51S control module supports 2 HDO signals, which are described in detail in the *HCU Control Unit Hardware Guide*. For software functions, see the function diagram H116.

Note

HDO can be used as DO. For details about relevant parameter settings in this case, see section *"6.10.2 DO" on page 216*.

6.10.7 HIO

The n7/n8/n9 parameter groups are for HIO module enable selection and status display. The n23/n26/n29 parameter groups are for the configuration of DIO, RO, AI and AO of the HIO-10 module, and the n24/n27/n30 parameter groups are for the configuration of DIO and RO of the HIO-20 module. The n25/n28/n31 parameter groups are for the configuration of DI, DIO, RO, AI and AO of the HIO-30 module. The relationship is shown in the following table:

Para.	Description
n7-02	0: Disable 1: HIO-10, group n23 takes effect, and groups n24 and n25 are hidden 2: HIO-20, group n24 takes effect, and groups n23 and n25 are hidden 3: HIO-30, group n25 takes effect, and groups n23 and n24 are hidden
n8-02	0: Disable 1: HIO-10, group n26 takes effect, and groups n27 and n28 are hidden 2: HIO-20, group n27 takes effect, and groups n26 and n28 are hidden 3: HIO-30, group n28 takes effect, and groups n26 and n27 are hidden
n9-02	0: Disable 1: HIO-10, group n29 takes effect, and groups n30 and n31 are hidden 2: HIO-20, group n30 takes effect, and groups n29 and n31 are hidden 3: HIO-30, group n31 takes effect, and groups n29 and n30 are hidden

The parameter description of the HIO-10 module is shown in the following table:

Para.	Description
n7-00 (n8-00, n9-00)	Sets HIO module expansion slot location.
n7-02 (n8-02, n9-02)	Module type selection: 0: Disable 1: HIO-10 2: HIO-20 3: HIO-30
n7-01 (n8-01, n9-01)	Displays HIO module online status.
n7-10 (n8-10, n9-10)	Displays DIO configuration status.
n7-11 to n7-14 (n8-11 to n8-14, n9-11 to n9-14)	Displays DI, DIO, RO input and output status.

Para.	Description
n7-15 (n8-15, n9-15)	Displays AI input status, including AI disconnection and AI crossover.
n7-20 to n7-25 (n8-20 to n8-25, n9-20 to n9-25)	Displays AI input value and AI input proportion.
n7-30 to n7-35 (n8-30 to n8-35, n9-30 to n9-35)	Displays AO output proportion and AO output actual value.
n23-00 (n26-00, n29-00)	Sets DI/DIO input filter time.
n23-09 to n23-15 (n26-09 to n26-15, n29-09 to n29-15)	Sets the positive and negative logic, signal source, switch-on time, and switch-off time of DIO.
n23-20 to n23-23 (n26-20 to n26-23, n29-20 to n29-23)	Sets positive and negative logic, signal source, switch-on delay, and switch-off delay of RO.
n23-35 to n23-37 (n26-35 to n26-37, n29-35 to n29-37)	Sets AI smaller than min. input reference selection, AI disconnection monitoring enable, and AI setting zero-crossing threshold.
n23-40 to n23-59 (n26-40 to n26-59, n29-40 to n29-59)	Sets AI enable, AI type <1>, AI curve parameter, AI filter time, AI denoising threshold, AI disconnection monitoring threshold, and AI disconnection monitoring delay.
n23-70 to n23-85 (n26-70 to n26-85, n29-70 to n29-85)	Sets AO signal source, AO type <1> and AO curve parameters.

Note

<1>: The function selection of AI type and AO type is consistent with the hardware DIP switch (jumper).

6.10.7.1 DI or DIO

Before using the DIO terminal, see the HIO-10 Input and Output Function Module User Guide for peripheral circuit wiring of HIO using internal power supply or external power supply.

Taking HIO-10 as an example. When n7-00 and n7-02 are both set to 1, DIO1 and DIO2 are configured as DI or DO by parameters n23-10 and n23-13. The figure shows the DIO software function diagram of HIO. When n23-10/n23-13 is set as DI, DI signals are processed in turn by input filtering, switch-on delay, switch-off delay, and positive and negative logic. When n23-10/n23-13 is set to B connector, DIO is configured as DO, and n23-10 and n23-13 are used as DO signal sources of DIO1 and DIO2. DO signals are processed in turn by switch-on delay, switch-off delay, and positive and negative logic. When connector B is at low level, a low level is output, and when B connector is at high level, a high level is output.

The HIO-30 module includes 6 DIs, and DI signal processing is the same as when DIO is used as DI.

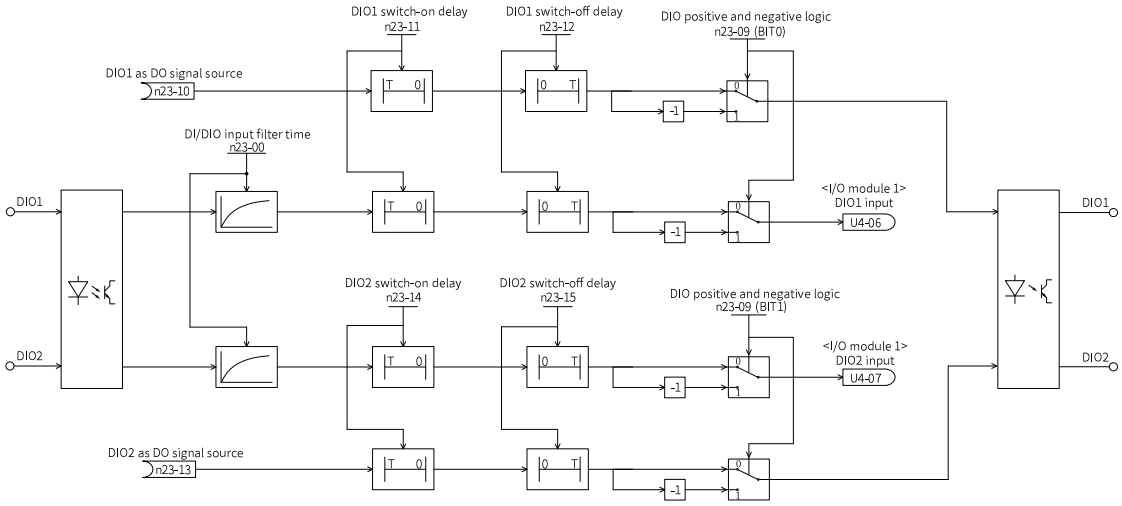


Figure 6-59 DIO software function diagram of HIO

DIO function parameters are as follows:

Para.	Name	Description
n7-10/n8-10/n9-10	Configuration for DIO used as output	The HIO module has 6 DIOs at most, and DIO1 to DOI6 correspond to bit00 to bit05 of n7-10. 0: DIO as DI 1: DIO as DO
n7-11/n8-11/n9-11	DI/DIO input original status	Displays the initial status of DI or DIO as DI. bit00 to bit05 display the initial status of DIO as DI, and bit08 to bit13 display the initial status of DI.
n7-12/n8-12/n9-12	DI/DIO input final status	Displays the final input status of DI or DIO as DI after filtering, delay and positive and negative logic processing. bit00 to bit05 display the final status of DIO as DI, and bit08 to bit13 display the final status of DI.
n7-13/n8-13/n9-13	RO/DIO output setting status	Displays the setting status of RO or DIO as DO. bit00 to bit05 display the setting status of DIO as DO, and bit08 to bit13 display the setting status of RO.
n7-14/n8-14/n9-14	RO/DIO output final status	Displays the final output status of RO or DIO as DO after delay and positive and negative logic processing. bit00 to bit05 display the final status of DIO as DO, and bit08 to bit13 display the final status of RO.
n23-10/n26-10/n29-10	DIO1 as DO signal source	DIO1 is used as DI by default. When n23-10 is configured as a B connector, DIO1 is used as a DO. 0: DI Other: B connector
n23-13/n26-13/n29-13	DIO2 as DO signal source	DIO2 is used as DI by default; When n23-13 is configured as a B connector, DIO1 is used as a DO. 0: DI Other: B connector
n23-00/n26-00/n29-00	DI/DIO input filter time	0.000s to 1.000s

Para.	Name	Description
n23-11/n26-11/n29-11	DIO1 switch-on delay	0.00s to 360.00s
n23-14/n26-14/n29-14	DIO2 switch-on delay	0.00s to 360.00s
n23-12/n26-12/n29-12	DIO1 switch-off delay	0.00s to 360.00s
n23-15/n26-15/n29-15	DIO2 switch-off delay	0.00s to 360.00s
n23-09/n26-09/n29-09	DIO positive and negative logic	bit00: DIO1 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level bit01: DIO2 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level bit02: DIO3 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level bit03: DIO4 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level bit04: DIO5 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level bit05: DIO6 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level

The DI/DIO connector parameters are as follows:

Para.	Description	Para.	Description	Para.	Description
U4-00	<I/O module 1> DI1 input	U4-12	<I/O module 2> DI1 input	U4-24	<I/O module 3> DI1 input
U4-01	<I/O module 1> DI2 input	U4-13	<I/O module 2> DI2 input	U4-25	<I/O module 3> DI2 input
U4-02	<I/O module 1> DI3 input	U4-14	<I/O module 2> DI3 input	U4-26	<I/O module 3> DI3 input
U4-03	<I/O module 1> DI4 input	U4-15	<I/O module 2> DI4 input	U4-27	<I/O module 3> DI4 input
U4-04	<I/O module 1> DI5 input	U4-16	<I/O module 2> DI5 input	U4-28	<I/O module 3> DI5 input
U4-05	<I/O module 1> DI6 input	U4-17	<I/O module 2> DI6 input	U4-29	<I/O module 3> DI6 input
U4-06	<I/O module 1> DIO1 input	U4-18	<I/O module 2> DIO1 input	U4-30	<I/O module 3> DIO1 input
U4-07	<I/O module 1> DIO2 input	U4-19	<I/O module 2> DIO2 input	U4-31	<I/O module 3> DIO2 input
U4-08	<I/O module 1> DIO3 input	U4-20	<I/O module 2> DIO3 input	U4-32	<I/O module 3> DIO3 input
U4-09	<I/O module 1> DIO4 input	U4-21	<I/O module 2> DIO4 input	U4-33	<I/O module 3> DIO4 input

Para.	Description	Para.	Description	Para.	Description
U4-10	<I/O module 1> DIO5 input	U4-22	<I/O module 2> DIO5 input	U4-34	<I/O module 3> DIO5 input
U4-11	<I/O module 1> DIO6 input	U4-23	<I/O module 2> DIO6 input	U4-35	<I/O module 3> DIO6 input

Note

For DIO and DI configuration of HIO-20 and HIO-30 modules, see that of the HIO-10 module above.

6.10.7.2 AI

Take HIO-10 as an example. HIO-10 provides 2 AIs and supports current and voltage signal types. Before using AI, you must determine whether the external signal is current or voltage, and select the DIP switch accordingly (for details, see *HIO-10 I/O Function Module User Guide*). When n7-00 and n7-02 are set to 1, configuration is carried out through n23-41/n23-51. The AI function is achieved as shown in the following function diagram:

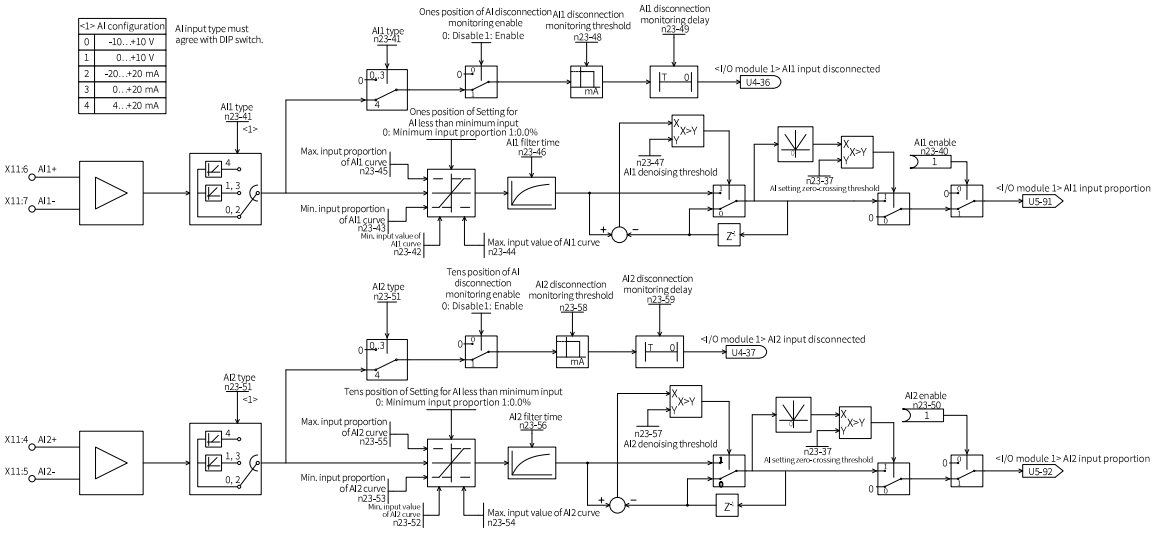


Figure 6-60 AI software Function diagram of HIO

AI function parameters are as follows:

Para.	Name	Description
n7-20/n8-20/n9-20	AI1 input value	Displays AI1 input value in V or mA according to the selection of n23-41.
n7-21/n8-21/n9-21	AI1 input proportion	Displays the percentage corresponding to AI1 input, which is the final output after AI module processing.
n7-22/n8-22/n9-22	AI2 input value	Displays AI2 input value in V or mA according to the selection of n23-51.
n7-23/n8-23/n9-23	AI2 input proportion	Displays the percentage corresponding to AI2 input, which is the final output after AI module processing.

Para.	Name	Description
n23-41/n26-41/n29-41	AI1 type	Sets the input signal type of AI1 or AI2. Different signal types require different HIO AI DIP switches. For details, see HIO-10 I/O Function Module User Guide. 0: –10 V to +10 V 1: 0 V to 10 V 2: –20 mA to +20 mA 3: 0 mA to 20 mA 4: 4 mA to 20 mA
n23-51/n26-51/n29-51	AI2 type	
n23-42/n26-42/n29-42	Min. input value of AI1 curve	Calibrates AI1. n23-42 and n23-44 together define the input range of AI1 (the unit is V or mA based on the setting of n23-41). Within the value range, convert the input into a value in percentage to output according to a straight line. When the input is less than n23-42: The default output is [n23-43], or the output can be set to 0.0% according to the ones position of n23-35.
n23-43/n26-43/n29-43	Min. input proportion of AI1 curve	
n23-44/n26-44/n29-44	Max. input value of AI1 curve	
n23-45/n26-45/n29-45	Max. input proportion of AI1 curve	
n23-52/n26-52/n29-52	Min. input value of AI2 curve	Calibrates AI2. n23-52 and n23-54 together define the input range of AI2 (the unit is V or mA based on the setting of n23-51). Within the value range, convert the input into a value in percentage to output according to a straight line. When the input is less than n23-52: The default output is [n23-53], or the output can be set to 0.0% according to the tens position of n23-35.
n23-53/n26-53/n29-53	Min. input proportion of AI2 curve	
n23-54/n26-54/n29-54	Max. input value of AI2 curve	
n23-55/n26-55/n29-55	Max. input proportion of AI2 curve	
n23-35/n26-35/n29-35	Setting for AI less than minimum input	Ones position: Setting for AI1 lower than minimum input 0: Minimum input proportion 1: 0.0% Tens position: Setting for AI2 lower than minimum input 0: Minimum input proportion 1: 0.0%
n23-46/n26-46/n29-46	AI1 filter time	Defines the AI filter time, which can remove interference and generate a delay effect.
n23-56/n26-56/n29-56	AI2 filter time	
n23-47/n26-47/n29-47	AI1 denoising threshold	Defines the denoising threshold. When the AI input fluctuation is smaller than the threshold, the AI input proportion remains unchanged.
n23-57/n26-57/n29-57	AI2 denoising threshold	
n23-37/n26-37/n29-37	AI setting zero-crossing threshold	When the AI value is smaller than the threshold, the AI value is 0%.
n23-40/n26-40/n29-40	AI1 enable	Enables or disables AI1. When AI1 is disabled, its value is forced to be 0.
n23-50/n26-50/n29-50	AI2 enable	Enables or disables AI2. When AI2 is disabled, its value is forced to be 0.

Para.	Name	Description
n23-36/n26-36/n29-36	AI disconnection monitoring enable	Enables or disables disconnection monitoring. Monitoring is only enabled when the signal type is 4 mA to 20 mA. When the AI input value is smaller than the disconnection monitoring threshold and the monitoring delay is maintained, disconnection occurs. Ones position: AI1 disconnection monitoring enable 0: Disable 1: Enable Tens position: AI2 disconnection monitoring enable 0: Disable 1: Enable Hundreds position: AI3 disconnection monitoring enable 0: Disable 1: Enable
n23-48/n26-48/n29-48	AI1 disconnection monitoring threshold	0.000 mA to 4.000 mA
n23-58/n26-58/n29-58	AI2 disconnection monitoring threshold	0.000 mA to 4.000 mA
n23-49/n26-49/n29-49	AI1 disconnection monitoring delay	0.00s to 10.00s
n23-59/n26-59/n29-59	AI2 disconnection monitoring delay	0.00s to 10.00s

AI connector parameters are as follows:

Para.	Description	Para.	Description
U4-36	<I/O module 1> AI1 input disconnected	U5-91	<I/O module 1> AI1 input proportion
U4-37	<I/O module 1> AI2 input disconnected	U5-92	<I/O module 1> AI2 input proportion
U4-38	<I/O module 1> AI3 input disconnected	U5-93	<I/O module 1> AI3 input proportion
U4-39	<I/O module 2> AI1 input disconnected	U5-94	<I/O module 2> AI1 input proportion
U4-40	<I/O module 2> AI2 input disconnected	U5-95	<I/O module 2> AI2 input proportion
U4-41	<I/O module 2> AI3 input disconnected	U5-96	<I/O module 2> AI3 input proportion
U4-42	<I/O module 3> AI1 input disconnected	U5-97	<I/O module 3> AI1 input proportion
U4-43	<I/O module 3> AI2 input disconnected	U5-98	<I/O module 3> AI2 input proportion
U4-44	<I/O module 3> AI3 input disconnected	U5-99	<I/O module 3> AI3 input proportion

Note

For AI configuration of the HIO-30 module, see that of the HIO-10 module above.

6.10.7.3 AO

Take HIO-10 as an example. HIO-10 provides 2 AO outputs and supports current and voltage signal types. Before using AO, you need to set the corresponding hardware jumper (see HIO-10 I/O Function Module User Guide for details). When n7-00 and n7-02 are set to 1, the corresponding configuration is carried out through n23-71/n23-81. The AO function is achieved as shown in the following function diagram:

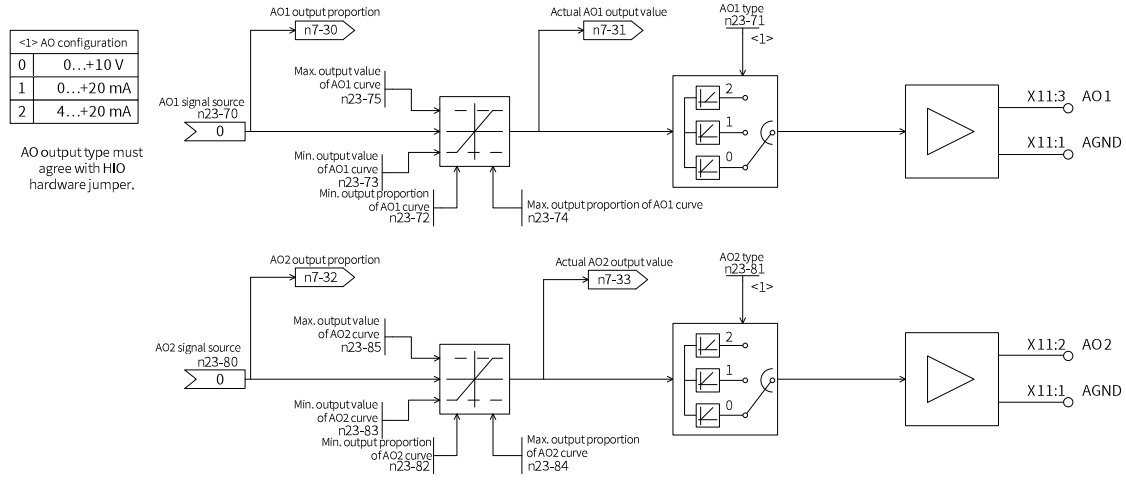


Figure 6-61 AO software function diagram of HIO

AO function parameters are as follows:

Para.	Name	Description
n7-30/n8-30/n9-30	AO1 output proportion	Displays the AO1 output value in V or mA according to the setting of n23-71.
n7-31/n8-31/n9-31	Actual AO1 output value	Displays AO1 output in percentage corresponding to [n23-70].
n7-32/n8-32/n9-32	AO2 output proportion	Displays the AO2 output value in V or mA according to the setting of n23-81.
n7-33/n8-33/n9-33	Actual AO2 output value	Displays AO2 output in percentage corresponding to [n23-80].
n23-70/n26-70/n29-70	AO1 signal source	Sets the signal source of AO1 output.
n23-80/n26-80/n29-80	AO2 signal source	Sets the signal source of AO2 output.
n23-71/n26-71/n29-71	AO1 type	Sets the signal type output by AO1 or AO2. To set the signal type output by AO1 or AO2, you need to wire the signal cable correctly. For details, see HIO-10 I/O Module User Guide 0: 0 V to 10 V; 1: 0 mA to 20 mA; 2: 4 mA to 20 mA
n23-81/n26-81/n29-81	AO2 type	

Para.	Name	Description
n23-73/n26-73/n29-73	Min. output value of AO1 curve	Sets the scale factor of AO1. n23-73 and n23-75 restrict the range of the AO1 output percentage. Within the range, the output numerical value is calculated according to the line (the unit is V or mA, depending on the setting of n23-71).
N23-72/n26-72/n29-72	Min. output proportion of AO1 curve	
n23-75/n26-75/n29-75	Max. output value of AO1 curve	
n23-74/n26-74/n29-74	Max. output proportion of AO1 curve	
n23-83/n26-83/n29-83	Min. output value of AO2 curve	Sets the scale factor of AO2. n23-83 and n23-85 restrict the range of the AO2 output percentage. Within the range, the output numerical value is calculated according to the line (the unit is V or mA, depending on the setting of n23-81).
N23-82/n26-82/n29-82	Min. output proportion of AO2 curve	
n23-85/n26-85/n29-85	Max. output value of AO2 curve	
n23-84/n26-84/n29-84	Max. output proportion of AO2 curve	

Note

For AO configuration of the HIO-30 module, see that of the HIO-10 module above.

6.10.7.4 RO

Taking HIO-10 as an example. HIO-10 provides one RO. The RO function is achieved as shown in the following function diagram:

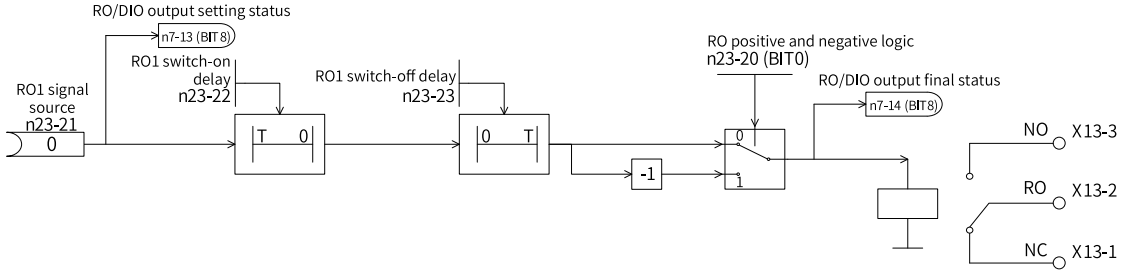


Figure 6-62 RO software function diagram of HIO

RO function parameters are as follows:

Para.	Name	Description
n7-13/n8-13/n9-13	RO/DIO output setting status	Displays the setting status of RO or DIO as DO. bit00 to bit05 display the setting status of DIO as DO, and bit08 to bit13 display the setting status of RO.
n7-14/n8-14/n9-14	RO/DIO output final status	Displays the final output status of RO or DIO as DO after delay and positive and negative logic processing. bit00 to bit05 display the final status of DIO as DO, and bit08 to bit13 display the final status of RO.
n23-21/n26-21/n29-21	RO1 signal source	0: Low level 1: High level Other: B connector
n23-22/n26-22/n29-22	RO1 switch-on delay	0.00s to 360.00s

Para.	Name	Description
n23-23/n26-23/n29-23	RO1 switch-off delay	0.00s to 360.00s
n23-20/n26-20/n29-20	RO positive and negative logic	bit00: RO1 positive and negative logic 0: Logic 1 outputs high level 1: Logic 1 outputs low level bit01: RO2 positive and negative logic 0: Logic 1 outputs high level 1: Logic 1 outputs low level bit02: RO3 positive and negative logic 0: Logic 1 outputs high level 1: Logic 1 outputs low level bit03: RO4 positive and negative logic 0: Logic 1 outputs high level 1: Logic 1 outputs low level

Note

For RO configuration of HIO-20 and HIO-30 modules, see that of HIO-10 module above.

6.11 Motor Temperature Detection

The motor temperature can be detected through simple wiring and parameter setting. Supported detection methods include KTY84, PT100, PT1000, and PTC. PG cards or AI/AO support motor temperature detection in various ways. You can choose the detection methods through E8-22, and set the motor over-temperature threshold and alarm threshold through E8-23 and E8-24 respectively. The detected motor temperature value is displayed in U5-06.

When connector is selected in E8-22, the temperature unit is °C and is used for obtaining the motor temperature through communication. When E8-22 is set to the value of U5-53, PZD received is the motor temperature. When U5-53 is set to 100, the current motor temperature is 10.0°C.

Related parameters:

Para.	Name	Description
U5-06	Detected motor temperature	The measured temperature is displayed based on the temperature measurement mode selected in E8-22. Unit: °C The actual temperature cannot be obtained by measuring the PTC.
E8-22	Motor temperature detection mode	Selects the encoder module (determined by d0-11): KTY84 and PTC are supported. Selects AI1/AO1 or AI2/AO2 detection: KTY84, PTC, PT100 and PT1000 are supported. For HCU-50S/51S jumper, the AO jumper must be set to the current mode output and the AI jumper to the voltage mode input.

Para.	Name	Description
d0-11	Current motor selection	When E8-22 is set to measure the temperature through the encoder module, d0-11 determines the activated encoder module.
E8-23	Motor over-temperature protection value	When the value of [U5-06] is greater than that of [E8-23], the motor over-temperature fault occurs and the motor coasts to stop. When the value is greater than that of [E8-24], only an alarm is triggered.
E8-24	Motor over-temperature alarm value	

6.11.1 Motor Temperature Detection with PG card

HPG-10 or HPG-50 has a temperature sampling module, which can realize motor temperature detection in KTY84 and PTC modes. No matter which encoder signal type is used, the wiring of the motor temperature detection part is the same[<1>]. Take the HPG-10 HTL incremental encoder as an example:

Connect the temperature sensors (thermistors) in series to pins 2 and 3 of the X31 terminal. According to the sampling value detected inside the module, the resistance value of the thermistor at this time can be obtained through conversion. Further, the motor temperature value at this time can be obtained by looking up the "Resistance-Temperature" table. The wiring diagram is as follows:

When HPG-10 is used to detect the motor temperature, the PG module must be inserted into the specified expansion slot and must be configured correctly. Select the encoder detection module to be used in the motor parameter group d0-11 (default is 1). After selection, select the expansion slot and encoder type in the corresponding expansion module group (n4). When the module status is online, the PG card is activated. Then, the motor temperature detection can be easily achieved by selecting the corresponding motor temperature detection mode through E8-22.

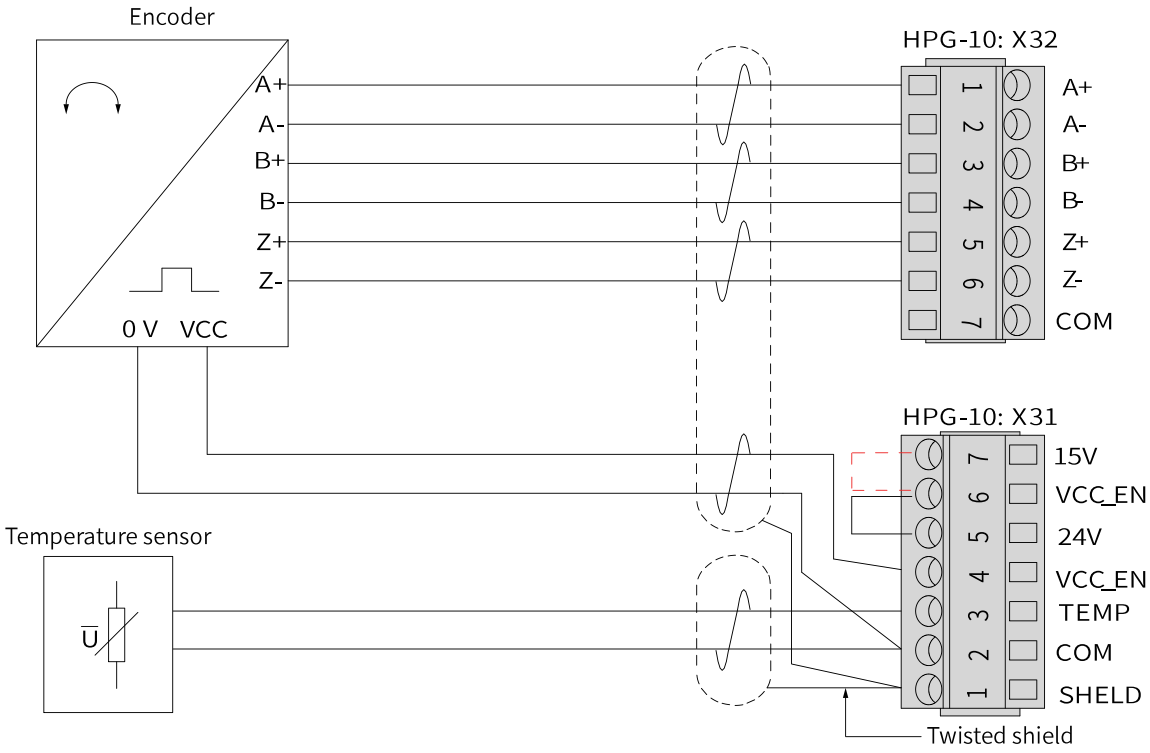


Figure 6-63 Push-pull output HTL encoder interfaces

Note

<1>: For detailed introduction of PG module, see *HPG-10 HTL Incremental Encoder Detection Module User Guide* and *TTL Incremental Encoder Detection Module User Guide*.

6.11.2 Motor Temperature Detection with AI/AO

To measure motor temperature with analog quantity, AI/AO<1> are required. The supported detection methods include KTY84, PT100, PT100×2, PT100×3, PT1000, and PTC. AI1 can only be used with AO1 and AI2 can only be used with AO2. This section takes AI1/AO1 as an example.

When you use AI1/AO1 to measure motor temperature, AI1 must be switched to voltage output mode and AO1 to current output mode with the jumper. According to the detection mode selected by E8-22, AO1 outputs a fixed current value<2>, as shown in the following table:

Detection Mode (E8-22)	KTY84	PT100	PT100×2	PT100×3	PT1000	PTC
AO output value (F3-00)	2 mA	5 mA	5 mA	5 mA	2 mA	2 mA

The temperature sensors (thermistors) are connected in series to both ends of AO1. By measuring the voltage at both ends of AO1, the resistance value of the thermistor at this time can be obtained according to Ohm's law. Further, the motor temperature value at this time can be obtained by looking up the "Resistance-Temperature" table. Connecting both ends of AO1 to AI1 respectively can achieve automatic measurement of AO voltage value<3>. Then, the AI1 input value displayed in F2-00 is the voltage at both ends of AO1. After the wiring is completed, select the motor temperature detection

mode through E8-22. Then, the motor temperature can be detected easily. The wiring diagram is as follows:

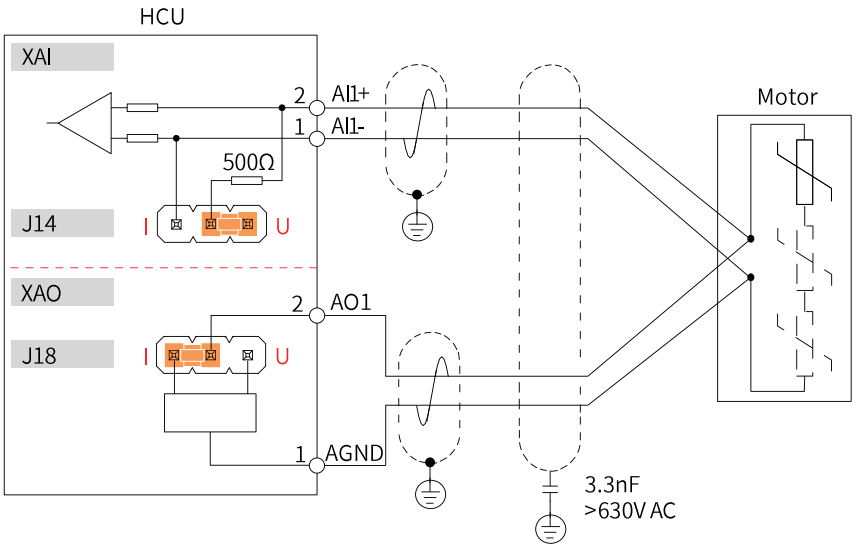


Figure 6-64 Temperature detection wiring with AI1 and AO1

Note

- <1>: To improve the detection accuracy, it is recommended to calibrate AI and AO in advance.
- <2>: When you use AI1/AO1 to measure the motor temperature, the setting of F3-04 (AO1 signal source) is inactive.
- <3>: Do not ground both ends of the cable shield. Ground one end and suspend the other end, or ground one end and ground the other end after passing through a string capacitor.

6.12 Process PID Module

In industrial control applications, to control the speed, pressure, temperature, or current for the controlled objects and maintain a stable output, the closed-loop control mode is generally used. The proportional control (P), integral control (I), and differential control (D) are used together to keep the feedback value consistent with the setpoint.

The output of P control is proportional to the deviation. In case of proportional control only, the system output contains steady state errors.

The output of I control is proportional to the deviation integral. The integral item is introduced to clear system static errors.

The output of D control is proportional to the deviation differential. The differential item can be used to predict the deviation change trend, optimizing the dynamic response of large-inertia controlled objects with a great delay.

Set parameters in group L4 as needed and adjust PID parameters for well control on controlled variables. PID function and PID operation are enabled by L4-00 and L4-01, respectively, and the execution cycle of PID controller is selected by L4-03.

6.12.1 PID Input

Set L4-04 and L4-08 to the target value and actual value of the controlled variable as the reference source and feedback source of the controller. Filter (L4-07, L4-09) the reference and feedback as required. For inverse characteristic load, set the PID action direction (L4-02) as the reverse direction, so that when the input value is positive, the PID output is reduced. The input deviation (U9-60) is added to the supplementary reference of L4-10 as the final PID input (U9-61). When reference freezing (L4-06) is enabled, the reference does not change. See the following figure.

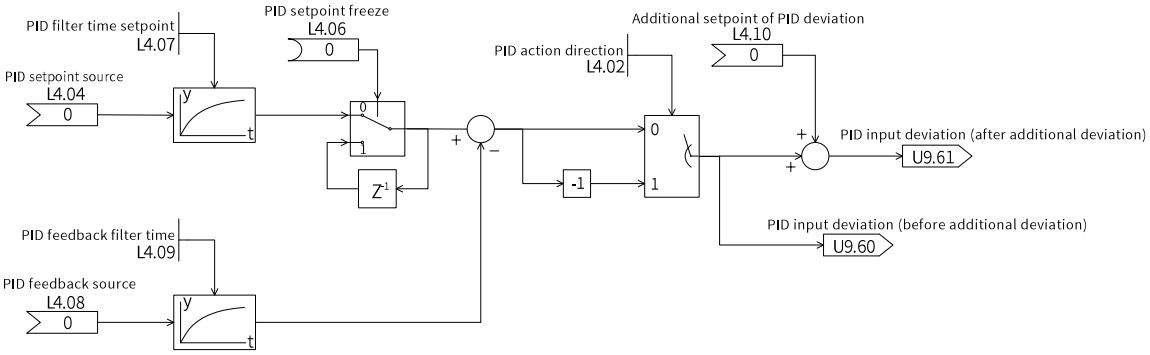


Figure 6-65 PID input

6.12.2 PID Output

When the input deviation is out of the dead zone reference, the PID controller starts to work. When the controller input is not 0, the control volume will continue to increase or decrease under the PID function till the output limit. Adjust the proportional gain Kp and integral time Ti to ensure the dynamic response and steady accuracy of PID output. See the following figure.

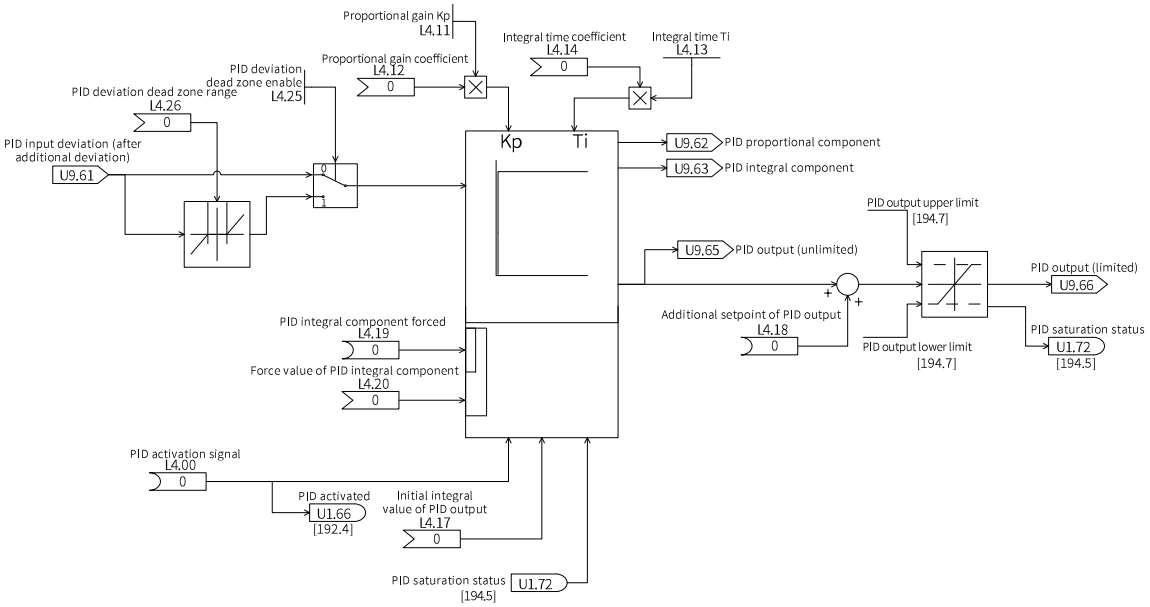


Figure 6-66 PID output

6.12.3 PID Limit

Set the upper and lower limits and the rise and fall time to limit the PID output, ensuring that the controller output is within the controllable range. See the following figure.

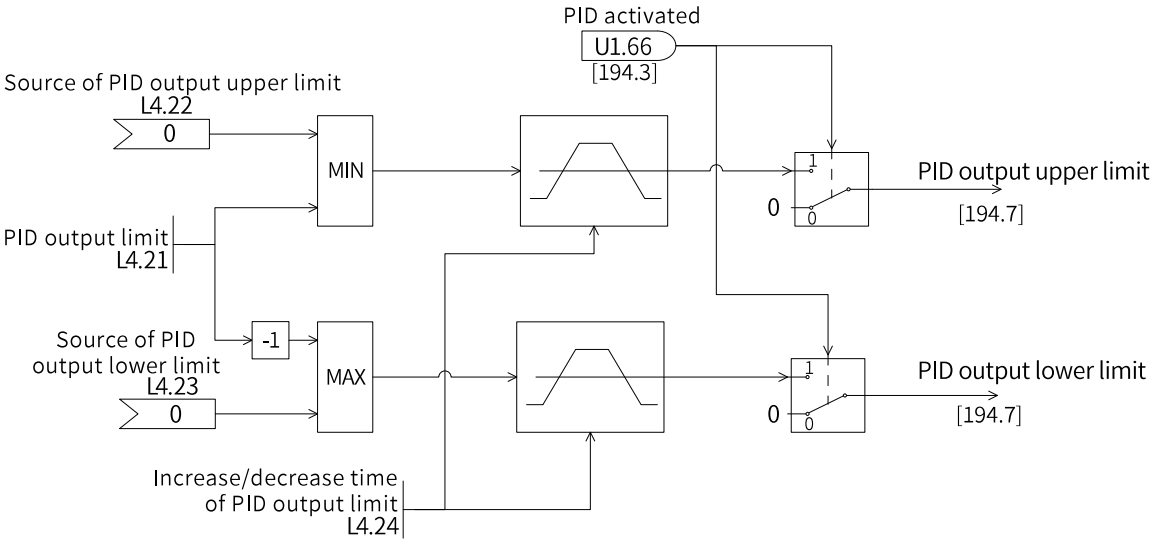


Figure 6-67 PID limit

6.12.4 Detection of PID Feedback Loss

When the absolute value of the PID feedback is continuously lower than the detection value (L4-27) within the detection time (L4-28), the system determines PID feedback loss and reports error code 31, asking users to check the sensor or connection.

6.13 Encoder Speed Measurement

HCU-50S/51S supports up to 3 encoder detection modules. The parameters in groups n4/n5/n6 correspond to the settings of the 3 modules. The corresponding parameter group parameters need to be selected and set according to d0-11. In motor parameters, d0-11 is set to 0 [encoder detection module 1] by default.

6.13.1 Encoder Parameter Setting

6.13.1.1 Incremental Encoder Setting

HCU-50S/51S supports incremental encoders with HTL and TTL levels, and the corresponding encoder detection module models are HPG-10 and HPG-50 respectively. The software configuration methods of the two are exactly the same. Take encoder detection module 1 (d0-11 set to 0) as an example:

Para.	Name	Description
n4-00	Expansion slot	According to the actual slot position of the encoder detection module in HCU-50S/51S. When two encoder detection modules are enabled, they must be different.
n4-02	Encoder type	0: Invalid type, encoder function off 1: Generic ABZ encoder with support for HPG-10 and HPG-50 modules The HPG-10 is an HTL-level ABZ encoder detection module that supports 12 V to 24 V incremental encoders and supports differential, single-ended, and OC inputs. The HPG-50 is a TTL level ABZ encoder detection module that supports a 5 V incremental encoder and does not support the OC input.
n4-01	Module online/ offline state	After n4-00 and n4-02 are configured correctly, their status should be displayed as "online".
n4-03	Input A/B phase sequence	If the encoder speed measuring direction is reverse to the selected motor direction, modify this parameter to adjust the speed measuring direction.
n4-04	Speed test mode	0: Quadruple frequency, faster response at lower speed, when the duty cycle of encoder signal is not 50%, or the orthogonality of A/B signal is not good, and it will lead to increased fluctuation of speed measurement. 1: A pulse, the speed measurement response at extremely low speed is slightly poor, but relatively stable.
n4-07	Encoder resolution (pulses/ revolutions)	This parameter is marked on the nameplate of an incremental encoder, indicating the number of pulses upon each revolution.

6.13.1.2 Resolver Setting

The resolver detection module mode is HPG-40. Take encoder detection module 1 (d0-11 set to 0) as an example to describe the parameter settings:

Para.	Name	Description
n4-00	Expansion slot	According to the actual slot position of the encoder detection module in HCU-50S/51S. When two encoder detection modules are enabled, they must be different.
n4-02	Encoder type	0: Invalid type, encoder function off 3: Resolver
n4-01	Module online/ offline state	After n4-00 and n4-02 are configured correctly, their status should be displayed as "online".
n4-03	Input A/B phase sequence	If the encoder speed measuring direction is reverse to the selected motor direction, modify this parameter to adjust the speed measuring direction.
n4-12	Encoder installation position angle	When a synchronous motor is used, the resolver installation position angle must be set correctly; otherwise, motor runaway will occur during running. The installation position angle can be auto-tuned (b5-00 set to 2 or b5-00 set to 7), and must be auto-tuned each time after the encoder is replaced for the parameter settings are restored to factory defaults. When an asynchronous motor is used, the installation position angle is not required.

Para.	Name	Description
n4-25	Resolver type	0: 7Vp-p, ratio 0.5 1: 7Vrms, ratio 0.5 2: 7Vrms, ratio 0.286 3: 4Vrms, ratio 0.3
n4-26	Resolver excitation signal frequency	0: 10 kHz 1: 12 kHz 2: 15 kHz 3: 20 kHz

6.13.2 Anti-Interference and Frequency-Division Output

Para.	Name	Description
n4-08	Enable PG quadrature interlock	It is enabled by default and can increase the suppression of interference signals.
n4-17	Filter time of encoder speed test	The detected feedback speed is filtered to smooth burr.
n4-09	Pulse frequency-division output coefficient	The encoder input signal is divided and then output. When 1 is selected, the frequency of the output signal is the same as that of the original signal; When n is selected, the output signal is the input signal frequency such as 1/n.
n4-05	Output A/B phase sequence	0: Forward, the A signal of frequency division output is ahead of B. 1: Reverse, the A signal of frequency division output lags behind B.
n4-06	Output Z phase sequence	0: Maintain the polarity of input Z signal. 1: Output Z signal after reversing the polarity.

6.13.3 Disconnection Detection

6.13.3.1 Incremental Encoder Hardware Disconnection Detection

Para.	Name	Description
n4-10	Disconnection detection mode for ABZ encoder	The encoder detection module monitors the connection status of encoder signal cables, and reports a fault upon disconnection. 0: Do not detect, disabled 1: ABZ differential signal, detecting six signal cables A+/A–, B +/B–, and Z+/Z– 2: AB differential signal, detecting four signal cables A+/A– and B+/B– 3: ABZ single-ended positive signal, detecting three signal cables A+, B+ and Z+. Note that only these three cables can be used during wiring; otherwise the encoder disconnection fault will be reported. 4: AB single-ended positive signal, detecting only two signal cables A+ and B+. Note that only these two cables can be used during wiring; otherwise the encoder disconnection fault will be reported.
n4-11	PG disconnection detection time during speed feedback	When the encoder disconnection duration exceeds this duration, a disconnection fault is reported. Increase the duration in case of false alarms. Setting it to 0 indicates that the disconnection detection function is disabled.

6.13.3.2 Resolver Disconnection Detection

Para.	Name	Description
n4-27	Resolver disconnection detection time	When the encoder disconnection duration exceeds this duration, a disconnection fault is reported. Increase the duration in case of false alarms. Due to characteristics of the resolver, if the resolver stops at a certain angle, its disconnection cannot be detected and can be detected after the resolver runs. Setting it to 0 indicates that the disconnection detection function is disabled.

6.13.3.3 Encoder Signal Error Software Detection Setting

If the encoder signal cable is not properly routed or the shield is not properly connected, the encoder signal will be interfered with, causing great fluctuation in measured speed. The software disconnection detection function can be used to identify such exceptions, prompting users to detect cables. A loose encoder shaft may also cause the encoder software disconnection fault.

Para.	Name	Description
n4-20	Enable software detection of encoder signal error	0: Disable 1: Enable
n4-21	Encoder signal error software detection coefficient	This threshold is automatically set during auto-tuning. Invalid threshold is displayed in n4-22. If the deviation of the encoder detection speed exceeds this threshold, the measured value is abnormal.
n4-22	Software detection threshold of encoder signal error	
n4-23	Threshold of encoder signal error count	When an incremental encoder is enabled, the value of n4-23 is the threshold. When a resolver is enabled, the value of n4-31 is the threshold. When the encoder detection signal fluctuation exceeds the threshold specified in n4-22 for a time of n4-23/n4-31, the encoder software disconnection fault will occur. Abnormal signals before the count is reached will be eliminated to ensure smooth speed detection.
n4-31	Threshold of abnormal resolver signals	
n4-28	Enable burr removal for encoder speed test	Even if n4-20 is set to 0, you can set n4-28 to remove abnormal encoder detection signal.

6.13.4 Encoder Disconnection Fault and Fault Response Setting

E8-50 is used to set the encoder fault processing mode, which is the stop mode set in E8-51 by default. The settings of E8-51 are as follows:

Setpoint	Meaning	Action
0	OFF2 stop	The device coasts to stop after a fault occurs.
1	OFF3 stop (SVC)	After a fault occurs, the mode switches from FVC to SVC and the device adopts the emergency stop mode.
2	OFF1 stop (SVC)	After a fault occurs, the mode switches from FVC to SVC and the device decelerates to stop.

If E8-50 is set to alarm and the device continues to run in SVC mode, after an encoder fault occurs, the mode switches from FVC to SVC and the device continues to run until it is stopped by the user or the running speed is lower than the setting of E8-52, and then the fault is reported.

The default minimum running speed of after encoder disconnection and mode switching to SVC (E8-52) is 3%. After an encoder fault occurs, the mode switches from FVC to SVC, if the running synchronous frequency is lower than 3%, the fault is reported. If the parameter is set to 0%, after the mode is changed to SVC, the device continues to run until it is stopped by the user. If proactive load E8-52 is set to 0%, SVC control may be abnormal.

Note

When active FVC switch to SVC is enabled in E11-04 and FVC has actively switched to SVC, if the encoder is disconnected, the encoder fault processing mode set in E8-50 is no longer active no matter when the fault can be restored.

6.13.5 Pulse Counting and Encoder Angle Simulation

Depending on the internal operation function of HCU-50S/51S, not only incremental encoder can be used to measure speed, but also pulses can be counted to simulate absolute encoder to realize position measurement. You can change the current count value to correct the home position.

Para.	Name	Description
U29-40	Encoder 1 pulse position value (4-frequency multiplication)	Displays the pulse position accumulation of the encoder 1/2/3. The position increases upon forward running and decreases upon reverse running. When the motor rotates forward by one turn, the pulse position increases by 4 x [n4-07].
U29-41	Encoder 2 pulse position value (4-frequency multiplication)	
U29-42	Encoder 3 pulse position value (4-frequency multiplication)	
U9-12	Encoder pulse position value (4-frequency multiplication)	Displays the pulse position accumulation of the activated encoder module (d0-11). If d0-11 is set to 0, the value of U29-40 is displayed.
n4-36	Retention of encoder pulses upon power failure	1: Save pulse number The current position value of U29-40 is retained before HCU is powered off. The counting starts from the last position upon the next power-on. Ensure that the encoder and device has no displacement upon HCU power failure. 0: U29-40 counts from 0 upon each power-on.
n4-38	Encoder position setting switch	When n4-38 is set to 1, the value of U29-40 is forced to be the connector selected in n4-39. If n4-39 to 0, the value is cleared. When n4-38 is set to 0, the value of U29-40 increases or decreases with encoder rotating.
n4-39	Encoder position setpoint	

The position value of the encoder can be converted into the rotor rotation angle and turns based on the encoder pulses per revolution. The following table lists the parameters.

Para.	Name	Description
U8-77	Encoder pulse count	Displays the number of incremental input pulses counted by the current encoder module. Corresponds to the quadruple frequency of the input pulse: that is, when a 1024 PPR encoder rotates one revolution, the count increases by 4096.
U16-94	Encoder 1 measuring angle	Simulates the absolute encoder to convert the number of encoder pulses into the angle. The angle increases upon forward running and decreases upon reverse running. 0 to 65535 correspond to angles of 0° to 360°. U16-95 and U16-94 can be used together to simulate a multi-turn absolute encoder.
U16-95	Measured revolutions of encoder 1	
U16-96	Encoder 2 measuring angle	Corresponds to encoder module detection in group n5. See U16-94/U16-95.
U16-97	Measured revolutions of encoder 2	
U16-98	Encoder 3 measuring angle	Corresponds to encoder module detection in group n6. See U16-94/U16-95.
U16-99	Measured revolutions of encoder 3	
U5-11	Encoder measuring angle	Displays the revolutions and angle of the activated encoder module (d0-11). If d0-11 is set to 0, the values of U16-94 and U16-95 are displayed.
U5-12	Number of revolutions of encoder	

Para.	Name	Description
n4-18	Encoder initial angle trigger reference	Sets U16-94 and U16-95 when the set connector numerical value changes. When the connector is a single-word connector, the numerical value after change will be set to the value of U16-94. When the connector is a double-word connector, the low word of the numerical value after change will be set to the value of U16-94 and the high word will be set to the value of U16-95.

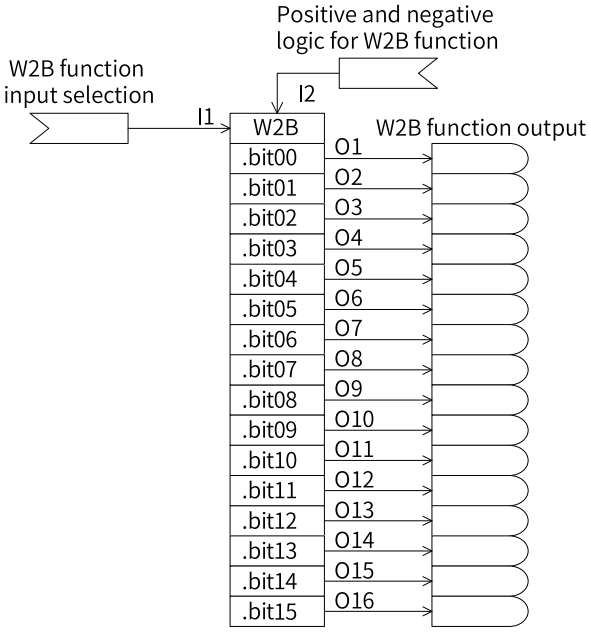
6.14 Application Functions

In engineering application, the AC drive control needs to be applied in logic operation function blocks. These function blocks can associate multiple status signals and control signals. The application functions of MD880 include logic operation, arithmetic function, word-to-bit conversion, single-word and double-word conversion, switch function, control function, multi-point curve, constant setting and parameter monitoring and modification module. You can set related parameters in group L to achieve simple logic operation.

6.14.1 Word-Bit Conversion Function

6.14.1.1 Word-to-Bit (W2B) Module (1 to 4)

Diagram



Operation

When input I1 is single-word input, outputs O1 to O16 correspond to bit00 to bit15 of input I1. When input I1 is double-word input, outputs O1 to O16 correspond to bit00 to bit15 of the high 16 bits of input I1. When the bit of I2 is 0, the value is not inverted. When the bit is 1, the value is inverted.

Connection

Input I1 is a signed number.

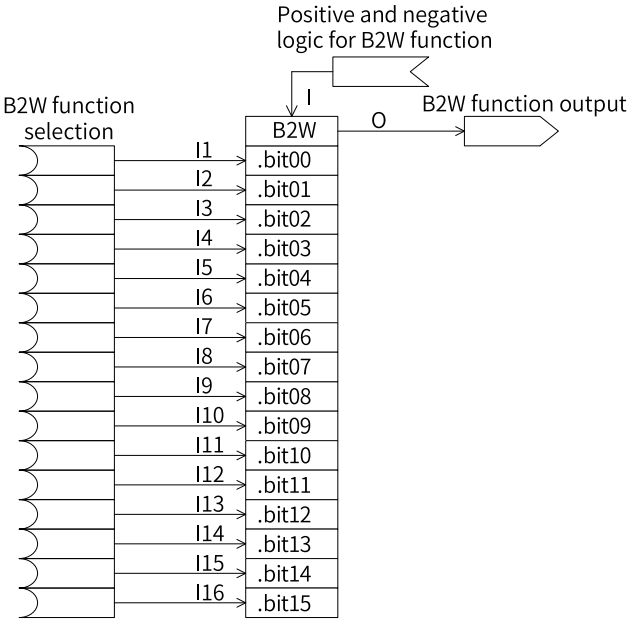
Input I2 is an unsigned number.

Outputs O1 to O16 are binary numbers.

W2B Module		1	2	3	4
Input	I1	L0-00	L0-01	L0-02	L0-03
	I2	L0-74	L0-75	L0-76	L0-77
Output	O1 (bit00)	U2-48	U2-64	U2-80	U4-76
	O2 (bit01)	U2-49	U2-65	U2-81	U4-77
	O3 (bit02)	U2-50	U2-66	U2-82	U4-78
	O4 (bit03)	U2-51	U2-67	U2-83	U4-79
	O5 (bit04)	U2-52	U2-68	U2-84	U4-80
	O6 (bit05)	U2-53	U2-69	U2-85	U4-81
	O7 (bit06)	U2-54	U2-70	U2-86	U4-82
	O8 (bit07)	U2-55	U2-71	U2-87	U4-83
	O9 (bit08)	U2-56	U2-72	U2-88	U4-84
	O10 (bit09)	U2-57	U2-73	U2-89	U4-85
	O11 (bit10)	U2-58	U2-74	U2-90	U4-86
	O12 (bit11)	U2-59	U2-75	U2-91	U4-87
	O13 (bit12)	U2-60	U2-76	U2-92	U4-88
	O14 (bit13)	U2-61	U2-77	U2-93	U4-89
	O15 (bit14)	U2-62	U2-78	U2-94	U4-90
	O16 (bit15)	U2-63	U2-79	U2-95	U4-91

6.14.1.2 Bit-to-Word (B2W) Module (1 to 4)

Diagram



Operation

bit00 to bit16 of output O correspond to inputs I1 to I16. When the bit of I is 0, the value is not inverted. When the bit is 1, the value is inverted.

Connection

Input I is an unsigned number.

Inputs I1 to I16 are binary numbers.

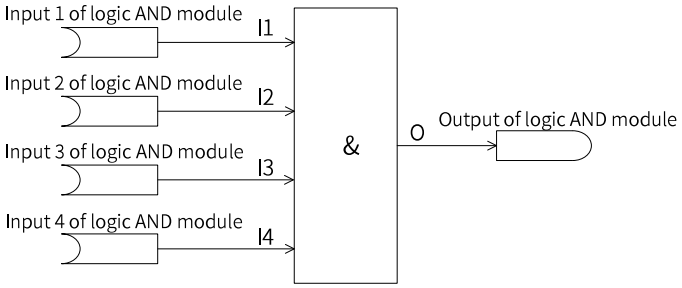
Output O is a signed number.

B2W Module		1	2	3	4
Input	I1 (bit00)	L0-10	L0-26	L0-42	L0-58
	I2 (bit01)	L0-11	L0-27	L0-43	L0-59
	I3 (bit02)	L0-12	L0-28	L0-44	L0-60
	I4 (bit03)	L0-13	L0-29	L0-45	L0-61
	I5 (bit04)	L0-14	L0-30	L0-46	L0-62
	I6 (bit05)	L0-15	L0-31	L0-47	L0-63
	I7 (bit06)	L0-16	L0-32	L0-48	L0-64
	I8 (bit07)	L0-17	L0-33	L0-49	L0-65
	I9 (bit08)	L0-18	L0-34	L0-50	L0-66
	I10 (bit09)	L0-19	L0-35	L0-51	L0-67
	I11 (bit10)	L0-20	L0-36	L0-52	L0-68
	I12 (bit11)	L0-21	L0-37	L0-53	L0-69
	I13 (bit12)	L0-22	L0-38	L0-54	L0-70
	I14 (bit13)	L0-23	L0-39	L0-55	L0-71
	I15 (bit14)	L0-24	L0-40	L0-56	L0-72
	I16 (bit15)	L0-25	L0-41	L0-57	L0-73
	I	L0-78	L0-79	L0-80	L0-81
Output	O	U5-86	U5-87	U5-88	U5-89

6.14.2 Logic Operation Function

6.14.2.1 Logic AND Module (A to D)

Diagram



Operation

O=I1&I2&I3&I4

Only if inputs I1, I2, I3, and I4 are all true, output O is true. Otherwise, output O is false. The truth table is as follows.

Input				Output
I1	I2	I3	I4	O
0	×	×	×	0
×	0	×	×	0
×	×	0	×	0
×	×	×	0	0
1	1	1	1	1

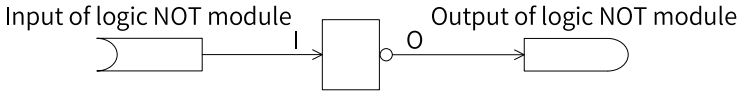
Connection Inputs I1, I2, I3, and I4 are binary numbers.

Output O is a binary number.

Logic AND Module	Input				Output
	I1	I2	I3	I4	O
A	L2-00	L2-01	L2-02	L2-03	U3-00
B	L2-04	L2-05	L2-06	L2-07	U3-01
C	L2-08	L2-09	L2-10	L2-11	U3-02
D	L2-12	L2-13	L2-14	L2-15	U3-03

6.14.2.2 Logic NOT Module (A to H)

Diagram



Operation

$$O=\bar{I}$$

Input	Output
I	O
0	1
1	0

Connection

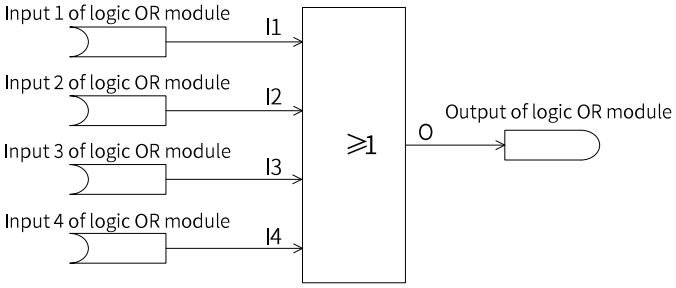
Input I is a binary number.

Output O is a binary number.

Logic NOT Module	Input	Output
	I	O
A	L2-16	U3-04
B	L2-17	U3-05
C	L2-18	U3-06
D	L2-19	U3-07
E	L2-20	U3-08
F	L2-21	U3-09
G	L2-22	U3-10
H	L2-23	U3-11

6.14.2.3 Logic OR Module (A to D)

Diagram



Operation

O=I1|I2|I3|I4

If any of inputs I1, I2, I3, and I4 is true, the output is also true. The truth table is as follows.

Input				Output
I1	I2	I3	I4	O
0	0	0	0	0
1	×	×	×	1
×	1	×	×	1
×	×	1	×	1
×	×	×	1	1

Connection

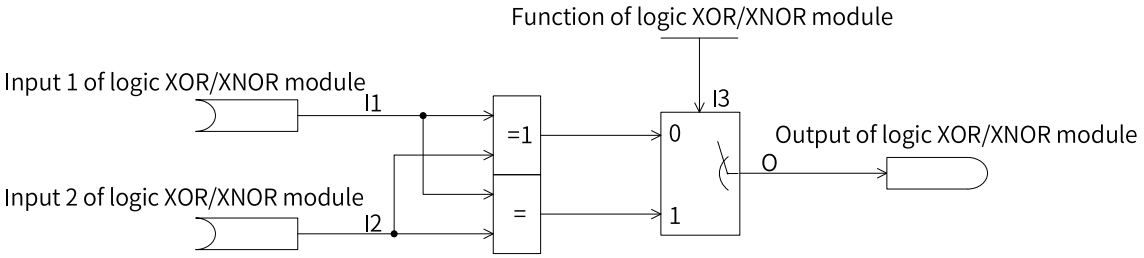
Inputs I1, I2, I3, and I4 are binary numbers.

Output O is a binary number.

Logic OR Module	Input				Output
	I1	I2	I3	I4	O
A	L2-24	L2-25	L2-26	L2-27	U3-12
B	L2-28	L2-29	L2-30	L2-31	U3-13
C	L2-32	L2-33	L2-34	L2-35	U3-14
D	L2-36	L2-37	L2-38	L2-39	U3-15

6.14.2.4 Logic XOR/XNOR Module (A to D)

Diagram



Operation

When I3 (Logic XOR/XNOR module function) is set to 0, logic XOR is enabled and $O=\overline{I1}I2+I1\overline{I2}$.

When inputs I1 and I2 are the same, output O is 0. When inputs I1 and I2 are different, output O is 1. The truth table is as follows.

Input		Output
I1	I2	O
0	0	0
1	0	1
0	1	1
1	1	0

When I3 (Logic XOR/XNOR module function) is set to 1, logic XNOR is enabled, and $O=I1I2+\overline{I1}\overline{I2}$.

When inputs I1 and I2 are the same, output O is 1. When inputs I1 and I2 are different, output O is 0. The truth table is as follows.

Input		Output
I1	I2	O
0	0	1
1	0	0
0	1	0
1	1	1

Connection

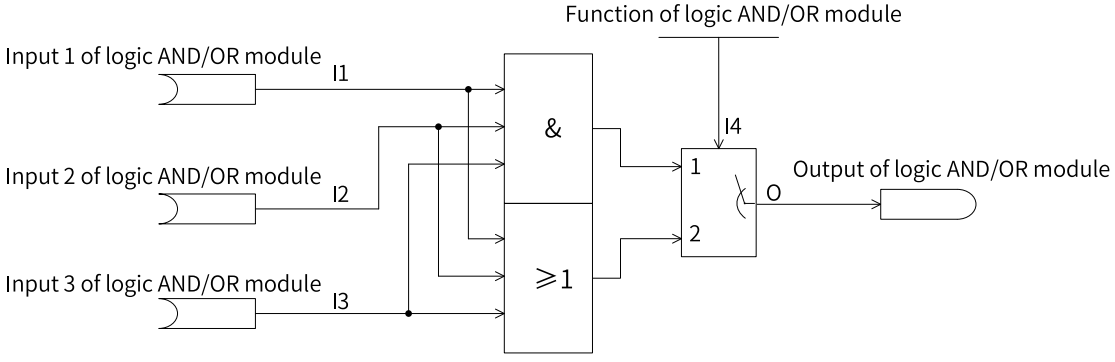
Inputs I1, I2, and I3 are binary numbers.

Output O is a binary number.

Logic XOR/XNOR Module	Input			Output
	I1	I2	I3	O
A	L2-41	L2-42	L2-40	U3-16
B	L2-44	L2-45	L2-43	U3-17
C	L2-47	L2-48	L2-46	U3-18
D	L2-50	L2-51	L2-49	U3-19

6.14.2.5 Logic AND/OR Module (A to H)

Diagram



Operation

For function selection of the logic AND/OR module, if I4 is 1, logic AND is valid and $O=I1\&I2\&I3$.

If inputs I1, I2, and I3 are true, output O is true. Otherwise, output O is false. The truth table is as follows.

Input			Output
I1	I2	I3	O
0	0	0	0
1	0	0	0
0	1	0	0
1	1	0	0
0	0	1	0
1	0	1	0
0	1	1	0
1	1	1	1

For function selection of the logic AND/OR module, if I4 is 2, logic OR is valid and $O=I1|I2|I3$.

If any of inputs I1, I2, and I3 are true, the output is also true. The truth table is as follows.

Input			Output
I1	I2	I3	O
0	0	0	0
1	0	0	1
0	1	0	1
1	1	0	1
0	0	1	1
1	0	1	1
0	1	1	1
1	1	1	1

Connection

Inputs I1, I2, I3, and I4 are binary numbers.

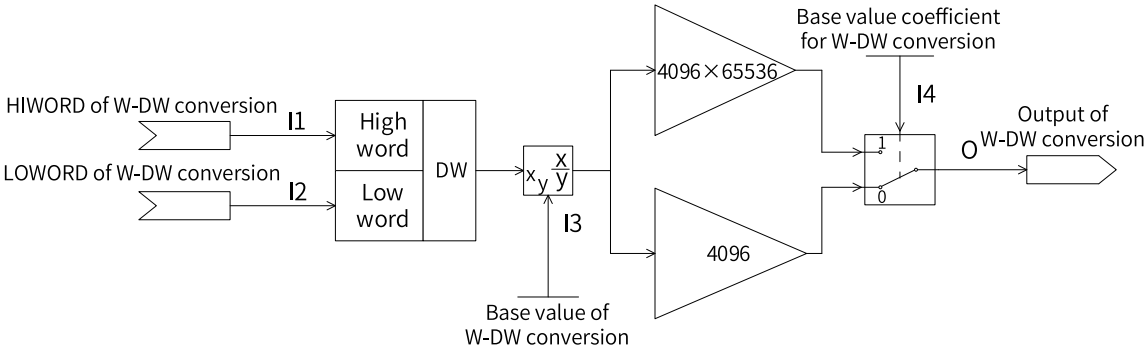
Output O is a binary number.

Logic OR Module	Input				Output
	I1	I2	I3	I4	O
A	L2-61	L2-62	L2-63	L2-60	U4-92
B	L2-65	L2-66	L2-67	L2-64	U4-93
C	L2-69	L2-70	L2-71	L2-68	U4-94
D	L2-73	L2-74	L2-75	L2-72	U4-95
E	L2-77	L2-78	L2-79	L2-76	U4-96
F	L2-81	L2-82	L2-83	L2-80	U4-97
G	L2-85	L2-86	L2-87	L2-84	U4-98
H	L2-89	L2-90	L2-91	L2-88	U4-99

6.14.3 W2DW Conversion Function

6.14.3.1 W2DW Conversion (1 to 5)

Diagram



Operation

$$O=\begin{cases}\frac{I1\times 65536+I2}{I3}\times 4096\times 65536, I4=1\\ \frac{I1\times 65536+I2}{I3}\times 4096, I4=0\end{cases}$$

The output equals to I1 (high 16 bits) or I2 (low 16 bits) double word divided by base value I3 and then multiplied by the base value coefficient (specified by I4). When the input value is a double word, it is a high 16-bit double word.

When I3 is set to 0, the output value equals to the input value without base value conversion.

Connection

Inputs I1 and I2 are signed numbers.

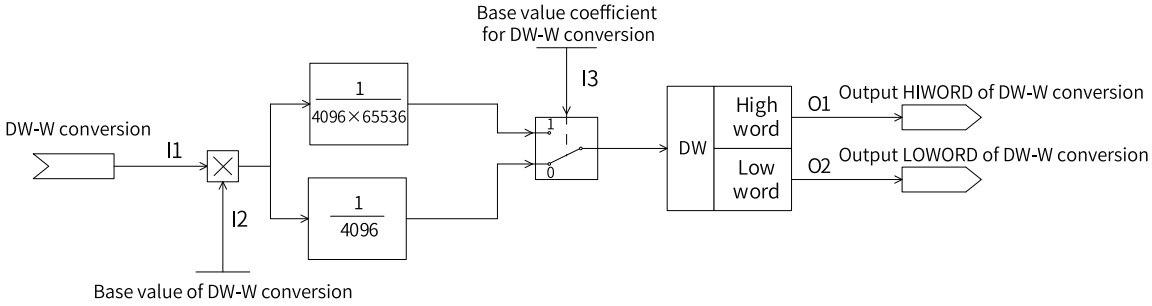
Input I3 is an unsigned number.

Output O is a signed number.

W2DW Conversion	Input				Output
	I1	I2	I3	I4	O
1	L3-01	L3-02	L3-03	L3-00 (bit0)	U9-47
2	L3-04	L3-05	L3-06	L3-00 (bit1)	U9-48
3	L3-07	L3-08	L3-09	L3-00 (bit2)	U9-49
4	L3-10	L3-11	L3-12	L3-00 (bit3)	U9-26
5	L3-13	L3-14	L3-15	L3-00 (bit4)	U9-27

6.14.3.2 DW2W Conversion (1 to 5)

Diagram



Operation

$$O1=\begin{cases}\left(\frac{I1\cdot I2}{4096\times 65536}>>16\right)\&0xFFF, I3=1\\ \left(\frac{I1\cdot I2}{4096}>>16\right)\&0xFFF, I3=0\end{cases}$$

$$O2=\begin{cases}\left(\frac{I1\cdot I2}{4096\times 65536}>>16\right)\&0xFFF, I3=1\\ \left(\frac{I1\cdot I2}{4096}>>16\right)\&0xFFF, I3=0\end{cases}$$

The output high word equals to the high 16 bits of I1 multiplied by the base value I2 and divided by the base value coefficient (specified by I3). The output low word equals to the low 16 bits of I1 multiplied by the base value I2 and divided by the base value coefficient (specified by I3).

When I2 is set to 0, the output high word is the input high word while the output low word is the input low word, without base value conversion.

Connection

Input I1 is a signed number.

Input I2 is an unsigned number.

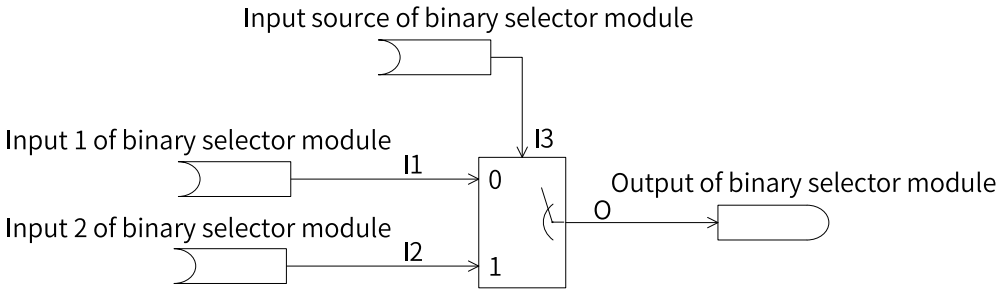
Outputs O1 and O2 are signed numbers.

DW2W Conversion	Input			Output	
	I1	I2	I3	O1	O2
1	L3-26	L3-27	L3-25 (bit0)	U5-76	U5-77
2	L3-28	L3-29	L3-25 (bit1)	U5-78	U5-79
3	L3-30	L3-31	L3-25 (bit2)	U5-80	U5-81
4	L3-32	L3-33	L3-25 (bit3)	U5-82	U5-83
5	L3-34	L3-35	L3-25 (bit4)	U5-84	U5-85

6.14.4 Switch Function Block

6.14.4.1 Binary Selector Module (A to E)

Diagram



Operation

$$O=\begin{cases} I1, I3=0 \\ I2, I3=1 \end{cases}$$

When I3 (Binary selector module input) is set to 0, output O equals to I1 (bit). When I3 (Binary selector module input) is set to 1, output O equals to I2 (bit).

Connection

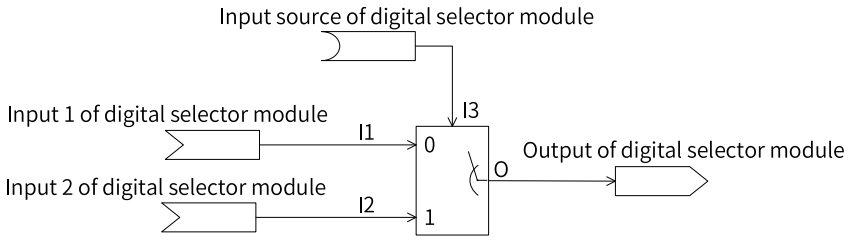
Inputs I1, I2, and I3 are binary numbers.

Output O is a binary number.

Binary Selector Module	Input			Output
	I1	I2	I3	O
A	L5-01	L5-02	L5-00	U3-20
B	L5-04	L5-05	L5-03	U3-21
C	L5-07	L5-08	L5-06	U3-97
D	L5-10	L5-11	L5-09	U3-98
E	L5-13	L5-14	L5-12	U3-99

6.14.4.2 Digital Selector Module (A to E)

Diagram



Operation

$$O=\begin{cases} I1, I3=0 \\ I2, I3=1 \end{cases}$$

When I3 (digital selector module input) is set to 0, output O equals to I1 (word). When I3 (digital selector module input) is set to 1, output O equals to I2 (word).

Connection

Inputs I1 and I2 are signed numbers.

Input I3 is a binary number.

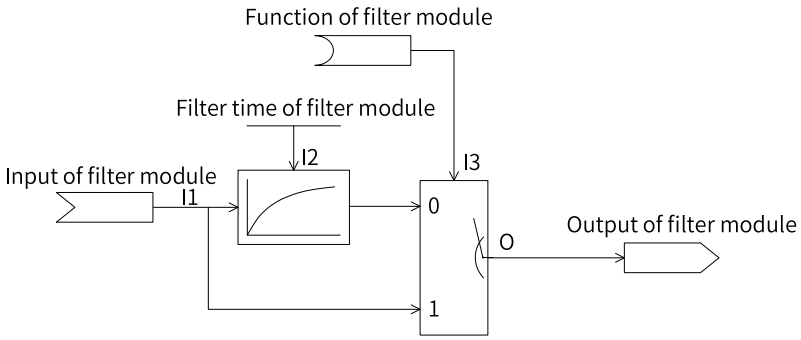
Output O is a signed number.

Digital Selector Module	Input			Output
	I1	I2	I3	O
A	L5-21	L5-22	L5-20	U9-67
B	L5-24	L5-25	L5-23	U9-68
C	L5-27	L5-28	L5-26	U9-87
D	L5-30	L5-31	L5-29	U9-88
E	L5-33	L5-34	L5-32	U9-89

6.14.5 Control Function Block

6.14.5.1 Filter Module (A to D)

Diagram



Operation

When I3 (Filter module function) is set to 0, output O equals to the filter value of input I1. When I3 (Filter module function) is set to 1, output O equals to input I1.

Connection

Input I1 is a signed number.

Input I2 is an unsigned number.

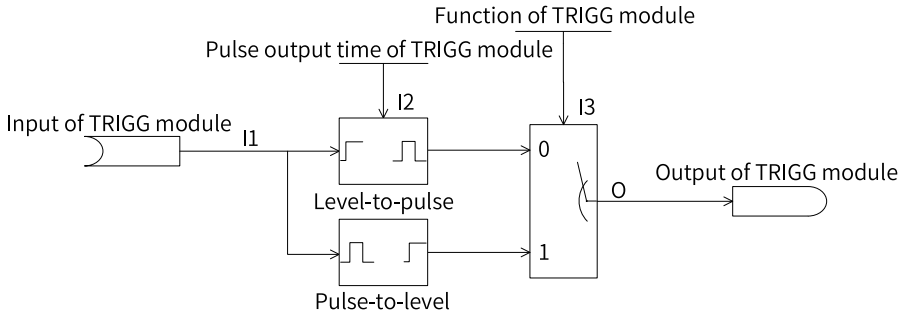
Input I3 is a binary number.

Output O is a signed number.

Filter Module	Input			Output
	I1	I2	I3	O
A	L6-01	L6-02	L6-00	U9-69
B	L6-04	L6-05	L6-03	U9-70
C	L6-07	L6-08	L6-06	U9-71
D	L6-10	L6-11	L6-09	U9-72

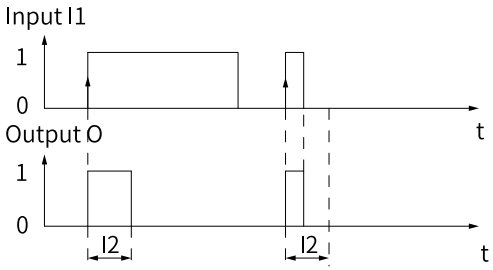
6.14.5.2 P_L Conversion Module (A to D)

Diagram

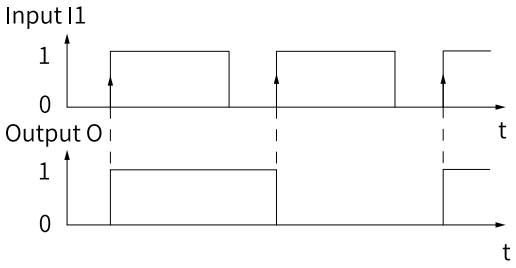


Operation

When the level-pulse (P_L) conversion module function (I3) is set to 0, level-to-pulse conversion is active. In this case, the output becomes high on the rising edge of input I1 within the pulse output time indicated by I2. If input I1 is set to 0, the output immediately changes to 0, regardless of whether the pulse duration is reached.



When the P_L conversion module function is set to 1, pulse-to-level conversion is active. In this case, the output becomes high on the first rising edge of input I1, and becomes low on the second rising edge of input I1, and so on. That is, the pulse output of odd numbers is at a high level, while the pulse output of even numbers is at a low level.



Connection

Inputs I1 and I3 are binary numbers.

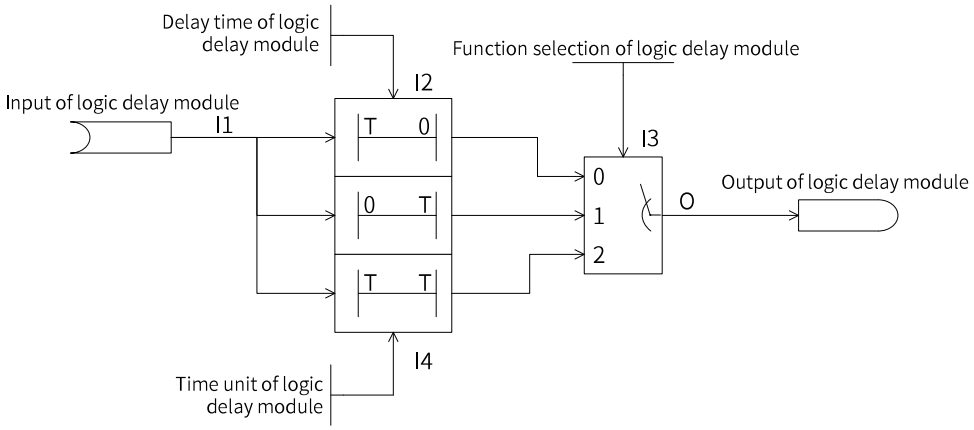
Input I2 is an unsigned number.

Output O is a binary number.

P_L Conversion Module	Input			Output
	I1	I2	I3	O
A	L6-13	L6-14	L6-12	U3-22
B	L6-16	L6-17	L6-15	U3-23
C	L6-19	L6-20	L6-18	U3-24
D	L6-22	L6-23	L6-21	U3-25

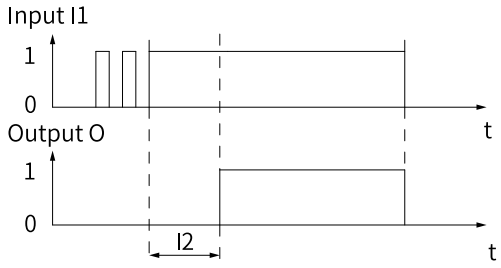
6.14.5.3 Logic Delay Module (A to D)

Diagram

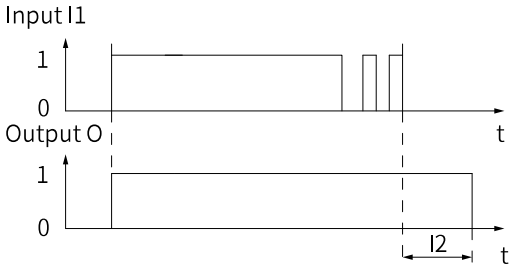


Operation

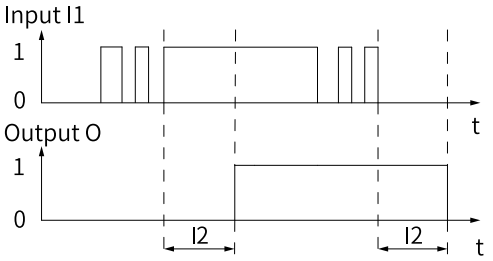
When logic delay module function selection I3 is 0, switch-on delay becomes active when input changes from 0 to 1, and the delay time is determined by I2 and the unit is I4 (time unit). After switch-on delay is enabled, high-level pulses lasting less than I2 will be filtered out, as shown in the following figure.



When logic delay module function selection I3 is 1, switch-off delay becomes active when input changes from 1 to 0, and the delay time is determined by I2 and I4 (time unit). After switch-off delay is enabled, low-level pulses lasting less than I2 will be filtered out, as shown in the following figure.



When logic switch delay block function selection I3 is 2, switch-on delay becomes active when input changes from 0 to 1 or from 1 to 0, and the delay time is determined by I2 and I4 (time unit). Both switch-on and switch-off delays will filter the pulses, as shown in the following figure.



Connection

Input I1 is a binary number.

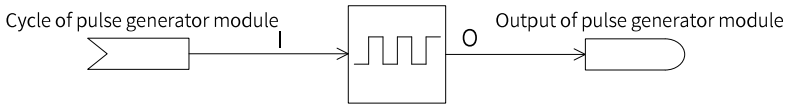
Inputs I2 and I3 are unsigned numbers.

Output O is a binary number.

Logic Delay Module	Input				Output
	I1	I2	I3	I4	O
A	L6-24	L6-26	L6-25	L6-27	U3-26
B	L6-28	L6-30	L6-29	L6-31	U3-27
C	L6-32	L6-34	L6-33	L6-35	U3-28
D	L6-36	L6-38	L6-37	L6-39	U3-29

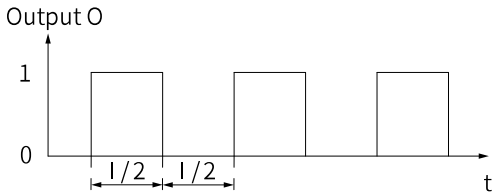
6.14.5.4 Pulse Generator Module

Diagram



Operation

When the cycle input of the pulse generator module is 0, the module always outputs a low level. If input I is not 0, the module output is a square wave.



Connection

Input I is an unsigned number.

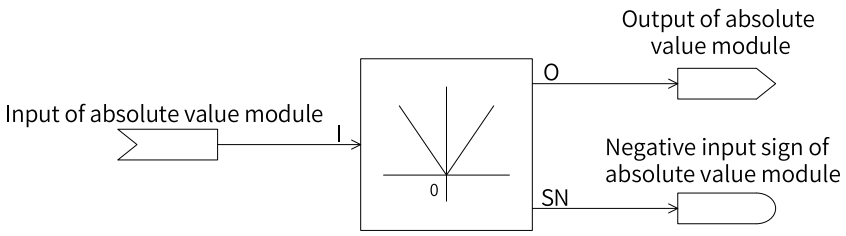
Output O is a binary number.

Pulse Generator Module	Input	Output
	I	O
A	L6-45	U4-45
B	L6-46	U4-46
C	L6-47	U4-47

6.14.6 Arithmetic Function Block

6.14.6.1 Absolute Value Module (A to D)

Diagram



Operation

O=|I|

$$SN=\begin{cases}1, I<0\\0, I\geqslant 0\end{cases}$$

The output equals to the absolute value of input I. When the input value is negative, the flag bit SN is 1. Otherwise, the flag bit is 0.

Connection

Input I is a signed number.

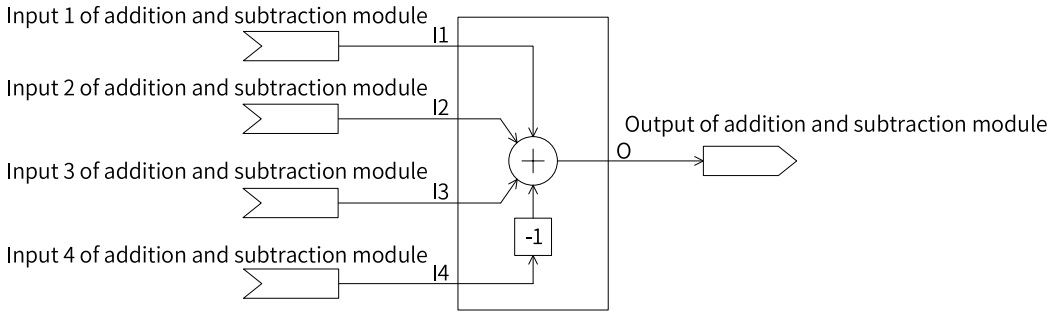
Output O is a signed number.

The output SN is a binary number.

Absolute Value Module	Input		Output
	I	SN	O
A	L7-00	U3-30	U9-73
B	L7-01	U3-31	U9-74
C	L7-02	U3-32	U9-75
D	L7-03	U3-33	U9-76

6.14.6.2 ADD_SUB Module (A to D)

Diagram



Operation

O=I1+I2+I3-I4

The value of output O equals to the sum of I1, I2, and I3 minus I4.

Connection

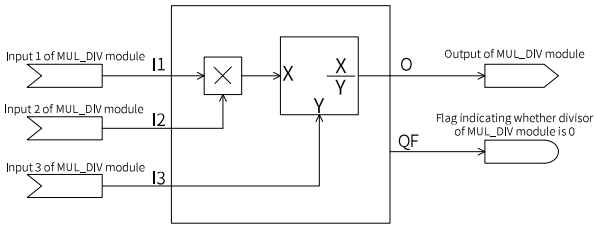
Inputs I1, I2, I3, and I4 are signed numbers.

Output O is a signed number.

ADD_SUB Module	Input				Output
	I1	I2	I3	I4	O
A	L7-04	L7-05	L7-06	L7-07	U9-77
B	L7-08	L7-09	L7-10	L7-11	U9-78
C	L7-12	L7-13	L7-14	L7-15	U9-79
D	L7-16	L7-17	L7-18	L7-19	U9-80

6.14.6.3 MUL_DIV Module (A to D)

Diagram



Operation

$$O=(I1 \cdot I2)/I3$$

$$QF=\begin{cases}1, I3=0\\0, I3\neq 0\end{cases}$$

Connection

Inputs I1, I2, and I3 are signed numbers.

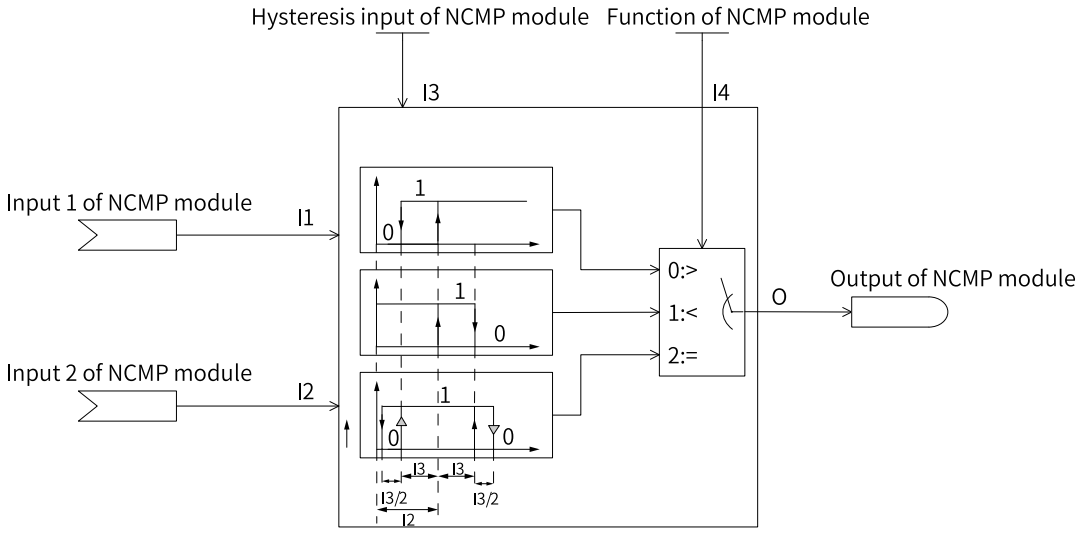
Output O is a signed number.

Output QF is a binary number.

MUL_DIV Module	Input				Output
	I1	I2	I3	QF	O
A	L7-20	L7-21	L7-22	U3-34	U9-81
B	L7-23	L7-24	L7-25	U3-35	U9-82
C	L7-26	L7-27	L7-28	U3-36	U9-83
D	L7-29	L7-30	L7-31	U3-37	U9-84

6.14.6.4 NCMP Module (A to E)

Diagram



Operation

If the comparison (NCMP) module function (I4) is set to 0, output O remains at a low level before I1 increases to I2 from 0 in the forward direction. When I1 exceeds I2, output O changes to a high level. If I1 further increases, output O remains at the high level. If I1 decreases but is still greater than I2 minus I3, output O still remains at the high level. Output O changes to the low level only when I1 becomes less than I2 minus I3.

If the NCMP module function (I4) is set to 1, output O remains at a high level before I1 increases to I2 plus I3 from 0 in the forward direction. When I1 becomes greater than I2 plus I3, output O changes to a low level. If I1 further increases, output O remains at the low level. If I1 decreases but is still greater than I2, output O still remains at the low level. Output O changes to the high level only when I1 becomes less than I2.

If the NCMP module function (I4) is set to 2, output O remains at a low level before I1 increases to I2 minus I3 from 0 in the forward direction. When I1 becomes greater than I2 minus I3 but less than I2 plus I3, output O changes to a high level. If I1 further increases to become greater than I2 plus I3 multiplied by 1.5, output O changes to the low level. If I1 decreases, output O still remains at the low level when I1 is less than I2 plus I3. Output O changes to the high level when I1 becomes less than I2 plus I3 but greater than I2 minus I3 multiplied by 1.5. Output O changes to the low level when I1 becomes less than I2 minus I3 multiplied by 1.5.

Hysteresis input I3 suppresses frequent connection and disconnection.

Connection

Inputs I1 and I2 are signed numbers.

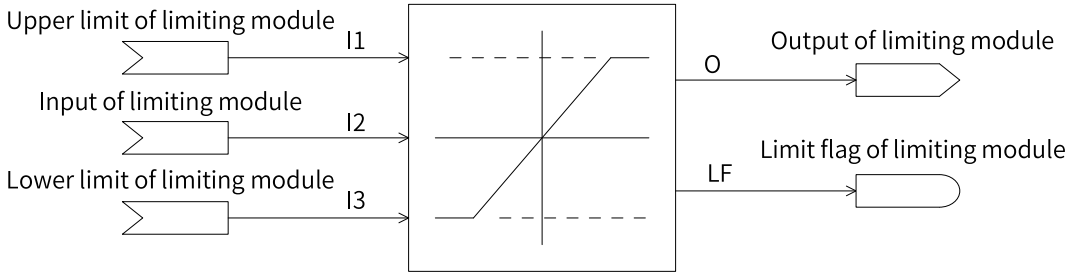
Inputs I3 and I4 are unsigned numbers.

Output O is a binary number.

NCMP Module	Input				Output
	I1	I2	I3	I4	O
A	L7-33	L7-34	L7-35	L7-32	U3-38
B	L7-37	L7-38	L7-39	L7-36	U3-39
C	L7-41	L7-42	L7-43	L7-40	U4-69
D	L7-45	L7-46	L7-47	L7-44	U4-70
E	L7-49	L7-50	L7-51	L7-48	U4-71

6.14.6.5 Limit Module (A to D)

Diagram



Operation

$$O=\begin{cases} I1, & I2>I1 \\ I2, & I3\leqslant I2\leqslant I1 \\ I3, & I2<I3 \end{cases}$$

$$LF=\begin{cases} 1, & I2>I1 \text{ or } I2<I3 \\ 0, & I3\leqslant I2\leqslant I1 \end{cases}$$

When input I2 is greater than the upper limit I1, output O equals to I1. When input I2 is less than the lower limit I3, output O equals to I3. When input I2 is within the limits, the output value equals to the input value. When input I2 is greater than the upper limit I1 or less than the lower limit I3, the limit flag is at position 1.

Connection

Inputs I1, I2, and I3 are signed numbers.

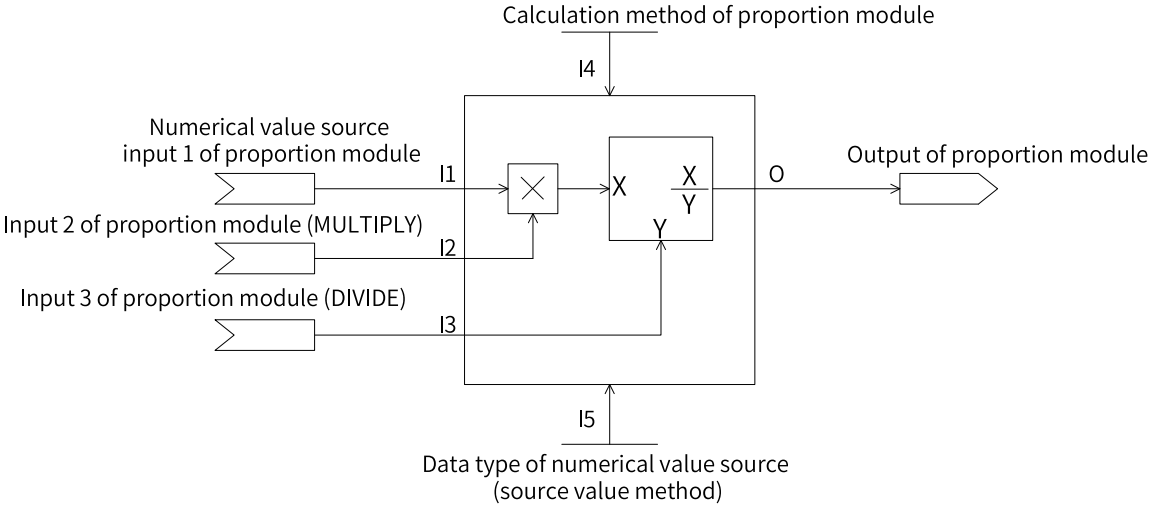
Output O is a signed number.

Output LF is a binary number.

Limit Module	Input				Output
	I1	I2	I3	LF	O
A	L7-61	L7-60	L7-62	U4-72	U9-90
B	L7-64	L7-63	L7-65	U4-73	U9-91
C	L7-67	L7-66	L7-68	U4-74	U9-92
D	L7-70	L7-69	L7-71	U4-75	U9-93

6.14.6.6 Proportion Module (1 to 15)

Diagram



Operation

The operation of the proportion module is similar to that of the multiplication and division module. However, the calculation method and data type for I1 can be selected as required. According to section 2.4.2, 4096 corresponds to 100% for single-word connectors, and 4096 x 65536 corresponds to 100% for double-word connectors. Proportion modules 1 to 10 are used for single-word connector operation, and proportion modules 11 to 15 are used for double-word connector operation.

Connection

Inputs I1, I3, I4, and I5 are unsigned numbers.

Input I2 is a signed number.

Output O is a signed number.

Proportion Module	Input					Output
	I1	I2	I3	I4	I5	O
1	L11-02	L11-03	L11-04	L11-00 (bit0)	L11-01 (bit0)	U15-10
2	L11-05	L11-06	L11-07	L11-00 (bit1)	L11-01 (bit1)	U15-11
3	L11-08	L11-09	L11-10	L11-00 (bit2)	L11-01 (bit2)	U15-12
4	L11-11	L11-12	L11-13	L11-00 (bit3)	L11-01 (bit3)	U15-13
5	L11-14	L11-15	L11-16	L11-00 (bit4)	L11-01 (bit4)	U15-14
6	L11-17	L11-18	L11-19	L11-00 (bit5)	L11-01 (bit5)	U15-15
7	L11-20	L11-21	L11-22	L11-00 (bit6)	L11-01 (bit6)	U15-16
8	L11-23	L11-24	L11-25	L11-00 (bit7)	L11-01 (bit7)	U15-17
9	L11-26	L11-27	L11-28	L11-00 (bit8)	L11-01 (bit8)	U15-18
10	L11-29	L11-30	L11-31	L11-00 (bit9)	L11-01 (bit9)	U15-19
11	L11-32	L11-33	L11-34	L11-00 (bit10)	L11-01 (bit10)	U19-95
12	L11-35	L11-36	L11-37	L11-00 (bit11)	L11-01 (bit11)	U19-96

Proportion Module	Input					Output
	I1	I2	I3	I4	I5	O
13	L11-38	L11-39	L11-40	L11-00 (bit12)	L11-01 (bit12)	U19-97
14	L11-41	L11-42	L11-43	L11-00 (bit13)	L11-01 (bit13)	U19-98
15	L11-44	L11-45	L11-46	L11-00 (bit14)	L11-01 (bit14)	U19-99

Example:

- Single-word connector U7-47 uses the proportion module 1 for multiplication and division.
  Numerical value source input 1 of proportion module 1 is set by connector U7-47, and input 2 of proportion module 1 (MULTIPLY) and input 3 of proportion module 1 (DIVIDE) are both set to 1.

Para.	Name	Setpoint
L11-02	Numerical value source input 1 of proportion module 1	U7-47 [constant setpoint 1 output]
L11-03	Input 2 of proportion module 1 (MULTIPLY)	1
L11-04	Input 3 of proportion module 1 (DIVIDE)	1

  The following table lists the proportion module output values upon different calculation methods and data types when the constant reference 1 (single word) is ±10.0%.

[L9-00]	[L11-00] bit0	[L11-01] bit0	[U15-10]
10.0	0 (Raw value)	0 (Signed number)	10%
	0	1 (Unsigned number)	10%
	1 (Per-unit value)	-	10%
–10.0	0	0	–10%
	0	1	800%<1>
	1	-	–10%

Note

If –10.0% is processed as an unsigned number, the output value will reach the positive limit.

- The multiplication and division operation is performed on the double-word connector U9-51 by using proportion module 11.
  Numerical value source input 1 of proportion module 11 is set by connector U9-51, and input 2 of proportion module 11 (MULTIPLY) and input 3 of proportion module 11 (DIVIDE) are both set to 1.

Para.	Name	Setpoint
L11-32	Numerical value source input 1 of proportion module 11	U9-51 [constant setpoint 6 output]
L11-33	Input 2 of proportion module 11 (MULTIPLY)	1
L11-34	Input 3 of proportion module 11 (DIVIDE)	1

  The following table lists the proportion module output values upon different calculation methods and data types when the constant reference 6 (double word) is ±10.00%.

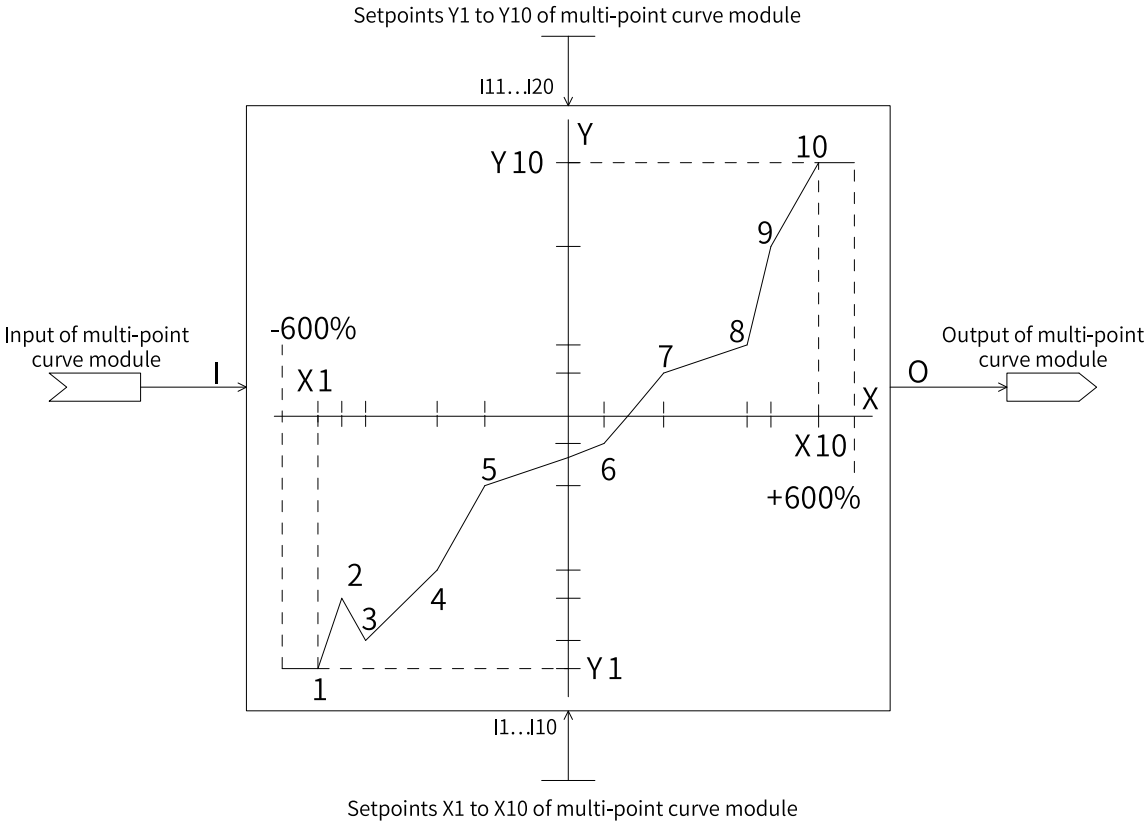
[L9-05]	[L11-00] bit10	[L11-01] bit10	[U19-95]
10.00%	0 (Raw value)	0 (Signed number)	10%
	0	1 (Unsigned number)	10%
	1 (Per-unit value)	-	10%
–10.00%	0	0	–10%
	0	1	800%<1>
	1	-	–10

Note

If –10.0% is processed as an unsigned number, the output value will reach the positive limit.

6.14.7 Multi-Point Curve Module

Diagram



Operation

Only when the X1 < X2 < ... condition is met, the set coordinate points are active. When the input is out of the active coordinate points, the output equals to the ordinate value of the adjacent active coordinate points. When the input is within the active coordinate points, the ordinate value corresponding to the output can be calculated according to the curve.

Connection

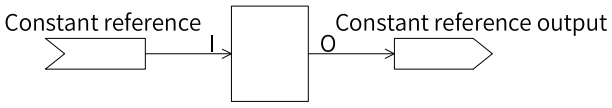
Inputs I and I1 to I20 are signed numbers.

Output O is a signed number.

Multi-Point Curve Module		A	B
Input	I	L8-00	L8-21
	I1 (X1)	L8-01	L8-22
	I2 (X2)	L8-03	L8-24
	I3 (X3)	L8-05	L8-26
	I4 (X4)	L8-07	L8-28
	I5 (X5)	L8-09	L8-30
	I6 (X6)	L8-11	L8-32
	I7 (X7)	L8-13	L8-34
	I8 (X8)	L8-15	L8-36
	I9 (X9)	L8-17	L8-38
	I10 (X10)	L8-19	L8-40
	I11 (Y1)	L8-02	L8-23
	I12 (Y2)	L8-04	L8-25
	I13 (Y3)	L8-06	L8-27
	I14 (Y4)	L8-08	L8-29
	I15 (Y5)	L8-10	L8-31
	I16 (Y6)	L8-12	L8-33
	I17 (Y7)	L8-14	L8-35
	I18 (Y8)	L8-16	L8-37
	I19 (Y9)	L8-18	L8-39
	I20 (Y10)	L8-20	L8-41
Output	O	U9-85	U9-86

6.14.8 Constant Setting Module

Diagram



Operation

O = I

Output O equals to input I. Constant setting modules 1 to 5 contain one decimal place, and constant setting modules 6 to 10 contain two decimal places, with higher accuracy.

Connection

Input I is a signed number.

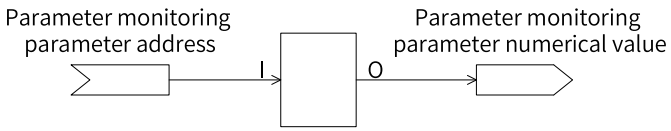
Output O is a signed number.

Constant Setting Module	Input	Output
	I	O
1	L9-00	U7-47
2	L9-01	U7-48
3	L9-02	U7-49
4	L9-03	U7-50
5	L9-04	U7-51
6	L9-05	U9-51
7	L9-06	U9-52
8	L9-07	U9-53
9	L9-08	U9-54
10	L9-09	U9-55

6.14.9 Parameter Monitoring and Modification

6.14.9.1 Parameter Monitoring (1 to 10)

Diagram



Operation

Output O of the parameter monitoring modules corresponds to the setpoint of the parameter monitoring parameter address I. The parameter monitoring modules 1 to 4 can monitor the parameters in the range of 0 to 65535, and the parameter monitoring modules 5 to 10 can monitor the parameters in the range of –32768 to +32767.

Connection

Input I is an unsigned number.

Output O of modules 1 to 4 is an unsigned number, and that of modules 5 to 10 is a signed number.

Parameter Monitoring Module	Input	Output
	I	O
1	L10-00	U7-65
2	L10-01	U7-66
3	L10-02	U7-67
4	L10-03	U7-68
5	L10-04	U7-69
6	L10-05	U7-70
7	L10-06	U7-71
8	L10-07	U7-72
9	L10-08	U7-73
10	L10-09	U7-74

Example:

Use parameter monitoring modules 1 and 5 to monitor constant setpoint 1.

Both parameter monitoring modules 1 and 5 are set to 3429, which corresponds to the address of constant setpoint 1 of L9-00.

Para.	Name	Setpoint
L10-00	Parameter monitoring parameter address 1	3429
L10-04	Parameter monitoring parameter address 5	3429

The following table lists the output values of parameter monitoring modules 1 and 5 when the constant setpoint 1 of L9-00 is set to ±10.0%.

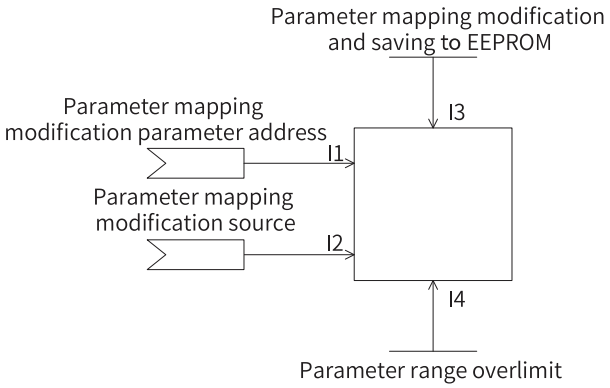
[L9-00]	[U7-65]	[U7-69]
10.0	100	100
–10.0	65436<1>	–100

Note

<1>: The output data types of parameter monitoring modules 1 to 4 are 16-bit unsigned numbers. The 16-bit unsigned number corresponding to the complement of −100 is 65436. Therefore, parameter monitoring modules 5 to 10 are required to monitor signed parameter values.

6.14.9.2 Parameter Mapping (1 to 16)

Diagram



Operation

For a modified value of I2 written to a parameter indicated by address I1, you can set I3 to determine whether to retain the modified parameter indicated by I1 at power failure, and set I4 to determine whether to apply limits if the modified value of I2 exceeds the upper limit/lower limit of I1.

Connection

Inputs I1, I2, I3, and I4 are unsigned numbers.

Parameter Mapping Module	Input			Output
	I1	I2	I3	I4
1	L10-18	L10-19	L10-16 (bit0)	L10-17 (bit0)
2	L10-20	L10-21	L10-16 (bit1)	L10-17 (bit1)
3	L10-22	L10-23	L10-16 (bit2)	L10-17 (bit2)
4	L10-24	L10-25	L10-16 (bit3)	L10-17 (bit3)
5	L10-26	L10-27	L10-16 (bit4)	L10-17 (bit4)
6	L10-28	L10-29	L10-16 (bit5)	L10-17 (bit5)
7	L10-30	L10-31	L10-16 (bit6)	L10-17 (bit6)
8	L10-32	L10-33	L10-16 (bit7)	L10-17 (bit7)
9	L10-34	L10-35	L10-16 (bit8)	L10-17 (bit8)
10	L10-36	L10-37	L10-16 (bit9)	L10-17 (bit9)
11	L10-38	L10-39	L10-16 (bit10)	L10-17 (bit10)
12	L10-40	L10-41	L10-16 (bit11)	L10-17 (bit11)
13	L10-42	L10-43	L10-16 (bit12)	L10-17 (bit12)
14	L10-44	L10-45	L10-16 (bit13)	L10-17 (bit13)
15	L10-46	L10-47	L10-16 (bit14)	L10-17 (bit14)
16	L10-48	L10-49	L10-16 (bit15)	L10-17 (bit15)

Example:

Connector U7-47 (output of constant setpoint 1) modifies C6-05 (multi-reference value 1) using the parameter mapping module 1.

L10-18 is set to 191, which is the address of C6-05 (multi-reference value 1). L10-19 is set to U7-47, which is the output of constant setpoint 1.

Para.	Name	Setpoint
L10-18	Parameter mapping modification parameter address 1	191
L10-19	Parameter mapping modification source 1	U7-47 [constant setpoint 1 output]

The following table lists the setpoint of C6-05 when the constant setpoint 1 of L9-00 is set to ±10.0% or ±150.0%.

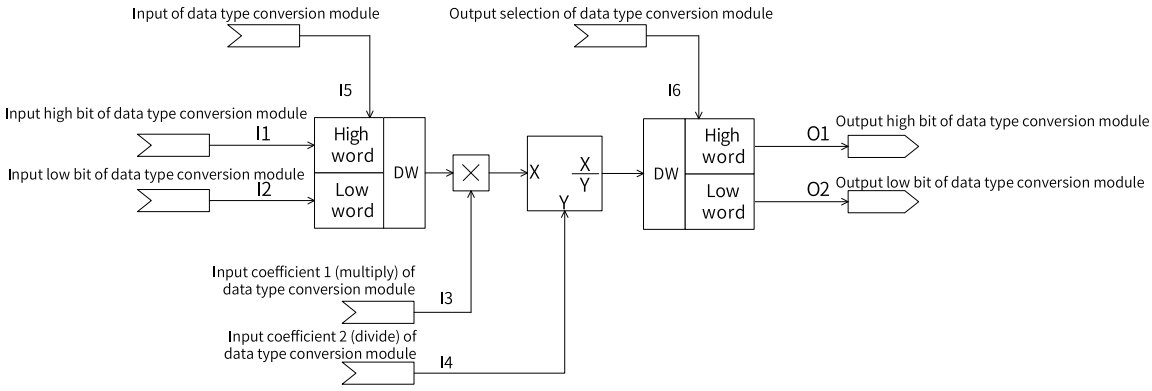
[L9-00]	[L10-17] bit0	[C6-05]
10.0	-	41.0<1>
–10.0	-	–41.0
150.0	0: No action	Invalid
	1 (upper or lower limit)	600.0<2>
–150.0	0: No action	Invalid
	1 (upper or lower limit)	–600.0<2>

Note

- <1>: 4096 corresponds to 100% for single-word connectors according to Section 2.4.2. [U7-47] is 10.00%, the per-unit value of 10% corresponds to the raw value 410, and C6-05 has a decimal point, so [C6-05] is 41.0.
- <2>: The raw value corresponding to ±150.0% per-unit value exceeds the upper limit/lower limit of C6-05. When the modification range overrun handling is effective, C6-05 is limited to the maximum value/minimum value.

6.14.10 Data Type Conversion Module

Diagram



Operation

I5 determines the input data type of I1 and I2. The input is multiplied by I3 and divided by I4 and then the output data type of O1 and O2 is determined by I6.

Connection

Inputs I1 to I3 are signed numbers.

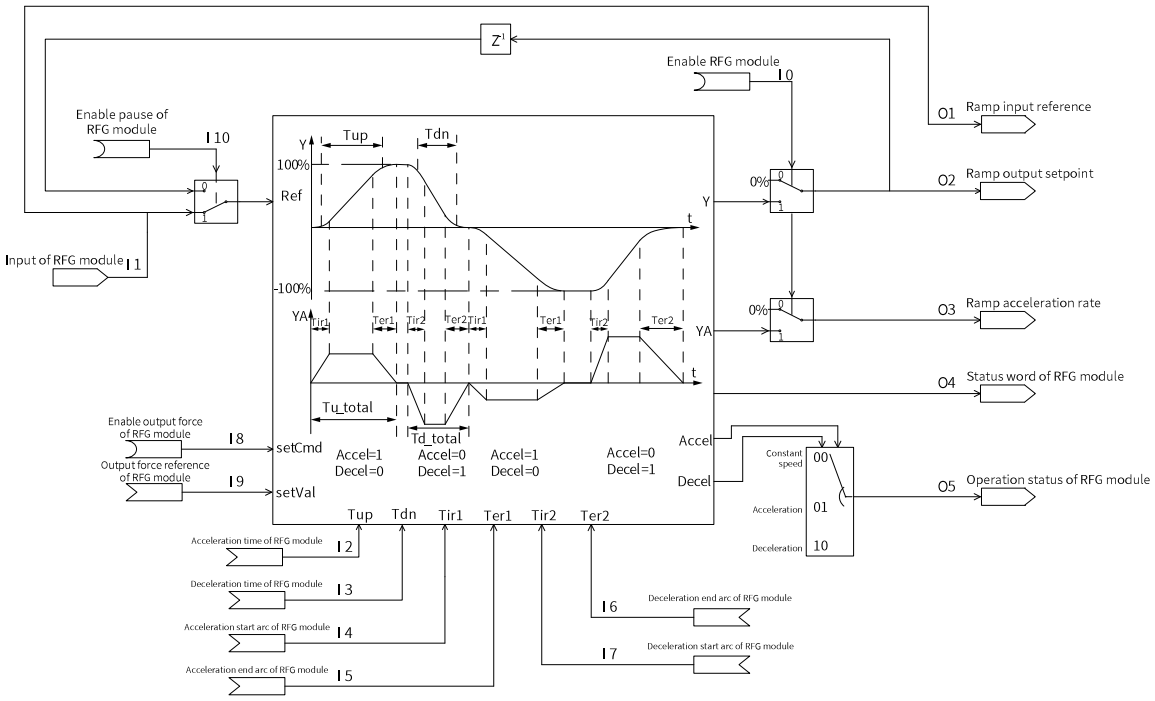
Input I4 to I6 are unsigned numbers.

Outputs O1 and O2 are signed numbers.

Parameter monitoring module	Input						Output	
	I1	I2	I3	I4	I5	I6	O1	O2
1	L12-02	L12-03	L12-04	L12-05	L12-00	L12-01	U15-55	U15-56
2	L12-08	L12-09	L12-10	L12-11	L12-06	L12-07	U15-57	U15-58
3	L12-14	L12-15	L12-16	L12-17	L12-12	L12-13	U15-59	U15-60
4	L12-20	L12-21	L12-22	L12-23	L12-18	L12-19	U15-61	U15-62
5	L12-26	L12-27	L12-28	L12-29	L12-24	L12-25	U15-63	U15-64
6	L12-32	L12-33	L12-34	L12-35	L12-30	L12-31	U15-65	U15-66
7	L12-38	L12-39	L12-40	L12-41	L12-36	L12-37	U15-67	U15-68
8	L12-44	L12-45	L12-46	L12-47	L12-42	L12-43	U15-69	U15-70
9	L12-50	L12-51	L12-52	L12-53	L12-48	L12-49	U15-71	U15-72
10	L12-56	L12-57	L12-58	L12-59	L12-54	L12-55	U15-73	U15-74
11	L12-62	L12-63	L12-64	L12-65	L12-60	L12-61	U15-75	U15-76
12	L12-68	L12-69	L12-70	L12-71	L12-66	L12-67	U15-77	U15-78
13	L12-74	L12-75	L12-76	L12-77	L12-72	L12-73	U15-79	U15-80
14	L12-80	L12-81	L12-82	L12-83	L12-78	L12-79	U15-81	U15-82
15	L12-86	L12-87	L12-88	L12-89	L12-84	L12-85	U15-83	U15-84
16	L12-92	L12-93	L12-94	L12-95	L12-90	L12-91	U15-85	U15-86

6.14.11 Ramp Function Generator Module

Diagram



Operation

I2 acceleration time is the time for the speed to increase from 0 to 100% or to –100%, and I3 deceleration time is the time for the speed to decrease from 100% or –100% to 0.

I4 acceleration start arc time is the time for the acceleration rate to increase from 0 to the maximum acceleration rate (determined by the acceleration time). I5 acceleration end arc time is the time for the acceleration rate to decrease from the maximum acceleration rate (determined by the acceleration time) to 0.

I7 deceleration start arc time is the time for the acceleration rate to increase from 0 to the maximum acceleration rate (determined by the deceleration time). I6 deceleration end arc time is the time for the acceleration rate to decrease from the maximum acceleration rate (determined by the deceleration time) to 0.

The priority of I8 forcing is higher than that of I10 pause.

Definitions of status words of O4 RFG module:

Bit	Meaning	Description
bit0 to bit1	Operation status of RFG module	0: Constant speed 1: Accelerate 2: Decelerate
bit2	RFG module enable	0: Disable 1: Enable
bit3	Reserved	-

Bit	Meaning	Description
bit4	Force enable	0: Disable 1: Enable
bit5	Pause enable	0: Disable 1: Enable
bit6 to bit7	Reserved	-
bit8	Ramp acceleration rate positive	0: No 1: Yes
bit9	Ramp acceleration rate negative	0: No 1: Yes
bit10 to bit15	Reserved	-

Connection

Inputs I0, I8, and I10 are binary numbers.

Inputs I1 and I9 are signed numbers.

Input I2 to I7 are unsigned numbers.

Outputs O1, O2, and O3 are signed numbers.

Outputs O4 and O5 are unsigned numbers.

Ramp Function Generator Module		A	B
Input	I0	L14-00	L14-00
	I1	L14-01	L14-11
	I2	L14-02	L14-12
	I3	L14-03	L14-13
	I4	L14-04	L14-14
	I5	L14-05	L14-15
	I6	L14-06	L14-16
	I7	L14-07	L14-17
	I8	L14-08	L14-18
	I9	L14-09	L14-19
	I10	L14-10	L14-20
Output	O1	U29-50	U29-53
	O2	U29-51	U29-54
	O3	U29-52	U29-55
	O4	U15-50	U15-52
	O5	U15-25	U15-51

6.15 Free Function Block

6.15.1 Switching Process Parameter Group

The HCU-50S/51S control module supports up to four groups of process parameters, and each group includes a process setting parameter group and a process controller parameter group. You can switch the active process setting parameter group and process controller parameter group through A9-04 and A9-05.

Para.	Name	Description
A9-04	Process parameter group selection 0 source	A9-04/A9-03: 00: o0 (process setting parameter group 1) o1 (process controller parameter group 1) 01: o2 (process setting parameter group 2) o3 (process controller parameter group 2) 10: o4 (process setting parameter group 3) o5 (process controller parameter group 3) 11: o6 (process setting parameter group 4) o7 (process controller parameter group 4)
A9-05	Process parameter group selection 1 source	

6.15.2 Execution Sequence

To use group o (process parameters) and group P (user-defined function blocks), the execution sequence needs to be defined first. The execution sequence value ranges from 0 to 65535, and the function block with a smaller execution sequence value will be calculated first. For example, setting P9-04 to 1 indicates that the execution sequence of process setting word parameter 1 is 1 and setting P9-05 to 2 indicates that the execution sequence of process setting word parameter 2 is 2. Process setting word parameter 1 will be calculated before 2.

When the execution sequences of two free function blocks are the same, P9-00 to P9-03 will display the type and group of the two conflict blocks so that they can be located. For example, if P9-04 is set to 1 and P9-05 is also set to 1, P9-00 to P9-03 display the following:

Para.	Name	Current Value
P9-00	Type of execution sequence conflict module 1	27 [process setting word parameter in group P9]
P9-01	Group of execution sequence conflict module 1	1
P9-02	Type of execution sequence conflict module 2	27 [process setting word parameter in group P9]
P9-03	Group of execution sequence conflict module 2	2
P9-04	Execution sequence of process setting word parameter 1	1
P9-05	Execution sequence of process setting word parameter 2	1

Note

For individual process parameters and user-defined function blocks, you need to enable a user-defined function block in A8-15 and set its execution sequence.

6.15.3 Process Setting Parameter Groups

There are four process setting parameter groups, which can be switched with A9-04 and A9-05.

The process setting word parameter module is the same as the constant setting modules 6 to 10 (two decimal points) in section *"6.14.8 Constant Setting Module" on page 263*. The parameters and

connector parameters corresponding to process setting word parameters 1 to 14 are shown in the following table:

Process setting word parameter	Process setting parameter group 1		Process setting parameter group 2		Process setting parameter group 3		Process setting parameter group 4	
	Input	Output	Input	Output	Input	Output	Input	Output
	I	O	I	O	I	O	I	O
1	o0-00	U19-67	o2-00	U19-67	o4-00	U19-67	o6-00	U19-67
2	o0-01	U19-68	o2-01	U19-68	o4-01	U19-68	o6-01	U19-68
3	o0-02	U19-69	o2-02	U19-69	o4-02	U19-69	o6-02	U19-69
4	o0-03	U19-70	o2-03	U19-70	o4-03	U19-70	o6-03	U19-70
5	o0-04	U19-71	o2-04	U19-71	o4-04	U19-71	o6-04	U19-71
6	o0-05	U19-72	o2-05	U19-72	o4-05	U19-72	o6-05	U19-72
7	o0-06	U19-73	o2-06	U19-73	o4-06	U19-73	o6-06	U19-73
8	o0-07	U19-74	o2-07	U19-74	o4-07	U19-74	o6-07	U19-74
9	o0-08	U19-75	o2-08	U19-75	o4-08	U19-75	o6-08	U19-75
10	o0-09	U19-76	o2-09	U19-76	o4-09	U19-76	o6-09	U19-76
11	o0-10	U19-77	o2-10	U19-77	o4-10	U19-77	o6-10	U19-77
12	o0-11	U19-78	o2-11	U19-78	o4-11	U19-78	o6-11	U19-78
13	o0-12	U19-79	o2-12	U19-79	o4-12	U19-79	o6-12	U19-79
14	o0-13	U19-80	o2-13	U19-80	o4-13	U19-80	o6-13	U19-80

Defines the execution sequence of the process setting bit parameter module, activates the corresponding module, and its output bit is equal to the input bit. The parameters and connector parameters corresponding to process setting bit parameters 1 to 6 are shown in the following table:

Process setting bit parameter	Process setting parameter group 1		Process setting parameter group 2		Process setting parameter group 3		Process setting parameter group 4	
	Input	Output	Input	Output	Input	Output	Input	Output
	I	O	I	O	I	O	I	O
1	o0-14	U11-64	o2-14	U11-64	o4-14	U11-64	o6-14	U11-64
2	o0-15	U11-65	o2-15	U11-65	o4-15	U11-65	o6-15	U11-65
3	o0-16	U11-66	o2-16	U11-66	o4-16	U11-66	o6-16	U11-66
4	o0-17	U11-67	o2-17	U11-67	o4-17	U11-67	o6-17	U11-67
5	o0-18	U11-68	o2-18	U11-68	o4-18	U11-68	o6-18	U11-68
6	o0-19	U11-69	o2-19	U11-69	o4-19	U11-69	o6-19	U11-69

6.15.4 Process Controller Parameter Group

There are four process controller parameter groups, which can be switched with A9-04 and A9-05.

The process controller consists of reference, supplementation, feedback, differential operation, droop, Kp adaptation, proportional operation, integral operation, output limit, and output proportion. To control an object, you need to set related parameters in groups o1, o3, o5 and o7 and adjust PID parameters. You can set the process controller execution sequence through P9-24, and enable all four groups of process controllers by enabling any one of o1-00, o3-00, o5-00, and o7-00.

6.15.4.1 Input of Process Controller

Taking process controller group 1 as an example. You can set the reference source and feedback source of the process controller through o1-02 to o1-05 and o1-09 to o1-12, and set the additional

setpoints through o1-06 and o1-07. You can filter the reference and feedback (o1-08 and o1-13) as required. The differential type is selected by the hundreds position of o1-01, and finally the controller differential component U19-83 and the deviation value U19-86 are obtained.

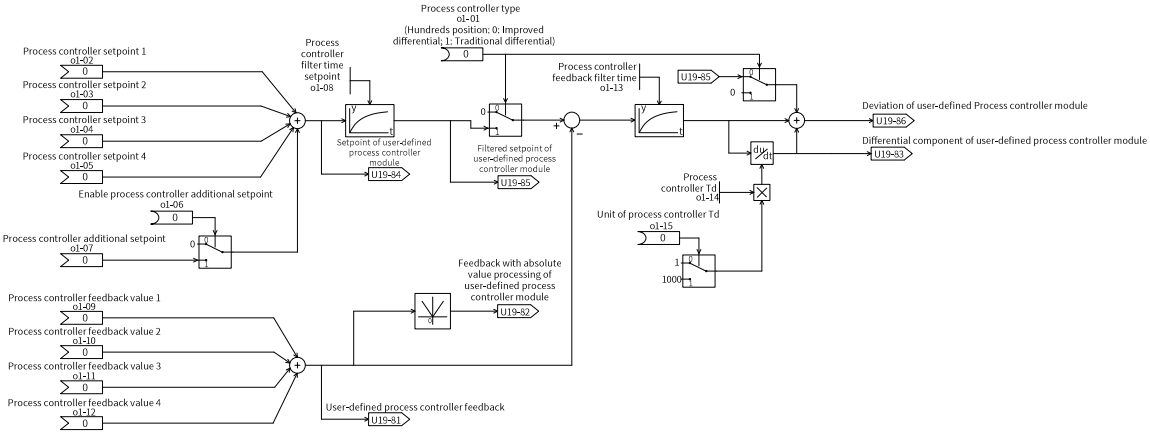


Figure 6-68 Input of process controller

6.15.4.2 Output of Process Controller

The controller is enabled through o1-00, and the integral, proportion, and calculation direction of the process controller type o1-01 are set. The negative feedback is introduced through o1-16 to o1-19 to achieve the droop function. The Kp adaptation function is achieved through o1-20 to o1-25. The limit output of the controller is achieved through o1-30 to o1-33, and finally the output proportion is achieved through o1-34 and o1-35.

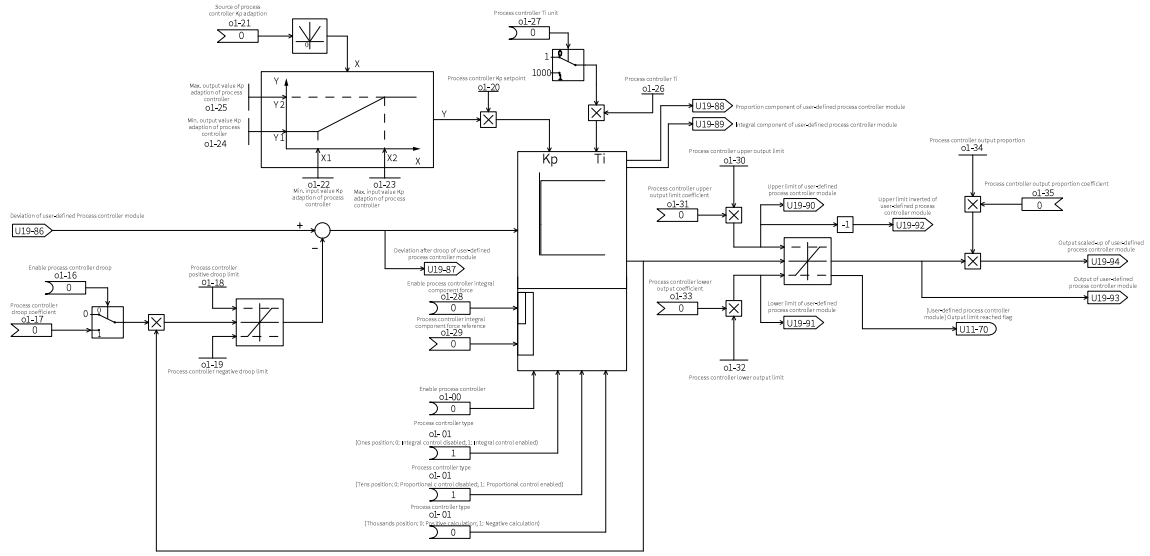


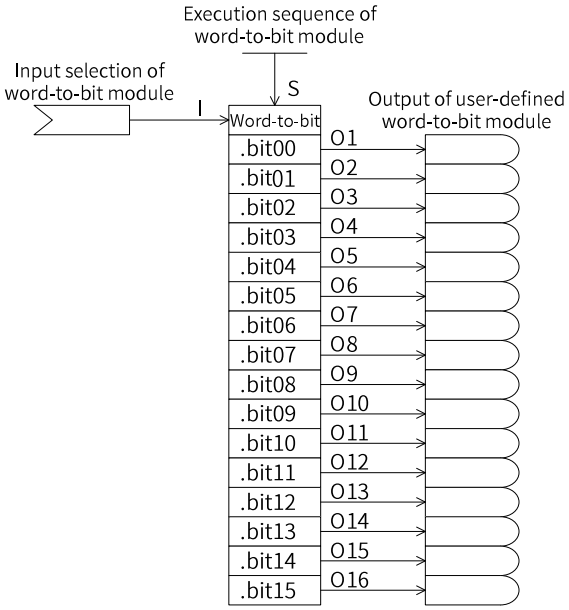
Figure 6-69 Output of Process Controller

6.15.5 User-Defined Function Block

6.15.5.1 User-Defined Conversion Function Block

1) Word-to-Bit (W2B) Module (1 to 3)

Diagram



Operation

When the input I is a single word, outputs O1 to O16 correspond to bit00 to bit15 of input I. When the input I is a double word, outputs O1 to O16 correspond to bit00 to bit15 of the high 16 bits of input I.

Connection

Input I is a signed number.

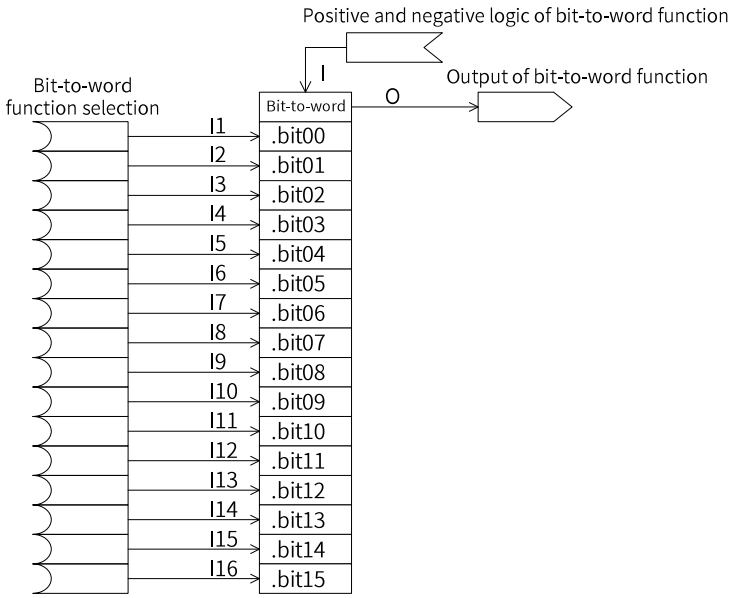
Outputs O1 to O16 are binary numbers.

W2B Module		1	2	3
Input	S	P0-00	P0-02	P0-04
	I	P0-01	P0-03	P0-05

Output	O1 (bit00)	U10-00	U10-16	U10-32
	O2 (bit01)	U10-01	U10-17	U10-33
	O3 (bit02)	U10-02	U10-18	U10-34
	O4 (bit03)	U10-03	U10-19	U10-35
	O5 (bit04)	U10-04	U10-20	U10-36
	O6 (bit05)	U10-05	U10-21	U10-37
	O7 (bit06)	U10-06	U10-22	U10-38
	O8 (bit07)	U10-07	U10-23	U10-39
	O9 (bit08)	U10-08	U10-24	U10-40
	O10 (bit09)	U10-09	U10-25	U10-41
	O11 (bit10)	U10-10	U10-26	U10-42
	O12 (bit11)	U10-11	U10-27	U10-43
	O13 (bit12)	U10-12	U10-28	U10-44
	O14 (bit13)	U10-13	U10-29	U10-45
	O15 (bit14)	U10-14	U10-30	U10-46
	O16 (bit15)	U10-15	U10-31	U10-47

2) Bit-to-Word (B2W) Module (1 to 4)

Diagram



Operation

bit00 to bit16 of output O correspond to inputs I1 to I16.

Connection

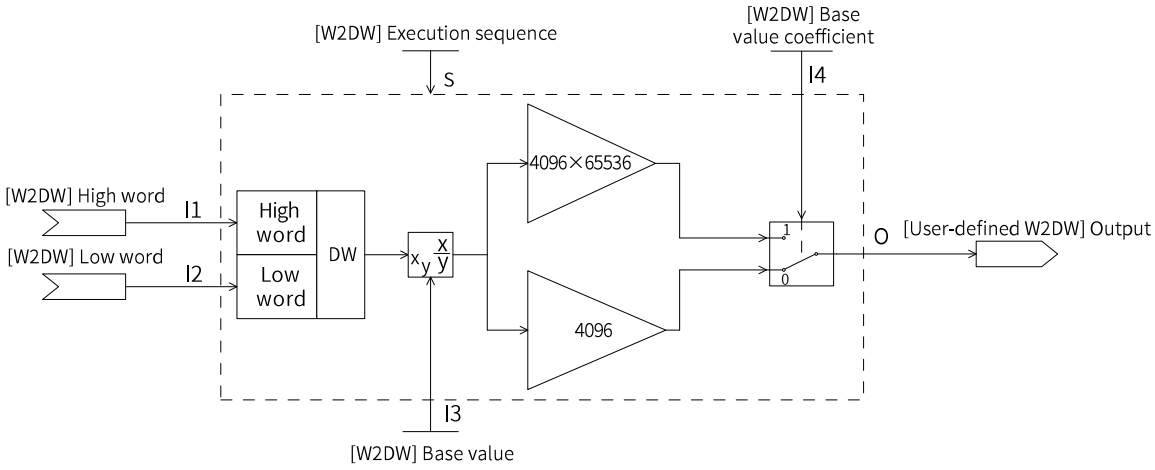
Inputs I1 to I16 are binary numbers.

Output O is a signed number.

B2W Module		1	2	3	4
Input	S	P0-06	P0-23	P0-40	P0-57
	I1 (bit00)	P0-07	P0-24	P0-41	P0-58
	I2 (bit01)	P0-08	P0-25	P0-42	P0-59
	I3 (bit02)	P0-09	P0-26	P0-43	P0-60
	I4 (bit03)	P0-10	P0-27	P0-44	P0-61
	I5 (bit04)	P0-11	P0-28	P0-45	P0-62
	I6 (bit05)	P0-12	P0-29	P0-46	P0-63
	I7 (bit06)	P0-13	P0-30	P0-47	P0-64
	I8 (bit07)	P0-14	P0-31	P0-48	P0-65
	I9 (bit08)	P0-15	P0-32	P0-49	P0-66
	I10 (bit09)	P0-16	P0-33	P0-50	P0-67
	I11 (bit10)	P0-17	P0-34	P0-51	P0-68
	I12 (bit11)	P0-18	P0-35	P0-52	P0-69
	I13 (bit12)	P0-19	P0-36	P0-53	P0-70
	I14 (bit13)	P0-20	P0-37	P0-54	P0-71
	I15 (bit14)	P0-21	P0-38	P0-55	P0-72
	I16 (bit15)	P0-22	P0-39	P0-56	P0-73
Output	O	U15-00	U15-01	U15-02	U15-03

3) W2DW Conversion (1 to 3)

Diagram



Operation

$$O=\begin{cases}\frac{I1\times 65536+I2}{I3}\times 4096\times 65536, & I4=1\\ \frac{I1\times 65536+I2}{I3}\times 4096, & I4=0\end{cases}$$

The output equals to I1 (high 16 bits) or I2 (low 16 bits) double word divided by base value I3 and then multiplied by the base value coefficient (specified by I4). When the input value is a double word, it is a high 16-bit double word.

When I3 is set to 0, the output value equals to the input value without base value conversion.

Connection

Inputs I1 and I2 are signed numbers.

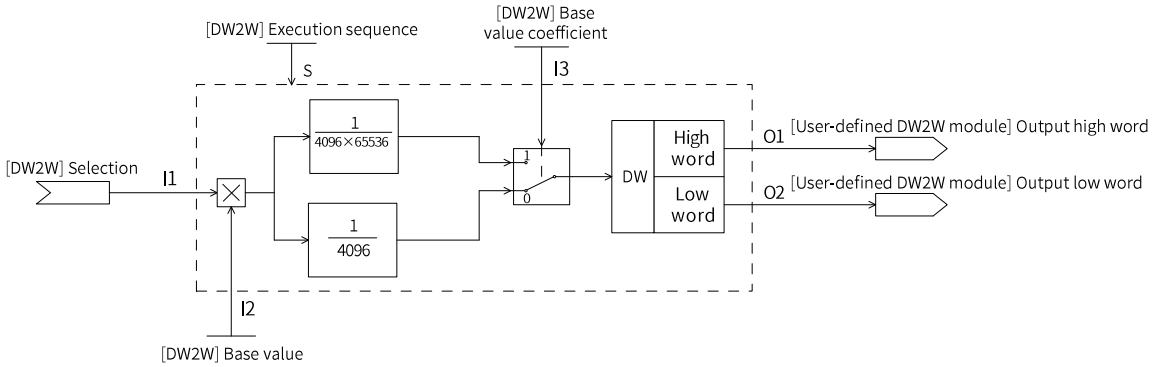
Input I3 is an unsigned number.

Output O is a signed number.

W2DW Conversion	Input					Output
	S	I1	I2	I3	I4	O
1	P0-75	P0-76	P0-77	P0-78	P0-74 (bit0)	U19-00
2	P0-79	P0-80	P0-81	P0-82	P0-74 (bit1)	U19-01
3	P0-83	P0-84	P0-85	P0-86	P0-74 (bit2)	U19-02

4) DW2W Conversion (1 to 3)

Diagram



Operation

$$O\ 1=\begin{cases}\left(\frac{I1\cdot I2}{4096\times 65536}>>16\right)\&0XFFFF, I3=1\\ \left(\frac{I1\cdot I2}{4096}>>16\right)\&0XFFFF, I3=0\end{cases}$$

$$O\ 2=\begin{cases}\left(\frac{I1\cdot I2}{4096\times 65536}>>16\right)\&0XFFFF, I3=1\\ \left(\frac{I1\cdot I2}{4096}>>16\right)\&0XFFFF, I3=0\end{cases}$$

The output high word equals to the high 16 bits of I1 multiplied by the base value I2 and divided by the base value coefficient (specified by I3). The output low word equals to the low 16 bits of I1 multiplied by the base value I2 and divided by the base value coefficient (specified by I3).

When I2 is set to 0, the output high word is the input high word while the output low word is the input low word, without base value conversion.

Connection

Input I1 is a signed number.

Input I2 is an unsigned number.

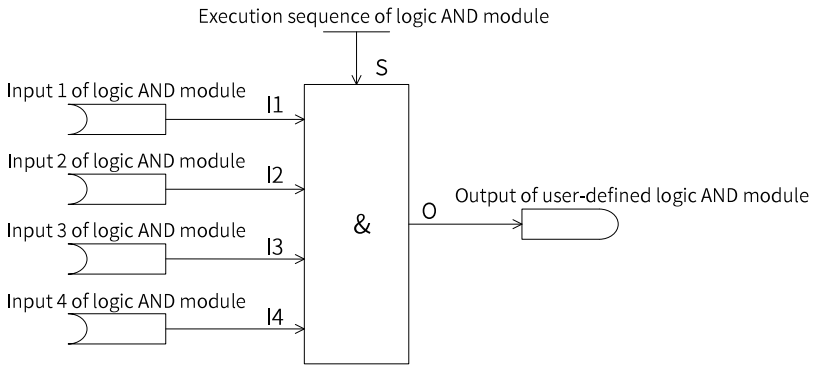
Outputs O1 and O2 are signed numbers.

DW2W Conversion	Input				Output	
	S	I1	I2	I3	O1	O2
1	P0-88	P0-89	P0-90	P0-87 (bit0)	U15-04	U15-05
2	P0-91	P0-92	P0-93	P0-87 (bit1)	U15-06	U15-07
3	P0-94	P0-95	P0-96	P0-87 (bit2)	U15-08	U15-09

6.15.5.2 User-Defined Logic Function Block

1) Logic AND module (1 to 16)

Diagram



Operation

O = I1 & I2 & I3 & I4

Only if inputs I1, I2, I3, and I4 are all true, output O is true. Otherwise, output O is false. The truth table is as follows.

Input				Output
I1	I2	I3	I4	O
0	×	×	×	0
×	0	×	×	0
×	×	0	×	0
×	×	×	0	0
1	1	1	1	1

Connection

Inputs I1, I2, I3, and I4 are binary numbers.

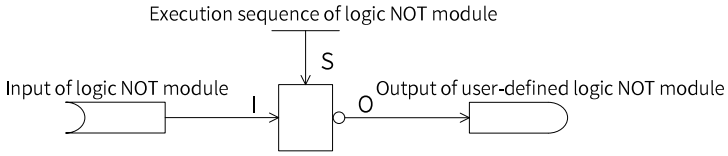
Output O is a binary number.

Logic AND Module		Input				Output
	S	I1	I2	I3	I4	O
1	P1-00	P1-01	P1-02	P1-03	P1-04	U10-48
2	P1-05	P1-06	P1-07	P1-08	P1-09	U10-49
3	P1-10	P1-11	P1-12	P1-13	P1-14	U10-50
4	P1-15	P1-16	P1-17	P1-18	P1-19	U10-51

Logic AND Module		Input				Output
	S	I1	I2	I3	I4	O
5	P1-20	P1-21	P1-22	P1-23	P1-24	U10-52
6	P1-25	P1-26	P1-27	P1-28	P1-29	U10-53
7	P1-30	P1-31	P1-32	P1-33	P1-34	U10-54
8	P1-35	P1-36	P1-37	P1-38	P1-39	U10-55
9	P1-40	P1-41	P1-42	P1-43	P1-44	U10-56
10	P1-45	P1-46	P1-47	P1-48	P1-49	U10-57
11	P1-50	P1-51	P1-52	P1-53	P1-54	U10-58
12	P1-55	P1-56	P1-57	P1-58	P1-59	U10-59
13	P1-60	P1-61	P1-62	P1-63	P1-64	U10-60
14	P1-65	P1-66	P1-67	P1-68	P1-69	U10-61
15	P1-70	P1-71	P1-72	P1-73	P1-74	U10-62
16	P1-75	P1-76	P1-77	P1-78	P1-79	U10-63

2) Logic NOT module (1 to 8)

Diagram



Operation

$O = \overline{I}$

The output is the inversion of input I. The truth table is as follows.

Input	Output
I	O
0	1
1	0

Connection

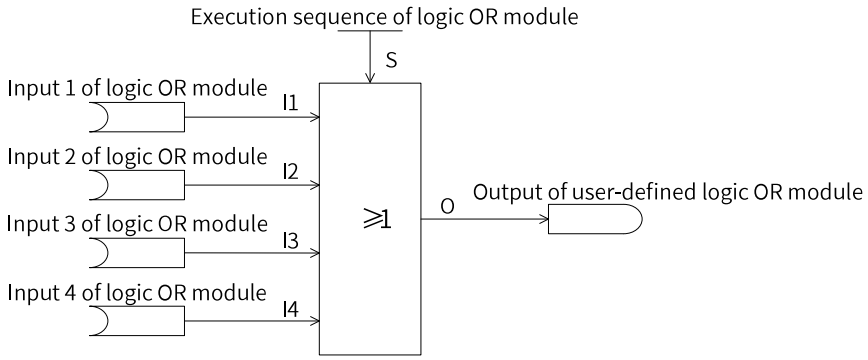
Input I is a binary number.

Output O is a binary number.

Logic NOT Module	Input		Output
	S	I	O
1	P1-80	P1-81	U10-64
2	P1-82	P1-83	U10-65
3	P1-84	P1-85	U10-66
4	P1-86	P1-87	U10-67
5	P1-88	P1-89	U10-68
6	P1-90	P1-91	U10-69
7	P1-92	P1-93	U10-70
8	P1-94	P1-95	U10-71

3) Logic OR module (1 to 12)

Diagram



Operation

O=I1|I2|I3|I4

If any of inputs I1, I2, I3, and I4 is true, the output is also true. The truth table is as follows.

Input				Output
I1	I2	I3	I4	O
0	0	0	0	0
1	×	×	×	1
×	1	×	×	1
×	×	1	×	1
×	×	×	1	1

Connection

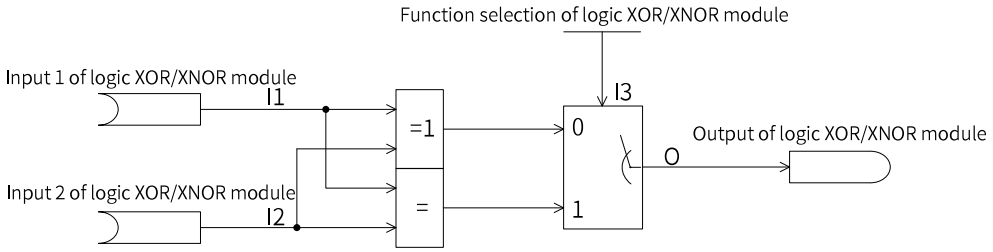
Inputs I1, I2, I3, and I4 are binary numbers.

Output O is a binary number.

Logic OR Module	Input					Output
	S	I1	I2	I3	I4	O
1	P2-00	P2-01	P2-02	P2-03	P2-04	U10-72
2	P2-05	P2-06	P2-07	P2-08	P2-09	U10-73
3	P2-10	P2-11	P2-12	P2-13	P2-14	U10-74
4	P2-15	P2-16	P2-17	P2-18	P2-19	U10-75
5	P2-20	P2-21	P2-22	P2-23	P2-24	U10-76
6	P2-25	P2-26	P2-27	P2-28	P2-29	U10-77
7	P2-30	P2-31	P2-32	P2-33	P2-34	U10-78
8	P2-35	P2-36	P2-37	P2-38	P2-39	U10-79
9	P2-40	P2-41	P2-42	P2-43	P2-44	U10-80
10	P2-45	P2-46	P2-47	P2-48	P2-49	U10-81
11	P2-50	P2-51	P2-52	P2-53	P2-54	U10-82
12	P2-55	P2-56	P2-57	P2-58	P2-59	U10-83

4) Logic XOR/XNOR module (1 to 4)

Diagram



Operation

When XOR/XNOR function selection I3 is 0, XOR is active and $O = \overline{I1}\, I2 + I1\, \overline{I2}$.

When inputs I1 and I2 are the same, output O is 0. When inputs I1 and I2 are different, output O is 1. The truth table is as follows.

Input		Output
I1	I2	O
0	0	0
1	0	1
0	1	1
1	1	0

When I3 (Logic XOR/XNOR module function) is set to 1, logic XNOR is enabled, and $O = I1\, I2 + \overline{I1}\, \overline{I2}$.

When inputs I1 and I2 are the same, output O is 1. When inputs I1 and I2 are different, output O is 0. The truth table is as follows.

Input		Output
I1	I2	O
0	0	1
1	0	0
0	1	0
1	1	1

Connection

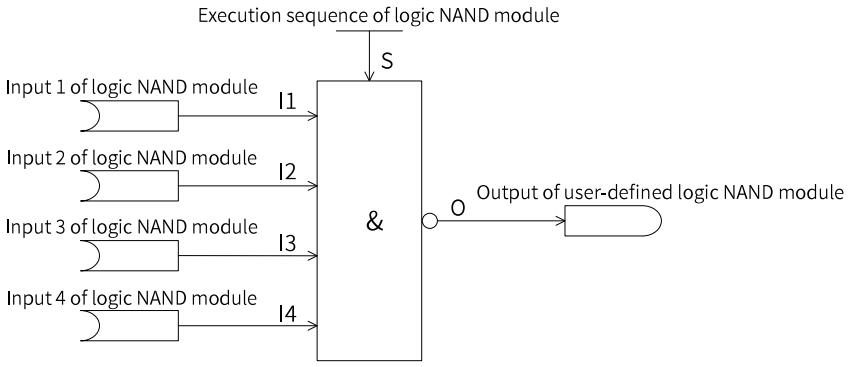
Inputs I1, I2, and I3 are binary numbers.

Output O is a binary number.

Logic XOR/XNOR Module	Input				Output
	S	I1	I2	I3	O
1	P2-60	P2-62	P2-63	P2-61	U10-84
2	P2-64	P2-66	P2-67	P2-65	U10-85
3	P2-68	P2-70	P2-71	P2-69	U10-86
4	P2-72	P2-74	P2-75	P2-73	U10-87

5) Logic NAND module (1 to 4)

Diagram



Operation

$O = \overline{I1 \& I2 \& I3 \& I4}$

If the inputs I1, I2, I3 and I4 are all true, the output O is false; otherwise the output O is true. The truth table is as follows.

Input				Output
I1	I2	I3	I4	O
0	0	0	0	1
1	0	0	0	1
0	1	0	0	1
1	1	0	0	1
0	0	1	0	1
1	0	1	0	1
0	1	1	0	1
1	1	1	0	1
0	0	0	1	1
1	0	0	1	1
0	1	0	1	1
1	1	0	1	1
0	0	1	1	1
1	0	1	1	1
0	1	1	1	1
1	1	1	1	0

Connection

Inputs I1, I2, I3, and I4 are binary numbers.

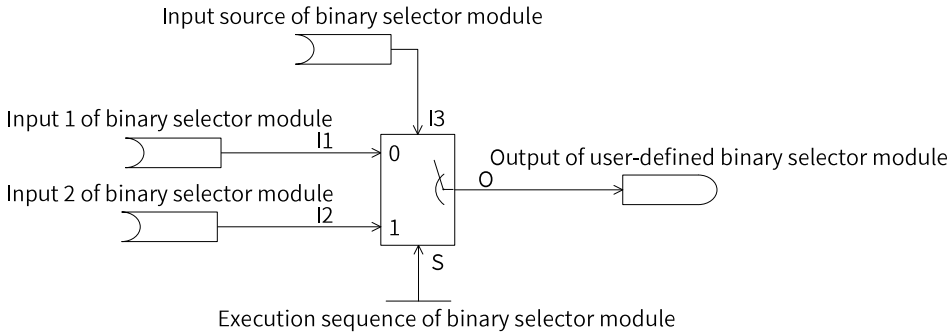
Output O is a binary number.

Logic NAND Module	Input					Output
	S	I1	I2	I3	I4	O
1	P2-76	P2-77	P2-78	P2-79	P2-80	U10-88
2	P2-81	P2-82	P2-83	P2-84	P2-85	U10-89
3	P2-86	P2-87	P2-88	P2-89	P2-90	U10-90
4	P2-91	P2-92	P2-93	P2-94	P2-95	U10–91

6.15.5.3 User-Defined Switch Function Block

1) Binary selector module (1 to 8)

Diagram



Operation

$$O = \begin{cases} I1, I3=0 \\ I2, I3=1 \end{cases}$$

Connection

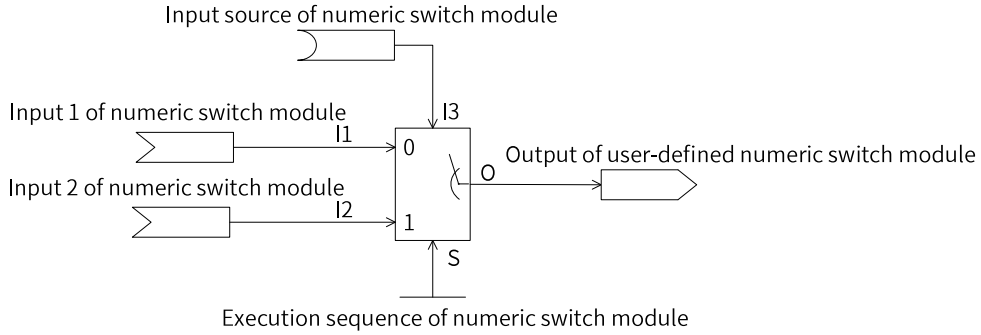
Inputs I1, I2, and I3 are binary numbers.

Output O is a binary number.

Binary Selector Module	Input				Output
	S	I1	I2	I3	O
1	P3-00	P3-02	P3-03	P3-01	U10-92
2	P3-04	P3-06	P3-07	P3-05	U10-93
3	P3-08	P3-10	P3-11	P3-09	U10-94
4	P3-12	P3-14	P3-15	P3-13	U10-95
5	P3-16	P3-18	P3-19	P3-17	U10-96
6	P3-20	P3-22	P3-23	P3-21	U10-97
7	P3-24	P3-26	P3-27	P3-25	U10-98
8	P3-28	P3-30	P3-31	P3-29	U10-99

2) Digital selector module (1 to 12)

Diagram



Operation

$$O = \begin{cases} I1, I3=0 \\ I2, I3=1 \end{cases}$$

When I3 (digital selector module input) is set to 0, output O equals to I1 (word). When I3 (digital selector module input) is set to 1, output O equals to I2 (word).

Connection

Inputs I1 and I2 are signed numbers.

Input I3 is a binary number.

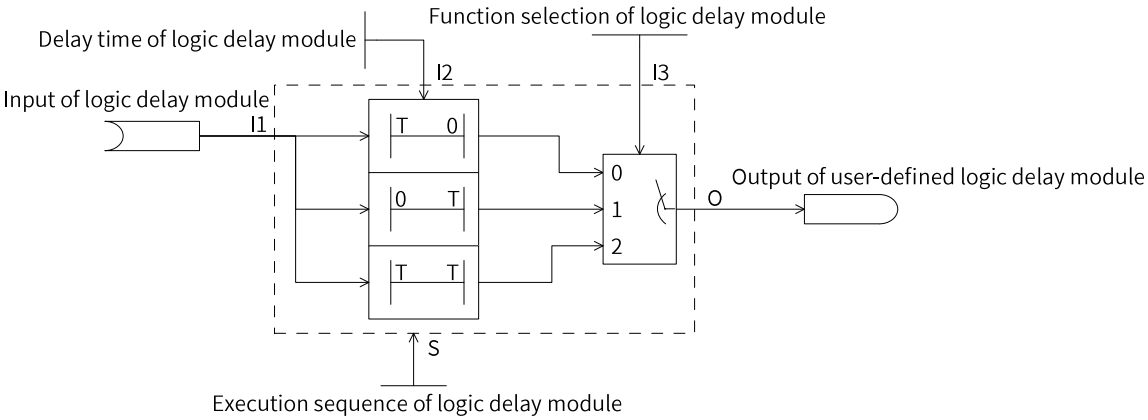
Output O is a signed number.

Digital Selector Module	Input				Output
	S	I1	I2	I3	O
1	P3-32	P3-34	P3-35	P3-33	U19-03
2	P3-36	P3-38	P3-39	P3-37	U19-04
3	P3-40	P3-42	P3-43	P3-41	U19-05
4	P3-44	P3-46	P3-47	P3-45	U19-06
5	P3-48	P3-50	P3-51	P3-49	U19-07
6	P3-52	P3-54	P3-55	P3-53	U19-08
7	P3-56	P3-58	P3-59	P3-57	U19-09
8	P3-60	P3-62	P3-63	P3-61	U19-10
9	P3-64	P3-66	P3-67	P3-65	U19-11
10	P3-68	P3-70	P3-71	P3-69	U19-12
11	P3-72	P3-74	P3-75	P3-73	U19-13
12	P3-76	P3-78	P3-79	P3-77	U19-14

6.15.5.4 User-Defined Control Function Block

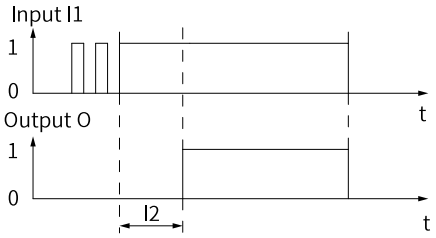
1) Logic delay module (1 to 4)

Diagram

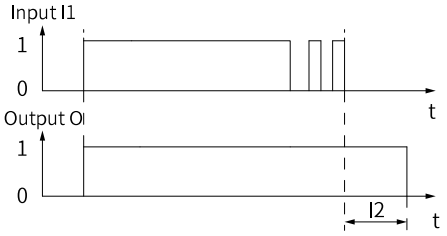


Operation

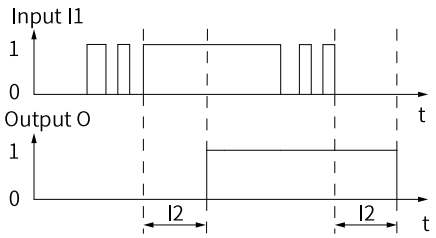
After the logic delay module function I3 is set to 0, switch-on delay becomes active when input changes from 0 to 1, and the delay time is determined by I2. After switch-on delay is enabled, high-level pulses lasting less than I2 will be filtered out, as shown in the following figure.



After the logic delay module function I3 is set to 1, switch-off delay becomes active when input changes from 1 to 0, and the delay time is determined by I2. After switch-off delay is enabled, low-level pulses lasting less than I2 will be filtered out, as shown in the following figure.



After the logic delay module function I3 is set to 2, switch-on delay becomes active when input changes from 0 to 1 or from 1 to 0, and the delay time is determined by I2. Both switch-on and switch-off delays will filter the pulses, as shown in the following figure.



Connection

Input I1 is a binary number.

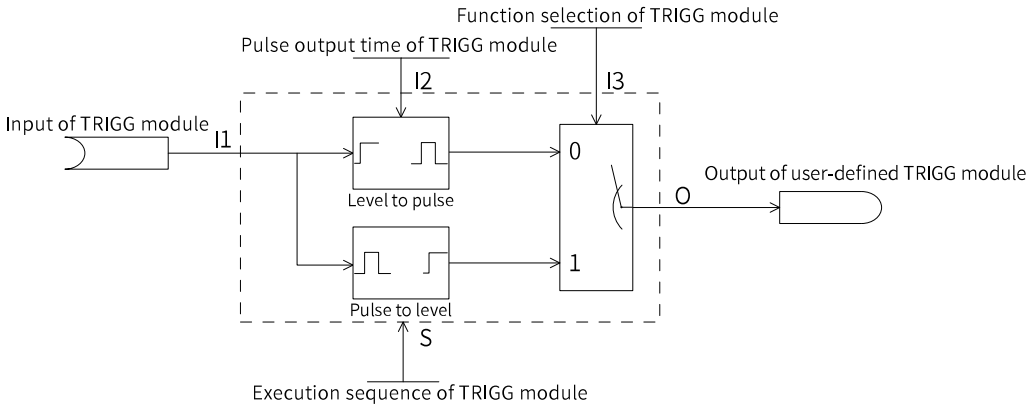
Inputs I2 and I3 are unsigned numbers.

Output O is a binary number.

Logic Delay Module	Input				Output
	S	I1	I2	I3	O
1	P4-00	P4-01	P4-03	P4-02	U11-00
2	P4-04	P4-05	P4-07	P4-06	U11-01
3	P4-08	P4-09	P4-11	P4-10	U11-02
4	P4-12	P4-13	P4-15	P4-14	U11-03

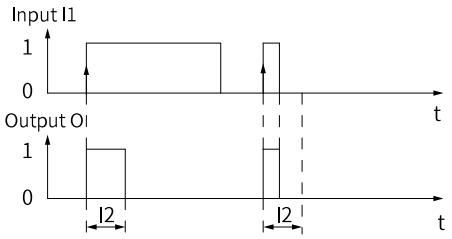
2) P_L conversion module (1 to 4)

Diagram

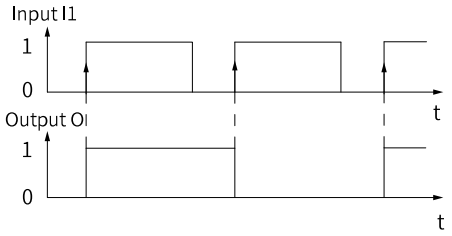


Operation

When the P_L conversion module function (I3) is set to 0, level-to-pulse conversion is active. In this case, the output becomes high on the rising edge of input I1 within the pulse output time indicated by I2. If input I1 is set to 0, the output immediately changes to 0, regardless of whether the pulse duration is reached.



When the P_L conversion module function is set to 1, pulse-to-level conversion is active. In this case, the output becomes high on the first rising edge of input I1, and becomes low on the second rising edge of input I1, and so on. That is, the pulse output of odd numbers is at a high level, while the pulse output of even numbers is at a low level.



Connection

Inputs I1 and I3 are binary numbers.

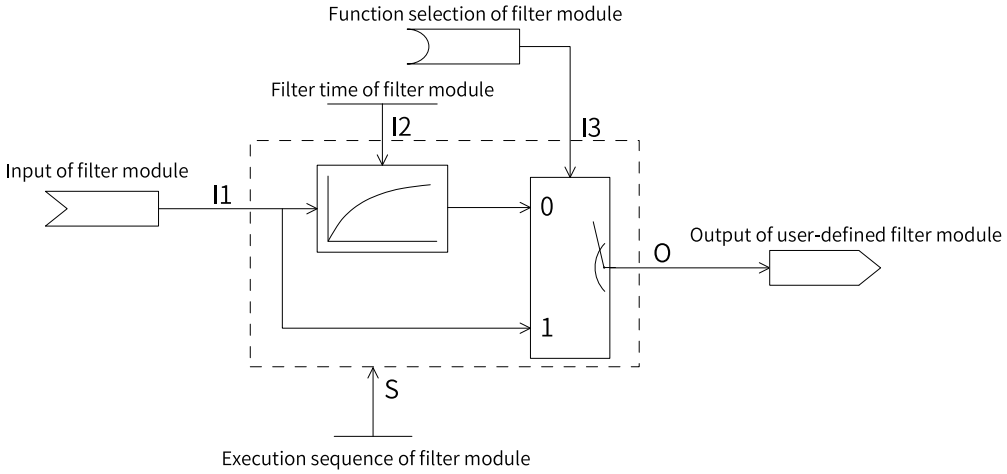
Input I2 is an unsigned number.

Output O is a binary number.

P_L conversion module	Input				Output
	S	I1	I2	I3	O
1	P4-16	P4-18	P4-19	P4-17	U11-04
2	P4-20	P4-22	P4-23	P4-21	U11-05
3	P4-24	P4-26	P4-27	P4-25	U11-06
4	P4-28	P4-30	P4-31	P4-29	U11-07

3) Filter module (1 to 8)

Diagram



Operation

When I3 (filter module function) is set to 0, output O equals to the filter value of input I1. When I3 (filter module function) is set to 1, output O equals to input I1.

Connection

Input I1 is a signed number.

Input I2 is an unsigned number.

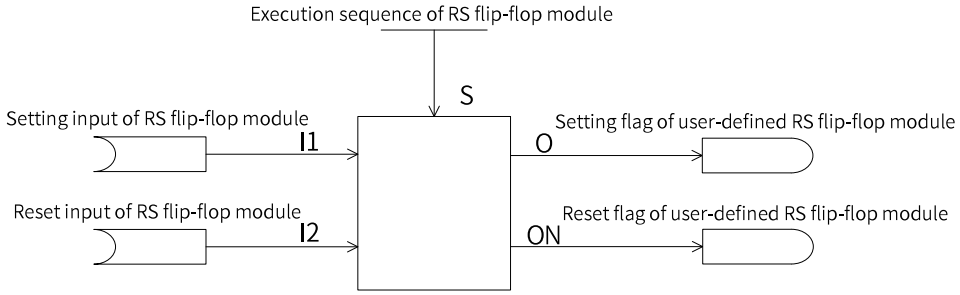
Input I3 is a binary number.

Output O is a signed number.

Filter Module	Input				Output
	S	I1	I2	I3	O
1	P4-32	P4-34	P4-35	P4-33	U19-15
2	P4-36	P4-38	P4-39	P4-37	U19-16
3	P4-40	P4-42	P4-43	P4-41	U19-17
4	P4-44	P4-46	P4-47	P4-45	U19-18
5	P4-48	P4-50	P4-51	P4-49	U19-19
6	P4-52	P4-54	P4-55	P4-53	U19-20
7	P4-56	P4-58	P4-59	P4-57	U19-21
8	P4-60	P4-62	P4-63	P4-61	U19-22

4) RS flip-flop module (1 to 4)

Diagram



Operation

If both inputs I1 and I2 are set to 0, output O remains at the current value. If input I1 is set to 1 and input I2 is set to 0, output O is 1. If input I2 is set to 1, output O is 0. If both inputs I1 and I2 are set to 1, output O is 0. Output ON is always opposite to the value of O. The truth table is as follows.

Input		Output	
I1	I2	O	ON
0	0	Unchanged	Unchanged
1	0	1	0
0	1	0	1
1	1	0	1

Connection

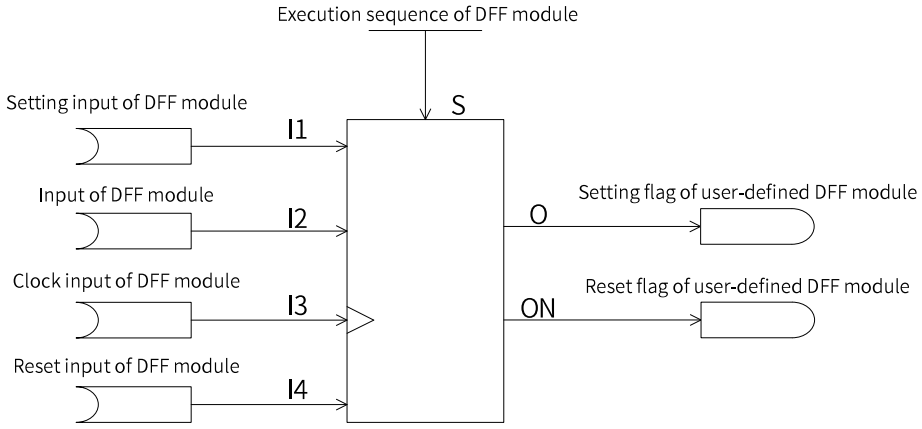
Inputs I1 and I2 are binary numbers.

Outputs O and ON are binary numbers.

RS Flip-Flop Module	Input			Output	
	S	I1	I2	O	ON
1	P4-64	P4-65	P4-66	U11-08	U11-09
2	P4-67	P4-68	P4-69	U11-10	U11-11
3	P4-70	P4-71	P4-72	U11-12	U11-13
4	P4-73	P4-74	P4-75	U11-14	U11-15

5) DLL module (1 to 4)

Diagram

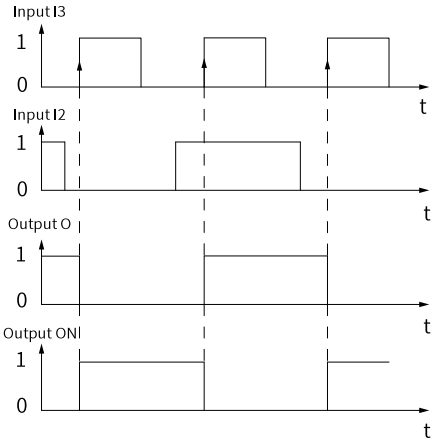


Operation

If the inputs I1 and I4 are both set to 0, output O is equal to input I2 on the rising edge of input I3. If input I1 is set to 1, output O is 1. If input I4 is set to 1, output O is 0.

If both inputs I1 and I4 are set to 0 and input I3 has no rising edge, output O remains at the current value. If both inputs I1 and I4 are set to 1, output O is 0. Output ON is always opposite to the value of O.

When I1 and I4 are set to 0, the outputs O, ON and I2 and clock I3 timing diagrams are:



Connection

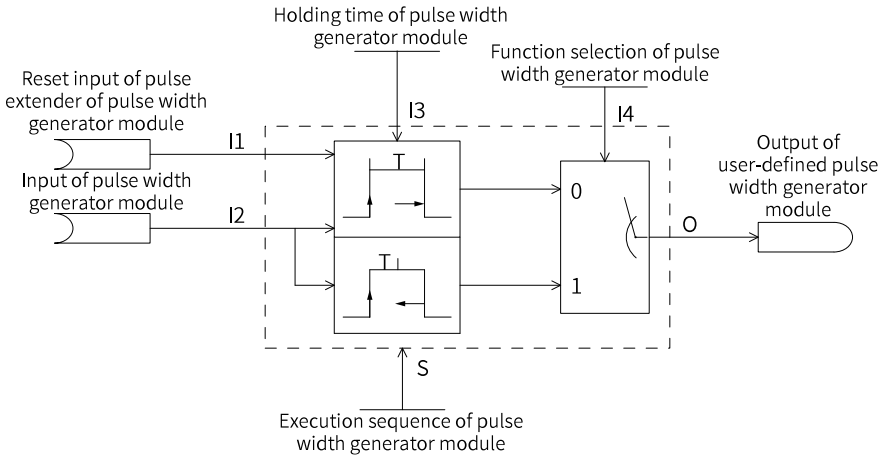
Inputs I1, I2, I3, and I4 are binary numbers.

Outputs O and ON are binary numbers.

DLL Module	Input					Output	
	S	I1	I2	I3	I4	O	ON
1	P4-76	P4-79	P4-77	P4-80	P4-78	U11-16	U11-17
2	P4-81	P4-84	P4-82	P4-85	P4-83	U11-18	U11-19
3	P4-86	P4-89	P4-87	P4-90	P4-88	U11-20	U11-21
4	P4-91	P4-94	P4-92	P4-95	P4-93	U11-22	U11-23

6) Pulse width generator module (1 to 8)

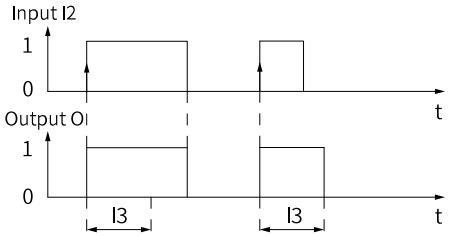
Diagram



Operation

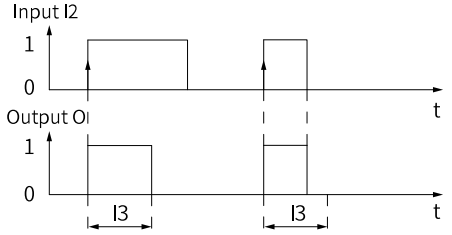
When pulse width generator module function selection I4 is 0, the pulse extension is active, and the output is set to 1 on the rising edge of input I2. When input I2 is 0 and the pulse duration reaches I3, output O is set to 0, and the output is set to 0 at any time by resetting the input I1 to 1.

When I1 is 0, the output O and input I2 timing diagrams are:



When pulse width generator module function selection I4 is 1, the pulse shortening is active. The output is set to 1 at the rising edge of input I2, and the output O is set to 0 when input I2 is 0 or the pulse duration reaches I3.

The timing diagram of output O and Input I2 is:



Connection

Inputs I1, I2, and I4 are binary numbers.

Input I3 is an unsigned number.

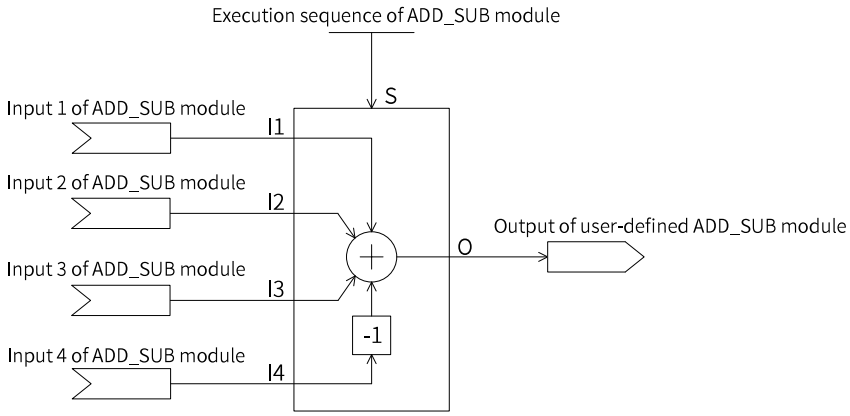
Output O is a binary number.

Pulse Width Generator Module	Input					Output
	S	I1	I2	I3	I4	O
1	P5-00	P5-04	P5-22	P5-23	P5-01	U11-24
2	P5-05	P5-09	P5-27	P5-28	P5-06	U11-25
3	P5-10	P5-14	P5-32	P5-33	P5-11	U11-26
4	P5-15	P5-19	P5-37	P5-38	P5-16	U11-27
5	P5-20	P5-24	P5-42	P5-43	P5-21	U11-28
6	P5-25	P5-29	P5-47	P5-48	P5-26	U11-29
7	P5-30	P5-34	P5-52	P5-53	P5-31	U11-30
8	P5-35	P5-39	P5-57	P5-58	P5-36	U11-31

6.15.5.5 User-Defined Arithmetic Function Block

1) ADD_SUB module (1 to 8)

Diagram



Operation

O=I1+I2+I3-I4

The value of output O equals to the sum of I1, I2, and I3 minus I4.

Connection

Inputs I1, I2, I3, and I4 are signed numbers.

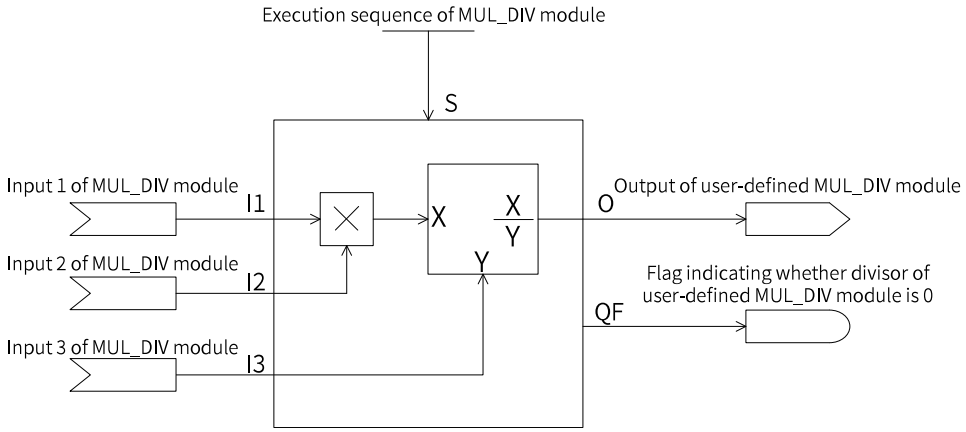
Output O is a signed number.

ADD_SUB Module	Input					Output
	S	I1	I2	I3	I4	O
1	P6-00	P6-01	P6-02	P6-03	P6-04	U19-23
2	P6-05	P6-06	P6-07	P6-08	P6-09	U19-24
3	P6-10	P6-11	P6-12	P6-13	P6-14	U19-25
4	P6-15	P6-16	P6-17	P6-18	P6-19	U19-26
5	P6-20	P6-21	P6-22	P6-23	P6-24	U19-27
6	P6-25	P6-26	P6-27	P6-28	P6-29	U19-28

ADD_SUB Module	Input					Output
	S	I1	I2	I3	I4	O
7	P6-30	P6-31	P6-32	P6-33	P6-34	U19-29
8	P6-35	P6-36	P6-37	P6-38	P6-39	U19-30

2) MUL_DIV module (1 to 8)

Diagram



Operation

$O=(I1 \cdot I2)/I3$

$$QF=\begin{cases}1, I3=0\\0, I3\neq 0\end{cases}$$

Connection

Inputs I1, I2, and I3 are signed numbers.

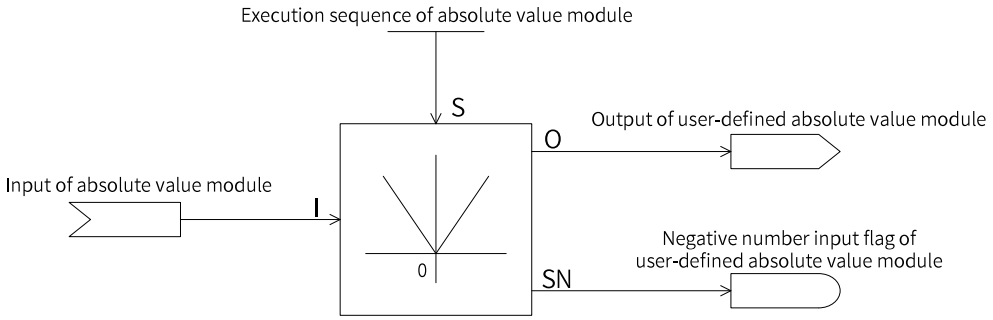
Output O is a signed number.

Output QF is a binary number.

MUL_DIV Module	Input				Output	
	S	I1	I2	I3	QF	O
1	P6-40	P6-41	P6-42	P6-43	U11-32	U19-31
2	P6-44	P6-45	P6-46	P6-47	U11-33	U19-32
3	P6-48	P6-49	P6-50	P6-51	U11-34	U19-33
4	P6-52	P6-53	P6-54	P6-55	U11-35	U19-34
5	P6-56	P6-57	P6-58	P6-59	U11-36	U19-35
6	P6-60	P6-61	P6-62	P6-63	U11-37	U19-36
7	P6-64	P6-65	P6-66	P6-67	U11-38	U19-37
8	P6-68	P6-69	P6-70	P6-71	U11-39	U19-38

3) Absolute value module (1 to 4)

Diagram



Operation

$O = |I|$

The output equals to the absolute value of input I. When the input value is negative, the flag bit SN is 1. Otherwise, the flag bit is 0.

Connection

Input I is a signed number.

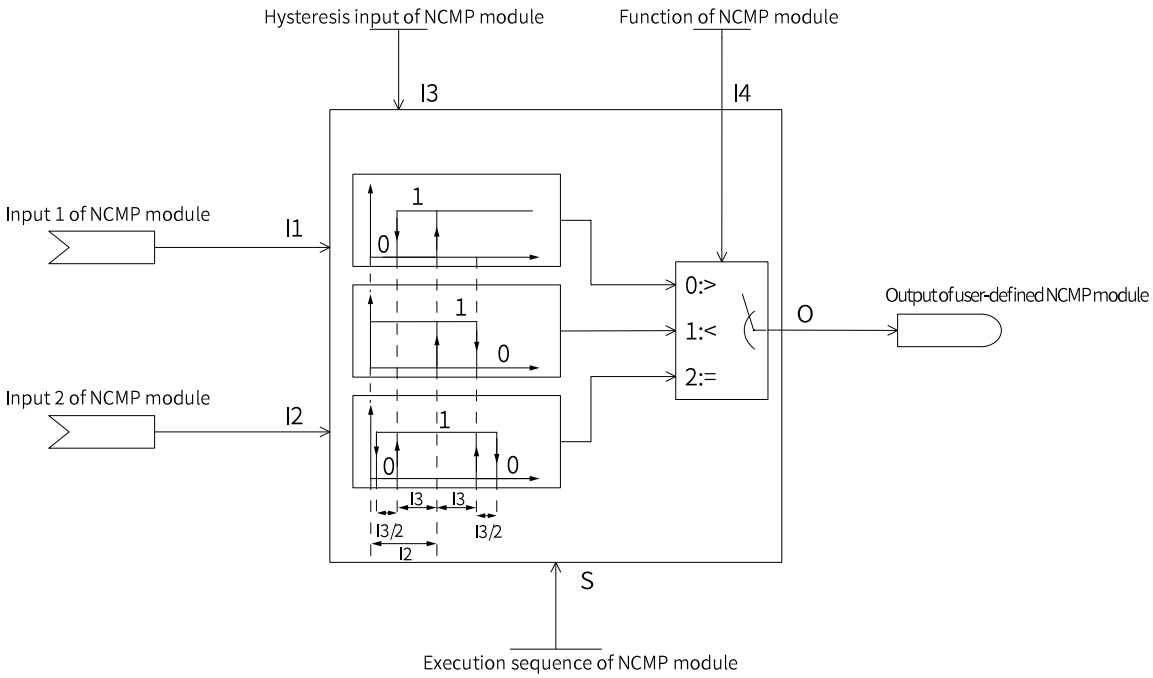
Output O is a signed number.

The output SN is a binary number.

Absolute Value Module	Input		Output	
	S	I	SN	O
1	P6-72	P6-73	U11-40	U19-39
2	P6-74	P6-75	U11-41	U19-40
3	P6-76	P6-77	U11-42	U19-41
4	P6-78	P6-79	U11-43	U19-42

4) NCMP module (1 to 4)

Diagram



Operation

If the NCMP module function (I4) is set to 0, output O remains at a low level before I1 increases to I2 from 0 in the forward direction. When I1 exceeds I2, output O changes to a high level. If I1 further increases, output O remains at the high level. If I1 decreases but is still greater than I2 minus I3, output O still remains at the high level. Output O changes to the low level only when I1 becomes less than I2 minus I3.

If the NCMP module function (I4) is set to 1, output O remains at a high level before I1 increases to I2 plus I3 from 0 in the forward direction. When I1 becomes greater than I2 plus I3, output O changes to a low level. If I1 further increases, output O remains at the low level. If I1 decreases but is still greater than I2, output O still remains at the low level. Output O changes to the high level only when I1 becomes less than I2.

If the NCMP module function (I4) is set to 2, output O remains at a low level before I1 increases to I2 minus I3 from 0 in the forward direction. When I1 becomes greater than I2 minus I3 but less than I2 plus I3, output O changes to a high level. If I1 further increases to become greater than I2 plus I3 multiplied by 1.5, output O changes to the low level. If I1 decreases, output O still remains at the low level when I1 is less than I2 plus I3. Output O changes to the high level when I1 becomes less than I2 plus I3 but greater than I2 minus I3 multiplied by 1.5. Output O changes to the low level when I1 becomes less than I2 minus I3 multiplied by 1.5.

Hysteresis input I3 suppresses frequent connection and disconnection.

Connection

Inputs I1 and I2 are signed numbers.

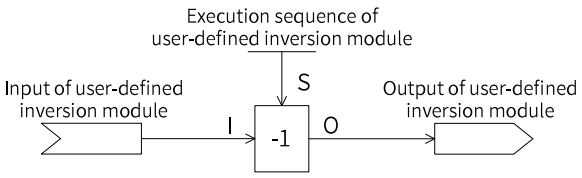
Inputs I3 and I4 are unsigned numbers.

Output O is a binary number.

NCMP Module	Input					Output
	S	I1	I2	I3	I4	O
1	P6-80	P6-82	P6-83	P6-84	P6-81	U11-44
2	P6-85	P6-87	P6-88	P6-89	P6-86	U11-45
3	P6-90	P6-92	P6-93	P6-94	P6-91	U11-46
4	P6-95	P6-97	P6-98	P6-99	P6-96	U11-47

5) Inversion module (1 to 8)

Diagram



Operation

O = - I

Output O equals inverted input I.

Connection

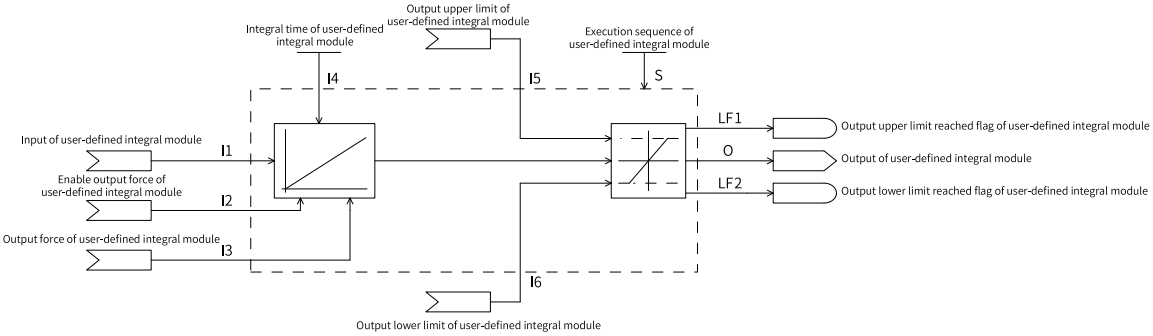
Input I is a signed number.

Output O is a signed number.

Inversion Module	Input		Output
	S	I	O
1	P7-00	P7-01	U19-43
2	P7-02	P7-03	U19-44
3	P7-04	P7-05	U19-45
4	P7-06	P7-07	U19-46
5	P7-08	P7-09	U19-47
6	P7-10	P7-11	U19-48
7	P7-12	P7-13	U19-49
8	P7-14	P7-15	U19-50

6) Integral module (1 to 4)

Diagram



Operation

$Y_n=Y_{n-1}+X_n/T_i$

Yn is the output value, Y_{n-1} is the last beat value of the output Y_n, X_n is the input value, and T_i is the integral time.

The change of output value is proportional to the input value and inversely proportional to the integral time.

The output of the integrator is limited by I5 and I6. If the output reaches the upper or lower limit, the corresponding output limit flag bit is set to 1, and if I5 is smaller than or equal to I6, the output O equals to I5.

If I2 is forced to 1, output O equals to I3.

Connection

Inputs I1, I3, I5, I6 are signed numbers.

Input I4 is an unsigned number.

Input I2 is a binary number.

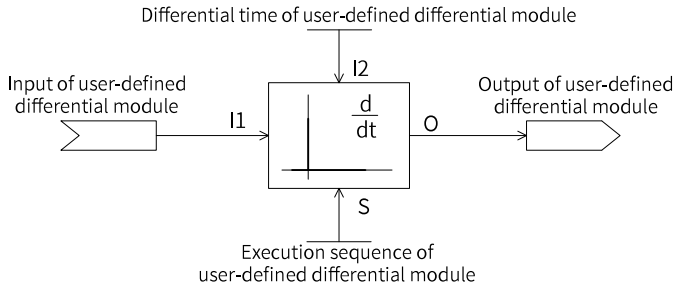
Outputs LF1 and LF2 are binary numbers.

Output O is a signed number.

Integral Module	Input							Output		
	S	I1	I2	I3	I4	I5	I6	LF1	LF2	O
1	P7-16	P7-17	P7-20	P7-21	P7-22	P7-18	P7-19	U11-48	U11-49	U19-51
2	P7-23	P7-24	P7-27	P7-28	P7-29	P7-25	P7-26	U11-50	U11-51	U19-52
3	P7-30	P7-31	P7-34	P7-35	P7-36	P7-32	P7-33	U11-52	U11-53	U19-53
4	P7-37	P7-38	P7-41	P7-42	P7-43	P7-39	P7-40	U11-54	U11-55	U19-54

7) Differential module (1 to 4)

Diagram



Operation

$Y_n=(X_n-X_{n-1})\cdot T_d$

Y_n is the output value, X_n is the input value, X_{n-1} is the last beat value of the input X_n, and T_d is the differential time.

The output Y is proportional to the input deviation and the differential time.

Connection

Input I1 is a signed number.

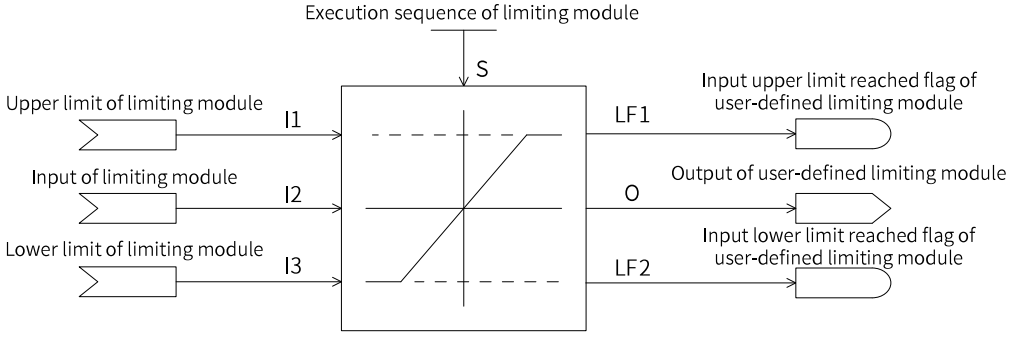
Input I2 is an unsigned number.

Output O is a signed number.

Differential Module	Input			Output
	S	I1	I2	O
1	P7-44	P7-45	P7-46	U19-55
2	P7-47	P7-48	P7-49	U19-56
3	P7-50	P7-51	P7-52	U19-57
4	P7-53	P-54	P7-55	U19-58

8) Limit module (1 to 4)

Diagram



Operation

$$O=\begin{cases} I1, & I1>I2 \\ I2, & I3\leqslant I2\leqslant I1 \\ I3, & I2<I3 \end{cases}$$

When the input I2 is greater than the upper limit I1, the output O is equal to I1, and the upper limit flag position LF1 is 1. When the input I2 is less than the lower limit I3, the output O is equal to I3, and the lower limit flag position LF2 is 1.

When input I2 is within the upper and lower limits, the output is equal to the input value.

Connection

Inputs I1, I2, and I3 are signed numbers.

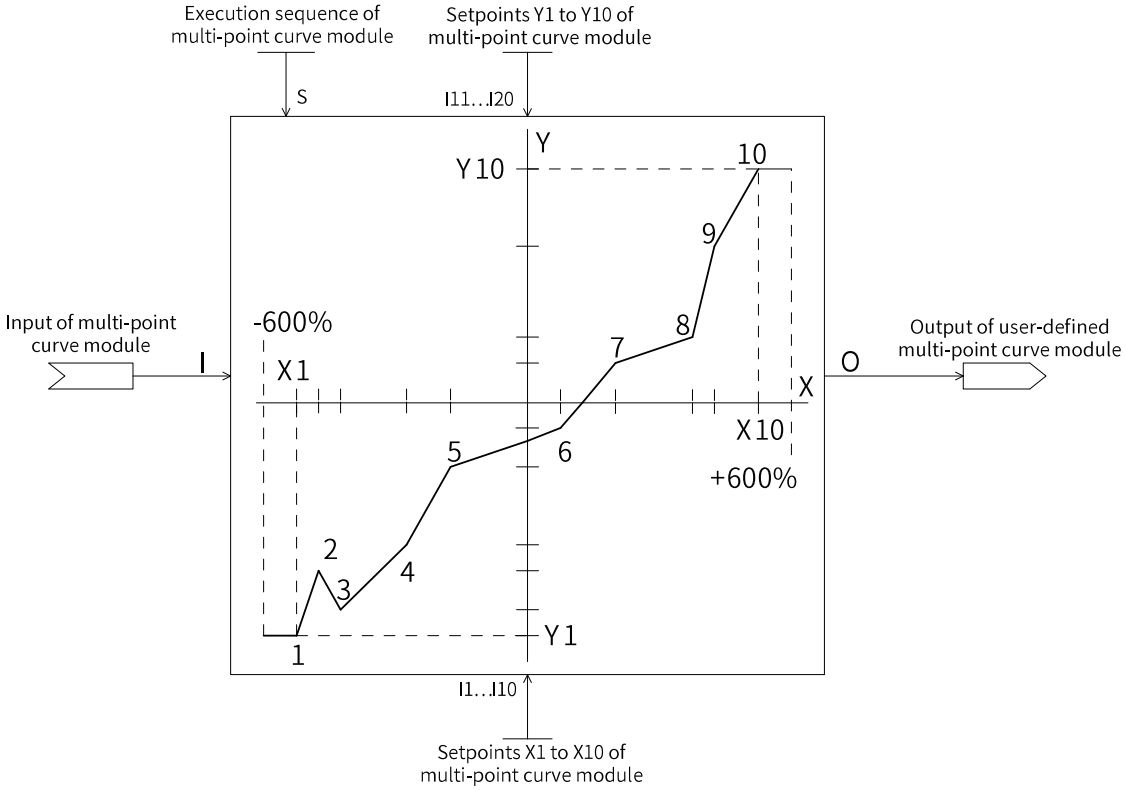
Output O is a signed number.

Outputs LF1 and LF2 are binary numbers.

Limit Module	Input				Output		
	S	I1	I2	I3	LF1	LF2	O
1	P7-56	P7-58	P7-57	P7-59	U11-56	U11-57	U19-59
2	P7-60	P7-62	P7-61	P7-63	U11-58	U11-59	U19-60
3	P7-64	P7-66	P7-65	P7-67	U11-60	U11-61	U19-62
4	P7-68	P7-70	P7-69	P7-71	U11-62	U11-63	U19-63

6.15.5.6 User-Defined Multi-Point Operation Function Block

Diagram



Operation

Only when the X1 < X2 < ... condition is met, the set coordinate points are active. When the input is out of the active coordinate points, the output equals to the ordinate value of the adjacent active coordinate points. When the input is within the active coordinate points, the ordinate value corresponding to the output can be calculated according to the curve.

Connection

Inputs I and I1 to I20 are signed numbers.

Output O is a signed number.

Multi-point curve module		1	2	3	4
Input	S	P8-00	P8-22	P8-44	P8-66
	I	P8-01	P8-23	P8-45	P8-67
	I1 (X1)	P8-02	P8-24	P8-46	P8-68
	I2 (X2)	P8-04	P8-26	P8-48	P8-70
	I3 (X3)	P8-06	P8-28	P8-50	P8-72
	I4 (X4)	P8-08	P8-30	P8-52	P8-74
	I5 (X5)	P8-10	P8-32	P8-54	P8-76
	I6 (X6)	P8-12	P8-34	P8-56	P8-78
	I7 (X7)	P8-14	P8-36	P8-58	P8-80
	I8 (X8)	P8-16	P8-38	P8-60	P8-82
	I9 (X9)	P8-18	P8-40	P8-62	P8-84
	I10 (X10)	P8-20	P8-42	P8-64	P8-86
	I11 (Y1)	P8-03	P8-25	P8-47	P8-69
	I12 (Y2)	P8-05	P8-27	P8-49	P8-71
	I13 (Y3)	P8-07	P8-29	P8-51	P8-73
	I14 (Y4)	P8-09	P8-31	P8-53	P8-75
	I15 (Y5)	P8-11	P8-33	P8-55	P8-77
	I16 (Y6)	P8-13	P8-35	P8-57	P8-79
	I17 (Y7)	P8-15	P8-37	P8-59	P8-81
	I18 (Y8)	P8-17	P8-39	P8-61	P8-83
	I19 (Y9)	P8-19	P8-41	P8-63	P8-85
	I20 (Y10)	P8-21	P8-43	P8-65	P8-87
Output	O	U19-63	U19-64	U19-65	U19-66

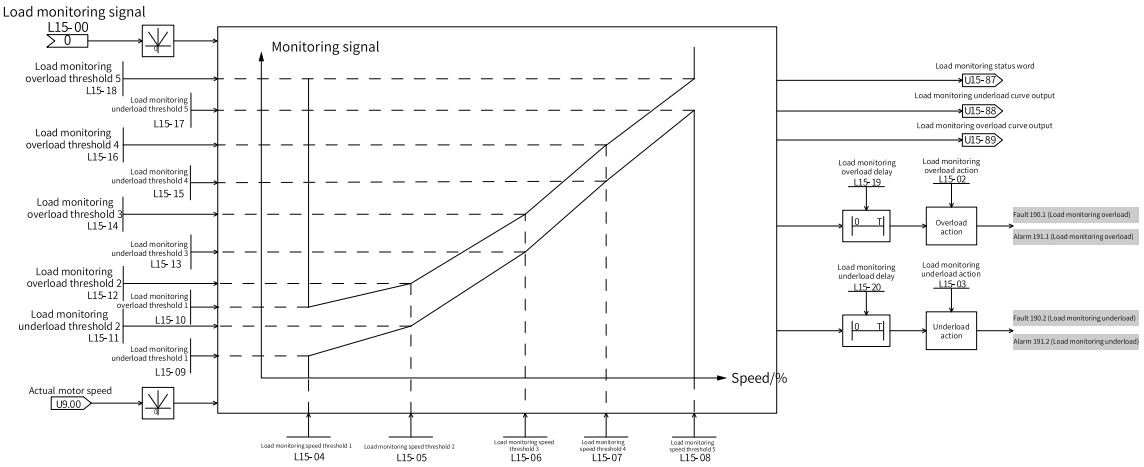
6.16 Load Monitoring Module

The load monitoring module monitors input signals (such as output current, output torque, and output power) related to the AC drive output speed. It can monitor both underload and overload. Underload monitoring can detect load loss due to reasons such as conveyor belt breaking or mechanical shaft breaking. Overload monitoring can detect whether the drive load is blocked due to reasons such as motor stall.

During load monitoring, the current speed/monitoring signal is compared with the speed/overload or speed/underload threshold set by the user. If the current speed exceeds the threshold set by the user, a fault or an alarm is reported based on the setpoint of L15-02/L15-03 after a delay time set by L15-19/ L15-20.

The conditions for activating the load monitoring module include:

- L15-00 is not set to 0.
- Speeds on the load monitoring curve are incremental (that is, L15-04 < L15-05 < L15-06 < L15-07 < L15-08).
- The actual motor speed is within the range of (L15-04 to L15-08).
- Under the same speed point of the load monitoring curve, the overload threshold is greater than the underload threshold.



Para.	Name	Description	Default	Description
L15-00	Load monitoring signal	0: Monitor prohibited 1: Output current 2: Output torque 3: Output power Other: K connector	0	The monitoring variable can be output current, torque or power based on actual application.
L15-01	Load monitoring status	0: Inactive 1: Active	-	Display whether the load monitoring module is active.
L15-02	Load monitoring overload action	0: No alarm/no fault 1: Alarm 2: Fault 3: Alarm/fault	0	[No alarm/no fault]: No alarm or fault is reported. [Alarm]: The overload or underload alarm is reported. [Fault]: The overload or underload fault is reported. [Alarm/fault]: When the duration that the monitoring signal is above the overload curve is greater than the half of the overload delay time set in L15-19, the overload alarm ERR191-1 is reported. When the duration is greater than the value of L15-19, the overload fault ERR190-1 is reported. When the duration that the monitoring signal is above the underload curve is greater than the half of the underload delay time set in L15-20, the underload alarm ERR191-2 is reported. When the duration is greater than the value of L15-20, the underload fault ERR190-2 is reported.
L15-03	Load monitoring underload action	0: No alarm/no fault 1: Alarm 2: Fault 3: Alarm/fault	0	

Para.	Name	Description	Default	Description
L15-04	Load monitoring speed point 1	0.0% to 600.0%	10.0%	Set the first speed point of the X axis for load monitoring. The speed point is symmetrical and effective in the negative direction.
L15-05	Load monitoring speed point 2	0.0% to 600.0%	50.0%	Set the second speed point of the X axis for load monitoring.
L15-06	Load monitoring speed point 3	0.0% to 600.0%	86.0%	Set the third speed point of the X axis for load monitoring.
L15-07	Load monitoring speed point 4	0.0% to 600.0%	100.0%	Set the fourth speed point of the X axis for load monitoring.
L15-08	Load monitoring speed point 5	0.0% to 600.0%	120.0%	Set the fifth speed point of the X axis for load monitoring.
L15-09	Load monitoring underload threshold 1	0.0% to 400.0%	10.0%	Set the first underload threshold for load monitoring.
L15-10	Load monitoring overload threshold 1	0.0% to 400.0%	100.0%	Set the first overload threshold for load monitoring.
L15-11	Load monitoring underload threshold 2	0.0% to 400.0%	15.0%	Set the second underload threshold for load monitoring.
L15-12	Load monitoring overload threshold 2	0.0% to 400.0%	100.0%	Set the second overload threshold for load monitoring.
L15-13	Load monitoring underload threshold 3	0.0% to 400.0%	25.0%	Set the third underload threshold for load monitoring.
L15-14	Load monitoring overload threshold 3	0.0% to 400.0%	100.0%	Set the third overload threshold for load monitoring.
L15-15	Load monitoring underload threshold 4	0.0% to 400.0%	35.0%	Set the fourth underload threshold for load monitoring.
L15-16	Load monitoring overload threshold 4	0.0% to 400.0%	100.0%	Set the fourth overload threshold for load monitoring.
L15-17	Load monitoring underload threshold 5	0.0% to 400.0%	50.0%	Set the fifth underload threshold for load monitoring.
L15-18	Load monitoring overload threshold 5	0.0% to 400.0%	100.0%	Set the fifth overload threshold for load monitoring.
L15-19	Load monitoring overload delay	0.0s to 1000.0s	10.0s	Set the delay time for the action specified in L15-02.
L15-20	Load monitoring underload delay	0.0s to 1000.0s	10.0s	Set the delay time for the action specified in L15-03.

Para.	Name	Description	Default	Description
U15-87	Load monitoring status word	bit00: Underload limit 0: Normal 1: L5-00 monitoring signal smaller than underload curve bit01: Overload limit 0: Normal 1: L5-00 monitoring signal greater than underload curve bit02: Underload fault/ alarm 0: No 1: Yes bit03: Overload fault/ alarm 0: No 1: Yes bit04 to bit15: Reserved	-	bit00/bit01 is not affected by the monitoring action and delay time set in L15-02, L15-03, L15-19, and L15-20. bit02/bit03 is determined by the monitoring action and delay time set in L15-02, L15-03, L15-19, and L15-20.
U15-88	Load monitoring underload curve output	-	-	The speed/underload curve set by the user
U15-89	Load monitoring overload curve output	-	-	The speed/overload curve set by the user

6.17 Module Fan Running Control

The fan speed governing of the MD880 inverter module can be set in A4-30.

Para.	Name	Description
A4-30	Module fan running control selection	0: Run at full speed when the system is running. The fan runs at full speed when the inverter is running. 1: Run at full speed after power-on. The fan runs at full speed when the DC bus is established. 2: Automatically adjust the speed during running. After the inverter runs, the fan running is controlled based on the internal temperature/duty cycle curve. The minimum duty cycle for multi-drive system fans during speed governing is 50%, and that for single-drive system is 40%.

This mode is supported only by some models as listed in the following table. For models not supporting fan speed governing, if A4-30 is set to 2, the fan runs at full speed after the inverter runs.

Frame Size	Module Model
400 V multi-drive system	
H8	MD880-50M-0757-4
H8	MD880-50M-0900-4

Frame Size	Module Model
500 V multi-drive system	
H8	MD880-50M-0617-5
H8	MD880-50M-0810-5
690 V multi-drive system	
H8	MD880-50M-0530-7
H8	MD880-50M-0600-7
H8	MD880-50M-0650-7
H8	MD880-50M-0721-7
690 V single-drive system	
H8	MD880-01S-0600-7-SG
H8	MD880-01S-0650-7-SG
H8	MD880-01S-0721-7-SG

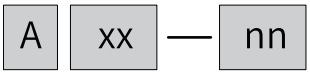
Note

- When the maximum power unit temperature set in A0-14 is above 50°C, the fan is forced to run. When the temperature is blow 45°C, the fan stops.
- The fan will stop one minute after the inverter stops.

7 Parameter Description

7.1 Function Parameter Categories

Parameters of HCU are grouped by function and displayed in three levels of menus, as shown below:



- A indicates a level-1 menu, which is represented by one letter and corresponds to a group of complete functions.
- xx indicates the number of the level-2 menu, which is represented by one or two digits. It combines with the level-1 menu to indicate a group of specific functions.
- nn indicates the number of the level-3 menu, which is represented by two digits. It combines with the level-1 or level-2 menu to indicate a specific parameter.

The level-2 menu and the level-3 menu are separated by "-" for the communication purpose, or by "." for display on LEDs. Axx-nn and Axx.nn indicate the same parameter.

The following table shows the menu classification of parameters.

Level-1 Menu	Name of Level-1 Menu	Level-2 Menu	Name of Level-2 Menu	Remarks
A	System	A0	Status monitoring	Common variables for monitoring the motor running status
		A1	Faults and alarms	Display the currently activated fault and alarm codes
		A2	Drive information	Display rated module parameters, indicating the types and software versions of the HCU, HINT, HPCU, and expansion modules
		A4	Power unit control	Set the carrier frequency or dead zone compensation, enable the power-on buffer detection or parallel module detection, or select the load mode or fan running control mode
		A6	Rectifier control	-
		A8	Environment setting	Reset, back up, and restore parameters, and set the parameter access level
		A9	Data set selection	Switch the command channels, motor data sets, and process parameter groups
		A10	SOP-20/Relay communication	Set communication parameters for SOP-20-880 (including using a repeater to connect InoDriveStudio)
		A12	Trigger oscilloscope	Used together with the trigger oscilloscope function page of InoDriveStudio
		A13	Black box user-defined channel	Customize data you want to additionally record when a fault occurs
		A14	HE200 rectifier parameters	Parameters dedicated for HE200 cabinet modules. Display the status and setting the power-on logic of the rectifier unit
		A15	Parallel parameters	Set the parallel parameters and view the status of parallel modules when using HPCU for parallel control
b	Control channel	b0	Start/Stop control word setting of channel 1	Set the start/stop control word when channel 1 is active. See the function diagram H246
		b1	Other control word settings of channel 1	Set the control word when channel 1 is active. See the function diagram H220/H326
b	Control channel	b2	Start/Stop control word setting of channel 2	Set the start/stop control word when channel 2 is active. See the function diagram H246
		b3	Other control word settings of channel 2	Set the control word when channel 2 is active. See the function diagram H220/H326
		b4	Terminal start/stop module	Set the start/stop mode in the DI terminal control mode
		b5	Auto-tuning/Self-test	Set the self-test or auto-tuning request
		b6	Auxiliary control word setting	For 690 V single-drive cabinet module, HDI1 is forced to be used as DI, and is used as the reactor over-temperature detection signal.
C	Reference channel	C0	Speed reference for channel 1	Control the primary and secondary speed control reference and additional speed reference when channel 1 is active. See function diagram H310

Level-1 Menu	Name of Level-1 Menu	Level-2 Menu	Name of Level-2 Menu	Remarks
C	Reference channel	C1	Torque reference for channel 1	Control the torque control reference, window control reference, additional torque reference, and torque ramp time reference when channel 1 is active. See function diagram H430/H330
		C2	Speed reference for channel 2	Control the primary and secondary speed control reference and additional speed reference when channel 2 is active. See function diagram H310
		C3	Torque reference for channel 2	Control the torque control reference, window control reference, additional torque reference, and torque ramp time reference when channel 2 is active. See function diagram H430/H330
		C4	Motor-driven potentiometer	Set the function parameters of the motor-driven potentiometer
		C5	Jog reference	Set the jog speed and jog time
		C6	Multi-reference value	Set 16 fixed references
		C7	Ramp function generator	Set the function parameters of the ramp function generator
d	Motor parameters	d0	Basic motor parameters	Set the rated motor parameters
		d1	Basic auto-tuning parameters	Auto-tuned basic motor parameters
		d2	Additional auto-tuning parameters	Parameters related to motor mechanical features
		d3	Base value information	Base values used for system per-unit values
E	Motor control	E0	Control setting	-
		E1	Start/Stop control	-
		E2	Limit	-
		E3	V/f control	-
		E4	Speed regulator	-
		E5	Current regulator	-
		E6	Excitation control	-
		E7	Flying start	-
		E8	Protection	-
		E9	Vdc control	-
		E11	Motor model	-
F	Input and output	F0	DI	-
		F1	DO	-
		F2	AI	-
		F3	AO	-
		F4	HDI	-
		F5	HDO	-
		F6	AI/AO factory correction parameters	

Level-1 Menu	Name of Level-1 Menu	Level-2 Menu	Name of Level-2 Menu	Remarks
H	Protection and auxiliary	H0	Troubleshooting	-
		H1	Fault data records	-
		H2	Latest fault code record	-
		H3	Second latest fault code record	-
		H4	Third latest fault code record	-
		H5	Fourth latest fault code record	-
		H6	Fifth latest fault code record	-
		H7	Latest active limit code record	-
		H8	Latest alarm code record	-
		H10	User-defined error word	-
L	Application functions	L0	Word-bit conversion function	-
		L1	Brake control	-
		L2	Logic operation function	-
		L3	W2DW conversion function	-
		L4	Process PID	-
L	Application functions	L5	Switch function block	-
		L6	Control function block	-
		L7	Arithmetic function block 1	-
		L8	Multi-point curve module	-
		L9	Constant setting module	-
		L10	Parameter monitoring and modification	-
		L11	Arithmetic function block 2	-
		L12	Data type conversion module	-
		L14	Ramp function generator module	-
		L15	Load monitoring module	-
		L16	Pulse counting module	-

Level-1 Menu	Name of Level-1 Menu	Level-2 Menu	Name of Level-2 Menu	Remarks
n	Fieldbus adapter and expansion module	n0	InoLink communication	Implement peer-to-peer communication between HCUs or load distribution or master-slave control
		n1	Fieldbus adapter A	Set the receiving and sending of communication data
		n2	Fieldbus adapter B	
		n3	Fieldbus Adapter C	Force to bind the EtherNet commissioning module
		n4	Encoder detection module 1	Set the encoder and measure the motor speed
		n5	Encoder detection module 2	
		n6	Encoder detection module 3	
		n7	Configuration of HIO module 1	Select the HIO module type and monitor parameters
		n8	Configuration of HIO module 2	
		n9	Configuration of HIO module 3	
		n10	Modbus RTU module	Set the slot and inherent parameters for the communication module
		n11	CANlink module	
		n12	CANopen module	
		n13	EtherNet module	
		n14	EtherCAT module	
		n15	HDVN module	
		n16	PROFIBUS-DP module	
		n17	PROFINET IO module	
		n18	Customized communication module	More other communication modules use this parameter group for setting
		n19	Sync voltage detection module 1	Detect the voltage and phase
		n22	Optical fiber routing control module	Set parameters of the HOFR module. Exchange data between multiple HCUs
		n23	Parameter settings of HIO module 1 (HIO-10)	Parameter configuration of the HIO module 1 in group n7. n23 corresponds to n7-02 = HIO-10, n24 corresponds to n7-02 = HIO-20, and n25 corresponds to n7-02 = HIO-30.
		n24	Parameter settings of HIO module 1 (HIO-20)	
		n25	Parameter settings of HIO module 1 (HIO-30)	
		n26	Parameter settings of HIO module 2 (HIO-10)	Parameter configuration of the HIO module 2 in group n8. n26 corresponds to n8-02 = HIO-10, n27 corresponds to n8-02 = HIO-20, and n28 corresponds to n8-02 = HIO-30.
		n27	Parameter settings of HIO module 2 (HIO-20)	
		n28	Parameter settings of HIO module 2 (HIO-30)	

Level-1 Menu	Name of Level-1 Menu	Level-2 Menu	Name of Level-2 Menu	Remarks
n	Fieldbus adapter and expansion module	n29	Parameter settings of HIO module 3 (HIO-10)	Parameter configuration of the HIO module 3 in group n9. n29 corresponds to n9-02 = HIO-10, n30 corresponds to n9-02 = HIO-20, and n31 corresponds to n9-02 = HIO-30.
		n30	Parameter settings of HIO module 3 (HIO-20)	
		n31	Parameter settings of HIO module 3 (HIO-30)	
		n32	High-speed pulse detection module	Calculate the actual output torque based on the detected output pulse of the torque sensor
o	Process parameters	o0	Process setting parameter group 1	-
		o1	Process controller parameter group 1	-
		o2	Process setting parameter group 2	-
		o3	Process controller parameter group 2	-
		o4	Process setting parameter group 3	-
		o5	Process controller parameter group 3	-
		o6	Process setting parameter group 4	-
		o7	Process controller parameter group 4	-
		o10	Rotary control process	-
P	User-defined function block	P0	User-defined conversion function block	-
		P1	User-defined logic function block 1	-
		P2	User-defined logic function block 2	-
		P3	User-defined switch function block	-
		P4	User-defined control function block 1	
		P5	User-defined control function block 2	-
		P6	User-defined arithmetic function block 1	-
		P7	User-defined arithmetic function block 2	-
		P8	User-defined multi-point operation function block	-
		P9	User-defined process control function block	-

Level-1 Menu	Name of Level-1 Menu	Level-2 Menu	Name of Level-2 Menu	Remarks
U	Connector	U0 to U11, U15, U16, U19, and U29	-	Read-only parameters, which can be used to view the status of inputs, outputs, and program execution, or used as inputs for reference source parameters

7.2 Function Parameter List

7.2.1 Group A: System

Para.	Name	Value Range	Unit	Default	Change Mode	Address
Group A0: Status monitoring						
A0-00	Current state machine	1: System initialization 2: Power-on check 3: Fault 4: Switch-on inhibited 5: Ready to switch on 6: Pre-charging 7: Ready to run 8: Waiting for demagnetization 9: Detection before running 10: Pre-excitation 11: Flying start 12: Running 13: OFF1 stop 14: OFF3 stop 15: DC injection braking at startup 16: Ready for self-test 17: Self-test 18: Ready for auto-tuning 19: Auto-tuning 20: Parameter restoration 21: Parameter download 22: Jogging 23: Jog stop 24: Stop with running permission 25: DC injection braking at stop 26: Waiting for DC injection braking at stop 27: Stop at fault 28: Motor parameter calculation 29: Switchover between speed control and torque control 30: Waiting for heat dissipation 31: Wait before operation	-	0	Unmodifiable	32768
A0-01	RFG speed reference	–21474836.48 to +21474836.47	RPM	0	Unmodifiable	35832
A0-02	Target speed	–21474836.48 to +21474836.47	RPM	0	Unmodifiable	35830

Para.	Name	Value Range	Unit	Default	Change Mode	Address
A0-03	Actual motor speed	–21474836.48 to +21474836.47	RPM	0	Unmodifiable	35828
A0-04	RFG frequency reference	–2147483.648 to +2147483.647	Hz	0	Unmodifiable	35838
A0-05	Target frequency	–2147483.648 to +2147483.647	Hz	0	Unmodifiable	35836
A0-06	Actual motor frequency	–2147483.648 to +2147483.647	Hz	0	Unmodifiable	35834
A0-07	Output voltage	0 to 65535	V	0	Unmodifiable	32771
A0-08	Output current	0.0 to 6553.5	A	0	Unmodifiable	32772
A0-09	Output torque	–3276.8 to +3276.7	%	0	Unmodifiable	32773
A0-10	Active power output	–3276.8 to +3276.7	kW	0	Unmodifiable	32774
A0-11	DC bus voltage	0.0 to 6553.5	V	0	Unmodifiable	32775
A0-12	Active MDS	0: Motor 1 1: Motor 2 2: Motor 3 3: Motor 4	-	0	Unmodifiable	32894
A0-13	Active BDS	0: Command channel 1 1: Command channel 2	-	0	Unmodifiable	32895
A0-14	Max. power unit temperature	–32768 to +32767	°C	0	Unmodifiable	32776
A0-15	Max. power unit cavity temperature	–32768 to +32767	°C	0	Unmodifiable	33398

Para.	Name	Value Range	Unit	Default	Change Mode	Address
A0-16	Error prompt type	0: None 1: The OFF1\JOG\terminal start-stop command is not reset, resulting in switch-on inhibited 2: OFF2 is activated, resulting in switch-on inhibited 3: OFF3 is activated, resulting in switch-on inhibited 4: Operation is not allowed to be activated, resulting in operation preparation 5: External fault 1 activated, parameter H0.00 (reserved) 6: External fault 2 activated, parameter H0.01 (reserved) 7: External alarm 1 activated, parameter H0.02 (reserved) 8: External alarm 2 activated, parameter H0.03 (reserved) 9: STO activated 10: DP bus data privilege released but PZD1. check bit not set to 1 11: Switch-on inhibited due to enabling switchover of user-defined function block 12: Switch-on inhibited because OFF2 is activated by three-phase braking A5-01	-	0	Unmodifiable	34298
A0-17	Error prompt source	0: None 1: Set to normally activated. Check parameters in group b 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 11: Fieldbus adapter A.PZD1.0 12: Fieldbus adapter A.PZD1.1	-	0	Unmodifiable	34299

Para.	Name	Value Range	Unit	Default	Change Mode	Address
A0-17	Error prompt source	13: Fieldbus adapter A.PZD1.2 14: Fieldbus adapter A.PZD1.3 15: Fieldbus adapter A.PZD1.8 16: Fieldbus adapter A.PZD1.9 17: Fieldbus adapter B.PZD1.0 18: Fieldbus adapter B.PZD1.1 19: Fieldbus adapter B.PZD1.2 20: Fieldbus adapter B.PZD1.3 21: Fieldbus adapter B.PZD1.8 22: Fieldbus adapter B.PZD1.9 23: PC control bit activated 24: Fieldbus adapter A.PZD1. check bit 25: Fieldbus adapter B.PZD1. check bit 26: Change in user-defined function block enable. HCU failed to power on 27: Three-phase braking A5-00 set to 0 28: HINT is not ready due to e.g. model parameter error 29: STO action signal active	-	0	Unmodifiable	34299
A0-18	Port 24 V detection voltage of HCU control board	0.000 to 65.535	V	0	Unmodifiable	34831
A0-19	Internal 15 V detection voltage of HCU control board	0.000 to 65.535	V	0	Unmodifiable	34832
A0-20	Measured temperature of HCU control board	–32768 to +32767	°C	0	Unmodifiable	36335
Group A1: Faults and alarms						
A1-00	Current fault code 1	0 to 65535	-	0	Unmodifiable	32777
A1-01	Subcode of current fault 1	0 to 65535	-	0	Unmodifiable	32778
A1-02	Current fault code 2	0 to 65535	-	0	Unmodifiable	32779
A1-03	Subcode of current fault 2	0 to 65535	-	0	Unmodifiable	32780
A1-04	Current fault code 3	0 to 65535	-	0	Unmodifiable	32781
A1-05	Subcode of current fault 3	0 to 65535	-	0	Unmodifiable	32782
A1-06	Current fault code 4	0 to 65535	-	0	Unmodifiable	32783
A1-07	Subcode of current fault 4	0 to 65535	-	0	Unmodifiable	32784

Para.	Name	Value Range	Unit	Default	Change Mode	Address
A1-08	Current fault code 5	0 to 65535	-	0	Unmodifiable	32785
A1-09	Subcode of current fault 5	0 to 65535	-	0	Unmodifiable	32786
A1-10	Current fault code 6	0 to 65535	-	0	Unmodifiable	32787
A1-11	Subcode of current fault 6	0 to 65535	-	0	Unmodifiable	32788
A1-12	Active limit code 1	0 to 65535	-	0	Unmodifiable	33795
A1-13	Subcode of active limit 1	0 to 65535	-	0	Unmodifiable	33796
A1-14	Active limit code 2	0 to 65535	-	0	Unmodifiable	33797
A1-15	Subcode of active limit 2	0 to 65535	-	0	Unmodifiable	33798
A1-16	Active limit code 3	0 to 65535	-	0	Unmodifiable	33799
A1-17	Subcode of active limit 3	0 to 65535	-	0	Unmodifiable	33800
A1-18	Active limit code 4	0 to 65535	-	0	Unmodifiable	33801
A1-19	Subcode of active limit 4	0 to 65535	-	0	Unmodifiable	33802
A1-20	Active limit code 5	0 to 65535	-	0	Unmodifiable	33803
A1-21	Subcode of active limit 5	0 to 65535	-	0	Unmodifiable	33804
A1-22	Active limit code 6	0 to 65535	-	0	Unmodifiable	33805
A1-23	Subcode of active limit 6	0 to 65535	-	0	Unmodifiable	33806
A1-24	Current alarm code 1	0 to 65535	-	0	Unmodifiable	32789
A1-25	Subcode of current alarm 1	0 to 65535	-	0	Unmodifiable	32790
A1-26	Current alarm code 2	0 to 65535	-	0	Unmodifiable	32791
A1-27	Subcode of current alarm 2	0 to 65535	-	0	Unmodifiable	32792
A1-28	Current alarm code 3	0 to 65535	-	0	Unmodifiable	32793
A1-29	Subcode of current alarm 3	0 to 65535	-	0	Unmodifiable	32794
A1-30	Current alarm code 4	0 to 65535	-	0	Unmodifiable	32795
A1-31	Subcode of current alarm 4	0 to 65535	-	0	Unmodifiable	32796
A1-32	Current alarm code 5	0 to 65535	-	0	Unmodifiable	32797
A1-33	Subcode of current alarm 5	0 to 65535	-	0	Unmodifiable	32798

Para.	Name	Value Range	Unit	Default	Change Mode	Address
A1-34	Current alarm code 6	0 to 65535	-	0	Unmodifiable	32799
A1-35	Subcode of current alarm 6	0 to 65535	-	0	Unmodifiable	32800
Group A2: Drive information						
A2-00	Product type	0: Diode rectifier 1: Basic rectifier 2: Inverter 3: Regenerative rectifier 4: 3-phase braking 5: DC/DC	-	0	Unmodifiable	32867
A2-01	Rated module power	0.0 to 6553.5	kW	0	Unmodifiable	32868
A2-02	Rated module voltage	0 to 65535	V	0	Unmodifiable	32869
A2-03	Rated module current	0.0 to 6553.5	A	0	Unmodifiable	32870
A2-04	Total rated device power	0.0 to 6553.5	kW	0	Unmodifiable	34118
A2-05	Total rated device current	0.0 to 6553.5	A	0	Unmodifiable	34119
A2-07	HCU software type	0: Multi-drive inverter 1: Basic rectifier 2: Active rectifier 3: Regenerative rectifier 4: 3-phase braking 5: DC/DC 6: Single-drive inverter 7: HE200 9999: Unknown	-	0	Unmodifiable	34017
A2-08	HCU-MCU function software version	0.00 to 655.35	-	0	Unmodifiable	32871
A2-09	HCU-MCU function software subversion	0.00 to 655.35	-	0	Unmodifiable	34121
A2-10	HCU-MCU performance software version	0.00 to 655.35	-	0	Unmodifiable	32872
A2-11	HCU-MCU performance software subversion	0.00 to 655.35	-	0	Unmodifiable	34120
A2-12	Parameter version	0 to 65535	-	0	Unmodifiable	34053
A2-16	HCU-FPGA software version	0.00 to 655.35	-	0	Unmodifiable	32873

Para.	Name	Value Range	Unit	Default	Change Mode	Address
A2-18	HINT type	0: Diode rectifier 1: Basic rectifier 2: Active rectifier 3: Regenerative rectifier 4: Multi-drive inverter 5: DC/DC 6: 3-phase braking 7: Shore power 8: Single drive 100: Offline 101: Inconsistent type 102: Inconsistent software version 103: Unknown	-	0	Unmodifiable	32984
A2-19	HINT software version	0.00 to 655.35	-	0	Unmodifiable	32874
A2-22	HPCU software version	0.00 to 655.35	-	0	Unmodifiable	32875

Para.	Name	Value Range	Unit	Default	Change Mode	Address
A2-24	Expansion slot 1_1 module type	0: No expansion card 17: I/O module HIO-10 32: Encoder detection module PG-10 35: Encoder detection module PG-40 36: Encoder detection module PG-50 38: High-speed pulse detection module 48: Sync voltage detection module HSVM-10 49: Sync voltage detection module HSVM-20 64: HINT module (HE200 rectifier) 96: HOFR module 112: PROFIBUS-DP module 113: CANopen module 114: CANlink module 115: Modbus RTU module 116: Modbus TCP module 117: PROFINET IO module 118: EtherCAT module 121: EtherNET module 122: DeviceNet module 124: IBA module 125: Customized communication module	-	0	Unmodifiable	32876
A2-25	Expansion slot 1_1 software version	0.00 to 655.35	-	0	Unmodifiable	32877

Para.	Name	Value Range	Unit	Default	Change Mode	Address
A2-26	Expansion slot 1_2 module type	0: No expansion card 17: I/O module HIO-10 32: Encoder detection module PG-10 35: Encoder detection module PG-40 36: Encoder detection module PG-50 38: High-speed pulse detection module 48: Sync voltage detection module HSVM-10 49: Sync voltage detection module HSVM-20 64: HINT module (HE200 rectifier) 96: HOFR module 96: HOFR module 112: PROFIBUS-DP module 113: CANopen module 114: CANlink module 115: Modbus RTU module 116: Modbus TCP module 117: PROFINET IO module 118: EtherCAT module 121: EtherNET module 122: DeviceNet module 124: IBA module 125: Customized communication module	-	0	Unmodifiable	32878
A2-27	Expansion slot 1_2 software version	0.00 to 655.35	-	0	Unmodifiable	32879

Para.	Name	Value Range	Unit	Default	Change Mode	Address
A2-28	Expansion slot 1_3 module type	0: No expansion card 17: I/O module HIO-10 32: Encoder detection module PG-10 35: Encoder detection module PG-40 36: Encoder detection module PG-50 38: High-speed pulse detection module 48: Sync voltage detection module HSVM-10 49: Sync voltage detection module HSVM-20 64: HINT module (HE200 rectifier) 96: HOFR module 112: PROFIBUS-DP module 113: CANopen module 114: CANlink module	-	0	Unmodifiable	32880
A2-28	Expansion slot 1_3 module type	115: Modbus RTU module 116: Modbus TCP module 117: PROFINET IO module 118: EtherCAT module 121: EtherNET module 122: DeviceNet module 124: IBA module 125: Customized communication module	-	0	Unmodifiable	32880
A2-29	Expansion slot 1_3 software version	0.00 to 655.35	-	0	Unmodifiable	32881

Para.	Name	Value Range	Unit	Default	Change Mode	Address
A2-30	Expansion slot 2_1 module type	0: No expansion card 17: I/O module HIO-10 32: Encoder detection module PG-10 35: Encoder detection module PG-40 36: Encoder detection module PG-50 38: High-speed pulse detection module 48: Sync voltage detection module HSVM-10 49: Sync voltage detection module HSVM-20 64: HINT module (HE200 rectifier) 96: HOFR module 112: PROFIBUS-DP module 113: CANopen module 114: CANlink module 115: Modbus RTU module 116: Modbus TCP module 117: PROFINET IO module 118: EtherCAT module 121: EtherNET module 122: DeviceNet module 124: IBA module 125: Customized communication module	-	0	Unmodifiable	32882
A2-31	Expansion slot 2_1 software version	0.00 to 655.35	-	0	Unmodifiable	32883
A2-32	Expansion slot 2_2 module type	0: No expansion card 17: I/O module HIO-10 32: Encoder detection module PG-10 35: Encoder detection module PG-40 36: Encoder detection module PG-50 38: High-speed pulse detection module 48: Sync voltage detection module HSVM-10 49: Sync voltage detection module HSVM-20 64: HINT module (HE200 rectifier)	-	0	Unmodifiable	32884

Para.	Name	Value Range	Unit	Default	Change Mode	Address
A2-32	Expansion slot 2_2 module type	96: HOFR module 112: PROFIBUS-DP module 113: CANopen module 114: CANlink module 115: Modbus RTU module 116: Modbus TCP module 117: PROFINET IO module 118: EtherCAT module 121: EtherNET module 122: DeviceNet module 124: IBA module 125: Customized communication module	-	0	Unmodifiable	32884
A2-33	Expansion slot 2_2 software version	0.00 to 655.35	-	0	Unmodifiable	32885
A2-34	Expansion slot 2_3 module type	0: No expansion card 17: I/O module HIO-10 32: Encoder detection module PG-10 35: Encoder detection module PG-40 36: Encoder detection module PG-50 38: High-speed pulse detection module 48: Sync voltage detection module HSVM-10 49: Sync voltage detection module HSVM-20 64: HINT module (HE200 rectifier) 96: HOFR module 112: PROFIBUS-DP module 113: CANopen module 114: CANlink module 115: Modbus RTU module 116: Modbus TCP module 117: PROFINET IO module 118: EtherCAT module 121: EtherNET module 122: DeviceNet module 124: IBA module 125: Customized communication module	-	0	Unmodifiable	32886

Para.	Name	Value Range	Unit	Default	Change Mode	Address
A2-35	Expansion slot 2_3 software version	0.00 to 655.35	-	0	Unmodifiable	32887
A2-36	Expansion slot 3_1 module type	0: No expansion card 17: I/O module HIO-10 32: Encoder detection module PG-10 35: Encoder detection module PG-40 36: Encoder detection module PG-50 38: High-speed pulse detection module 48: Sync voltage detection module HSVM-10 49: Sync voltage detection module HSVM-20 64: HINT module (HE200 rectifier) 96: HOFR module 112: PROFIBUS-DP module 113: CANopen module 114: CANlink module 115: Modbus RTU module 116: Modbus TCP module 117: PROFINET IO module 118: EtherCAT module 121: EtherNET module 122: DeviceNet module 124: IBA module 125: Customized communication module	-	0	Unmodifiable	32888
A2-37	Expansion slot 3_1 software version	0.00 to 655.35	-	0	Unmodifiable	32889
A2-40	Available HCU-FPGA functions	0x0000 to 0xFFFF	-	0	Unmodifiable	34826
A2-41	Enabled HCU-FPGA functions	0x0000 to 0xFFFF	-	0	Unmodifiable	34827
A2-42	Available HINT functions	0x0000 to 0xFFFF	-	0	Unmodifiable	34828
A2-43	Enabled HINT functions	0x0000 to 0xFFFF	-	0	Unmodifiable	34829
A2-44	Current year	0 to 65535	-	0	Unmodifiable	34836
A2-45	Current date	0 to 65535	-	0	Unmodifiable	34837
A2-46	Current time	0 to 65535	-	0	Unmodifiable	34838

Para.	Name	Value Range	Unit	Default	Change Mode	Address
A2-47	Year of current power-on	0 to 65535	-	0	Unmodifiable	34839
A2-48	Date of current power-on	0 to 65535	-	0	Unmodifiable	34840
A2-49	Time of current power-on	0 to 65535	-	0	Unmodifiable	34841
A2-53	Inverter software type	0: Standard software 1: Professional software for crane	-	0	Unmodifiable	33085
A2-54	Cabinet status display	0: Standard mode 1: INOVANCE 690 V single-drive cabinet	-	0	Unmodifiable	33084
Group A4: Power unit control						
A4-00	Max. allowable carrier frequency	1.20 to 12.00	kHz	4	Unmodifiable	47
A4-01	Actual valid carrier frequency	1.20 to 12.00	kHz	1.25	Unmodifiable	48
A4-02	Carrier frequency setting	1.20 to 8.00	kHz	1.25	At once	49
A4-06	DPWM switchover frequency	0.0 to 300.0	Hz	0	At stop	53
A4-07	PWM modulation mode	0: Without overmodulation 1: With overmodulation	-	0	At stop	54
A4-08	Random PWM	0 to 10	-	0	At stop	55
A4-09	Dead zone compensation enable	0: Disable 1: Enable	-	1	At stop	56
A4-10	Fast current limiting	0: Disable 1: Enable	-	1	At stop	57
A4-11	Pre-charge resistor detection enable	0: Disable 1: Enable	-	1	At stop	58
A4-12	Input phase loss detection enable	0: Disable 1: Enable	-	1	At stop	59
A4-15	DC bus overvoltage threshold	80.0 to 100.0	%	100	At stop	60
A4-17	Software undervoltage threshold adjustment coefficient	0: 100% Other: K connector	-	0	At stop	1844
A4-18	Valid software undervoltage threshold	0.0 to 6553.5	V	0	Unmodifiable	33760
A4-23	Output phase loss detection enable for parallel module	0: Disable 1: Enable	-	1	At once	2864
A4-24	Bus voltage detection enable for parallel module	0: Disable 1: Enable	-	1	At once	2868
A4-25	Current unbalance detection enable for parallel module	0: Disable 1: Enable	-	1	At once	2910

Para.	Name	Value Range	Unit	Default	Change Mode	Address
A4-27	Module pre-overtemperature threshold	0 to 60	°C	5	At once	2913
A4-30	Module fan running control selection	0: Run at full speed when the system is running 1: Run at full speed after power-on 2: Automatically adjust the speed during running	-	2	At once	3211
A4-32	Over-modulation depth	100.0 to 110.0	%	103	At once	4218
A4-48	Valid software overvoltage threshold	0.0 to 6553.5	V	0	Unmodifia-ble	36334
Group A6: Rectifier control						
A6-00	Rectifier control enable	0: Disable 1: Enable	-	0	At stop	69
A6-01	Rectifier control start time	0.0 to 100.0	s	10	At stop	70
A6-02	Pre-charge completion additional condition selection	0: Disable 1: Enable Other: B connector	-	1	At once	1670
A6-03	Pre-charge completion additional condition waiting time	0.00 to 100.00	s	0	At once	1671
Group A8: Environment setting						
A8-00	Parameter reset mode	0: Disable 1: Restore partial parameters to factory defaults 2: Restore all parameters to factory defaults 3: Clear fault records 4: Clear black box records	-	0	At stop	33787
A8-01	Parameter reset	0: Canceled 1: Confirm	-	0	At stop	33788
A8-02	Parameter access level	0: Standard parameter 1: Expansion parameter 2: Expert parameter 3: Maintenance parameter	-	0	At once	34064
A8-03	Factory password	0 to 65535	-	0	At once	78
A8-05	Parameter backup function selection	0: None 1: Save to SD card 2: Restore from SD card 3: Check parameters	-	0	At once	34236
A8-06	Parameter backup function confirmation	0: Canceled 1: Confirm	-	0	At once	34238

Para.	Name	Value Range	Unit	Default	Change Mode	Address
A8-07	Parameter backup status	0: None 1: Saving 2: Saved 3: Failed to save 4: Restoring 5: Restored 6: Failed to restore 7: Checking 8: Parameter file error 9: Parameter consistent 10: Parameter inconsistent 11: SD card busy	-	0	Unmodifiable	34237
A8-08	Inconsistent parameter addresses	0 to 65535	-	0	Unmodifiable	34844
A8-09	Parameter value in the file	0 to 65535	-	0	Unmodifiable	34845
A8-15	User-defined function block enable	0: Disable 1: Enable	-	1	At once	3240
A8-17	Time statistics reset selection	0: None 1: Reset current statistics time 2: Reset accumulated statistics time 3: Reset all statistics time	-	0	At once	34842
A8-18	Time statistics reset confirmation	0: Canceled 1: Confirm	-	0	At once	34843
A8-22	Simulation operation mode	0: Disable 1: Enable	-	0	At stop	34245
A8-23	Simulation operation load torque	–3276.8 to +3276.7	%	0	At once	33081
Group A9: Data group selection						
A9-00	Command channel source selection	0: Command channel 1 1: Command channel 2 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At stop	80

Para.	Name	Value Range	Unit	Default	Change Mode	Address
A9-02	MDS 0 source	0: 0 1: 1 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At stop	81
A9-03	MDS 1 source	0: 0 1: 1 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At stop	82
A9-04	Process parameter group selection 0 source	0: 0 1: 1 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At stop	4801

Para.	Name	Value Range	Unit	Default	Change Mode	Address
A9-05	Process parameter group selection 1 source	0: 0 1: 1 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At stop	4802
Group A10: SOP-20/relay communication						
A10-00	SOP-20 control enable	0: Disable 1: Enable Other: B connector	-	1	At stop	84
A10-01	SOP-20 control speed reference selection	0: Motor-driven potentiometer 1: Speed reference channel Other: B connector	-	0	At stop	85
A10-03	SOP-20/Relay communication address	1 to 127	-	1	At once	88
A10-04	SOP-20/Relay communication baud rate	0: 115200 bps 1: 1 Mbps 2: 2 Mbps 3: 4 Mbps	-	3	At stop	89
A10-05	SOP-20 disconnection detection	0: Enable 1: Disable	-	0	At stop	34195
A10-06	SOP-20 disconnection detection time	0.5 to 6000.0	s	3	At once	6404
A10-07	SOP-20 start/stop control selection	0: SOP-20 valid 1: Control reference channel Other: B connector	-	0	At stop	3187
A10-09	Retention upon power failure of SOP-20 local/ remote status	0: Do not retain 1: Retain Other: B connector	-	0	At once	3189
A10-10	SOP-20 setpoint 1 (Hz)	–327.68 to +327.67	Hz	0	At once	36312
A10-11	SOP-20 setpoint 2 (RPM)	–32768 to +32767	RPM	0	At once	36313
A10-12	SOP-20 setpoint 3 (%)	–3276.8 to +3276.7	%	0	At once	36314
Group A12: Trigger oscilloscope						
A12-00	Trigger oscilloscope status	0: Not triggered 1: Triggered	-	0	Unmodifia-ble	33784

Para.	Name	Value Range	Unit	Default	Change Mode	Address
A12-01	Trigger oscilloscope start	0: Stop 1: Start	-	0	At once	33783
A12-02	Trigger oscilloscope sampling period	0: Carrier period 1: 2 ms	-	1	At once	1867
A12-03	Trigger oscilloscope sampling period multiplier	1 to 16	-	1	At once	1868
A12-04	Trigger oscilloscope trigger ratio	10 to 90	%	50	At once	1869
A12-05	Trigger mode of trigger condition 1	0: By analog 1: By analog bit 2: By digital 3: By state machine 4: By fault 5: By active limit 6: By alarm	-	0	At once	1870
A12-06	Analog selection of trigger condition 1	0: Disable Other: K connector	-	0	At once	1871
A12-07	Analog bit selection of trigger condition 1	0 to 15	-	0	At once	1872
A12-08	Digital selection of trigger condition 1	0: Disable Other: K connector	-	0	At once	1873
A12-09	Analog comparison condition of trigger condition 1	0: Greater than (>) 1: Less than (<) 2: Equal to (=) 3: Greater than or equal to (>=) 4: Less than or equal to (<=)	-	0	At once	1874
A12-10	Bit comparison condition of trigger condition 1	0: Rising edge changing from 0 to 1 1: Falling edge changing from 1 to 0 2: Edge changing from 0 to 1 or from 1 to 0 3: High signal 1 4: Low signal 0	-	0	At once	1875
A12-11	Analog value of trigger condition 1	–32768 to +32767	-	0	At once	1876
A12-12	Trigger condition relation	0: Trigger condition 2 invalid 1: AND 2: OR 3: XOR	-	0	At once	1877

Para.	Name	Value Range	Unit	Default	Change Mode	Address
A12-13	Trigger mode of trigger condition 2	0: By analog 1: By analog bit 2: By digital 3: By state machine 4: By fault 5: By active limit 6: By alarm	-	0	At once	1878
A12-14	Analog selection of trigger condition 2	0: Disable Other: K connector	-	0	At once	1879
A12-15	Analog bit selection of trigger condition 2	0 to 15	-	0	At once	1880
A12-16	Digital selection of trigger condition 2	0: Disable Other: K connector	-	0	At once	1881
A12-17	Analog comparison condition of trigger condition 2	0: Greater than (>) 1: Less than (<) 2: Equal to (=) 3: Greater than or equal to (>=) 4: Less than or equal to (<=)	-	0	At once	1882
A12-18	Bit comparison condition of trigger condition 2	0: Rising edge changing from 0 to 1 1: Falling edge changing from 1 to 0 2: Edge changing from 0 to 1 or from 1 to 0 3: High signal 1 4: Low signal 0	-	0	At once	1883
A12-19	Analog value of trigger condition 2	–32768 to +32767	-	0	At once	1884
A12-20	Number of trigger oscilloscope sampling channels	0 to 50	-	1	At once	1935
A12-21	Trigger oscilloscope channel 1 selection	1000 to 3999	-	1000	At once	1885
A12-22	Trigger oscilloscope channel 2 selection	1000 to 3999	-	1000	At once	1886
A12-23	Trigger oscilloscope channel 3 selection	1000 to 3999	-	1000	At once	1887
A12-24	Trigger oscilloscope channel 4 selection	1000 to 3999	-	1000	At once	1888
A12-25	Trigger oscilloscope channel 5 selection	1000 to 3999	-	1000	At once	1889
A12-26	Trigger oscilloscope channel 6 selection	1000 to 3999	-	1000	At once	1890
A12-27	Trigger oscilloscope channel 7 selection	1000 to 3999	-	1000	At once	1891
A12-28	Trigger oscilloscope channel 8 selection	1000 to 3999	-	1000	At once	1892

Para.	Name	Value Range	Unit	Default	Change Mode	Address
A12-29	Trigger oscilloscope channel 9 selection	1000 to 3999	-	1000	At once	1893
A12-30	Trigger oscilloscope channel 10 selection	1000 to 3999	-	1000	At once	1894
A12-31	Trigger oscilloscope channel 11 selection	1000 to 3999	-	1000	At once	1895
A12-32	Trigger oscilloscope channel 12 selection	1000 to 3999	-	1000	At once	1896
A12-33	Trigger oscilloscope channel 13 selection	1000 to 3999	-	1000	At once	1897
A12-34	Trigger oscilloscope channel 14 selection	1000 to 3999	-	1000	At once	1898
A12-35	Trigger oscilloscope channel 15 selection	1000 to 3999	-	1000	At once	1899
A12-36	Trigger oscilloscope channel 16 selection	1000 to 3999	-	1000	At once	1900
A12-37	Trigger oscilloscope channel 17 selection	1000 to 3999	-	1000	At once	1901
A12-38	Trigger oscilloscope channel 18 selection	1000 to 3999	-	1000	At once	1902
A12-39	Trigger oscilloscope channel 19 selection	1000 to 3999	-	1000	At once	1903
A12-40	Trigger oscilloscope channel 20 selection	1000 to 3999	-	1000	At once	1904
A12-41	Trigger oscilloscope channel 21 selection	1000 to 3999	-	1000	At once	1905
A12-42	Trigger oscilloscope channel 22 selection	1000 to 3999	-	1000	At once	1906
A12-43	Trigger oscilloscope channel 23 selection	1000 to 3999	-	1000	At once	1907
A12-44	Trigger oscilloscope channel 24 selection	1000 to 3999	-	1000	At once	1908
A12-45	Trigger oscilloscope channel 25 selection	1000 to 3999	-	1000	At once	1909
A12-46	Trigger oscilloscope channel 26 selection	1000 to 3999	-	1000	At once	1910
A12-47	Trigger oscilloscope channel 27 selection	1000 to 3999	-	1000	At once	1911
A12-48	Trigger oscilloscope channel 28 selection	1000 to 3999	-	1000	At once	1912
A12-49	Trigger oscilloscope channel 29 selection	1000 to 3999	-	1000	At once	1913
A12-50	Trigger oscilloscope channel 30 selection	1000 to 3999	-	1000	At once	1914
A12-51	Trigger oscilloscope channel 31 selection	1000 to 3999	-	1000	At once	1915
A12-52	Trigger oscilloscope channel 32 selection	1000 to 3999	-	1000	At once	1916
A12-53	Trigger oscilloscope channel 33 selection	1000 to 3999	-	1000	At once	1917
A12-54	Trigger oscilloscope channel 34 selection	1000 to 3999	-	1000	At once	1918

Para.	Name	Value Range	Unit	Default	Change Mode	Address
A12-55	Trigger oscilloscope channel 35 selection	1000 to 3999	-	1000	At once	1919
A12-56	Trigger oscilloscope channel 36 selection	1000 to 3999	-	1000	At once	1920
A12-57	Trigger oscilloscope channel 37 selection	1000 to 3999	-	1000	At once	1921
A12-58	Trigger oscilloscope channel 38 selection	1000 to 3999	-	1000	At once	1922
A12-59	Trigger oscilloscope channel 39 selection	1000 to 3999	-	1000	At once	1923
A12-60	Trigger oscilloscope channel 40 selection	1000 to 3999	-	1000	At once	1924
A12-61	Trigger oscilloscope channel 41 selection	1000 to 3999	-	1000	At once	1925
A12-62	Trigger oscilloscope channel 42 selection	1000 to 3999	-	1000	At once	1926
A12-63	Trigger oscilloscope channel 43 selection	1000 to 3999	-	1000	At once	1927
A12-64	Trigger oscilloscope channel 44 selection	1000 to 3999	-	1000	At once	1928
A12-65	Trigger oscilloscope channel 45 selection	1000 to 3999	-	1000	At once	1929
A12-66	Trigger oscilloscope channel 46 selection	1000 to 3999	-	1000	At once	1930
A12-67	Trigger oscilloscope channel 47 selection	1000 to 3999	-	1000	At once	1931
A12-68	Trigger oscilloscope channel 48 selection	1000 to 3999	-	1000	At once	1932
A12-69	Trigger oscilloscope channel 49 selection	1000 to 3999	-	1000	At once	1933
A12-70	Trigger oscilloscope channel 50 selection	1000 to 3999	-	1000	At once	1934
Group A13: Black box user-defined channel						
A13-00	Black box user-defined channel 1	0: Disable Other: K connector	-	0	At once	1954
A13-01	Black box user-defined channel 2	0: Disable Other: K connector	-	0	At once	1955
A13-02	Black box user-defined channel 3	0: Disable Other: K connector	-	1833	At once	1956
A13-03	Black box user-defined channel 4	0: Disable Other: K connector	-	1780	At once	1957
A13-04	Black box user-defined channel 5	0: Disable Other: K connector	-	1544	At once	1958
A13-05	Black box user-defined channel 6	0: Disable Other: K connector	-	1560	At once	1959
A13-06	Black box user-defined channel 7	0: Disable Other: K connector	-	1909	At once	1960
A13-07	Black box user-defined channel 8	0: Disable Other: K connector	-	2523	At once	1961

Para.	Name	Value Range	Unit	Default	Change Mode	Address
A13-08	Black box user-defined channel 9	0: Disable Other: K connector	-	2522	At once	1962
A13-09	Black box user-defined channel 10	0: Disable Other: K connector	-	1877	At once	1963
A13-10	Black box user-defined channel 11	0: Disable Other: K connector	-	1787	At once	1964
A13-11	Black box user-defined channel 12	0: Disable Other: K connector	-	1839	At once	1965
A13-12	Black box user-defined channel 13	0: Disable Other: K connector	-	1840	At once	1966
A13-13	Black box user-defined channel 14	0: Disable Other: K connector	-	1874	At once	1967
A13-14	Black box user-defined channel 15	0: Disable Other: K connector	-	1875	At once	1968
A13-15	Black box user-defined channel 16	0: Disable Other: K connector	-	1876	At once	1969
Group A14: HE200 rectifier parameters						
A14-00	[Rectifier unit 1] Online status	0: Offline 1: Online	-	0	Unmodifiable	33891
A14-01	[Rectifier unit 2] Online status	0: Offline 1: Online	-	0	Unmodifiable	33908
A14-02	[Rectifier unit 1] Fault status 1	0 to 65535	-	0	Unmodifiable	33892
A14-03	[Rectifier unit 1] Fault status 2	0 to 65535	-	0	Unmodifiable	33893
A14-04	[Rectifier unit 2] Fault status 1	0 to 65535	-	0	Unmodifiable	33909
A14-05	[Rectifier unit 2] Fault status 2	0 to 65535	-	0	Unmodifiable	33910
A14-06	[Rectifier unit 1] Bus voltage	0.0 to 6553.5	V	0	Unmodifiable	33894
A14-07	[Rectifier unit 2] Bus voltage	0.0 to 6553.5	V	0	Unmodifiable	33911
A14-08	[Rectifier unit 1] Grid voltage	0 to 65535	V	0	Unmodifiable	33895
A14-09	[Rectifier unit 2] Grid voltage	0 to 65535	V	0	Unmodifiable	33912
A14-10	[Rectifier unit 1] Module temperature 1	–3276.8 to +3276.7	°C	0	Unmodifiable	33898
A14-11	[Rectifier unit 1] Module temperature 2	–3276.8 to +3276.7	°C	0	Unmodifiable	33899
A14-12	[Rectifier unit 1] Module temperature 3	–3276.8 to +3276.7	°C	0	Unmodifiable	33900
A14-13	[Rectifier unit 1] Temperature of line connection module	–3276.8 to +3276.7	°C	0	Unmodifiable	33901

Para.	Name	Value Range	Unit	Default	Change Mode	Address
A14-14	[Rectifier unit 1] Temperature of brake module	–3276.8 to +3276.7	°C	0	Unmodifiable	33902
A14-15	[Rectifier unit 2] Module temperature 1	–3276.8 to +3276.7	°C	0	Unmodifiable	33915
A14-16	[Rectifier unit 2] Module temperature 2	–3276.8 to +3276.7	°C	0	Unmodifiable	33916
A14-17	[Rectifier unit 2] Module temperature 3	–3276.8 to +3276.7	°C	0	Unmodifiable	33917
A14-18	[Rectifier unit 2] Temperature of line connection module	–3276.8 to +3276.7	°C	0	Unmodifiable	33918
A14-19	[Rectifier unit 2] Temperature of brake module	–3276.8 to +3276.7	°C	0	Unmodifiable	33919
A14-20	[Rectifier unit 1] Power-on status	0: Wait for power-on 1: Pre-charge power-on 2: Wait for completion 3: Power-on completed	-	0	Unmodifiable	33896
A14-21	[Rectifier unit 2] Power-on status	0: Wait for power-on 1: Pre-charge power-on 2: Wait for completion 3: Power-on completed	-	0	Unmodifiable	33913
A14-22	Grid power overvoltage threshold	0 to 65535	V	0	Unmodifiable	33897
A14-23	Grid power undervoltage threshold	0 to 65535	V	0	Unmodifiable	33914
A14-29	Latch current of braking unit 1	0.0 to 6553.5	A	0	Unmodifiable	33761
A14-35	Latch current of braking unit 2	0.0 to 6553.5	A	0	Unmodifiable	33762
A14-36	HINT expansion card selection	0: Single: HINT expansion card 1 valid 1:Parallel: Both HINT expansion cards 1 and 2 valid 2: HINT expansion card invalid	-	0	At once	2149
A14-37	HINT expansion card 1 slot selection	0: Disable 1: Expansion slot 1_1 2: Expansion slot 1_2 3: Expansion slot 1_3 4: Expansion slot 2_1 5: Expansion slot 2_2 6: Expansion slot 2_3 7: Expansion slot 3_1	-	0	At once	2150

Para.	Name	Value Range	Unit	Default	Change Mode	Address
A14-38	HINT expansion card 2 slot selection	0: Disable 1: Expansion slot 1_1 2: Expansion slot 1_2 3: Expansion slot 1_3 4: Expansion slot 2_1 5: Expansion slot 2_2 6: Expansion slot 2_3 7: Expansion slot 3_1	-	0	At once	2151
A14-40	Rectifier control source selection	0: Cabinet door 1: "Rectifier switch-on/off command source" parameter 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	3036
A14-41	Rectifier switch-on/off command source	2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	1000	At once	2153
A14-42	Rectifier and braking unit mode selection	0: Enable rectifier, disable braking unit 1: Enable rectifier and brake 1 in the single mode 2: Enable rectifier and brake units 1/2 in the parallel mode 3: Only braking unit for single - disable the rectifier, enable braking unit 1 4: Only braking unit for parallel - disable rectifier, enable both braking units 1 and 2	-	0	At once	2155

Para.	Name	Value Range	Unit	Default	Change Mode	Address
A14-43	Built-in braking unit model	0: U41 1: U42 2: U43 3: U44 4: U45 5: U46 6: U47 7: U48 8: U49 9: U50 10: U71 11: U72 12: U73 13: U74 14: U75 15: U76 16: U77 17: U78 18: U79 19: U80 20: U81 21: U82	-	12	At stop	2156
A14-44	Brake opening threshold selection	0: Low 1: High	-	0	At once	2157
A14-46	Brake opening voltage threshold	500.0 to 1150.0	V	1126	At once	3035
A14-47	Valid brake opening voltage threshold	0.0 to 6553.5	V	0	Unmodifia-ble	33983

Para.	Name	Value Range	Unit	Default	Change Mode	Address
A14-48	Braking function selection 1	Ones position: Overload suppression enable 0: Disable 1: Enable Tens potion: Power-on self-test enable 0: Disable 1: Enable Hundreds position: Operation on braking self-test fault 0: Rectifier does not power off 1: Rectifier powers off Thousands position: Operation on braking overload 0: Rectifier does not power off 1: Rectifier powers off Ten thousands position: Operation on braking overvoltage 0: Rectifier does not power off 1: Rectifier powers off	-	100	At once	2158
A14-49	Braking function selection 2	Ones position: Operation on braking overcurrent 0: Rectifier does not power off 1: Rectifier powers off Tens position: Operation on braking over-temperature 0: Rectifier does not power off 1: Rectifier powers off Hundreds position: Operation on braking low temperature 0: Rectifier does not power off 1: Rectifier powers off Thousands position: Operation on braking IGBT-VCE fault 0: Rectifier does not power off 1: Rectifier powers off Ten thousands position: Operation on braking overvoltage 0: Rectifier does not power off 1: Rectifier powers off	-	10000	At once	23037
A14-50	[Rectifier unit 1] Bus voltage gain	80.0 to 120.0	%	100	At once	2159
A14-51	[Rectifier unit 1] Bus voltage offset	0.0 to 50.0	%	0	At once	2160

Para.	Name	Value Range	Unit	Default	Change Mode	Address
A14-52	[Rectifier unit 2] Bus voltage gain	80.0 to 120.0	%	100	At once	2161
A14-53	[Rectifier unit 2] Bus voltage offset	0.0 to 50.0	%	0	At once	2162
A14-54	High grid voltage judgment threshold	110.0 to 135.0	%	115	At once	2217
A14-55	Low grid voltage judgment threshold	30.0 to 85.0	%	85	At once	2218
Group A15: Parallel parameters						
A15-00	Parallel function selection	0: Single 1: Parallel	-	100	At stop	2419
A15-01	HPCU online flag	0: Offline 1: Online	-	0	Unmodifiable	34122
A15-02	Parallel module enable 1	Ones position: Module 1 0: Disable 1: Enable Tens position: Module 2 0: Disable 1: Enable Hundreds position: Module 3 0: Disable 1: Enable Thousands position: Module 4 0: Disable 1: Enable Ten thousands position: Module 5 0: Disable 1: Enable	-	0	At stop	2420

Para.	Name	Value Range	Unit	Default	Change Mode	Address
A15-03	Parallel module enable 21	Ones position: Module 6 0: Disable 1: Enable Tens position: Module 7 0: Disable 1: Enable Hundreds position: Module 8 0: Disable 1: Enable Thousands position: Module 9 0: Disable 1: Enable Ten thousands position: Module 10 0: Disable 1: Enable	-	0	At stop	2421
A15-04	Number of enabled parallel modules	0 to 65535	-	0	Unmodifiable	34123
A15-05	Parallel module online display 1	Ones position: Module 1 0: Disable 1: Enable Tens position: Module 2 0: Disable 1: Enable Hundreds position: Module 3 0: Disable 1: Enable	-	0	Unmodifiable	34123
A15-05	Parallel module online display 1	Thousands position: Module 4 0: Disable 1: Enable Ten thousands position: Module 5 0: Disable 1: Enable	-	0	Unmodifiable	34125

Para.	Name	Value Range	Unit	Default	Change Mode	Address
A15-06	Parallel module online display 2	Ones position: Module 6 0: Disable 1: Enable Tens position: Module 7 0: Disable 1: Enable Hundreds position: Module 8 0: Disable 1: Enable Thousands position: Module 9 0: Disable 1: Enable Ten thousands position: Module 10 0: Disable 1: Enable	-	0	Unmodifiable	34126
A15-07	Number of online parallel modules	0 to 65535	-	0	Unmodifiable	34124
A15-08	Parallel balance enable	0: Disable 1: Enable	-	1	At stop	2422
A15-11	Parallel unbalance protection threshold	5 to 30	%	10	At once	2425
A15-12	Total rated device power	0.0 to 6553.5	kW	0	Unmodifiable	34118
A15-13	Total rated device current	0.0 to 6553.5	A	0	Unmodifiable	34119
A15-14	Module temperature of parallel module 1	–32768 to +32767	°C	0	Unmodifiable	34108
A15-15	Ambient temperature of parallel module 1	–32768 to +32767	°C	0	Unmodifiable	34098
A15-16	Module temperature of parallel module 2	–32768 to +32767	°C	0	Unmodifiable	34109
A15-17	Ambient temperature of parallel module 2	–32768 to +32767	°C	0	Unmodifiable	34099
A15-18	Module temperature of parallel module 3	–32768 to +32767	°C	0	Unmodifiable	34110
A15-19	Ambient temperature of parallel module 3	–32768 to +32767	°C	0	Unmodifiable	34100
A15-20	Module temperature of parallel module 4	–32768 to +32767	°C	0	Unmodifiable	34111
A15-21	Ambient temperature of parallel module 4	–32768 to +32767	°C	0	Unmodifiable	34101
A15-22	Module temperature of parallel module 5	–32768 to +32767	°C	0	Unmodifiable	34112
A15-23	Ambient temperature of parallel module 5	–32768 to +32767	°C	0	Unmodifiable	34102

Para.	Name	Value Range	Unit	Default	Change Mode	Address
A15-24	Module temperature of parallel module 6	–32768 to +32767	°C	0	Unmodifiable	34113
A15-25	Ambient temperature of parallel module 6	–32768 to +32767	°C	0	Unmodifiable	34103
A15-26	Module temperature of parallel module 7	–32768 to +32767	°C	0	Unmodifiable	34114
A15-27	Ambient temperature of parallel module 7	–32768 to +32767	°C	0	Unmodifiable	34104
A15-28	Module temperature of parallel module 8	–32768 to +32767	°C	0	Unmodifiable	34115
A15-29	Ambient temperature of parallel module 8	–32768 to +32767	°C	0	Unmodifiable	34105
A15-30	Module temperature of parallel module 9	–32768 to +32767	°C	0	Unmodifiable	34116
A15-31	Ambient temperature of parallel module 9	–32768 to +32767	°C	0	Unmodifiable	34106
A15-32	Module temperature of parallel module 10	–32768 to +32767	°C	0	Unmodifiable	34117
A15-33	Ambient temperature of parallel module 10	–32768 to +32767	°C	0	Unmodifiable	34107
A15-34	HPCU module ID	0 to 65535	-	0	Unmodifiable	34162
A15-35	HPCU version	0.00 to 655.35	-	0	Unmodifiable	34163
A15-36	Parallel general fault word 1	0x0000 to 0xFFFF	-	0	Unmodifiable	34164
A15-37	Parallel general fault word 2	0x0000 to 0xFFFF	-	0	Unmodifiable	34165
A15-50	HPCU-ARM status word	0x0000 to 0xFFFF	-	0	Unmodifiable	34178
A15-66	HINT module for monitoring	0: Module 1 1: Module 2 2: Module 3 3: Module 4 4: Module 5 5: Module 6 6: Module 7 7: Module 8 8: Module 9 9: Module 10	-	0	At once	2426
A15-67	HINT module ID	0: HINT offline 303: Multi-drive inverter/Active rectifier/Regenerative rectifier/ Braking/Shore power 304: Basic rectifier 305: DC/DC 307: Single drive	-	0	Unmodifiable	34129

Para.	Name	Value Range	Unit	Default	Change Mode	Address
A15-68	HINT software version	0.00 to 655.35	-	0	Unmodifiable	34130
A15-69	HINT module fault word 1	0x0000 to 0xFFFF	-	0	Unmodifiable	34131
A15-70	HINT module fault word 2	0x0000 to 0xFFFF	-	0	Unmodifiable	34132
A15-71	HINT module alarm word 1	0x0000 to 0xFFFF	-	0	Unmodifiable	34133
A15-90	Available functions of HINT module	0x0000 to 0xFFFF	-	0	Unmodifiable	34152
A15-91	Enabled functions of HINT module	0x0000 to 0xFFFF	-	0	Unmodifiable	34153
A15-94	HINT module DI/DO status	0x0000 to 0xFFFF	-	0	Unmodifiable	34156

7.2.2 Group b: Control Channels

Para.	Name	Value Range	Unit	Default	Change Mode	Address
Group b0: Start/stop control word setting of channel 1						
b0-00	Start/stop control word source	0: Terminal start/stop module 1: Fieldbus adapter A 2: Fieldbus adapter B 3: User-defined setting (group b0 setting)	-	0	At stop	90
b0-01	User-defined OFF1 source	0: Disable 1: Reserved 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	91

Para.	Name	Value Range	Unit	Default	Change Mode	Address
b0-02	User-defined OFF2 source	0: Disable 1: Reserved 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	1	At once	96
b0-03	User-defined OFF3 source	0: Disable 1: Reserved 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	1	At once	99
b0-04	User-defined running permission source	0: Disable 1: Reserved 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	1	At once	92

Para.	Name	Value Range	Unit	Default	Change Mode	Address
b0-05	User-defined fault reset source 1	0: Disable 1: Reserved 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	102
b0-06	User-defined JOG1 source	0: Disable 1: Reserved 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	94
b0-07	User-defined JOG2 source	0: Disable 1: Reserved 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	95

Para.	Name	Value Range	Unit	Default	Change Mode	Address
b0-08	User-defined speed inversion source	0: Disable 1: Reserved 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	93
Group b1: Other control word settings of channel 1						
b1-00	OFF2 source 2	0: Disable 1: Reserved 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	1	At once	97
b1-01	OFF2 source 3	0: Disable 1: Reserved 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	1	At once	98

Para.	Name	Value Range	Unit	Default	Change Mode	Address
b1-02	OFF3 source 2	0: Disable 1: Reserved 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	1	At once	100
b1-03	OFF3 source 3	0: Disable 1: Reserved 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	1	At once	101
b1-04	Fault reset source 2	0: Disable 1: Reserved 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	103

Para.	Name	Value Range	Unit	Default	Change Mode	Address
b1-05	Fault reset source 3	0: Disable 1: Reserved 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	104
b1-06	RFG prohibition source	0: Enable 1: Disable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	1	At once	105
b1-07	RFG pause source	0: Enable 1: Disable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	1	At once	106

Para.	Name	Value Range	Unit	Default	Change Mode	Address
b1-08	Source of setting RFG reference to 0	0: Enable 1: Disable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	1	At once	107
b1-09	Forced flying start source	0: Disable 1: Reserved 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	108
b1-10	Forced torque control source	0: Disable 1: Reserved 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	109

Para.	Name	Value Range	Unit	Default	Change Mode	Address
b1-11	Speed regulator enable source	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	1	At once	110
Group b2: Start/stop control word setting of channel 2						
b2-00	Start/stop control word source	0: Terminal start/stop module 1: Fieldbus adapter A 2: Fieldbus adapter B 3: User-defined setting (group b2 setting)	-	0	At stop	111
b2-01	User-defined OFF1 source	0: Disable 1: Reserved 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	112
b2-02	User-defined OFF2 source 1	0: Enable 1: Disable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	1	At once	117

Para.	Name	Value Range	Unit	Default	Change Mode	Address
b2-03	User-defined OFF3 source 1	0: Enable 1: Disable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	1	At once	120
b2-04	User-defined running permission source	0: Do not permit 1: Permit 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	1	At once	113
b2-05	User-defined fault reset source 1	0: Enable 1: Disable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	123

Para.	Name	Value Range	Unit	Default	Change Mode	Address
b2-06	User-defined JOG1 source	0: Disable 1: Reserved 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	115
b2-07	User-defined JOG2 source	0: Disable 1: Reserved 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	116
b2-08	User-defined speed inversion source	0: Enable 1: Disable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	114
Group b3: Other control word settings of channel 2						

Para.	Name	Value Range	Unit	Default	Change Mode	Address
b3-00	OFF2 source 2	0: Enable 1: Disable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	1	At once	118
b3-01	OFF2 source 3	0: Enable 1: Disable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	1	At once	119
b3-02	OFF3 source 2	0: Enable 1: Disable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	1	At once	121

Para.	Name	Value Range	Unit	Default	Change Mode	Address
b3-03	OFF3 source 3	0: Enable 1: Disable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	1	At once	122
b3-04	Fault reset source 2	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	124
b3-05	Fault reset source 3	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	125

Para.	Name	Value Range	Unit	Default	Change Mode	Address
b3-06	RFG prohibition source	0: Enable 1: Disable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	1	At once	126
b3-07	RFG pause source	0: Enable 1: Disable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	1	At once	127
b3-08	Source of setting RFG reference to 0	0: Enable 1: Disable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	1	At once	128

Para.	Name	Value Range	Unit	Default	Change Mode	Address
b3-09	Forced flying start source	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	129
b3-10	Forced torque control source	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	130
b3-11	Speed regulator enable source	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	1	At once	131
Group b4: Terminal start/stop module						
b4-00	OFF1 status	0 to 65535	-	0	Unmodifia-ble	33875
b4-01	REV status	0 to 65535	-	0	Unmodifia-ble	33876

Para.	Name	Value Range	Unit	Default	Change Mode	Address
b4-02	Terminal start/stop command 1/2 selection	0: Terminal start/stop command 1 1: Terminal start/stop command 2 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	134
b4-03	Terminal start/stop command 1 mode	0: Disable 1: IN1 start 2: IN1 start, IN2 direction 3: IN1 start in forward direction, IN2 start in reverse direction 4: IN1P start, IN2 stop 5: IN1P start, IN2 stop, IN3 direction 6: IN1P forward start, IN2P reverse start, IN3 stop	-	1	At once	135
b4-05	Input 1 of terminal start/start command 1	0: Disable 1: Reserved 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	2	At once	137

Para.	Name	Value Range	Unit	Default	Change Mode	Address
b4-06	Input 1 of terminal start/start command 2	0: Disable 1: Reserved 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	3	At once	138
b4-07	Input 1 of terminal start/start command 3	0: Disable 1: Reserved 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	139
b4-08	Terminal start/stop command 2 mode	0: Disable 1: IN1 start 2: IN1 start, IN2 direction 3: IN1 start in forward direction, IN2 start in reverse direction 4: IN1P start, IN2 stop 5: IN1P start, IN2 stop, IN3 direction 6: IN1P forward start, IN2P reverse start, IN3 stop	-	0	At once	140

Para.	Name	Value Range	Unit	Default	Change Mode	Address
b4-10	Input 2 of terminal start/start command 1	0: Disable 1: Reserved 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	142
b4-11	Input 2 of terminal start/start command 2	0: Disable 1: Reserved 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	143

Para.	Name	Value Range	Unit	Default	Change Mode	Address
b4-12	Input 2 of terminal start/start command 3	0: Disable 1: Reserved 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	144
b4-13	JOG1 source	0: Disable 1: Reserved 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	146
b4-14	JOG2 source	0: Disable 1: Reserved 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	147
Group b5: Auto-tuning/Self-test						

Para.	Name	Value Range	Unit	Default	Change Mode	Address
b5-00	Auto-tuning request	0: None 1: Static auto-tuning 2: No-load auto-tuning of all parameters 3: Static auto-tuning of all parameters of asynchronous motor 4: Auto-tuning of inter-phase current deviation coefficient 5: Auto-tuning of rotor inertia	-	0	At stop	33785
b5-00	Auto-tuning request	6: Auto-tuning of dead zone time 7: With-load auto-tuning of all synchronous motor parameters in FVC mode 8: No-load rotate auto-tuning 9: With-load rotate auto-tuning of asynchronous motor	-	0	At stop	33785
b5-01	Self-test request	0: None 1: Self-test	-	0	At stop	33786
b5-02	Parameter calculation type	0: None 1: Motor parameter calculation 2: Speed loop parameter calculation	-	0	At stop	34062
b5-03	Parameter calculation	0: Canceled 1: Confirm	-	0	At stop	34063
b5-04	Speed loop auto-tuning optimization enable	0: Enable 1: Disable	-	0	At stop	3684
b5-05	Speed loop auto-tuning coefficient	20 to 200	%	100	At stop	3168
b5-07	Enable self-test before auto-tuning	0: Enable 1: Disable	-	0	At stop	5712
b5-09	Speed reference source during with-load auto-tuning	0: Specified by users 1: Internal command	-	0	At stop	5506
b5-10	[With-load rotate auto-tuning of asynchronous motor] Speed limit	25.0 to 80.0	%	40	At once	1601
b5-11	[With-load auto-tuning of all synchronous motor parameters] Running speed	5.0 to 80.0	%	20	At stop	1597
b5-12	[With-load auto-tuning of all synchronous motor parameters] Running direction	0: Forward 1: Reverse	-	0	At stop	1598

Para.	Name	Value Range	Unit	Default	Change Mode	Address
b5-15	[With-load auto-tuning of all synchronous motor parameters] Acceleration time	0.0 to 1000.0	s	20	At once	1599
b5-16	[With-load auto-tuning of all synchronous motor parameters] Deceleration time	0.0 to 1000.0	s	20	At once	1600
b5-19	[No-load rotate auto-tuning] Speed	50.0 to 70.0	%	70	At stop	5713
Group b6: Auxiliary control word setting						
b6-04	Source of over-temperature signal of external reactor	0: Enable 1: Disable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	1	At once	5031

7.2.3 Group C: Reference Channels

Para.	Name	Value Range	Unit	Default	Change Mode	Address
Group C0: Speed reference for channel 1						
C0-00	Speed control main reference selection	0: 0 1: Multi-reference value 1 2: AI1 3: AI2 4: HDI1 5: HDI2 6: Multi-reference value 7: Motor-driven potentiometer 8: Reserved 9: Process data 2 of fieldbus adapter A 10: Process data 2 of fieldbus adapter B Other: K connector	-	0	At once	150

Para.	Name	Value Range	Unit	Default	Change Mode	Address
C0-01	Auxiliary speed control reference selection	0: 0 1: Multi-reference value 1 2: AI1 3: AI2 4: HDI1 5: HDI2 6: Multi-reference value 7: Motor-driven potentiometer 8: Reserved 9: Process data 2 of fieldbus adapter A 10: Process data 2 of fieldbus adapter B Other: K connector	-	0	At once	151
C0-02	Additional speed reference	0: 0 1: Multi-reference value 1 2: AI1 3: AI2 4: HDI1 5: HDI2 6: Multi-reference value 7: Motor-driven potentiometer 8: Reserved 9: Process data 2 of fieldbus adapter A 10: Process data 2 of fieldbus adapter B Other: K connector	-	0	At once	152
Group C1: Torque reference for channel 1						
C1-00	[Torque control] Torque reference selection	0: 0 1: Multi-reference value 2 2: AI1 3: AI2 4: HDI1 5: HDI2 6: Multi-reference value 7: Motor-driven potentiometer 8: Reserved 9: Process data 3 of fieldbus adapter A 10: Reserved Other: K connector	-	0	At once	153

Para.	Name	Value Range	Unit	Default	Change Mode	Address
C1-01	[Torque control] Torque filter time reference	0.00 to 10.00	s	0	At once	154
C1-02	[Torque control] Speed window enable	0: Enable 1: Disable	-	0	At once	157
C1-03	[Torque control] Window speed selection	0: Speed reference for channel 1 1: Digital setting	-	1	At once	155
C1-04	[Torque control] Window speed digital setting	–600.0 to +600.0	%	0	At once	156
C1-05	[Torque control] Speed window width	0.0 to 30.0	%	0	At once	158
C1-06	Additional torque reference 1 selection	0: 0 1: Digital setting Other: K connector	-	0	At once	159
C1-07	Additional torque 1 digital setting	–400.0 to +400.0	%	0	At once	160
C1-08	Additional torque reference 2	0: 0 Other: K connector	-	0	At once	161
C1-09	Friction torque selection (additional torque reference 3)	0: 0 1: D2-03 digital setting Other: K connector	-	0	At once	162
C1-10	RFG feedforward torque coefficient selection	0: 0 1: 100% Other: K connector	-	1	At once	163
C1-11	Torque ramp acceleration time	0.000 to 60.000	s	0	At once	3903
C1-12	Torque ramp deceleration time	0.000 to 60.000	s	0	At once	3904
Group C2: Speed reference for channel 2						
C2-00	Speed control main reference selection	0: 0 1: Multi-reference value 1 2: AI1 3: AI2 4: HDI1 5: HDI2 6: Multi-reference value 7: Motor-driven potentiometer 8: Reserved 9: Process data 2 of fieldbus adapter A 10: Reserved Other: K connector	-	0	At once	164

Para.	Name	Value Range	Unit	Default	Change Mode	Address
C2-01	Auxiliary speed control reference selection	0: 0 1: Multi-reference value 1 2: AI1 3: AI2 4: HDI1 5: HDI2 6: Multi-reference value 7: Motor-driven potentiometer 8: Reserved 9: Process data 2 of fieldbus adapter A 10: Reserved Other: K connector	-	0	At once	165
C2-02	Additional speed reference	0: 0 1: Multi-reference value 1 2: AI1 3: AI2 4: HDI1 5: HDI2 6: Multi-reference value 7: Motor-driven potentiometer 8: Reserved 9: Process data 2 of fieldbus adapter A 10: Reserved Other: K connector	-	0	At once	166
Group C3: Torque reference for channel 2						
C3-00	[Torque control] Torque reference selection	0: 0 1: Multi-reference value 2 2: AI1 3: AI2 4: HDI1 5: HDI2 6: Multi-reference value 7: Motor-driven potentiometer 8: Reserved 9: Process data 3 of fieldbus adapter A 10: Reserved Other: K connector	-	0	At once	167
C3-01	[Torque control] Torque filter time reference	0.00 to 10.00	s	0	At once	168

Para.	Name	Value Range	Unit	Default	Change Mode	Address
C3-02	[Torque control] Speed window enable	0: Disable 1: Enable	-	0	At once	171
C3-03	[Torque control] Window speed selection	0: Speed reference for channel 2 1: Digital setting	-	1	At once	169
C3-04	[Torque control] Window speed digital setting	–600.0 to +600.0	%	0	At once	170
C3-05	[Torque control] Speed window width	0.0 to 30.0	%	0	At once	172
C3-06	Additional torque reference 1 selection	0: 0 1: Digital setting Other: K connector	-	0	At once	173
C3-07	Additional torque 1 digital setting	–400.0 to +400.0	%	0	At once	174
C3-08	Additional torque reference 2	0: 0 Other: K connector	-	0	At once	175
C3-09	Friction torque selection (additional torque reference 3)	0: 0 1: D2-03 digital setting Other: K connector	-	0	At once	176
C3-10	RFG feedforward torque coefficient selection	0: 0 1: 100% Other: K connector	-	1	At once	177
C3-11	Torque ramp acceleration time	0.000 to 60.000	s	0	At once	3905
C3-12	Torque ramp deceleration time	0.000 to 60.000	s	0	At once	3906
Group C4: Motor-driven potentiometer						
C4-00	Motor-driven potentiometer function	0: Disable 1: Not retentive at power failure 2: Retentive at power failure	-	1	At stop	178
C4-01	Initial value of motor-driven potentiometer	–600.0 to +600.0	%	0	At once	179
C4-02	Ramp time of motor-driven potentiometer	0.1 to 1000.0	s	10	At once	180
C4-03	Minimum value of motor-driven potentiometer	–600.0 to +600.0	%	0	At once	181
C4-04	Maximum value of motor-driven potentiometer	–600.0 to +600.0	%	100	At once	182

Para.	Name	Value Range	Unit	Default	Change Mode	Address
C4-05	Source of motor-driven potentiometer increase command	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	1944
C4-06	Source of motor-driven potentiometer decrease command	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	1945
C4-07	Source of motor-driven potentiometer force command	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	1946
C4-08	Source of motor-driven potentiometer force value	0: 0 1: 100% 2: Set by C4-09 Other: K connector		2	At once	2899
C4-09	Force value of motor-driven potentiometer	–600.0 to +600.0	%	0	At once	2590

Para.	Name	Value Range	Unit	Default	Change Mode	Address
C4-10	Source of motor-driven potentiometer reset command	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	2900
C4-11	Source of motor-driven potentiometer reset value	0: 0 1: 100% 2: Set by C4-12 Other: K connector	-	2	At once	2901
C4-12	Reset value of motor-driven potentiometer	–600.0 to +600.0	%	0	At once	2902
Group C5: Jog setting						
C5-00	JOG1 setpoint	–50.0 to +50.0	%	10	At once	183
C5-01	JOG2 setpoint	–50.0 to +50.0	%	–10	At once	184
C5-02	JOG acceleration time	0.1 to 1000.0	s	10	At once	185
C5-03	JOG deceleration time	0.1 to 1000.0	s	10	At once	186
Group C6: Multi-reference value setting						
C6-00	Setpoint	–3276.8 to +3276.7	%	0	Unmodifia-ble	32801
C6-01	Multi-reference selection 1	0: 0 1: 1 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	187

Para.	Name	Value Range	Unit	Default	Change Mode	Address
C6-02	Multi-reference selection 2	0: 0 1: 1 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	188
C6-03	Multi-reference selection 3	0: 0 1: 1 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	189
C6-05	Multi-reference value 1	–600.0 to +600.0	%	10	At once	191
C6-06	Multi-reference value 2	–600.0 to +600.0	%	10	At once	192
C6-07	Multi-reference value 3	–600.0 to +600.0	%	0	At once	193
C6-08	Multi-reference value 4	–600.0 to +600.0	%	0	At once	194
C6-09	Multi-reference value 5	–600.0 to +600.0	%	0	At once	195
C6-10	Multi-reference value 6	–600.0 to +600.0	%	0	At once	196
C6-11	Multi-reference value 7	–600.0 to +600.0	%	0	At once	197
C6-12	Multi-reference value 8	–600.0 to +600.0	%	0	At once	198
C6-13	Multi-reference value 9	–600.0 to +600.0	%	0	At once	199
C6-14	Multi-reference value 10	–600.0 to +600.0	%	0	At once	200
C6-15	Multi-reference value 11	–600.0 to +600.0	%	0	At once	201
C6-16	Multi-reference value 12	–600.0 to +600.0	%	0	At once	202
C6-17	Multi-reference value 13	–300.00 to +300.00	%	0	At once	203
C6-18	Multi-reference value 14	–300.00 to +300.00	%	0	At once	204
C6-19	Multi-reference value 15	–300.00 to +300.00	%	0	At once	205

Para.	Name	Value Range	Unit	Default	Change Mode	Address
C6-20	Multi-reference value 16	–300.00 to +300.00	%	0	At once	206
Group C7: Ramp function generator						
C7-00	RFG input	–32768 to +32767	RPM	0	Unmodifiable	32802
C7-01	RFG output	–32768 to +32767	RPM	0	Unmodifiable	32803
C7-02	RFG ramp 1	0: 0 1: 1 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	207
C7-03	RFG ramp 2	0: 0 1: 1 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	208
C7-04	Ramp 1 acceleration time	0.0 to 1000.0	s	20	At once	209
C7-05	Ramp 1 deceleration time	0.0 to 1000.0	s	20	At once	210
C7-06	Ramp 2 acceleration time	0.0 to 1000.0	s	20	At once	211
C7-07	Ramp 2 deceleration time	0.0 to 1000.0	s	20	At once	212
C7-08	Ramp 3 acceleration time	0.0 to 1000.0	s	20	At once	213
C7-09	Ramp 3 deceleration time	0.0 to 1000.0	s	20	At once	214
C7-10	Ramp 4 acceleration time	0.0 to 1000.0	s	20	At once	215

Para.	Name	Value Range	Unit	Default	Change Mode	Address
C7-11	Ramp 4 deceleration time	0.0 to 1000.0	s	20	At once	216
C7-12	Ramp 1 initial rounding time	0.00 to 20.00	s	0	At once	217
C7-13	Ramp 1 end arc time	0.00 to 20.00	s	0	At once	218
C7-14	Ramp 2 initial rounding time	0.00 to 20.00	s	0	At once	219
C7-15	Ramp 2 end arc time	0.00 to 20.00	s	0	At once	220
C7-16	Ramp 3 initial rounding time	0.00 to 20.00	s	0	At once	221
C7-17	Ramp 3 end arc time	0.00 to 20.00	s	0	At once	222
C7-18	Ramp 4 initial rounding time	0.00 to 20.00	s	0	At once	223
C7-19	Ramp 4 end arc time	0.00 to 20.00	s	0	At once	224
C7-20	Low-speed acceleration time gain	1.0 to 10.0	-	1	At once	225
C7-21	Low-speed evaluation value	0.0 to 100.0	%	15	At once	226
C7-23	Enable forced RFG output	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	228
C7-24	RFG force setpoint	0: 0 Other: K connector	-	0	At once	229
C7-25	Enable RFG input ramp shift	0: Disable 1: Enable Other: B connector	-	0	At once	3217
C7-26	RFG input ramp shift interval	2 to 5000	ms	50	At once	3218
C7-27	RFG circle mode selection	0: Uncontinuous smoothing 1: Continuous smoothing	-	0	At once	3902

7.2.4 Group d: Motor Parameters

Para.	Name	Value Range	Unit	Default	Change Mode	Address
Group d0: Basic motor parameters						
d0-00	Motor type	0: Induction motor 2: Permanent magnet synchronous motor	-	0	At stop	233
d0-01	Rated motor power	0.1 to 6553.5	kW	3.7	At stop	237
d0-02	Rated motor voltage	1 to 1500	V	380	At stop	241
d0-03	Rated motor current	0.1 to 6553.5	A	9	At stop	245
d0-04	Rated motor frequency	0.1 to 600.0	Hz	50	At stop	249
d0-05	Rated motor speed	1 to 36000	RPM	1440	At stop	253
d0-06	Max. motor speed	0.0 to 600.0	%	100	At stop	257
d0-07	Min. motor speed	0.0 to 600.0	%	0	At stop	261
d0-08	Max. motor current	100.0 to 600.0	%	150	At stop	265
d0-09	Number of motor pole pairs (number of poles/ 2)	0 to 64	-	0	At stop	269
d0-10	Number of motors in parallel	1 to 99	-	1	At stop	341
d0-11	Speed feedback selection	0: Encoder detection module 1 1: Encoder detection module 2 2: Encoder detection module 3	-	0	At stop	277
d0-12	Motor power factor	0.700 to 0.999	-	0.86	At stop	1936
d0-13	Enable motor brake control	0: Disable 1: Enable	-	1	At stop	3077
d0-20	Output LC filter configuration selection	0: None 1: Available	-	0	At stop	5508
d0-21	Output LC filter inductance value	0.01 to 300.00	mH	10	At stop	5512
d0-22	Output LC filter capacitance	0.1 to 1000.0	uF	5	At stop	5516
Group d1: Basic auto-tuning parameters						
d1-02	Motor stator resistance	0.00010 to 65.00000	Ω	1.66666	At once	5120
d1-04	Rotor resistance of asynchronous motor	0.00010 to 65.00000	Ω	1.66666	At once	5128
d1-06	Asynchronous motor leakage inductance	0.001 to 65.535	mH	6.54	At stop	289
d1-08	Asynchronous motor mutual inductance	0.01 to 655.35	mH	173.4	At stop	293
d1-10	Asynchronous motor no-load current	0.1 to 6553.5	A	4	At stop	297
d1-11	No-load current (total)	0.0 to 6553.5	A	0	Unmodifia-ble	32965
d1-12	Asynchronous magnetic field saturated flux coefficient 1	0.0 to 150.0	%	125	At stop	2754

Para.	Name	Value Range	Unit	Default	Change Mode	Address
d1-13	Mutual inductance coefficient 1 for asynchronous magnetic field saturation	0.0 to 6553.5	%	140	At stop	301
d1-14	Asynchronous magnetic field saturated flux coefficient 2	0.0 to 150.0	%	115	At stop	2758
d1-15	Mutual inductance coefficient 2 for asynchronous magnetic field saturation	0.0 to 6553.5	%	115	At stop	305
d1-16	Asynchronous magnetic field saturated flux coefficient 3	0.0 to 150.0	%	85	At stop	2762
d1-17	Mutual inductance coefficient 3 for asynchronous magnetic field saturation	0.0 to 6553.5	%	90	At stop	309
d1-18	Asynchronous magnetic field saturated flux coefficient 4	0.0 to 150.0	%	50	At stop	2766
d1-19	Mutual inductance coefficient 4 for asynchronous magnetic field saturation	0.0 to 6553.5	%	80	At stop	313
d1-20	Rotor time constant for asynchronous magnetic field	0 to 65535	ms	0	Unmodifiable	33877
d1-21	Asynchronous motor Rr online auto-tuning	0.0 to 6553.5	%	0	Unmodifiable	33095
d1-22	Motor stator resistance	0.00010 to 65.00000	Ω	1.66666	At once	5120
d1-24	D axis inductance of synchronous motor	0.001 to 65.535	mH	0.001	At stop	325
d1-25	Q axis inductance of synchronous motor	0.001 to 65.535	mH	0.001	At stop	329
d1-26	Synchronous motor back EMF voltage	0.1 to 6553.5	V	0.1	At stop	333
Group d2: Additional auto-tuning parameters						
d2-00	Inertia	0.000 to 4294967.295	kg.m2	0	Unmodifiable	32976
d2-01	Number of motor pole pairs	0 to 65535	-	0	Unmodifiable	33780
d2-02	Inertia ratio	0 to 65535	%	100	At stop	345
d2-03	Friction torque	0.0 to 100.0	%	0	At stop	349
d2-04	Hot-cold res ratio	0 to 300	%	100	At stop	353

Para.	Name	Value Range	Unit	Default	Change Mode	Address
d2-05	Electromechanical time constant	0 to 65535	ms	0	Unmodifiable	32804
Group d3: Base value information						
d3-00	Per-unit base value of voltage	0 to 65535	V	0	Unmodifiable	33791
d3-01	Per-unit base value of current	0.0 to 6553.5	A	0	Unmodifiable	33792
d3-02	Per-unit base value of speed	0 to 65535	RPM	0	Unmodifiable	33789
d3-03	Per-unit base value of frequency	0.0 to 6553.5	Hz	0	Unmodifiable	33790
d3-04	Per-unit base value of power	0.0 to 6553.5	kW	0	Unmodifiable	33794
d3-05	Per-unit base value of DC voltage	–3276.8 to +3276.7	V	0	Unmodifiable	35046

7.2.5 Group E: Motor Control

Para.	Name	Value Range	Unit	Default	Change Mode	Address
Group E0: Control setting						
E0-00	Control method	0: SVC 1: FVC 2: VF	-	2	At stop	357
E0-01	Control mode	0: Speed control 1: Torque control 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	361

Para.	Name	Value Range	Unit	Default	Change Mode	Address
E0-02	Positive speed enable	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	1	At once	365
E0-03	Negative speed enable	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	1	At once	369
Group E1: Start/stop control						
E1-00	Start mode	0: Direct start 1: Flying start 2: Start after DC injection braking	-	0	At stop	373
E1-01	Pre-excitation mode	0: By time 1: By current	-	0	At stop	377
E1-02	Pre-excitation time	0.00 to 20.00	s	0.1	At stop	381
E1-03	Pre-excitation current reference source	0: Auto 1: Digital setting	-	0	At stop	385
E1-04	Digital setting of pre-excitation current	20.0 to 400.0	%	100	At stop	389
E1-05	DC injection braking current	0.0 to 100.0	%	100	At once	393
E1-06	DC injection braking active time	0.10 to 100.00	s	1	At once	397
E1-07	Shutdown DC injection braking active time	0.00 to 100.00	s	0	At once	401
E1-08	Short-circuit braking time at startup (reserved)	0.00 to 100.00	s	0	At once	405

Para.	Name	Value Range	Unit	Default	Change Mode	Address
E1-09	Short-circuit braking time at stop (reserved)	0.00 to 100.00	s	0	At once	409
E1-10	Braking starting speed	0.0 to 6000.0	RPM	30	At once	1946
E1-11	Zero speed value	0.1 to 6000.0	RPM	30	At once	413
E1-12	Delay of stop at zero speed	0.00 to 10.00	s	0.1	At once	1950
E1-13	Demagnetization time	0.00 to 100.00	s	0	At once	417
E1-14	OFF1 stop mode	0: Coast to stop 1: Decelerate to stop 2: Stop at max. capability	-	1	At stop	421
E1-15	OFF3 stop time	0.0 to 1000.0	s	1	At once	425
E1-16	OFF3 stop mode	0: Decelerate to stop 1: Stop at maximum capability	-	1	At stop	429
E1-17	Stop mode during operation	0: OFF1 stop 1: OFF2 stop 2: OFF3 stop	-	1	At stop	433
E1-18	Stop mode in torque control	0: OFF1 stop 1: OFF2 stop 2: OFF3 stop	-	1	At stop	437
Group E2: Limit						
E2-00	Lower limit of jump frequency 1	0.0 to 600.0	%	0	At once	441
E2-01	Upper limit of jump frequency 1	0.0 to 600.0	%	0	At once	445
E2-02	Lower limit of jump frequency 2	0.0 to 600.0	%	0	At once	449
E2-03	Upper limit of jump frequency 2	0.0 to 600.0	%	0	At once	453
E2-04	Forward speed limit	0.0 to 600.0	%	600	At once	457
E2-05	Reverse speed limit	–600.0 to 0.0	%	–600	At once	461
E2-06	Forward speed limit selection	0: 0.0% 1: 600.0% 2: AI1 3: AI2 4: HDI1 5: HDI2 6: None 7: None 8: None 9: None 10: None Other: K connector	-	1	At once	465

Para.	Name	Value Range	Unit	Default	Change Mode	Address
E2-07	Reverse speed limit selection	0: 0.0% 1: –600.0% 2: AI1 3: AI2 4: HDI1 5: HDI2 6: None 7: None 8: None 9: None 10: None Other: K connector	-	1	At once	469
E2-08	Digital setting of torque upper limit	0.0 to 400.0	%	150	At once	473
E2-09	Digital setting of torque lower limit	–400.0 to 0.0	%	–150	At once	477
E2-10	Torque upper limit setpoint selection	0: 0.0% 1: 400.0% 2: AI1 3: AI2 4: HDI1 5: HDI2 6: None 7: None 8: None 9: None 10: None Other: K connector	-	1	At once	481
E2-11	Torque lower limit setpoint selection	0: 0.0% 1: –400.0% 2: AI1 3: AI2 4: HDI1 5: HDI2 6: None 7: None 8: None 9: None 10: None Other: K connector	-	1	At once	485
E2-12	Torque upper limit coefficient selection upon speed governing	0: 100% Other: K connector	-	0	At stop	2528

Para.	Name	Value Range	Unit	Default	Change Mode	Address
E2-13	Torque lower limit coefficient selection upon speed governing	0: 100% Other: K connector	-	0	At stop	2532
E2-14	Regenerative power limit	0.0 to 400.0	%	200	At once	489
E2-15	Motoring power limit	0.0 to 400.0	%	200	At once	493
E2-16	Enable regenerative power limit coefficient	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	2573
E2-17	Regenerative power limit coefficient	0: 100% Other: K connector	-	0	At once	2581
E2-18	Enable motoring power limit coefficient	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	2577
E2-19	Motoring power limit coefficient	0: 100% Other: K connector	-	0	At stop	2585
Group E3: V/f control						
E3-00	V/f mode selection	0: V/f curve 1: V/f separation	-	0	At stop	497
E3-01	V/f curve selection	0: Linear V/f 1: Multi-point V/f 2: Square V/f 3: 1.2-power V/f 6: 1.6-power V/f 8: 1.8-power V/f	-	0	At stop	501

Para.	Name	Value Range	Unit	Default	Change Mode	Address
E3-02	Multi-point V/f curve frequency point 1	0.0 to 100.0	%	0	At once	505
E3-03	Multi-point V/f curve voltage point 1	0.0 to 100.0	%	0	At once	509
E3-04	Multi-point V/f curve frequency point 2	0.0 to 100.0	%	0	At once	513
E3-05	Multi-point V/f curve voltage point 2	0.0 to 100.0	%	0	At once	517
E3-06	Multi-point V/f curve frequency point 3	0.0 to 100.0	%	0	At once	521
E3-07	Multi-point V/f curve voltage point 3	0.0 to 100.0	%	0	At once	525
E3-08	Enable V/f droop	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	2454
E3-09	V/f droop coefficient	0.0 to 50.0	%	0	At once	2458
E3-10	Imax control enable	0: Disable 1: Enable	-	0	At once	529
E3-11	Imax control frequency modulation proportional coefficient	0 to 100	-	20	At once	533
E3-12	Imax control field weakening coefficient	0 to 200	-	100	At once	537
E3-13	V/f torque boost mode	0: Disable 1: Manual 2: Auto	-	0	At stop	541
E3-14	V/f manual constant-speed torque boost	0.0 to 25.0	%	1	At once	545
E3-15	V/f manual acceleration torque boost	0.0 to 20.0	%	0	At once	549
E3-16	Cut-off frequency of V/f torque boost	0.0 to 100.0	%	100	At stop	553
E3-17	V/f slip compensation coefficient	0.0 to 300.0	%	0	At once	557
E3-18	Filter time of V/f slip compensation	0.000 to 2.000	s	0.5	At once	561

Para.	Name	Value Range	Unit	Default	Change Mode	Address
E3-19	V/f slip compensation startup frequency	0.0 to 50.0	Hz	2	At stop	565
E3-20	V/f oscillation suppression mode	0: Disable 1: Enable	-	1	At once	569
E3-21	V/f oscillation suppression gain	0 to 2000	%	20	At once	573
E3-23	Cut-off frequency of V/f oscillation suppression	0.5 to 50.0	Hz	2	At once	581
E3-24	V/f overexcitation gain	0 to 200	-	0	At once	585
E3-25	V/f energy-saving control	0: Disable 1: Enable	-	0	At once	589
E3-28	Proportional coefficient of frequency modulation for Vdc control in V/f control mode	1 to 100	-	30	At once	901
E3-29	Vdc control frequency modulation integral coefficient in V/f control mode	10 to 8000	-	250	At once	905
E3-30	Vdc_max control switch in V/f control mode	0: Disable 1: Enable	-	0	At stop	1970
E3-31	Vdc_max voltage reserve in V/f control mode	20.0 to 300.0	V	100	At stop	897
E3-32	Vdc_max voltage modulation gain coefficient in V/f control mode	0 to 100	-	30	At once	909
E3-33	Vdc_max frequency increase limit in V/f control mode	1.0 to 30.0	Hz	5	At once	913
E3-34	Vdc control oscillation suppression gain in V/f control mode	0 to 500	%	60	At once	917
E3-35	Vdc control feedforward gain in V/f control mode	0 to 500	%	100	At once	921
E3-36	Vdc_min control switch in V/f control mode	0: Disable 1: Enable	-	0	At stop	1974
E3-37	Vdc_min operation frequency in V/f control mode	0.0 to 50.0	Hz	5	At once	933
E3-38	Vdc_min voltage reserve in V/f control mode	20.0 to 300.0	V	50	At stop	937
E3-39	Vdc_min voltage rise evaluation time in V/f control mode	0.1 to 100.0	s	1	At stop	941

Para.	Name	Value Range	Unit	Default	Change Mode	Address
E3-40	Vdc control dynamic coefficient in V/f control mode	0 to 300	%	100	At stop	945
E3-45	V/f separation mode selection	0: Frequency without ramp/ voltage ramp acceleration 1: Frequency/voltage independent ramp acceleration/ deceleration	-	0	At stop	6323
E3-46	V/f separation voltage reference	0: 0 1: 100.0% 2: AI1 3: AI2 4: HDI1 5: HDI2 Other: K connector	-	0	At once	593
E3-47	V/f separation voltage acceleration time	0.0 to 1000.0	s	0	At once	597
E3-48	V/f separation voltage deceleration time	0.0 to 1000.0	s	0	At once	6327
Group E4: Speed regulator						
E4-00	Speed filter time setpoint for motor VC	0 to 10000	ms	0	At once	601
E4-01	Speed feedback filter time for motor VC	0 to 10000	ms	0	At once	605
E4-02	FVC speed loop Kp	0.00 to 200.00	-	3	At once	609
E4-03	FVC speed loop Ti	1 to 10000	ms	500	At once	613
E4-04	SVC speed loop Kp	0.00 to 200.00	-	3	At once	617
E4-05	SVC speed loop Ti	1 to 10000	ms	500	At once	621
E4-06	Adaptive source of speed loop Kp	0: 0 Other: K connector	-	0	At once	625
E4-07	[Speed loop] Kp adaptive switchover lower limit	0.0 to 400.0	%	25	At once	629
E4-08	[Speed loop] Kp adaptive correction lower limit	0.0 to 400.0	%	25	At once	633
E4-09	[Speed loop] Kp adaptive switchover upper limit	0.0 to 400.0	%	100	At once	637
E4-10	[Speed loop] Kp adaptive correction upper limit	0.0 to 400.0	%	100	At once	641
E4-11	[Speed loop] Switchover low frequency	0.0 to 400.0	%	50	At once	645
E4-12	[Speed loop] Switchover high frequency	0.0 to 400.0	%	100	At once	649

Para.	Name	Value Range	Unit	Default	Change Mode	Address
E4-13	[Speed loop] High-frequency switchover correction coefficient	0.0 to 1600.0	%	50	At once	653
E4-14	Droop function enable	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	2341
E4-15	Droop function selection	0: Disable 1: General torque setpoint 2: Output upon speed governing 3: Integral component upon speed governing	-	0	At once	657
E4-16	Droop coefficient	0.0 to 50.0	%	0	At once	661
E4-17	Droop gain source	0: 100% Other: K connector	-	1	At once	1680
E4-18	Speed loop integral force source	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	669
E4-19	Source of speed loop integral force value	0: 0 Other: K connector	-	0	At once	673

Para.	Name	Value Range	Unit	Default	Change Mode	Address
E4-20	[speed loop integral] Freeze source	0: Run 1: Freeze 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	665
E4-22	Acceleration torque source	0: Disable 1: RFG feedforward 2: Feedback speed differential 3: Position control feedforward	-	0	At once	685
E4-23	Feedforward torque coefficient	0 to 400	%	0	At once	689
E4-24	Encoder feedback speed filter selection	0: No filter 1: Second-order low-pass 2: Notch	-	0	At once	693
E4-25	Encoder feedback speed filter time	0 to 1000	ms	0	At once	697
E4-26	Current filter selection for torque setpoint	0: No filter 1: Second-order low-pass 2: Notch	-	0	At once	677
E4-27	Current filter time for torque setpoint	0 to 1000	ms	5	At once	681
E4-30	Enable load observer	0: Disable 1: Enable	-	0	At stop	2556
E4-31	Load observer proportional gain adjustment coefficient	0 to 1000	%	100	At once	2560
E4-32	Load observer integral gain adjustment coefficient	0 to 1000	%	10	At once	2564
E4-33	Load observer inertia adjustment coefficient	20 to 1000	%	100	At stop	2568
Group E5: Current regulator						
E5-00	Current loop actual scaling	0.000 to 65.535	-	0	Unmodifiable	33880
E5-01	Current loop actual integral time	0.0 to 6553.5	ms	0	Unmodifiable	33881
E5-02	Current loop theoretical scaling	0.000 to 65.535	-	0	Unmodifiable	33878

Para.	Name	Value Range	Unit	Default	Change Mode	Address
E5-03	Current loop theoretical integral time	0.0 to 6553.5	ms	0	Unmodifia-ble	33879
E5-04	Current loop proportional coefficient	1 to 1000	%	50	At once	717
E5-05	Current loop integral coefficient	1 to 1000	%	100	At once	721
E5-06	Enable current loop scaling adaptation	0: Disable 1: Enable	-	0	At once	725
E5-07	Lower limit of current loop scaling adaptation	1 to 1000	%	100	At once	729
E5-08	Lower limit of current loop scaling adaptation	1 to 1000	%	100	At once	733
E5-09	Current loop scaling adaptation upper limit coefficient	1 to 1000	%	100	At once	737
E5-10	Current loop feedforward differential coefficient	0 to 1000	%	0	At once	741
E5-11	D-axis current adaptive control gain	0 to 1000	%	100	At once	1684
E5-12	Q-axis current adaptive control gain	0 to 1000	%	100	At once	1688
Group E6: Excitation control						
E6-00	Flux setpoint coefficient	50.0 to 200.0	%	100	At stop	1033
E6-01	Flux setpoint filter time	0 to 10000	ms	10	At once	745
E6-02	Voltage reserve	0.0 to 50.0	%	3	At once	749
E6-03	Min. flux threshold at startup	20.0 to 100.0	%	70	At stop	753
E6-04	Excitation differential coefficient	0.0 to 400.0	%	100	At stop	757
E6-05	Enable flux controller	0: Disable 1: Enable	-	1	At stop	761
E6-06	Enable efficiency optimization	0: Disable 1: Enable	-	0	At stop	765
E6-07	Min. flux for efficiency optimization	50.0 to 100.0	%	100	At stop	769
E6-08	Efficiency optimization additional filter time	0 to 1000	ms	4	At once	773
E6-09	Efficiency optimization filter exit time	0 to 1000	ms	20	At once	777
E6-11	Enable field weakening curve for synchronous motor	0: Disable 1: Enable	-	0	At once	1672

Para.	Name	Value Range	Unit	Default	Change Mode	Address
E6-13	Max. demagnetization current limit for synchronous motor	0.0 to 200.0	%	100	At once	2187
Group E7: Flying start						
E7-00	Flying start current Kp	0.5 to 2.0	-	1	At once	781
E7-01	Flying start speed filter	5 to 50	ms	10	At once	785
E7-02	Cut-off frequency of flying start filter	0.1 to 50.0	Hz	1	At once	789
E7-03	Current setpoint of flying start	20.0 to 80.0	%	50	At once	793
E7-04	Flying start time	50 to 5000	ms	1000	At once	797
E7-06	Phase-locked loop proportional coefficient	0 to 400	%	100	At once	3892
Group E8: Protection						
E8-00	Enable motor overload software protection	0: Disable 1: Enable	-	1	At once	801
E8-01	Gain of motor overload software protection	20 to 1000	%	100	At once	805
E8-02	Motor overload pre-warning coefficient	50 to 100	%	80	At once	809
E8-04	Overspeed detection level	0.0 to 50.0	%	20	At once	817
E8-05	Overspeed detection time	0.0 to 60.0	s	0.5	At once	821
E8-06	Detection level of excessive speed deviation	0.0 to 600.0	%	6	At once	825
E8-07	Excessive speed deviation detection time	0.0 to 600.0	s	1	At once	829
E8-08	Compare value reaching measured value	0.0 to 600.0	%	100	At once	2123
E8-09	Compare value reaching detection delay	0.0 to 600.0	%	3	At once	2127
E8-10	Compare value reaching detection time	0.0 to 100.0	s	3	At once	2131
E8-11	Leakage current detection	0: Disable 1: Enable	-	0	At once	833
E8-12	Leakage current detection threshold	0.0 to 80.0	%	30	At once	837
E8-13	Output disconnection detection (reserved)	0: Disable 1: Enable	-	0	At once	841
E8-14	PG software fault detection	0: Disable 1: Enable	-	0	At once	845

Para.	Name	Value Range	Unit	Default	Change Mode	Address
E8-15	VI detection mode	Ones position: Detection at power-on 0: Disable 1: Enable Tens position: Detection before operation 0: Disable 1: Enable	-	0	At once	849
E8-16	Detection mode of bridge arm	Ones position: Detection at power-on 0: Disable 1: Enable Tens position: Detection before operation 0: Disable 1: Enable	-	0	At once	853
E8-17	Detection mode of output current sensor CM	Ones position: Detection at power-on 0: Disable 1: Enable Tens position: Detection before operation 0: Disable 1: Enable	-	0	At once	857
E8-20	Detection mode of short-circuit to ground	Ones position: Detection at power-on 0: Disable 1: Enable Tens position: Detection before operation 0: Disable 1: Enable	-	0	At once	869
E8-21	Detection mode of output phase loss	Ones position: Detection at power-on 0: Disable 1: Enable Tens position: Detection before operation 0: Disable 1: Enable	-	100	At once	873

Para.	Name	Value Range	Unit	Default	Change Mode	Address
E8-22	Motor temperature detection mode	0: Disable 1: Active PG card KTY84 2: AI1 detection KTY84 3: AI1 detection PT100 4: AI1 detection PT100*2 5: AI1 detection PT100*3 6: AI1 detection PT1000 7: Reserved 8: Reserved 9: AI1 detection PTC 10: Active PG card PTC detection 11: Reserved 12: AI2 detection KTY84 13: AI2 detection PT100 14: AI2 detection PT100*2 15: AI2 detection PT100*3 16: AI2 detection PT1000 17: Reserved 18: Reserved 19: AI2 detection PTC 20: Reserved Other: K connector	-	0	At once	2407
E8-23	Motor over-temperature protection value	0 to 300	°C	130	At once	2411
E8-24	Motor over-temperature alarm value	0 to 300	°C	110	At once	2415
E8-25	Enable motor locked-rotor detection	0: Disable 1: Enable Other: B connector	-	1128	At once	2855
E8-26	Motor locked-rotor speed setpoint	0.0 to 100.0	%	6	At once	2552
E8-27	Motor locked-rotor detection time	0.00 to 65.00	s	2	At once	2536
E8-28	Enable motor stall detection	0: Disable 1: Enable	-	1	At once	2710
E8-29	Motor stall detection threshold	10.0 to 80.0	%	20	At once	2714
E8-30	Motor stall detection time	0.00 to 10.00	s	0.5	At once	2718
E8-31	Enable current control error detection	0: Disable 1: Enable	-	1	At once	2742
E8-32	Current control error detection threshold	10.0 to 80.0	%	25	At once	2746

Para.	Name	Value Range	Unit	Default	Change Mode	Address
E8-33	Current control error detection time	0 to 500	ms	50	At once	2750
E8-34	Hysteresis value when target speed reached	0.0 to 600.0	%	3	At once	2814
E8-35	Detection time when target speed reached	0.0 to 100.0	s	3	At once	2818
E8-36	Bridge arm self-test pulse open time	1 to 500	μs	100	At stop	3164
E8-37	Enable parallel module current sampling error detection	0: Disable 1: Enable	-	1	At once	1073
E8-38	SVC speed open-loop locked-rotor detection time	0.000 to 65.000	s	10	At once	1069
E8-39	SVC control error protection	0: Disable 1: Enable	-	0	At once	5708
E8-40	Motor temperature detection filter time	0 to 60000	ms	500	At once	6798
E8-46	Enable demagnetization protection for synchronous motor	0: Disable 1: Enable	-	1	At once	1602
E8-47	Demagnetization protection threshold of synchronous motor	30.0 to 500.0	%	300	At once	1606

Para.	Name	Value Range	Unit	Default	Change Mode	Address
E8-48	Self-test (b5-01) mode selection	bit00: VI detection 0: Disable 1: Enable bit01: Bridge arm detection 0: Disable 1: Enable bit02: Output current sensor CM detection 0: Disable 1: Enable bit03: Braking transistor detection (reserved) 0: Disable 1: Enable bit04: Bus capacitor detector (reserved) 0: Disable 1: Enable bit05: Short-circuit-to-ground detection 0: Disable 1: Enable bit06: Output phase loss detection 0: Disable 1: Enable bit07: Current output unbalance detection 0: Disable 1: Enable bit08 to bit15: Reserved	-	255	At once	6344
E8-50	Encoder fault handling mode	0: Stop at the mode defined in E8-51 1: Generate an alarm and continue to run in SVC mode Other: B connector	-	0	At once	2544
E8-51	Stop mode upon encoder fault	0: OFF2 stop 1: OFF3 stop 2: OFF1 stop	-	0	At once	6367
E8-52	Min. running speed of motor after encoder fault (SVC)	0.0 to 100.0	%	3	At once	6371
Group E9: Vdc control						

Para.	Name	Value Range	Unit	Default	Change Mode	Address
E9-00	Auto calculate Vdc excited voltage in VC mode	0: Parameter setting 1: Auto calculated	-	1	At once	881
E9-01	Vdc_max control switch in VC mode	0: Disable 1: Enable	-	0	At stop	889
E9-02	Vdc_max excited voltage in VC mode	110.0 to 140.0	%	115	At once	953
E9-03	Vdc_min control switch in VC mode	0: Disable 1: Enable	-	0	At stop	925
E9-04	Vdc_min control cut-off frequency in VC mode	0.0 to 50.0	Hz	2	At once	1978
E9-05	Vdc_min excited voltage in VC mode	60.0 to 90.0	%	80	At once	949
E9-06	Vdc control gain adjustment coefficient in VC mode	1 to 1500	%	100	At once	885
E9-07	Bus capacitance ratio	100 to 1500	%	100	At once	1940
E9-08	Vdc_min exit flying start deviation threshold	0.0 to 10.0	%	1	At once	6361
E9-10	DC regulator control enable	0: Disable 1: Enable Other: B connector	-	0	At once	1658
E9-11	DC regulator control voltage loop enable	0: Disable 1: Enable Other: B connector	-	1	At once	1662
E9-14	Voltage reference source in DC regulator mode	0: Digital setting Other: B connector	-	0	At once	1622
E9-15	Voltage digital setting in DC regulator mode	410.0 to 1200.0	V	600	At once	1626
E9-16	Voltage digital setting upper limit in DC regulator mode	60.0 to 150.0	%	120	At once	1630
E9-17	Voltage upper limit source in DC regulator mode	0: Disable Other: K connector	-	0	At once	1638
E9-18	Voltage digital setting lower limit in DC regulator mode	60.0 to 150.0	%	75	At once	1634
E9-19	Voltage lower limit source in DC regulator mode	0: Disable Other: K connector	-	0	At once	1642
E9-20	Voltage upper limit in DC regulator mode	–3276.8 to +3276.7	V	0	Unmodifiable	35049
E9-21	Voltage lower limit in DC regulator mode	–3276.8 to +3276.7	V	0	Unmodifiable	35050
E9-22	Voltage setpoint change reference time	0.0 to 2000.0	s	5	At once	1646

Para.	Name	Value Range	Unit	Default	Change Mode	Address
E9-26	Min. operating frequency in DC regulator mode	0.0 to 200.0	%	10	At once	1666
E9-27	Kp adjustment coefficient in DC regulator mode	1.0 to 1000.0	%	100	At once	1650
E9-28	Ki adjustment coefficient in DC regulator mode	1.0 to 1000.0	%	100	At once	1654
E9-29	Dynamic Kp adjustment in DC regulator mode	10.0 to 1000.0	%	100	At once	2191
E9-30	Dynamic Kp activation threshold in DC regulator mode	5.0 to 100.0	V	25	At once	2195
Group E11: Motor model						
E11-00	Upper frequency of model switchover	0.0 to 600.0	%	20	At once	1081
E11-01	Lower frequency of model switchover	0.0 to 600.0	%	10	At once	1085
E11-02	Model switchover coefficient	0.0 to 1000.0	%	100	At once	1089
E11-04	Enable active FVC switch to SVC	0: Disable 1: Enable	-	0	At once	2540
E11-05	Upper frequency of active FVC switch to SVC	0.0 to 100.0	%	25	At once	1097
E11-06	Lower frequency of active FVC switch to SVC	0.0 to 100.0	%	15	At once	1101
E11-07	Filter time of SVC speed estimation	0 to 1000	ms	15	At once	1105
E11-08	Enable SVC I/F	0: Disable 1: Enable	-	1	At stop	12706
E11-09	Steady speed torque current in SVC I/F	0.0 to 400.0	%	50	At once	2682
E11-10	Acceleration torque current in SVC I/F	0.0 to 400.0	%	0	At once	2686
E11-11	Flux filter time in SVC I/F	0.000 to 1.000	s	0.01	At stop	2690
E11-12	SVC I/F exit frequency	0.0 to 100.0	%	2.5	At stop	2694
E11-13	Hysteresis range in SVC I/F	0.0 to 100.0	%	50	At stop	2698
E11-14	Enable waiting time for SVC I/F	0: Disable 1: Enable Other: B connector	-	1	At once	3194
E11-15	Waiting time for SVC I/F	0.000 to 10.000	s	0.5	At stop	2702
E11-16	SVC I/F gain	5.0 to 3000.0	%	300	At stop	2846

Para.	Name	Value Range	Unit	Default	Change Mode	Address
E11-17	Slip coefficient for SVC I/F	0.0 to 800.0	%	100	At once	2957
E11-18	Torque coefficient for pre-control calculation	0.0 to 800.0	%	100	At once	3139
E11-19	Oscillation suppression coefficient in SVC I/F	0.0 to 1600.0	%	0	At once	3696
E11-29	Source of motor thermal model temperature	0: Estimation 1: Motor temperature sensor	-	0	At once	3764
E11-30	Motor temperature model type	0: No estimation 1: Temperature model 1	-	0	At once	3700
E11-31	Ambient temperature	–50.0 to +100.0	°C	20	At once	3704
E11-32	Steady state load	0.0 to 800.0	%	100	At once	3708
E11-33	Zero speed load	0.0 to 800.0	%	100	At once	3712
E11-34	Frequency at breakover point	0.0 to 100.0	Hz	20	At once	3716
E11-35	Motor temperature rise under rated load	0.0 to 200.0	°C	80	At once	3720
E11-36	Motor temperature rise time constant	0 to 20000	s	1000	At once	3724
E11-37	Source of encoder initial angle of synchronous motor	0: Local static auto-tuning 1: Local dynamic acquisition 2: External communication setting	-	0	At stop	3868
E11-38	External input value of encoder initial angle of synchronous motor	0: 0 Other: K connector	-	0	At once	**3872**
E11-39	Enable magnetic pole auto-tuning during synchronous motor startup in SVC mode	0: No detection 1: Detection at first power-on 2: Detection before each startup		0	At once	3876
E11-40	Current compensation coefficient of synchronous motor in SVC low frequency	0.0 to 60.0	%	20	At once	3880
E11-41	Enable MTPA control for synchronous motor	0: Disable 1: Enable	-	1	At once	1614
E11-43	Enable SVC I/F speed adjustment torque hold	0: Disable 1: Enable	-	0	At once	1610
E11-44	Load type	0: Relatively light load at low speed 1: Other	-	1	At stop	5524
E11-45	Stator resistance optimization	0: Relatively light load at low speed	-	0	At stop	4206
E11-46	Stator resistance optimization threshold 1	0.00 to 10.00	%	0.75	At stop	4210

7.2.6 Group F: Input and Output

Para.	Name	Value Range	Unit	Default	Change Mode	Address
Group F0: DI						
F0-00	DI physical status value	0x0000 to 0xFFFF	-	0	Unmodifiable	32805
F0-01	DI status value after processing	0x0000 to 0xFFFF	-	0	Unmodifiable	32806
F0-02	DI force selection	0x0000 to 0x01FF	-	0	At once	1117
F0-03	DI force data	0x0000 to 0x01FF	-	0	At once	1118
F0-04	DI1 switch-on delay	0.00 to 360.00	s	0.01	At once	1119
F0-05	DI1 switch-off delay	0.00 to 360.00	s	0.01	At once	1120
F0-06	DI2 switch-on delay	0.00 to 360.00	s	0.01	At once	1121
F0-07	DI2 switch-off delay	0.00 to 360.00	s	0.01	At once	1122
F0-08	DI3 switch-on delay	0.00 to 360.00	s	0.01	At once	1123
F0-09	DI3 switch-off delay	0.00 to 360.00	s	0.01	At once	1124
F0-10	DI4 switch-on delay	0.00 to 360.00	s	0.01	At once	1125
F0-11	DI4 switch-off delay	0.00 to 360.00	s	0.01	At once	1126
F0-12	DI5 switch-on delay	0.00 to 360.00	s	0.01	At once	1127
F0-13	DI5 switch-off delay	0.00 to 360.00	s	0.01	At once	1128
F0-14	DI6 switch-on delay	0.00 to 360.00	s	0.01	At once	1129
F0-15	DI6 switch-off delay	0.00 to 360.00	s	0.01	At once	1130
F0-16	DIL switch-on delay	0.00 to 360.00	s	0.01	At once	1131
F0-17	DIL switch-off delay	0.00 to 360.00	s	0.01	At once	1132
F0-18	HDI1 switch-on delay	0.00 to 360.00	s	0.01	At once	1133
F0-19	HDI1 switch-off delay	0.00 to 360.00	s	0.01	At once	1134
F0-20	HDI2 switch-on delay	0.00 to 360.00	s	0.01	At once	1135
F0-21	HDI2 switch-off delay	0.00 to 360.00	s	0.01	At once	1136
Group F1: DO						
F1-00	DO signal source status value	0x0000 to 0xFFFF	-	0	Unmodifiable	32807
F1-01	DO status value after processing	0x0000 to 0xFFFF	-	0	Unmodifiable	32808
F1-02	RO1 signal source	0: Low level 1: High level 2: Ready to switch on 3: Running permitted 4: Running 5: Compare value reached 6: Negative speed 7: Run at zero speed 8: Overspeed 9: Alarm 10: Fault Other: B connector	-	0	At stop	1138

Para.	Name	Value Range	Unit	Default	Change Mode	Address
F1-03	RO2 signal source	0: Low level 1: High level 2: Ready to switch on 3: Running permitted 4: Running 5: Compare value reached 6: Negative speed 7: Run at zero speed 8: Overspeed 9: Alarm 10: Fault Other: B connector	-	0	At stop	1139
F1-04	RO3 signal source	0: Low level 1: High level 2: Ready to switch on 3: Running permitted 4: Running 5: Compare value reached 6: Negative speed 7: Run at zero speed 8: Overspeed 9: Alarm 10: Fault Other: B connector	-	0	At stop	1140
F1-05	HDO1 as DO signal source	0: Low level 1: High level 2: Ready to switch on 3: Running permitted 4: Running 5: Compare value reached 6: Negative speed 7: Run at zero speed 8: Overspeed 9: Alarm 10: Fault Other: B connector	-	0	At stop	1141

Para.	Name	Value Range	Unit	Default	Change Mode	Address
F1-06	HDO2 as DO signal source	0: Low level 1: High level 2: Ready to switch on 3: Running permitted 4: Running 5: Compare value reached 6: Negative speed 7: Run at zero speed 8: Overspeed 9: Alarm 10: Fault Other: B connector	-	0	At stop	1142
F1-07	RO1 switch-on delay	0.00 to 360.00	s	0	At once	1143
F1-08	RO1 switch-off delay	0.00 to 360.00	s	0	At once	1144
F1-09	RO2 switch-on delay	0.00 to 360.00	s	0	At once	1145
F1-10	RO2 switch-off delay	0.00 to 360.00	s	0	At once	1146
F1-11	RO3 switch-on delay	0.00 to 360.00	s	0	At once	1147
F1-12	RO3 switch-off delay	0.00 to 360.00	s	0	At once	1148
F1-13	HDO1 as DO switch-on delay	0.00 to 360.00	s	0	At once	1149
F1-14	HDO1 as DO switch-off delay	0.00 to 360.00	s	0	At once	1150
F1-15	HDO2 as DO switch-on delay	0.00 to 360.00	s	0	At once	1151
F1-16	HDO2 as DO switch-off delay	0.00 to 360.00	s	0	At once	1152
F1-17	DO positive and negative logic	0x0000 to 0x001F	-	0	At stop	1153
Group F2: AI						
F2-00	AI1 input value	–32.768 to +32.767	-	0	Unmodifiable	32809
F2-01	AI1 input proportion	–3276.8 to +3276.7	%	0	Unmodifiable	32810
F2-02	AI2 input value	–32.768 to +32.767	-	0	Unmodifiable	32811
F2-03	AI2 input proportion	–3276.8 to +3276.7	%	0	Unmodifiable	32812
F2-04	AI1 type	0: －10 V to +10 V 1: 0 V to 10 V 2: －20 mA to +20 mA 3: 0 mA to 20 mA 4: 4 mA to 20 mA	-	0	At stop	1154

Para.	Name	Value Range	Unit	Default	Change Mode	Address
F2-05	AI2 type	0: －10 V to +10 V 1: 0 V to 10 V 2: －20 mA to +20 mA 3: 0 mA to 20 mA 4: 4 mA to 20 mA	-	0	At stop	1155
F2-06	Min. input value of AI1 curve	–20.000 to +20.000	-	–10	At once	1156
F2-07	Min. input proportion of AI1 curve	–600.0 to +600.0	%	–100	At once	1157
F2-08	Max. input value of AI1 curve	–20.000 to +20.000	-	10	At once	1158
F2-09	Max. input proportion of AI1 curve	–600.0 to +600.0	%	100	At once	1159
F2-10	Min. input value of AI2 curve	–20.000 to +20.000	-	–10	At once	1160
F2-11	Min. input proportion of AI2 curve	–600.0 to +600.0	%	–100	At once	1161
F2-12	Max. input value of AI2 curve	–20.000 to +20.000	-	10	At once	1162
F2-13	Max. input proportion of AI2 curve	–600.0 to +600.0	%	100	At once	1163
F2-14	Setting for AI less than minimum input	Ones position: Setting for AI1 lower than minimum input 0: Minimum input proportion 1: 0.0% Tens position: Setting for AI2 lower than minimum input 0: Minimum input proportion 1: 0.0%	-	0	At once	1164
F2-15	AI1 filter time	0.000 to 10.000	s	0	At once	1165
F2-16	AI2 filter time	0.000 to 10.000	s	0	At once	1166
F2-17	AI1 denoising threshold	0.0 to 20.0	%	0	At once	1167
F2-18	AI2 denoising threshold	0.0 to 20.0	%	0	At once	1168
F2-19	AI setting zero-crossing threshold	0.0 to 1.0	%	0	At once	2185

Para.	Name	Value Range	Unit	Default	Change Mode	Address
F2-20	AI1 enable	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	1	At once	1169
F2-21	AI2 enable	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	1	At once	1170
F2-22	AI1 disconnection monitoring threshold	0.000 to 4.000	mA	2	At once	1171
F2-23	AI2 disconnection monitoring threshold	0.000 to 4.000	mA	2	At once	1172
F2-24	AI1 disconnection monitoring delay	0.00 to 10.00	s	1	At once	1173
F2-25	AI2 disconnection monitoring delay	0.00 to 10.00	s	1	At once	1174
F2-26	AI disconnection monitoring enable	Ones position: AI1 disconnection monitoring enable 0: Disable 1: Enable Tens position: AI2 disconnection monitoring enable 0: Disable 1: Enable	-	0	At stop	1175
Group F3: AO						
F3-00	AO1 output value	0.000 to 65.535	-	0	Unmodifia-ble	32813

Para.	Name	Value Range	Unit	Default	Change Mode	Address
F3-01	AO1 output proportion	–3276.8 to +3276.7	%	0	Unmodifiable	32814
F3-02	AO2 output value	0.000 to 65.535	-	0	Unmodifiable	32815
F3-03	AO2 output proportion	–3276.8 to +3276.7	%	0	Unmodifiable	32816
F3-04	AO1 signal source	0: 0 1: Actual motor speed 2: Sync frequency 3: Motor current 4: Motor torque 5: DC bus voltage 6: Output power 7: Ramp input of speed reference 8: Ramp output of speed reference 9: Speed reference superposed 10: Torque ramp reference Other: K connector	-	0	At stop	1176
F3-05	AO2 signal source	0: 0 1: Actual motor speed 2: Sync frequency 3: Motor current 4: Motor torque 5: DC bus voltage 6: Output power 7: Ramp input of speed reference 8: Ramp output of speed reference 9: Speed reference superposed 10: Torque ramp reference Other: K connector	-	0	At stop	1177
F3-06	AO1 type	0: 0 V to 10 V 1: 0 mA to 20 mA 2: 4 mA to 20 mA	-	0	At stop	1178
F3-07	AO2 type	0: 0 V to 10 V 1: 0 mA to 20 mA 2: 4 mA to 20 mA	-	0	At stop	1179
F3-08	Min. output proportion of AO1 curve	–600.0 to +600.0	%	0	At once	1180
F3-09	Min. output value of AO1 curve	0.000 to 20.000	-	0	At once	1181

Para.	Name	Value Range	Unit	Default	Change Mode	Address
F3-10	Max. output proportion of AO1 curve	–600.0 to +600.0	%	100	At once	1182
F3-11	Max. output value of AO1 curve	0.000 to 20.000	-	10	At once	1183
F3-12	Min. output proportion of AO2 curve	–600.0 to +600.0	%	0	At once	1184
F3-13	Min. output value of AO2 curve	0.000 to 20.000	-	0	At once	1185
F3-14	Max. output proportion of AO2 curve	–600.0 to +600.0	%	100	At once	1186
F3-15	Max. output value of AO2 curve	0.000 to 20.000	-	10	At once	1187
Group F4: HDI						
F4-00	HDI1 input value	0.00 to 655.35	kHz	0	Unmodifia-ble	32817
F4-01	HDI1 input proportion	–3276.8 to +3276.7	%	0	Unmodifia-ble	32818
F4-02	HDI2 input value	0.00 to 655.35	kHz	0	Unmodifia-ble	32819
F4-03	HDI2 input proportion	–3276.8 to +3276.7	%	0	Unmodifia-ble	32820
F4-04	Using HDI as DI	Ones position: Using HDI1 as DI 0: Not using as DI 1: Using as DI Tens position: Using HDI2 as DI 0: Not using as DI 1: Using as DI	-	0	At stop	1188
F4-05	Min. input frequency of HDI1 curve	10.00 to 100.00	kHz	10	At once	1191
F4-06	Min. input proportion of HDI1 curve	–600.0 to +600.0	%	0	At once	1192
F4-07	Max. input frequency of HDI1 curve	10.00 to 100.00	kHz	100	At once	1193
F4-08	Max. input proportion of HDI1 curve	–600.0 to +600.0	%	100	At once	1194
F4-09	Min. input frequency of HDI2 curve	10.00 to 100.00	kHz	10	At once	1195
F4-10	Min. input proportion of HDI2 curve	–600.0 to +600.0	%	0	At once	1196
F4-11	Max. input frequency of HDI2 curve	10.00 to 100.00	kHz	100	At once	1197
F4-12	Max. input proportion of HDI2 curve	–600.0 to +600.0	%	100	At once	1198

Para.	Name	Value Range	Unit	Default	Change Mode	Address
F4-13	Setting for HDI lower than minimum input	Ones position: Setting for HDI1 lower than minimum input 0: Minimum input proportion 1: 0.0% Tens position: Setting for HDI2 lower than minimum input 0: Minimum input proportion 1: 0.0%	-	0	At once	2046
F4-14	HDI1 filter time	0.000 to 10.000	s	0	At once	1189
F4-15	HDI2 filter time	0.000 to 10.000	s	0	At once	1190
F4-16	HDI setting zero-crossing threshold	0.0 to 1.0	%	0	At once	2186
Group F5: HDO						
F5-00	HDO1 output value	0.00 to 655.35	kHz	0	Unmodifiable	32821
F5-01	HDO1 output proportion	–3276.8 to +3276.7	%	0	Unmodifiable	32822
F5-02	HDO2 output value	0.00 to 655.35	kHz	0	Unmodifiable	32823
F5-03	HDO2 output proportion	–3276.8 to +3276.7	%	0	Unmodifiable	32824
F5-04	Using HDO as common DO	Ones position: Using HDO1 as DO 0: Not using as DO 1: Using as DO Tens position: Using HDO2 as DO 0: Not using as DO 1: Using as DO	-	0	At stop	1199
F5-05	HDO1 signal source	0: 0 1: Actual motor speed 2: Sync frequency 3: Motor current 4: Motor torque 5: DC bus voltage 6: Output power 7: Ramp input of speed reference 8: Ramp output of speed reference 9: Speed reference superposed 10: Torque ramp reference Other: K connector	-	0	At stop	1200

Para.	Name	Value Range	Unit	Default	Change Mode	Address
F5-06	HDO2 signal source	0: 0 1: Actual motor speed 2: Sync frequency 3: Motor current 4: Motor torque 5: DC bus voltage 6: Output power 7: Ramp input of speed reference 8: Ramp output of speed reference	-	0	At stop	1201
F5-06	HDO2 signal source	9: Speed reference superposed 10: Torque ramp reference Other: K connector	-	0	At stop	1201
F5-07	Min. output proportion of HDO1 curve	–600.0 to +600.0	%	0	At once	1202
F5-08	Min. output frequency of HDO1 curve	0.00 to 100.00	kHz	0	At once	1203
F5-09	Max. output proportion of HDO1 curve	–600.0 to +600.0	%	100	At once	1204
F5-10	Max. output frequency of HDO1 curve	0.00 to 100.00	kHz	100	At once	1205
F5-11	Min. output proportion of HDO2 curve	–600.0 to +600.0	%	0	At once	1206
F5-12	Min. output frequency of HDO2 curve	0.00 to 100.00	kHz	0	At once	1207
F5-13	Max. output proportion of HDO2 curve	–600.0 to +600.0	%	100	At once	1208
F5-14	Max. output frequency of HDO2 curve	0.00 to 100.00	kHz	100	At once	1209
Group F6: AI/AO factory correction parameters						
F6-16	AO1 current output gain	95.0 to 105.0	%	100	At once	4201
F6-17	AO2 current output gain	95.0 to 105.0	%	100	At once	4202

7.2.7 Group H: Protection and auxiliary

Para.	Name	Value Range	Unit	Default	Change Mode	Address
Group H0: Troubleshooting						
H0-00	Source of external fault 1	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	1210
H0-01	Source of external fault 2	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4	-	0	At once	1211
H0-01	Source of external fault 2	6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	1211
H0-02	Source of external alarm 1	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	1212

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H0-03	Source of external alarm 2	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	1213
H0-06	User-defined black box trigger command source	0: Disable Other: B connector	-	0	At once	1216
H0-07	Auto fault reset	0: Disable 1: Enable	-	0	At once	1217
H0-08	Time for clearing reset attempts	0.0 to 3600.0	s	180	At once	1218
H0-09	Interval of reset attempts	0.0 to 600.0	s	30	At once	1219
H0-10	Fault reset attempts	0 to 5	-	5	At once	1220
H0-11	Code of non-resettable error 1	0 to 65535	-	0	At once	1221
H0-12	Code of non-resettable error 2	0 to 65535	-	0	At once	1222
H0-13	Code of non-resettable error 3	0 to 65535	-	0	At once	1223
H0-19	Restart after auto reset	0: Disable 1: Enable	-	0	At once	1230
H0-20	Waiting time of restart after auto reset	0.0 to 6000.0	s	1	At once	1229
H0-21	Source of errors that allow restart	0: Allow restart for specified error codes 1: Inhibit restart for specified error codes	-	0	At once	1231
H0-22	Specified error code 1	0 to 65535	-	0	At once	1232
H0-23	Specified error code 2	0 to 65535	-	0	At once	1233
H0-24	Specified error code 3	0 to 65535	-	0	At once	1234
H0-25	Specified error code 4	0 to 65535	-	0	At once	1235
H0-26	Specified error code 5	0 to 65535	-	0	At once	1236
H0-27	Startup mode after auto reset	0: Normal 1: Flying start	-	0	At stop	6366
H0-33	STO signal filter time	0 to 15	ms	4	At once	1215

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H0-34	STO signal inconsistency detection delay	15 to 2000	ms	50	At once	6402
H0-35	STO alarm status reset mode	0: Manual reset 1: Auto reset	-	0	At once	6380
H0-36	STO alarm status detection enable	0: Disabled in case of bus undervoltage 1: Enabled in case of bus undervoltage	-	0	At once	6403
H0-40	Enable error detection 1	Ones position: OFF2/OFF3 activation alarm 0: Disable 1: Enable Tens position: HCU RTC battery voltage low alarm 0: Disable 1: Enable Thousands position: SD card offline/error alarm 0: Disable 1: Enable Ten thousands position: SD card black box fault record condition 0: Fault occurring during running 1: Fault occurring at any time	-	11110	At once	3229
H0-41	Enable error detection 2	Ones position: HCU_24V input voltage low alarm 0: Disable 1: Enable Tens position: HOFR OF cross detection 0: Disable 1: Enable Hundreds position: MD880 inverter fan detection 0: Disable 1: Enable Thousands position: Alarm for excessive max.back EMF of synchronous motor 0: Disable 1: Enable	-	11111	At once	3230
Group H1: Fault level change						
H1-00	Error level change error code 1	0 to 65535	-	0	At once	1243

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H1-02	Level of error code 1	0: Coast to stop 1: Emergency stop 2: Stop as specified 3: Run at limited current 4: Run at limited speed 5: Run at limited torque 6: Display alarm only 7: No handling	-	0	At once	1244
H1-04	Error level change error code 2	0 to 65535	-	0	At once	1245
H1-06	Level of error code 2	0: Coast to stop 1: Emergency stop 2: Stop as specified 3: Run at limited current 4: Run at limited speed 5: Run at limited torque 6: Display alarm only 7: No handling	-	0	At once	1246
H1-08	Error level change error code 3	0 to 65535	-	0	At once	1247
H1-10	Level of error code 3	0: Coast to stop 1: Emergency stop 2: Stop as specified 3: Run at limited current 4: Run at limited speed 5: Run at limited torque 6: Display alarm only 7: No handling	-	0	At once	1248
H1-12	Error level change error code 4	0 to 65535	-	0	At once	1249
H1-14	Level of error code 4	0: Coast to stop 1: Emergency stop 2: Stop as specified 3: Run at limited current 4: Run at limited speed 5: Run at limited torque 6: Display alarm only 7: No handling	-	0	At once	1250
H1-16	Error level change error code 5	0 to 65535	-	0	At once	1251

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H1-18	Level of error code 5	0: Coast to stop 1: Emergency stop 2: Stop as specified 3: Run at limited current 4: Run at limited speed 5: Run at limited torque 6: Display alarm only 7: No handling	-	0	At once	1252
H1-20	Error level change error code 6	0 to 65535	-	0	At once	1253
H1-22	Level of error code 6	0: Coast to stop 1: Emergency stop 2: Stop as specified 3: Run at limited current 4: Run at limited speed 5: Run at limited torque 6: Display alarm only 7: No handling	-	0	At once	1254
H1-24	Error level change error code 7	0 to 65535	-	0	At once	1255
H1-26	Level of error code 7	0: Coast to stop 1: Emergency stop 2: Stop as specified 3: Run at limited current 4: Run at limited speed 5: Run at limited torque 6: Display alarm only 7: No handling	-	0	At once	1256
H1-28	Error level change error code 8	0 to 65535	-	0	At once	1257
H1-30	Level of error code 8	0: Coast to stop 1: Emergency stop 2: Stop as specified 3: Run at limited current 4: Run at limited speed 5: Run at limited torque 6: Display alarm only 7: No handling	-	0	At once	1258
H1-32	Error level change error code 9	0 to 65535	-	0	At once	1259

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H1-34	Level of error code 9	0: Coast to stop 1: Emergency stop 2: Stop as specified 3: Run at limited current 4: Run at limited speed 5: Run at limited torque 6: Display alarm only 7: No handling	-	0	At once	1260
H1-36	Error level change error code 10	0 to 65535	-	0	At once	1261
H1-38	Level of error code 10	0: Coast to stop 1: Emergency stop 2: Stop as specified 3: Run at limited current 4: Run at limited speed 5: Run at limited torque 6: Display alarm only 7: No handling	-	0	At once	1262
H1-40	[Run at limit current] Max. current	10.0 to 100.0	%	50	At once	2734
H1-42	[Run at limit speed] Mode set	0: Run at limit speed 1: Run at specified speed		0	At once	2726
H1-43	[Run at specified speed] Speed setpoint	–100.0 to +100.0	%	0	At once	2727
H1-44	[Run at limit speed] Positive limit	0.0 to 100.0	%	10	At once	2728
H1-45	[Run at limit speed] Reverse limit	–100.0 to 0.0	%	–10	At once	2729
H1-48	[Run at limit torque] Upper torque limit	0.0 to 100.0	%	50	At once	2730
H1-49	[Run at limit torque] Lower torque limit	–100.0 to 0.0	%	–50	At once	2731
H1-50	[Run at limit torque] Motoring power limit	0.0 to 100.0	%	50	At once	2732
H1-51	[Run at limit torque] Regenerative power limit	0.0 to 100.0	%	50	At once	2733
Group H2: Latest fault code record						
H2-00	Code of latest fault 1	0 to 65534	-	0	Unmodifiable	1293
H2-01	Subcode of latest fault 1	0 to 65534	-	0	Unmodifiable	1294
H2-02	Code of latest fault 2	0 to 65534	-	0	Unmodifiable	1295
H2-03	Subcode of latest fault 2	0 to 65534	-	0	Unmodifiable	1296

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H2-04	Code of latest fault 3	0 to 65534	-	0	Unmodifiable	1297
H2-05	Subcode of latest fault 3	0 to 65534	-	0	Unmodifiable	1298
H2-06	Code of latest fault 4	0 to 65534	-	0	Unmodifiable	1299
H2-07	Subcode of latest fault 4	0 to 65534	-	0	Unmodifiable	1300
H2-08	Code of latest fault 5	0 to 65534	-	0	Unmodifiable	1301
H2-09	Subcode of latest fault 5	0 to 65534	-	0	Unmodifiable	1302
H2-10	Code of latest fault 6	0 to 65534	-	0	Unmodifiable	1303
H2-11	Subcode of latest fault 6	0 to 65534	-	0	Unmodifiable	1304
H2-12	Speed of the latest fault	–300.00 to +300.00	Hz	0	Unmodifiable	1263
H2-13	Current of the latest fault	0.0 to 6553.5	A	0	Unmodifiable	1264
H2-14	Bus voltage upon latest fault	0.0 to 6553.5	V	0	Unmodifiable	1265
H2-15	Output torque of the latest fault	–800.0 to +800.0	%	0	Unmodifiable	1266
H2-16	Control word 1 upon latest fault	0x0000 to 0xFFFF	-	0	Unmodifiable	1267
H2-17	Control word 2 upon latest fault	0x0000 to 0xFFFF	-	0	Unmodifiable	1268
H2-18	Status word upon latest fault	0x0000 to 0xFFFF	-	0	Unmodifiable	1269
H2-19	State machine upon latest fault	0 to 65535	-	0	Unmodifiable	1270
H2-20	Latest fault occurrence time	0 to 65535	-	0	Unmodifiable	1271
H2-21	Latest fault occurrence date	0 to 65535	-	0	Unmodifiable	1272
Group H3: Second latest fault code record						
H3-00	Code of second latest fault 1	0 to 65534	-	0	Unmodifiable	1305
H3-01	Subcode of second latest fault 1	0 to 65534	-	0	Unmodifiable	1306
H3-02	Code of second latest fault 2	0 to 65534	-	0	Unmodifiable	1307
H3-03	Subcode of second latest fault 2	0 to 65534	-	0	Unmodifiable	1308
H3-04	Code of second latest fault 3	0 to 65534	-	0	Unmodifiable	1309
H3-05	Subcode of second latest fault 3	0 to 65534	-	0	Unmodifiable	1310
H3-06	Code of second latest fault 4	0 to 65534	-	0	Unmodifiable	1311

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H3-07	Subcode of second latest fault 4	0 to 65534	-	0	Unmodifiable	1312
H3-08	Code of second latest fault 5	0 to 65534	-	0	Unmodifiable	1313
H3-09	Subcode of second latest fault 5	0 to 65534	-	0	Unmodifiable	1314
H3-10	Code of second latest fault 6	0 to 65534	-	0	Unmodifiable	1315
H3-11	Subcode of second latest fault 6	0 to 65534	-	0	Unmodifiable	1316
H3-12	Speed of the second latest fault	–300.00 to +300.00	Hz	0	Unmodifiable	1273
H3-13	Current of the second latest fault	0.0 to 6553.5	A	0	Unmodifiable	1274
H3-14	Bus voltage upon second latest fault	0.0 to 6553.5	V	0	Unmodifiable	1275
H3-15	Output torque of the second latest fault	–800.0 to +800.0	%	0	Unmodifiable	1276
H3-16	Control word 1 upon second latest fault	0x0000 to 0xFFFF	-	0	Unmodifiable	1277
H3-17	Control word 2 upon second latest fault	0x0000 to 0xFFFF	-	0	Unmodifiable	1278
H3-18	Status word upon second latest fault	0x0000 to 0xFFFF	-	0	Unmodifiable	1279
H3-19	State machine upon second latest fault	0 to 65535	-	0	Unmodifiable	1280
H3-20	Second latest fault occurrence time	0 to 65535	-	0	Unmodifiable	1281
H3-21	Second latest fault occurrence date	0 to 65535	-	0	Unmodifiable	1282
Group H4: Third latest fault code record						
H4-00	Code of third latest fault 1	0 to 65534	-	0	Unmodifiable	1317
H4-01	Subcode of the third latest fault 1	0 to 65534	-	0	Unmodifiable	1318
H4-02	Code of third latest fault 2	0 to 65534	-	0	Unmodifiable	1319
H4-03	Subcode of the third latest fault 2	0 to 65534	-	0	Unmodifiable	1320
H4-04	Code of third latest fault 3	0 to 65534	-	0	Unmodifiable	1321
H4-05	Subcode of the third latest fault 3	0 to 65534	-	0	Unmodifiable	1322
H4-06	Code of third latest fault 4	0 to 65534	-	0	Unmodifiable	1323
H4-07	Subcode of the third latest fault 4	0 to 65534	-	0	Unmodifiable	1324
H4-08	Code of third latest fault 5	0 to 65534	-	0	Unmodifiable	1325
H4-09	Subcode of the third latest fault 5	0 to 65534	-	0	Unmodifiable	1326

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H4-10	Code of third latest fault 6	0 to 65534	-	0	Unmodifiable	1327
H4-11	Subcode of the third latest fault 6	0 to 65534	-	0	Unmodifiable	1328
H4-12	Speed of the third latest fault	–300.00 to +300.00	Hz	0	Unmodifiable	1283
H4-13	Current of the third latest fault	0.0 to 6553.5	A	0	Unmodifiable	1284
H4-14	Bus voltage upon third latest fault	0.0 to 6553.5	V	0	Unmodifiable	1285
H4-15	Output torque of third latest fault	–800.0 to +800.0	%	0	Unmodifiable	1286
H4-16	Control word 1 upon third latest fault	0x0000 to 0xFFFF	-	0	Unmodifiable	1287
H4-17	Control word 2 upon third latest fault	0x0000 to 0xFFFF	-	0	Unmodifiable	1288
H4-18	Status word upon third latest fault	0x0000 to 0xFFFF	-	0	Unmodifiable	1289
H4-19	State machine upon third latest fault	0 to 65535	-	0	Unmodifiable	1290
H4-20	Third latest fault occurrence time	0 to 65535	-	0	Unmodifiable	1291
H4-21	Third latest fault occurrence date	0 to 65535	-	0	Unmodifiable	1292
Group H5: Fourth latest fault code record						
H5-00	Code of fourth latest fault 1	0 to 65534	-	0	Unmodifiable	1329
H5-01	Subcode of fourth latest fault 1	0 to 65534	-	0	Unmodifiable	1330
H5-02	Code of fourth latest fault 2	0 to 65534	-	0	Unmodifiable	1331
H5-03	Subcode of fourth latest fault 2	0 to 65534	-	0	Unmodifiable	1332
H5-04	Code of fourth latest fault 3	0 to 65534	-	0	Unmodifiable	1333
H5-05	Subcode of fourth latest fault 3	0 to 65534	-	0	Unmodifiable	1334
H5-06	Code of fourth latest fault 4	0 to 65534	-	0	Unmodifiable	1335
H5-07	Subcode of fourth latest fault 4	0 to 65534	-	0	Unmodifiable	1336
H5-08	Code of fourth latest fault 5	0 to 65534	-	0	Unmodifiable	1337
H5-09	Subcode of fourth latest fault 5	0 to 65534	-	0	Unmodifiable	1338
H5-10	Code of fourth latest fault 6	0 to 65534	-	0	Unmodifiable	1339
H5-11	Subcode of fourth latest fault 6	0 to 65534	-	0	Unmodifiable	1340
H5-12	Speed of the fourth latest fault	–300.00 to +300.00	Hz	0	Unmodifiable	5051

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H5-13	Current of the fourth latest fault	0.0 to 6553.5	A	0	Unmodifiable	5052
H5-14	Bus voltage upon fourth latest fault	0.0 to 6553.5	V	0	Unmodifiable	5053
H5-15	Output torque of the fourth latest fault	–800.0 to +800.0	%	0	Unmodifiable	5054
H5-16	Control word 1 upon fourth latest fault	0x0000 to 0xFFFF	-	0	Unmodifiable	5055
H5-17	Control word 2 upon fourth latest fault	0x0000 to 0xFFFF	-	0	Unmodifiable	5056
H5-18	Status word upon fourth latest fault	0x0000 to 0xFFFF	-	0	Unmodifiable	5057
H5-19	State machine upon fourth latest fault	0 to 65535	-	0	Unmodifiable	5058
H5-20	Fourth latest fault occurrence time	0 to 65535	-	0	Unmodifiable	5059
H5-21	Fourth latest fault occurrence date	0 to 65535	-	0	Unmodifiable	5060
Group H6: Fifth latest fault code record						
H6-00	Code of fifth latest fault 1	0 to 65534	-	0	Unmodifiable	1341
H6-01	Subcode of fifth latest fault 1	0 to 65534	-	0	Unmodifiable	1342
H6-02	Code of fifth latest fault 2	0 to 65534	-	0	Unmodifiable	1343
H6-03	Subcode of fifth latest fault 2	0 to 65534	-	0	Unmodifiable	1344
H6-04	Code of fifth latest fault 3	0 to 65534	-	0	Unmodifiable	1345
H6-05	Subcode of fifth latest fault 3	0 to 65534	-	0	Unmodifiable	1346
H6-06	Code of fifth latest fault 4	0 to 65534	-	0	Unmodifiable	1347
H6-07	Subcode of fifth latest fault 4	0 to 65534	-	0	Unmodifiable	1348
H6-08	Code of fifth latest fault 5	0 to 65534	-	0	Unmodifiable	1349
H6-09	Subcode of fifth latest fault 5	0 to 65534	-	0	Unmodifiable	1350
H6-10	Code of fifth latest fault 6	0 to 65534	-	0	Unmodifiable	1351
H6-11	Subcode of fifth latest fault 6	0 to 65534	-	0	Unmodifiable	1352
H6-12	Speed of the fifth latest fault	–300.00 to +300.00	Hz	0	Unmodifiable	5061
H6-13	Current of the fifth latest fault	0.0 to 6553.5	A	0	Unmodifiable	5062
H6-14	Bus voltage upon fifth latest fault	0.0 to 6553.5	V	0	Unmodifiable	5063
H6-15	Output torque of the fifth latest fault	–800.0 to +800.0	%	0	Unmodifiable	5064

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H6-16	Control word 1 upon fifth latest fault	0x0000 to 0xFFFF	-	0	Unmodifiable	5065
H6-17	Control word 2 upon fifth latest fault	0x0000 to 0xFFFF	-	0	Unmodifiable	5066
H6-18	Status word upon fifth latest fault	0x0000 to 0xFFFF	-	0	Unmodifiable	5067
H6-19	State machine upon fifth latest fault	0 to 65535	-	0	Unmodifiable	5068
H6-20	Fifth latest fault occurrence time	0 to 65535	-	0	Unmodifiable	5069
H6-21	Fifth latest fault occurrence date	0 to 65535	-	0	Unmodifiable	5070
Group H7: Latest active limit code record						
H7-00	Active limit code 1	0 to 65534	-	0	Unmodifiable	1353
H7-01	Subcode of active limit 1	0 to 65534	-	0	Unmodifiable	1354
H7-02	Active limit code 2	0 to 65534	-	0	Unmodifiable	1355
H7-03	Subcode of active limit 2	0 to 65534	-	0	Unmodifiable	1356
H7-04	Active limit code 3	0 to 65534	-	0	Unmodifiable	1357
H7-05	Subcode of active limit 3	0 to 65534	-	0	Unmodifiable	1358
H7-06	Active limit code 4	0 to 65534	-	0	Unmodifiable	1359
H7-07	Subcode of active limit 4	0 to 65534	-	0	Unmodifiable	1360
H7-08	Active limit code 5	0 to 65534	-	0	Unmodifiable	1361
H7-09	Subcode of active limit 5	0 to 65534	-	0	Unmodifiable	1362
H7-10	Active limit code 6	0 to 65534	-	0	Unmodifiable	1363
H7-11	Subcode of active limit 6	0 to 65534	-	0	Unmodifiable	1364
Group H8: Latest alarm code record						
H8-00	Alarm code 1	0 to 65534	-	0	Unmodifiable	1365
H8-01	Subcode of alarm 1	0 to 65534	-	0	Unmodifiable	1366
H8-02	Alarm code 2	0 to 65534	-	0	Unmodifiable	1367
H8-03	Subcode of alarm 2	0 to 65534	-	0	Unmodifiable	1368
H8-04	Alarm code 3	0 to 65534	-	0	Unmodifiable	1369
H8-05	Subcode of alarm 3	0 to 65534	-	0	Unmodifiable	1370
H8-06	Alarm code 4	0 to 65534	-	0	Unmodifiable	1371

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H8-07	Subcode of alarm 4	0 to 65534	-	0	Unmodifiable	1372
H8-08	Alarm code 5	0 to 65534	-	0	Unmodifiable	1373
H8-09	Subcode of alarm 5	0 to 65534	-	0	Unmodifiable	1374
H8-10	Alarm code 6	0 to 65534	-	0	Unmodifiable	1375
H8-11	Subcode of alarm 6	0 to 65534	-	0	Unmodifiable	1376
Group H10: User-defined error words						
H10-00	User-defined error word 1	0x0000 to 0xFFFF	-	0	Unmodifiable	34914
H10-01	User-defined error word 2	0x0000 to 0xFFFF	-	0	Unmodifiable	34915
H10-02	Fault word 1 - Bit00 error code	0 to 65535	-	0	At once	3239
H10-03	Fault word 1 - Bit00 error subcode	0: All error subcodes 1: Error subcode 1 2: Error subcode 2 3: Error subcode 3 4: Error subcode 4 5: Error subcode 5 6: Error subcode 6 7: Error subcode 7 8: Error subcode 8 9: Error subcode 9 10: Error subcode 10 11: Error subcode 11 12: Error subcode 12 13: Error subcode 13 14: Error subcode 14 15: Error subcode 15 16: Error subcode 16	-	0	At once	3240
H10-04	Fault word 1 - Bit01 error code	0 to 65535	-	0	At once	3241

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H10-05	Fault word 1 - Bit01 error subcode	0: All error subcodes 1: Error subcode 1 2: Error subcode 2 3: Error subcode 3 4: Error subcode 4 5: Error subcode 5 6: Error subcode 6 7: Error subcode 7 8: Error subcode 8 9: Error subcode 9 10: Error subcode 10 11: Error subcode 11 12: Error subcode 12 13: Error subcode 13 14: Error subcode 14 15: Error subcode 15 16: Error subcode 16	-	0	At once	3242
H10-06	Fault word 1 - Bit02 error code	0 to 65535	-	0	At once	3243
H10-07	Fault word 1 - Bit02 error subcode	0: All error subcodes 1: Error subcode 1 2: Error subcode 2 3: Error subcode 3 4: Error subcode 4 5: Error subcode 5 6: Error subcode 6 7: Error subcode 7 8: Error subcode 8 9: Error subcode 9 10: Error subcode 10 11: Error subcode 11 12: Error subcode 12 13: Error subcode 13 14: Error subcode 14 15: Error subcode 15 16: Error subcode 16	-	0	At once	3244
H10-08	Fault word 1 - Bit03 error code	0 to 65535	-	0	At once	3245

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H10-09	Fault word 1 - Bit03 error subcode	0: All error subcodes 1: Error subcode 1 2: Error subcode 2 3: Error subcode 3 4: Error subcode 4 5: Error subcode 5 6: Error subcode 6 7: Error subcode 7 8: Error subcode 8 9: Error subcode 9 10: Error subcode 10 11: Error subcode 11 12: Error subcode 12 13: Error subcode 13 14: Error subcode 14 15: Error subcode 15 16: Error subcode 16	-	0	At once	3246
H10-10	Fault word 1 - Bit04 error code	0 to 65535	-	0	At once	3247
H10-11	Fault word 1 - Bit04 error subcode	0: All error subcodes 1: Error subcode 1 2: Error subcode 2 3: Error subcode 3 4: Error subcode 4 5: Error subcode 5 6: Error subcode 6 7: Error subcode 7 8: Error subcode 8 9: Error subcode 9 10: Error subcode 10 11: Error subcode 11 12: Error subcode 12 13: Error subcode 13 14: Error subcode 14 15: Error subcode 15 16: Error subcode 16	-	0	At once	3248
H10-12	Fault word 1 - Bit05 error code	0 to 65535	-	0	At once	3249

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H10-13	Fault word 1 - Bit05 error subcode	0: All error subcodes 1: Error subcode 1 2: Error subcode 2 3: Error subcode 3 4: Error subcode 4 5: Error subcode 5 6: Error subcode 6 7: Error subcode 7 8: Error subcode 8 9: Error subcode 9 10: Error subcode 10 11: Error subcode 11 12: Error subcode 12 13: Error subcode 13 14: Error subcode 14 15: Error subcode 15 16: Error subcode 16	-	0	At once	3250
H10-14	Fault word 1 - Bit06 error code	0 to 65535	-	0	At once	3251
H10-15	Fault word 1 - Bit06 error subcode	0: All error subcodes 1: Error subcode 1 2: Error subcode 2 3: Error subcode 3 4: Error subcode 4 5: Error subcode 5 6: Error subcode 6 7: Error subcode 7 8: Error subcode 8 9: Error subcode 9 10: Error subcode 10 11: Error subcode 11 12: Error subcode 12 13: Error subcode 13 14: Error subcode 14 15: Error subcode 15 16: Error subcode 16	-	0	At once	3252
H10-16	Fault word 1 - Bit07 error code	0 to 65535	-	0	At once	3253

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H10-17	Fault word 1 - Bit07 error subcode	0: All error subcodes 1: Error subcode 1 2: Error subcode 2 3: Error subcode 3 4: Error subcode 4 5: Error subcode 5 6: Error subcode 6 7: Error subcode 7 8: Error subcode 8 9: Error subcode 9 10: Error subcode 10 11: Error subcode 11 12: Error subcode 12 13: Error subcode 13 14: Error subcode 14 15: Error subcode 15 16: Error subcode 16	-	0	At once	3254
H10-18	Fault word 1 - Bit08 error code	0 to 65535	-	0	At once	3255
H10-19	Fault word 1 - Bit08 error subcode	0: All error subcodes 1: Error subcode 1 2: Error subcode 2 3: Error subcode 3 4: Error subcode 4 5: Error subcode 5 6: Error subcode 6 7: Error subcode 7 8: Error subcode 8 9: Error subcode 9 10: Error subcode 10 11: Error subcode 11 12: Error subcode 12 13: Error subcode 13 14: Error subcode 14 15: Error subcode 15 16: Error subcode 16	-	0	At once	3256
H10-20	Fault word 1 - Bit09 error code	0 to 65535	-	0	At once	3257

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H10-21	Fault word 1 - Bit09 error subcode	0: All error subcodes 1: Error subcode 1 2: Error subcode 2 3: Error subcode 3 4: Error subcode 4 5: Error subcode 5 6: Error subcode 6 7: Error subcode 7 8: Error subcode 8 9: Error subcode 9 10: Error subcode 10 11: Error subcode 11 12: Error subcode 12 13: Error subcode 13 14: Error subcode 14 15: Error subcode 15 16: Error subcode 16	-	0	At once	3258
H10-22	Fault word 1 - Bit10 error code	0 to 65535	-	0	At once	3259
H10-23	Fault word 1 - Bit10 error subcode	0: All error subcodes 1: Error subcode 1 2: Error subcode 2 3: Error subcode 3 4: Error subcode 4 5: Error subcode 5 6: Error subcode 6 7: Error subcode 7 8: Error subcode 8 9: Error subcode 9 10: Error subcode 10 11: Error subcode 11 12: Error subcode 12 13: Error subcode 13 14: Error subcode 14 15: Error subcode 15 16: Error subcode 16	-	0	At once	3260
H10-24	Fault word 1 - Bit11 error code	0 to 65535	-	0	At once	3261

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H10-25	Fault word 1 - Bit11 error subcode	0: All error subcodes 1: Error subcode 1 2: Error subcode 2 3: Error subcode 3 4: Error subcode 4 5: Error subcode 5 6: Error subcode 6 7: Error subcode 7 8: Error subcode 8 9: Error subcode 9 10: Error subcode 10 11: Error subcode 11 12: Error subcode 12 13: Error subcode 13 14: Error subcode 14 15: Error subcode 15 16: Error subcode 16	-	0	At once	3262
H10-26	Fault word 1 - Bit12 error code	0 to 65535	-	0	At once	3263
H10-27	Fault word 1 - Bit12 error subcode	0: All error subcodes 1: Error subcode 1 2: Error subcode 2 3: Error subcode 3 4: Error subcode 4 5: Error subcode 5 6: Error subcode 6 7: Error subcode 7 8: Error subcode 8 9: Error subcode 9 10: Error subcode 10 11: Error subcode 11 12: Error subcode 12 13: Error subcode 13 14: Error subcode 14 15: Error subcode 15 16: Error subcode 16	-	0	At once	3264
H10-28	Fault word 1 - Bit13 error code	0 to 65535	-	0	At once	3265

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H10-29	Fault word 1 - Bit13 error subcode	0: All error subcodes 1: Error subcode 1 2: Error subcode 2 3: Error subcode 3 4: Error subcode 4 5: Error subcode 5 6: Error subcode 6 7: Error subcode 7 8: Error subcode 8 9: Error subcode 9 10: Error subcode 10 11: Error subcode 11 12: Error subcode 12 13: Error subcode 13 14: Error subcode 14 15: Error subcode 15 16: Error subcode 16	-	0	At once	3266
H10-30	Fault word 1 - Bit14 error code	0 to 65535	-	0	At once	3267
H10-31	Fault word 1 - Bit14 error subcode	0: All error subcodes 1: Error subcode 1 2: Error subcode 2 3: Error subcode 3 4: Error subcode 4 5: Error subcode 5 6: Error subcode 6 7: Error subcode 7 8: Error subcode 8 9: Error subcode 9 10: Error subcode 10 11: Error subcode 11 12: Error subcode 12 13: Error subcode 13 14: Error subcode 14 15: Error subcode 15 16: Error subcode 16	-	0	At once	3268
H10-32	Fault word 1 - Bit15 error code	0 to 65535	-	0	At once	3269

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H10-33	Fault word 1 - Bit15 error subcode	0: All error subcodes 1: Error subcode 1 2: Error subcode 2 3: Error subcode 3 4: Error subcode 4 5: Error subcode 5 6: Error subcode 6 7: Error subcode 7 8: Error subcode 8 9: Error subcode 9 10: Error subcode 10 11: Error subcode 11 12: Error subcode 12 13: Error subcode 13 14: Error subcode 14 15: Error subcode 15 16: Error subcode 16	-	0	At once	3270
H10-34	Fault word 2 - Bit00 error code	0 to 65535	-	0	At once	3271
H10-35	Fault word 2 - Bit00 error subcode	0: All error subcodes 1: Error subcode 1 2: Error subcode 2 3: Error subcode 3 4: Error subcode 4 5: Error subcode 5 6: Error subcode 6 7: Error subcode 7 8: Error subcode 8 9: Error subcode 9 10: Error subcode 10 11: Error subcode 11 12: Error subcode 12 13: Error subcode 13 14: Error subcode 14 15: Error subcode 15 16: Error subcode 16	-	0	At once	3272
H10-36	Fault word 2 - Bit01 error code	0 to 65535	-	0	At once	3273

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H10-37	Fault word 2 - Bit01 error subcode	0: All error subcodes 1: Error subcode 1 2: Error subcode 2 3: Error subcode 3 4: Error subcode 4 5: Error subcode 5 6: Error subcode 6 7: Error subcode 7 8: Error subcode 8 9: Error subcode 9 10: Error subcode 10 11: Error subcode 11 12: Error subcode 12 13: Error subcode 13 14: Error subcode 14 15: Error subcode 15 16: Error subcode 16	-	0	At once	3274
H10-38	Fault word 2 - Bit02 error code	0 to 65535	-	0	At once	3275
H10-39	Fault word 2 - Bit02 error subcode	0: All error subcodes 1: Error subcode 1 2: Error subcode 2 3: Error subcode 3 4: Error subcode 4 5: Error subcode 5 6: Error subcode 6 7: Error subcode 7 8: Error subcode 8 9: Error subcode 9 10: Error subcode 10 11: Error subcode 11 12: Error subcode 12 13: Error subcode 13 14: Error subcode 14 15: Error subcode 15 16: Error subcode 16	-	0	At once	3276
H10-40	Fault word 2 - Bit03 error code	0 to 65535	-	0	At once	3277

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H10-41	Fault word 2 - Bit03 error subcode	0: All error subcodes 1: Error subcode 1 2: Error subcode 2 3: Error subcode 3 4: Error subcode 4 5: Error subcode 5 6: Error subcode 6 7: Error subcode 7 8: Error subcode 8 9: Error subcode 9 10: Error subcode 10 11: Error subcode 11 12: Error subcode 12 13: Error subcode 13 14: Error subcode 14 15: Error subcode 15 16: Error subcode 16	-	0	At once	3278
H10-42	Fault word 2 - Bit04 error code	0 to 65535	-	0	At once	3279
H10-43	Fault word 2 - Bit04 error subcode	0: All error subcodes 1: Error subcode 1 2: Error subcode 2 3: Error subcode 3 4: Error subcode 4 5: Error subcode 5 6: Error subcode 6 7: Error subcode 7 8: Error subcode 8 9: Error subcode 9 10: Error subcode 10 11: Error subcode 11 12: Error subcode 12 13: Error subcode 13 14: Error subcode 14 15: Error subcode 15 16: Error subcode 16	-	0	At once	3280
H10-44	Fault word 2 - Bit05 error code	0 to 65535	-	0	At once	3281

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H10-45	Fault word 2 - Bit05 error subcode	0: All error subcodes 1: Error subcode 1 2: Error subcode 2 3: Error subcode 3 4: Error subcode 4 5: Error subcode 5 6: Error subcode 6 7: Error subcode 7 8: Error subcode 8 9: Error subcode 9 10: Error subcode 10 11: Error subcode 11 12: Error subcode 12 13: Error subcode 13 14: Error subcode 14 15: Error subcode 15 16: Error subcode 16	-	0	At once	3282
H10-46	Fault word 2 - Bit06 error code	0 to 65535	-	0	At once	3283
H10-47	Fault word 2 - Bit06 error subcode	0: All error subcodes 1: Error subcode 1 2: Error subcode 2 3: Error subcode 3 4: Error subcode 4 5: Error subcode 5 6: Error subcode 6 7: Error subcode 7 8: Error subcode 8 9: Error subcode 9 10: Error subcode 10 11: Error subcode 11 12: Error subcode 12 13: Error subcode 13 14: Error subcode 14 15: Error subcode 15 16: Error subcode 16	-	0	At once	3284
H10-48	Fault word 2 - Bit07 error code	0 to 65535	-	0	At once	3285

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H10-49	Fault word 2 - Bit07 error subcode	0: All error subcodes 1: Error subcode 1 2: Error subcode 2 3: Error subcode 3 4: Error subcode 4 5: Error subcode 5 6: Error subcode 6 7: Error subcode 7 8: Error subcode 8 9: Error subcode 9 10: Error subcode 10 11: Error subcode 11 12: Error subcode 12 13: Error subcode 13 14: Error subcode 14 15: Error subcode 15 16: Error subcode 16	-	0	At once	3286
H10-50	Fault word 2 - Bit08 error code	0 to 65535	-	0	At once	3287
H10-51	Fault word 2 - Bit08 error subcode	0: All error subcodes 1: Error subcode 1 2: Error subcode 2 3: Error subcode 3 4: Error subcode 4 5: Error subcode 5 6: Error subcode 6 7: Error subcode 7 8: Error subcode 8 9: Error subcode 9 10: Error subcode 10 11: Error subcode 11 12: Error subcode 12 13: Error subcode 13 14: Error subcode 14 15: Error subcode 15 16: Error subcode 16	-	0	At once	3288
H10-52	Fault word 2 - Bit09 error code	0 to 65535	-	0	At once	3289

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H10-53	Fault word 2 - Bit09 error subcode	0: All error subcodes 1: Error subcode 1 2: Error subcode 2 3: Error subcode 3 4: Error subcode 4 5: Error subcode 5 6: Error subcode 6 7: Error subcode 7 8: Error subcode 8 9: Error subcode 9 10: Error subcode 10 11: Error subcode 11 12: Error subcode 12 13: Error subcode 13 14: Error subcode 14 15: Error subcode 15 16: Error subcode 16	-	0	At once	3290
H10-54	Fault word 2 - Bit10 error code	0 to 65535	-	0	At once	3291
H10-55	Fault word 2 - Bit10 error subcode	0: All error subcodes 1: Error subcode 1 2: Error subcode 2 3: Error subcode 3 4: Error subcode 4 5: Error subcode 5 6: Error subcode 6 7: Error subcode 7 8: Error subcode 8 9: Error subcode 9 10: Error subcode 10 11: Error subcode 11 12: Error subcode 12 13: Error subcode 13 14: Error subcode 14 15: Error subcode 15 16: Error subcode 16	-	0	At once	3292
H10-56	Fault word 2 - Bit11 error code	0 to 65535	-	0	At once	3293

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H10-57	Fault word 2 - Bit11 error subcode	0: All error subcodes 1: Error subcode 1 2: Error subcode 2 3: Error subcode 3 4: Error subcode 4 5: Error subcode 5 6: Error subcode 6 7: Error subcode 7 8: Error subcode 8 9: Error subcode 9 10: Error subcode 10 11: Error subcode 11 12: Error subcode 12 13: Error subcode 13 14: Error subcode 14 15: Error subcode 15 16: Error subcode 16	-	0	At once	3294
H10-58	Fault word 2 - Bit12 error code	0 to 65535	-	0	At once	3295
H10-59	Fault word 2 - Bit12 error subcode	0: All error subcodes 1: Error subcode 1 2: Error subcode 2 3: Error subcode 3 4: Error subcode 4 5: Error subcode 5 6: Error subcode 6 7: Error subcode 7 8: Error subcode 8 9: Error subcode 9 10: Error subcode 10 11: Error subcode 11 12: Error subcode 12 13: Error subcode 13 14: Error subcode 14 15: Error subcode 15 16: Error subcode 16	-	0	At once	3296
H10-60	Fault word 2 - Bit13 error code	0 to 65535	-	0	At once	3297

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H10-61	Fault word 2 - Bit13 error subcode	0: All error subcodes 1: Error subcode 1 2: Error subcode 2 3: Error subcode 3 4: Error subcode 4 5: Error subcode 5 6: Error subcode 6 7: Error subcode 7 8: Error subcode 8 9: Error subcode 9 10: Error subcode 10 11: Error subcode 11 12: Error subcode 12 13: Error subcode 13 14: Error subcode 14 15: Error subcode 15 16: Error subcode 16	-	0	At once	3298
H10-62	Fault word 2 - Bit14 error code	0 to 65535	-	0	At once	3299
H10-63	Fault word 2 - Bit14 error subcode	0: All error subcodes 1: Error subcode 1 2: Error subcode 2 3: Error subcode 3 4: Error subcode 4 5: Error subcode 5 6: Error subcode 6 7: Error subcode 7 8: Error subcode 8 9: Error subcode 9 10: Error subcode 10 11: Error subcode 11 12: Error subcode 12 13: Error subcode 13 14: Error subcode 14 15: Error subcode 15 16: Error subcode 16	-	0	At once	3300

Para.	Name	Value Range	Unit	Default	Change Mode	Address
H10-64	Fault word 2 - Bit15 error code	0 to 65535	-	0	At once	3301
H10-65	Fault word 2 - Bit15 error subcode	0: All error subcodes 1: Error subcode 1 2: Error subcode 2 3: Error subcode 3 4: Error subcode 4 5: Error subcode 5 6: Error subcode 6 7: Error subcode 7 8: Error subcode 8 9: Error subcode 9 10: Error subcode 10 11: Error subcode 11 12: Error subcode 12 13: Error subcode 13 14: Error subcode 14 15: Error subcode 15 16: Error subcode 16	-	0	At once	3302

7.2.8 Group L: Application Functions

Para.	Name	Value Range	Unit	Default	Change Mode	Address
Group L0: Word-bit conversion function						
L0-00	Word-to-bit conversion 1 input selection	0: Disable Other: K connector	-	0	At once	2047
L0-01	Word-to-bit conversion 2 input selection	0: Disable Other: K connector	-	0	At once	2048
L0-02	Word-to-bit conversion 3 input selection	0: Disable Other: K connector	-	0	At once	2049
L0-03	Word-to-bit conversion 4 input selection	0: Disable Other: K connector	-	0	At once	3339
L0-10	Bit-to-word function 1 - Bit00 selection	0: Disable Other: K connector	-	0	At once	2050
L0-11	Bit-to-word function 1 - Bit01 selection	0: Disable Other: K connector	-	0	At once	2051
L0-12	Bit-to-word function 1 - Bit02 selection	0: Disable Other: K connector	-	0	At once	2052
L0-13	Bit-to-word function 1 - Bit03 selection	0: Disable Other: K connector	-	0	At once	2053
L0-14	Bit-to-word function 1 - Bit04 selection	0: Disable Other: K connector	-	0	At once	2054

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L0-15	Bit-to-word function 1 - Bit05 selection	0: Disable Other: K connector	-	0	At once	2055
L0-16	Bit-to-word function 1 - Bit06 selection	0: Disable Other: K connector	-	0	At once	2056
L0-17	Bit-to-word function 1 - Bit07 selection	0: Disable Other: K connector	-	0	At once	2057
L0-18	Bit-to-word function 1 - Bit08 selection	0: Disable Other: K connector	-	0	At once	2058
L0-19	Bit-to-word function 1 - Bit09 selection	0: Disable Other: K connector	-	0	At once	2059
L0-20	Bit-to-word function 1 - Bit10 selection	0: Disable Other: K connector	-	0	At once	2060
L0-21	Bit-to-word function 1 - Bit11 selection	0: Disable Other: K connector	-	0	At once	2061
L0-22	Bit-to-word function 1 - Bit12 selection	0: Disable Other: K connector	-	0	At once	2062
L0-23	Bit-to-word function 1 - Bit13 selection	0: Disable Other: K connector	-	0	At once	2063
L0-24	Bit-to-word function 1 - Bit14 selection	0: Disable Other: K connector	-	0	At once	2064
L0-25	Bit-to-word function 1 - Bit15 selection	0: Disable Other: K connector	-	0	At once	2065
L0-26	Bit-to-word function 2 - Bit00 selection	0: Disable Other: K connector	-	0	At once	2066
L0-27	Bit-to-word function 2 - Bit01 selection	0: Disable Other: K connector	-	0	At once	2067
L0-28	Bit-to-word function 2 - Bit02 selection	0: Disable Other: K connector	-	0	At once	2068
L0-29	Bit-to-word function 2 - Bit03 selection	0: Disable Other: K connector	-	0	At once	2069
L0-30	Bit-to-word function 2 - Bit04 selection	0: Disable Other: K connector	-	0	At once	2070
L0-31	Bit-to-word function 2 - Bit05 selection	0: Disable Other: K connector	-	0	At once	2071
L0-32	Bit-to-word function 2 - Bit06 selection	0: Disable Other: K connector	-	0	At once	2072
L0-33	Bit-to-word function 2 - Bit07 selection	0: Disable Other: K connector	-	0	At once	2073
L0-34	Bit-to-word function 2 - Bit08 selection	0: Disable Other: K connector	-	0	At once	2074
L0-35	Bit-to-word function 2 - Bit09 selection	0: Disable Other: K connector	-	0	At once	2075
L0-36	Bit-to-word function 2 - Bit10 selection	0: Disable Other: K connector	-	0	At once	2076

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L0-37	Bit-to-word function 2 - Bit11 selection	0: Disable Other: K connector	-	0	At once	2077
L0-38	Bit-to-word function 2 - Bit12 selection	0: Disable Other: K connector	-	0	At once	2078
L0-39	Bit-to-word function 2 - Bit13 selection	0: Disable Other: K connector	-	0	At once	2079
L0-40	Bit-to-word function 2 - Bit14 selection	0: Disable Other: K connector	-	0	At once	2080
L0-41	Bit-to-word function 2 - Bit15 selection	0: Disable Other: K connector	-	0	At once	2081
L0-42	Bit-to-word function 3 - Bit00 selection	0: Disable Other: K connector	-	0	At once	2082
L0-43	Bit-to-word function 3 - Bit01 selection	0: Disable Other: K connector	-	0	At once	2083
L0-44	Bit-to-word function 3 - Bit02 selection	0: Disable Other: K connector	-	0	At once	2084
L0-45	Bit-to-word function 3 - Bit03 selection	0: Disable Other: K connector	-	0	At once	2085
L0-46	Bit-to-word function 3 - Bit04 selection	0: Disable Other: K connector	-	0	At once	2086
L0-47	Bit-to-word function 3 - Bit05 selection	0: Disable Other: K connector	-	0	At once	2087
L0-48	Bit-to-word function 3 - Bit06 selection	0: Disable Other: K connector	-	0	At once	2088
L0-49	Bit-to-word function 3 - Bit07 selection	0: Disable Other: K connector	-	0	At once	2089
L0-50	Bit-to-word function 3 - Bit08 selection	0: Disable Other: K connector	-	0	At once	2090
L0-51	Bit-to-word function 3 - Bit09 selection	0: Disable Other: K connector	-	0	At once	2091
L0-52	Bit-to-word function 3 - Bit10 selection	0: Disable Other: K connector	-	0	At once	2092
L0-53	Bit-to-word function 3 - Bit11 selection	0: Disable Other: K connector	-	0	At once	2093
L0-54	Bit-to-word function 3 - Bit12 selection	0: Disable Other: K connector	-	0	At once	2094
L0-55	Bit-to-word function 3 - Bit13 selection	0: Disable Other: K connector	-	0	At once	2095
L0-56	Bit-to-word function 3 - Bit14 selection	0: Disable Other: K connector	-	0	At once	2096
L0-57	Bit-to-word function 3 - Bit15 selection	0: Disable Other: K connector	-	0	At once	2097
L0-58	Bit-to-word function 4 - Bit00 selection	0: Disable Other: K connector	-	0	At once	2098

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L0-59	Bit-to-word function 4 - Bit01 selection	0: Disable Other: K connector	-	0	At once	2099
L0-60	Bit-to-word function 4 - Bit02 selection	0: Disable Other: K connector	-	0	At once	2100
L0-61	Bit-to-word function 4 - Bit03 selection	0: Disable Other: K connector	-	0	At once	2101
L0-62	Bit-to-word function 4 - Bit04 selection	0: Disable Other: K connector	-	0	At once	2102
L0-63	Bit-to-word function 4 - Bit05 selection	0: Disable Other: K connector	-	0	At once	2103
L0-64	Bit-to-word function 4 - Bit06 selection	0: Disable Other: K connector	-	0	At once	2104
L0-65	Bit-to-word function 4 - Bit07 selection	0: Disable Other: K connector	-	0	At once	2105
L0-66	Bit-to-word function 4 - Bit08 selection	0: Disable Other: K connector	-	0	At once	2106
L0-67	Bit-to-word function 4 - Bit09 selection	0: Disable Other: K connector	-	0	At once	2107
L0-68	Bit-to-word function 4 - Bit10 selection	0: Disable Other: K connector	-	0	At once	2108
L0-69	Bit-to-word function 4 - Bit11 selection	0: Disable Other: K connector	-	0	At once	2109
L0-70	Bit-to-word function 4 - Bit12 selection	0: Disable Other: K connector	-	0	At once	2110
L0-71	Bit-to-word function 4 - Bit13 selection	0: Disable Other: K connector	-	0	At once	2111
L0-72	Bit-to-word function 4 - Bit14 selection	0: Disable Other: K connector	-	0	At once	2112
L0-73	Bit-to-word function 4 - Bit15 selection	0: Disable Other: K connector	-	0	At once	2113
L0-74	Word-to-bit (W2B) 1 bit logic		-	0	At stop	6336
L0-75	Word-to-bit (W2B) 2 bit logic		-	0	At stop	6337
L0-76	Word-to-bit (W2B) 3 bit logic		-	0	At stop	6338
L0-77	Word-to-bit (W2B) 4 bit logic		-	0	At stop	6339
L0-78	[B2W 1] Bit logic		-	0	At stop	6340
L0-79	[B2W 2] Bit logic		-	0	At stop	6341
L0-80	[B2W 3] Bit logic		-	0	At stop	6342
L0-81	[B2W 4] Bit logic		-	0	At stop	6343
Group L1: Brake control						

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L1-00	Brake function selection	0: Without brake 1: With brake but without detection information 2: With brake and detection information	-	0	At stop	2135
L1-01	Brake opening time	0.00 to 10.00	s	0.2	At once	2136
L1-02	Brake closing time	0.00 to 60.00	s	0.2	At once	2137
L1-03	Brake opening feedback point source	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At stop	2147
L1-04	Brake feedback fault delay	0.00 to 0.10	s	0	At stop	2148
L1-06	Starting torque source in vector control mode	0: 0 1: Automatic retentive torque 2: L1-07 (digital setting) Other: K connector	-	0	At stop	2523
L1-07	Digital setting of starting torque	–200.0 to +200.0	%	0	At stop	2524
L1-08	Gain coefficient of auto torque memory	50.0 to 150.0	%	100	At stop	2525
L1-09	Upper limit setting of starting torque	–50.0 to +200.0	%	200	At once	5027
L1-10	Lower limit setting of starting torque	–200.0 to +50.0	%	-200	At once	5028
L1-11	Enable starting speed	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5	-	0	At stop	2139

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L1-11	Enable starting speed	7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At stop	2139
L1-12	Digital setting of starting speed	–20.0 to +20.0	%	0	At stop	2522
L1-14	Brake zero-speed closing command source	0: Disable 1: Enable Other: B connector	-	1147	At stop	2143
L1-15	Forced brake closing command source	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At stop	2146
L1-16	Speed threshold of brake closing	1.0 to 200.0	%	3	At stop	2144
L1-17	Brake closing delay	0.00 to 10.00	s	0.02	At once	2145
L1-22	Brake opening command source	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At stop	2138
L1-23	Comparison value source of brake opening	0: 0 Other: B connector	-	0	At stop	2140
L1-24	Comparison threshold of brake opening	0.0 to 200.0	%	0	At stop	2141
L1-25	Brake opening delay	0.00 to 10.00	s	0	At once	2142

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L1-30	Enable brake self-test	0: Disable 1: Enable Other: B connector	-	0	At once	5020
L1-31	Brake test hold time	0.01 to 30.00	s	0.3	At once	5021
L1-32	Max. experimental torque for brake test	0.0 to 200.0	%	10	At once	5022
L1-33	Torque direction for brake test	0: No reverse 1: Reverse Other: B connector	-	0	At once	5023
L1-34	Slip speed threshold for brake test	0.01 to 30.00	%	0.1	At once	5024
L1-35	Slip speed hold time for brake test	0.000 to 10.000	s	0.004	At once	5025
Group L2: Logic operation function						
L2-00	Input 1 of logic AND module A	1: Disable Other: B connector	-	1	At once	2301
L2-01	Input 2 of logic AND module A	1: Disable Other: B connector	-	1	At once	2302
L2-02	Input 3 of logic AND module A	1: Disable Other: B connector	-	1	At once	2303
L2-03	Input 4 of logic AND module A	1: Disable Other: B connector	-	1	At once	2304
L2-04	Input 1 of logic AND module B	1: Disable Other: B connector	-	1	At once	2305
L2-05	Input 2 of logic AND module B	1: Disable Other: B connector	-	1	At once	2306
L2-06	Input 3 of logic AND module B	1: Disable Other: B connector	-	1	At once	2307
L2-07	Input 4 of logic AND module B	1: Disable Other: B connector	-	1	At once	2308
L2-08	Input 1 of logic AND module C	1: Disable Other: B connector	-	1	At once	2309
L2-09	Input 2 of logic AND module C	1: Disable Other: B connector	-	1	At once	2310
L2-10	Input 3 of logic AND module C	1: Disable Other: B connector	-	1	At once	2311
L2-11	Input 4 of logic AND module C	1: Disable Other: B connector	-	1	At once	2312
L2-12	Input 1 of logic AND module D	1: Disable Other: B connector	-	1	At once	2313
L2-13	Input 2 of logic AND module D	1: Disable Other: B connector	-	1	At once	2314
L2-14	Input 3 of logic AND module D	1: Disable Other: B connector	-	1	At once	2315
L2-15	Input 4 of logic AND module D	1: Disable Other: B connector	-	1	At once	2316

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L2-16	Input of logic NOT module A	1: Disable Other: B connector	-	1	At once	2317
L2-17	Input of logic NOT module B	1: Disable Other: B connector	-	1	At once	2318
L2-18	Input of logic NOT module C	1: Disable Other: B connector	-	1	At once	2319
L2-19	Input of logic NOT module D	1: Disable Other: B connector	-	1	At once	2320
L2-20	Input of logic NOT module E	1: Disable Other: B connector	-	1	At once	2321
L2-21	Input of logic NOT module F	1: Disable Other: B connector	-	1	At once	2322
L2-22	Input of logic NOT module G	1: Disable Other: B connector	-	1	At once	2323
L2-23	Input of logic NOT module H	1: Disable Other: B connector	-	1	At once	2324
L2-24	Input 1 of logic OR module A	1: Disable Other: B connector	-	1	At once	2325
L2-25	Input 2 of logic OR module A	1: Disable Other: B connector	-	1	At once	2326
L2-26	Input 3 of logic OR module A	1: Disable Other: B connector	-	1	At once	2327
L2-27	Input 4 of logic OR module A	1: Disable Other: B connector	-	1	At once	2328
L2-28	Input 1 of logic OR module B	1: Disable Other: B connector	-	1	At once	2329
L2-29	Input 2 of logic OR module B	1: Disable Other: B connector	-	1	At once	2330
L2-30	Input 3 of logic OR module B	1: Disable Other: B connector	-	1	At once	2331
L2-31	Input 4 of logic OR module B	1: Disable Other: B connector	-	1	At once	2332
L2-32	Input 1 of logic OR module C	1: Disable Other: B connector	-	1	At once	2333
L2-33	Input 2 of logic OR module C	1: Disable Other: B connector	-	1	At once	2334
L2-34	Input 3 of logic OR module C	1: Disable Other: B connector	-	1	At once	2335
L2-35	Input 4 of logic OR module C	1: Disable Other: B connector	-	1	At once	2336
L2-36	Input 1 of logic OR module D	1: Disable Other: B connector	-	1	At once	2337
L2-37	Input 2 of logic OR module D	1: Disable Other: B connector	-	1	At once	2338

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L2-38	Input 3 of logic OR module D	1: Disable Other: B connector	-	1	At once	2339
L2-39	Input 4 of logic OR module D	1: Disable Other: B connector	-	1	At once	2340
L2-40	Function of logic XOR/ XNOR module A	0: XOR 1: XNOR	-	1	At once	2591
L2-41	Input 1 of logic XOR/ XNOR module A	1: Disable Other: B connector	-	1	At once	2595
L2-42	Input 2 of logic XOR/ XNOR module A	1: Disable Other: B connector	-	1	At once	2596
L2-43	Function of logic XOR/ XNOR module B	0: XOR 1: XNOR	-	1	At once	2592
L2-44	Input 1 of logic XOR/ XNOR module B	1: Disable Other: B connector	-	1	At once	2597
L2-45	Input 2 of logic XOR/ XNOR module B	1: Disable Other: B connector	-	1	At once	2598
L2-46	Function of logic XOR/ XNOR module C	0: XOR 1: XNOR	-	1	At once	2593
L2-47	Input 1 of logic XOR/ XNOR module C	1: Disable Other: B connector	-	1	At once	2599
L2-48	Input 2 of logic XOR/ XNOR module C	1: Disable Other: B connector	-	1	At once	2600
L2-49	Function of logic XOR/ XNOR module D	0: XOR 1: XNOR	-	1	At once	2594
L2-50	Input 1 of logic XOR/ XNOR module D	1: Disable Other: B connector	-	1	At once	2601
L2-51	Input 2 of logic XOR/ XNOR module D	0: Disable Other: B connector	-	1	At once	2602
L2-60	Function of logic AND-OR module A	1: Disable 1: Logic AND 2: Logic OR	-	1	At once	3347
L2-61	Input 1 of logic AND-OR module A	0: Logic 0 Other: B connector	-	1	At once	3355
L2-62	Input 2 of logic AND-OR module A	0: Logic 0 Other: B connector	-	1	At once	3363
L2-63	Input 3 of logic AND-OR module A	0: Logic 0 Other: B connector	-	1	At once	3371
L2-64	Function of logic AND-OR module B	1: Disable 1: Logic AND 2: Logic OR	-	1	At once	3348
L2-65	Input 1 of logic AND-OR module B	0: Logic 0 Other: B connector	-	1	At once	3356
L2-66	Input 2 of logic AND-OR module B	0: Logic 0 Other: B connector	-	1	At once	3364

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L2-67	Input 3 of logic AND-OR module B	0: Logic 0 Other: B connector	-	1	At once	3372
L2-68	Function of logic AND-OR module C	1: Disable 1: Logic AND 2: Logic OR	-	1	At once	3349
L2-69	Input 1 of logic AND-OR module C	0: Logic 0 Other: B connector	-	1	At once	3357
L2-70	Input 2 of logic AND-OR module C	0: Logic 0 Other: B connector	-	1	At once	3365
L2-71	Input 3 of logic AND-OR module C	0: Logic 0 Other: B connector	-	1	At once	3373
L2-72	Function of logic AND-OR module D	1: Disable 1: Logic AND 2: Logic OR	-	1	At once	3350
L2-73	Input 1 of logic AND-OR module D	0: Logic 0 Other: B connector	-	1	At once	3358
L2-74	Input 2 of logic AND-OR module D	0: Logic 0 Other: B connector	-	1	At once	3366
L2-75	Input 3 of logic AND-OR module D	0: Logic 0 Other: B connector	-	1	At once	3374
L2-76	Function of logic AND-OR module E	1: Disable 1: Logic AND 2: Logic OR	-	1	At once	3351
L2-77	Input 1 of logic AND-OR module E	0: Logic 0 Other: B connector	-	1	At once	3359
L2-78	Input 2 of logic AND-OR module E	0: Logic 0 Other: B connector	-	1	At once	3367
L2-79	Input 3 of logic AND-OR module E	0: Logic 0 Other: B connector	-	1	At once	3375
L2-80	Function of logic AND-OR module F	1: Disable 1: Logic AND 2: Logic OR	-	1	At once	3352
L2-81	Input 1 of logic AND-OR module F	0: Logic 0 Other: B connector	-	1	At once	3360
L2-82	Input 2 of logic AND-OR module F	0: Logic 0 Other: B connector	-	1	At once	3368
L2-83	Input 3 of logic AND-OR module F	0: Logic 0 Other: B connector	-	1	At once	3376
L2-84	Function of logic AND-OR module G	1: Disable 1: Logic AND 2: Logic OR	-	1	At once	3353
L2-85	Input 1 of logic AND-OR module G	0: Logic 0 Other: B connector	-	1	At once	3361

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L2-86	Input 2 of logic AND-OR module G	0: Logic 0 Other: B connector	-	1	At once	3369
L2-87	Input 3 of logic AND-OR module G	0: Logic 0 Other: B connector	-	1	At once	3377
L2-88	Function of logic AND-OR module H	1: Disable 1: Logic AND 2: Logic OR	-	1	At once	3354
L2-89	Input 1 of logic AND-OR module H	0: Logic 0 Other: B connector	-	1	At once	3362
L2-90	Input 2 of logic AND-OR module H	0: Logic 0 Other: B connector	-	1	At once	3370
L2-91	Input 3 of logic AND-OR module H	0: Logic 0 Other: B connector	-	1	At once	3378
Group L3: W2DW conversion function						
L3-00	[W2DW] Base value coefficient	Bit00: W2DW 1 0: x65536 1: ×1 Bit01: W2DW 2 0: x65536 1: ×1 Bit02: W2DW 3 0: x65536 1: ×1 Bit03: W2DW 4 0: x65536 1: ×1 Bit04: W2DW 5 0: x65536 1: ×1	-	0	At once	4224
L3-01	High word of W2DW conversion 1	0: Disable Other: K connector	-	0	At once	2352
L3-02	Low word of W2DW conversion 1	0: Disable Other: K connector	-	0	At once	2353
L3-03	Base value of W2DW conversion 1	0 to 65535	-	0	At once	2354
L3-04	High word of W2DW conversion 2	0: Disable Other: K connector	-	0	At once	2355
L3-05	Low word of W2DW conversion 2	0: Disable Other: K connector	-	0	At once	2356
L3-06	Base value of W2DW conversion 2	0 to 65535	-	0	At once	2357
L3-07	High word of W2DW conversion 3	0: Disable Other: K connector	-	0	At once	2358

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L3-08	Low word of W2DW conversion 3	0: Disable Other: K connector	-	0	At once	2359
L3-09	Base value of W2DW conversion 3	0 to 65535	-	0	At once	2360
L3-10	High word of W2DW conversion 4	0: Disable Other: K connector	-	0	At once	4229
L3-11	Low word of W2DW conversion 4	0: Disable Other: K connector	-	0	At once	4230
L3-12	Base value of W2DW conversion 4	0 to 65535	-	0	At once	4231
L3-13	High word of W2DW conversion 5	0: Disable Other: K connector	-	0	At once	4232
L3-14	Low word of W2DW conversion 5	0: Disable Other: K connector	-	0	At once	4233
L3-15	Base value of W2DW conversion 5	0 to 65535	-	0	At once	4234
L3-25	[DW2W] Base value coefficient	Bit00: W2DW 1 0: x65536 1: ×1 Bit01: W2DW 2 0: x65536 1: ×1 Bit02: W2DW 3 0: x65536 1: ×1 Bit03: W2DW 4 0: x65536 1: ×1 Bit04: W2DW 5 0: x65536 1: ×1	-	0	At once	4225
L3-26	DW2W conversion 1 selection	0: Disable Other: K connector	-	0	At once	2361
L3-27	Base value of DW2W conversion 1	0 to 65535	-	0	At once	2362
L3-28	DW2W conversion 2 selection	0: Disable Other: K connector	-	0	At once	2363
L3-29	Base value of DW2W conversion 2	0 to 65535	-	0	At once	2364
L3-30	DW2W conversion 3 selection	0: Disable Other: K connector	-	0	At once	2365
L3-31	Base value of DW2W conversion 3	0 to 65535	-	0	At once	2366
L3-32	DW2W conversion 4 selection	0: Disable Other: K connector	-	0	At once	4235

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L3-33	Base value of DW2W conversion 4	0 to 65535	-	0	At once	4236
L3-34	DW2W conversion 5 selection	0: Disable Other: K connector	-	0	At once	4237
L3-35	Base value of DW2W conversion 5	0 to 65535	-	0	At once	4238
Group L4: Process PID parameters						
L4-00	PID activation signal	0: Disable 1: Enable 2: DI1 3: DI2	-	0	At once	2367
L4-00	PID activation signal	4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	2367
L4-01	PID operation enable signal	0: Disable 1: Enable Other: B connector	-	0	At once	2368
L4-02	PID action direction	0: Forward 1: Reverse	-	0	At once	2369
L4-03	PID calculation cycle coefficient	1: 1 x 2 ms 2: 2 x 2 ms 3: 3 x 2 ms 4: 4 x 2 ms 5: 5 x 2 ms 6: 6 x 2 ms 7: 7 x 2 ms 8: 8 x 2 ms 9: 9 x 2 ms 10: 10 x 2 ms	-	1	At once	2392

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L4-04	PID setpoint source	0: L4.05 1: Multi-reference value 1 2: AI1 3: AI2 4: HDI1 5: HDI2 6: Multi-reference value 7: Motor-driven potentiometer 8: Reserved 9: Process data 2 of fieldbus adapter A 10: Process data 2 of fieldbus adapter B Other: K connector	-	0	At once	2370
L4-05	PID reference	–600.0 to +600.0	%	0	At once	2371
L4-06	PID setpoint freeze	0: 0 1: 1 2: DI1 3: DI2 4: DI3 5: DI4	-	0	At once	2372
L4-06	PID setpoint freeze	6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	2372
L4-07	PID filter time setpoint	0.00 to 60.00	s	0	At once	2373
L4-08	PID feedback source	0: 0 1: Multi-reference value 1 2: AI1 3: AI2 4: HDI1 5: HDI2 6: Multi-reference value 7: Motor-driven potentiometer 8: Reserved 9: Process data 2 of fieldbus adapter A 10: Process data 2 of fieldbus adapter B Other: K connector	-	0	At once	2374
L4-09	PID feedback filter time	0.00 to 60.00	s	0	At once	2375

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L4-10	Additional setpoint of PID deviation	0: 0 1: Multi-reference value 1 2: AI1 3: AI2 4: HDI1 5: HDI2 6: Multi-reference value 7: Motor-driven potentiometer 8: Reserved 9: Process data 2 of fieldbus adapter A 10: Process data 2 of fieldbus adapter B Other: K connector	-	0	At once	2376
L4-11	Proportional gain Kp	0.00 to 125.00	-	1	At once	2377
L4-12	Proportional gain coefficient	0: 100% 1: Multi-reference value 1 2: AI1 3: AI2 4: HDI1 5: HDI2 6: Multi-reference value 7: Motor-driven potentiometer	-	0	At once	2378
L4-12	Proportional gain coefficient	8: Reserved 9: Process data 2 of fieldbus adapter A 10: Process data 2 of fieldbus adapter B Other: K connector	-	0	At once	2378
L4-13	Integral time Ti	0.01 to 100.00	s	2	At once	2379

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L4-14	Integral time coefficient	0: 100% 1: Multi-reference value 1 2: AI1 3: AI2 4: HDI1 5: HDI2 6: Multi-reference value 7: Motor-driven potentiometer 8: Reserved 9: Process data 2 of fieldbus adapter A 10: Process data 2 of fieldbus adapter B Other: K connector	-	0	At once	2380
L4-15	Derivative time Td1	0 to 10	s	0	At once	2381
L4-16	Derivative time coefficient	0 to 0	-	0	At once	2382
L4-17	Initial integral value of PID output	0: 0 1: Multi-reference value 1 2: AI1 3: AI2 4: HDI1 5: HDI2 6: Multi-reference value 7: Motor-driven potentiometer 8: Reserved 9: Process data 2 of fieldbus adapter A 10: Process data 2 of fieldbus adapter B Other: K connector	-	0	At once	2427

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L4-18	Additional setpoint of PID output	0: 0 1: Multi-reference value 1 2: AI1 3: AI2 4: HDI1 5: HDI2 6: Multi-reference value 7: Motor-driven potentiometer 8: Reserved 9: Process data 2 of fieldbus adapter A 10: Process data 2 of fieldbus adapter B Other: K connector	-	0	At once	2383
L4-19	PID integral component forced	0: 0 1: 1 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	2384
L4-20	Force value of PID integral component	0: 0 1: Multi-reference value 1 2: AI1 3: AI2 4: HDI1 5: HDI2 6: Multi-reference value 7: Motor-driven potentiometer 8: Reserved 9: Process data 2 of fieldbus adapter A 10: Process data 2 of fieldbus adapter B Other: K connector	-	0	At once	2385
L4-21	PID output limit	0.0 to 600.0	%	100	At once	2386

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L4-22	Source of PID output upper limit	0: 100% 1: Multi-reference value 1 2: AI1 3: AI2 4: HDI1 5: HDI2 6: Multi-reference value 7: Motor-driven potentiometer 8: Reserved 9: Process data 2 of fieldbus adapter A 10: Process data 2 of fieldbus adapter B Other: K connector	-	0	At once	2387
L4-23	Source of PID output lower limit	0: 0 1: Multi-reference value 1 2: AI1 3: AI2 4: HDI1 5: HDI2 6: Multi-reference value 7: Motor-driven potentiometer 8: Reserved 9: Process data 2 of fieldbus adapter A 10: Process data 2 of fieldbus adapter B Other: K connector	-	0	At once	2388
L4-24	Increase/decrease time of PID output limit	0.00 to 100.00	s	0	At once	2389
L4-25	PID deviation dead zone enable	0: Disable 1: Enable	-	0	At once	2390
L4-26	PID deviation dead zone range	0.0 to 600.0	%	0	At once	2391
L4-27	Detection level of PID feedback loss	0.0 to 100.0	%	0	At once	2393
L4-28	PID feedback loss detection time	0.00 to 60.00	s	0	At once	2394
Group L5: Switch function block						
L5-00	Input source of binary selector module A	0: Input 1 1: Input 2 Other: B connector	-	0	At once	2603
L5-01	Input 1 of binary selector module A	0: Disable Other: B connector	-	0	At once	2605

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L5-02	Input 2 of binary selector module A	0: Disable Other: B connector	-	0	At once	2606
L5-03	Input source of binary selector module B	0: Input 1 1: Input 2 Other: B connector	-	0	At once	2604
L5-04	Input 1 of binary selector module B	0: Disable Other: B connector	-	0	At once	2607
L5-05	Input 2 of binary selector module B	0: Disable Other: B connector	-	0	At once	2608
L5-06	Input source of binary selector module C	0: Input 1 1: Input 2 Other: B connector	-	0	At once	3381
L5-07	Input 1 of binary selector module C	0: Disable Other: B connector	-	0	At once	3385
L5-08	Input 2 of binary selector module C	0: Disable Other: B connector	-	0	At once	3389
L5-09	Input source of binary selector module D	0: Input 1 1: Input 2 Other: B connector	-	0	At once	3382
L5-10	Input 1 of binary selector module D	0: Disable Other: B connector	-	0	At once	3386
L5-11	Input 2 of binary selector module D	0: Disable Other: B connector	-	0	At once	3390
L5-12	Input source of binary selector module E	0: Input 1 1: Input 2 Other: B connector	-	0	At once	3383
L5-13	Input 1 of binary selector module E	0: Disable Other: B connector	-	0	At once	3387
L5-14	Input 2 of binary selector module E	0: Disable Other: B connector	-	0	At once	3391
L5-20	Input source of numeric switch module A	0: Input 1 1: Input 2 Other: B connector	-	0	At once	2609
L5-21	Input 1 of numeric switch module A	0: Disable Other: B connector	-	0	At once	2611
L5-22	Input 2 of numeric switch module A	0: Disable Other: B connector	-	0	At once	2612
L5-23	Input source of numeric switch module B	0: Input 1 1: Input 2 Other: B connector	-	0	At once	2610
L5-24	Input 1 of numeric switch module B	0: Disable Other: B connector	-	0	At once	2613
L5-25	Input 2 of numeric switch module B	0: Disable Other: B connector	-	0	At once	2614

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L5-26	Input source of numeric switch module C	0: Input 1 1: Input 2 Other: B connector	-	0	At once	3393
L5-27	Input 1 of numeric switch module C	0: Disable Other: B connector	-	0	At once	3397
L5-28	Input 2 of numeric switch module C	0: Disable Other: B connector	-	0	At once	3401
L5-29	Input source of numeric switch module D	0: Input 1 1: Input 2 Other: B connector	-	0	At once	3394
L5-30	Input 1 of numeric switch module D	0: Disable Other: B connector	-	0	At once	3398
L5-31	Input 2 of numeric switch module D	0: Disable Other: B connector	-	0	At once	3402
L5-32	Input source of numeric switch module E	0: Input 1 1: Input 2 Other: B connector	-	0	At once	3395
L5-33	Input 1 of numeric switch module E	0: Disable Other: B connector	-	0	At once	3399
L5-34	Input 2 of numeric switch module E	0: Disable Other: B connector	-	0	At once	3403
Group L6: Control function block						
L6-00	Function selection of filter module A	0: With filter 1: No filter Other: B connector	-	1	At once	2615
L6-01	Input of filter module A	0: Input 0 Other: K connector	-	0	At once	2619
L6-02	Filter time of filter module A	0.000 to 10.000	s	0	At once	2623
L6-03	Function selection of filter module B	0: With filter 1: No filter Other: B connector	-	1	At once	2616
L6-04	Input of filter module B	0: Input 0 Other: K connector	-	0	At once	2620
L6-05	Filter time of filter module B	0.000 to 10.000	s	0	At once	2624
L6-06	Function selection of filter module C	0: With filter 1: No filter Other: B connector	-	1	At once	2617
L6-07	Input of filter module C	0: Input 0 Other: K connector	-	0	At once	2621
L6-08	Filter time of filter module C	0.000 to 10.000	s	0	At once	2625

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L6-09	Function selection of filter module D	0: With filter 1: No filter Other: B connector	-	1	At once	2618
L6-10	Input of filter module D	0: Input 0 Other: K connector	-	0	At once	2622
L6-11	Filter time of filter module D	0.000 to 10.000	s	0	At once	2626
L6-12	Function of level-pulse conversion module A	0: Level to pulse 1: Pulse to level	-	0	At once	2627
L6-13	Input of level-pulse conversion module A	0: Disable Other: B connector	-	0	At once	2631
L6-14	Pulse output time of level-to-pulse conversion module A	0.00 to 600.00	s	0.1	At once	2635
L6-15	Function of level-pulse conversion module B	0: Level to pulse 1: Pulse to level	-	0	At once	2628
L6-16	Input of level-pulse conversion module B	0: Disable Other: B connector	-	0	At once	2632
L6-17	Pulse output time of level-to-pulse conversion module B	0.00 to 600.00	s	0.1	At once	2636
L6-18	Function of level-pulse conversion module C	0: Level to pulse 1: Pulse to level	-	0	At once	2629
L6-19	Input of level-pulse conversion module C	0: Disable Other: B connector	-	0	At once	2633
L6-20	Pulse output time of level-to-pulse conversion module C	0.00 to 600.00	s	0.1	At once	2637
L6-21	Function of level-pulse conversion module D	0: Level to pulse 1: Pulse to level	-	0	At once	2630
L6-22	Input of level-pulse conversion module D	0: Disable Other: B connector	-	0	At once	2634
L6-23	Pulse output time of level-to-pulse conversion module D	0.00 to 600.00	s	0.1	At once	2638
L6-24	Input of logic delay module A	0: Disable Other: B connector	-	0	At once	2395
L6-25	Function selection of logic delay module A	0: Switch-on delay 1: Switch-off delay 2: Bidirectional delay	-	0	At once	2399
L6-26	Delay time of logic delay module A	0 to 65535	-	0	At once	2403
L6-27	Time unit of logic delay module A	0: 0.01s 1: 0.1s 2: 1s	-	0	At once	3768
L6-28	Input of logic delay module B	0: Disable Other: B connector	-	0	At once	2396

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L6-29	Function selection of logic delay module B	0: Switch-on delay 1: Switch-off delay 2: Bidirectional delay	-	0	At once	2400
L6-30	Delay time of logic delay module B	0 to 65535	-	0	At once	2404
L6-31	Time unit of logic delay module B	0: 0.01s 1: 0.1s 2: 1s	-	0	At once	3769
L6-32	Input of logic delay module C	0: Disable Other: B connector	-	0	At once	2397
L6-33	Function selection of logic delay module C	0: Switch-on delay 1: Switch-off delay 2: Bidirectional delay	-	0	At once	2401
L6-34	Delay time of logic delay module C	0 to 65535	-	0	At once	2405
L6-35	Time unit of logic delay module C	0: 0.01s 1: 0.1s 2: 1s	-	0	At once	3770
L6-36	Input of logic delay module D	0: Disable Other: B connector	-	0	At once	2398
L6-37	Function selection of logic delay module D	0: Switch-on delay 1: Switch-off delay 2: Bidirectional delay	-	0	At once	2402
L6-38	Delay time of logic delay module D	0 to 65535	-	0	At once	2406
L6-39	Time unit of logic delay module D	0: 0.01s 1: 0.1s 2: 1s	-	0	At once	3771
L6-45	Cycle of pulse generator module 1	0.00 to 600.00	s	0	At once	4203
L6-46	Cycle of pulse generator module 2	0.000 to 60.000	s	0	At once	4204
L6-47	Cycle of pulse generator module 3	0.0 to 6000.0	s	0	At once	4205
Group L7: Arithmetic function block						
L7-00	Input of absolue value module A	0: Disable Other: K connector	-	0	At once	2639
L7-01	Input of absolue value module B	0: Disable Other: K connector	-	0	At once	2640
L7-02	Input of absolue value module C	0: Disable Other: K connector	-	0	At once	2641
L7-03	Input of absolue value module D	0: Disable Other: K connector	-	0	At once	2642
L7-04	Input 1 of ADD_SUB module A (ADD)	0: Disable Other: K connector	-	0	At once	2643

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L7-05	Input 2 of ADD_SUB module A (ADD)	0: Disable Other: K connector	-	0	At once	2644
L7-06	Input 3 of ADD_SUB module A (ADD)	0: Disable Other: K connector	-	0	At once	2645
L7-07	Input 4 of ADD_SUB module A (SUBTRACT)	0: Disable Other: K connector	-	0	At once	2646
L7-08	Input 1 of ADD_SUB module B (ADD)	0: Disable Other: K connector	-	0	At once	2647
L7-09	Input 2 of ADD_SUB module B (ADD)	0: Disable Other: K connector	-	0	At once	2648
L7-10	Input 3 of ADD_SUB module B (ADD)	0: Disable Other: K connector	-	0	At once	2649
L7-11	Input 4 of ADD_SUB module B (SUBTRACT)	0: Disable Other: K connector	-	0	At once	2650
L7-12	Input 1 of ADD_SUB module C (ADD)	0: Disable Other: K connector	-	0	At once	2651
L7-13	Input 2 of ADD_SUB module C (ADD)	0: Disable Other: K connector	-	0	At once	2652
L7-14	Input 3 of ADD_SUB module C (ADD)	0: Disable Other: K connector	-	0	At once	2653
L7-15	Input 4 of ADD_SUB module C (SUBTRACT)	0: Disable Other: K connector	-	0	At once	2654
L7-16	Input 1 of ADD_SUB module D (ADD)	0: Disable Other: K connector	-	0	At once	2655
L7-17	Input 2 of ADD_SUB module D (ADD)	0: Disable Other: K connector	-	0	At once	2656
L7-18	Input 3 of ADD_SUB module D (ADD)	0: Disable Other: K connector	-	0	At once	2657
L7-19	Input 4 of ADD_SUB module D (SUBTRACT)	0: Disable Other: K connector	-	0	At once	2658
L7-20	Input 1 of MUL_DIV module A (MULTIPLY)	0: Prohibited by module Other: K connector	-	0	At once	2659
L7-21	Input 2 of MUL_DIV module A (MULTIPLY)	0: Not used for calculation Other: K connector	-	0	At once	2660
L7-22	Input 3 of MUL_DIV module A (DIVIDE)	0: Not used for calculation Other: K connector	-	0	At once	2661
L7-23	Input 1 of MUL_DIV module B (MULTIPLY)	0: Prohibited by module Other: K connector	-	0	At once	2662
L7-24	Input 2 of MUL_DIV module B (MULTIPLY)	0: Not used for calculation Other: K connector	-	0	At once	2663
L7-25	Input 3 of MUL_DIV module B (DIVIDE)	0: Not used for calculation Other: K connector	-	0	At once	2664
L7-26	Input 1 of MUL_DIV module C (MULTIPLY)	0: Prohibited by module Other: K connector	-	0	At once	2665

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L7-27	Input 2 of MUL_DIV module C (MULTIPLY)	0: Not used for calculation Other: K connector	-	0	At once	2666
L7-28	Input 3 of MUL_DIV module C (DIVIDE)	0: Not used for calculation Other: K connector	-	0	At once	2667
L7-29	Input 1 of MUL_DIV module D (MULTIPLY)	0: Prohibited by module Other: K connector	-	0	At once	2668
L7-30	Input 2 of MUL_DIV module D (MULTIPLY)	0: Not used for calculation Other: K connector	-	0	At once	2669
L7-31	Input 3 of MUL_DIV module D (DIVIDE)	0: Not used for calculation Other: K connector	-	0	At once	2670
L7-32	Function of NCMP module A	0: Input 1 > Input 2 1: Input 1 < Input 2 2: Input 1 = Input 2	-	0	At once	2671
L7-33	Input 1 of NCMP module A	0: Disable Other: K connector	-	0	At once	2673
L7-34	Input 2 of NCMP module A	0: Not used for calculation Other: K connector	-	0	At once	2674
L7-35	Hysteresis input of NCMP module A	0.0 to 100.0	%	0	At once	2675
L7-36	Function of NCMP module B	0: Input 1 > Input 2 1: Input 1 < Input 2 2: Input 1 = Input 2	-	0	At once	2672
L7-37	Input 1 of NCMP module B	0: Disable Other: K connector	-	0	At once	2676
L7-38	Input 2 of NCMP module B	0: Disable Other: K connector	-	0	At once	2677
L7-39	Hysteresis input of NCMP module B	0.0 to 100.0	%	0	At once	2678
L7-40	Function of NCMP module C	0: Input 1 > Input 2 1: Input 1 < Input 2 2: Input 1 = Input 2	-	0	At once	3417
L7-41	Input 1 of NCMP module C	0: Disable Other: K connector	-	0	At once	3421
L7-42	Input 2 of NCMP module C	0: Disable Other: K connector	-	0	At once	3425
L7-43	Hysteresis input of NCMP module C	0.0 to 100.0	%	0	At once	3341
L7-44	Function of NCMP module D	0: Input 1 > Input 2 1: Input 1 < Input 2 2: Input 1 = Input 2	-	0	At once	3418
L7-45	Input 1 of NCMP module D	0: Disable Other: K connector	-	0	At once	3422
L7-46	Input 2 of NCMP module D	0: Disable Other: K connector	-	0	At once	3426

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L7-47	Hysteresis input of NCMP module D	0.0 to 100.0	%	0	At once	3342
L7-48	Function of NCMP module E	0: Input 1 > Input 2 1: Input 1 < Input 2 2: Input 1 = Input 2	-	0	At once	3419
L7-49	Input 1 of NCMP module E	0: Disable Other: K connector	-	0	At once	3423
L7-50	Input 2 of NCMP module E	0: Disable Other: K connector	-	0	At once	3427
L7-51	Hysteresis input of NCMP module E	0.0 to 100.0	%	0	At once	3343
L7-60	Input of limiting module A	0: Disable Other: K connector	-	0	At once	3405
L7-61	Upper limit of limiting module A	0: Invalid Other: K connector	-	0	At once	3409
L7-62	Lower limit of limiting module A	0: Invalid Other: K connector	-	0	At once	3413
L7-63	Input of limiting module B	0: Disable Other: K connector	-	0	At once	3406
L7-64	Upper limit of limiting module B	0: Invalid Other: K connector	-	0	At once	3410
L7-65	Lower limit of limiting module B	0: Invalid Other: K connector	-	0	At once	3414
L7-66	Input of limiting module C	0: Disable Other: K connector	-	0	At once	3407
L7-67	Upper limit of limiting module C	0: Invalid Other: K connector	-	0	At once	3411
L7-68	Lower limit of limiting module C	0: Invalid Other: K connector	-	0	At once	3415
L7-69	Input of limiting module D	0: Disable Other: K connector	-	0	At once	3408
L7-70	Upper limit of limiting module D	0: Invalid Other: K connector	-	0	At once	3412
L7-71	Lower limit of limiting module D	0: Invalid Other: K connector	-	0	At once	3416
Group L8: Multi-point curve module						
L8-00	Input of multi-point curve module A	0: Module disabled Other: K connector	-	0	At once	2770
L8-01	Setpoint X1 of multi-point curve module A	–600.0 to +600.0	%	0	At once	2771
L8-02	Setpoint Y1 of multi-point curve module A	–600.0 to +600.0	%	0	At once	2781
L8-03	Setpoint X2 of multi-point curve module A	–600.0 to +600.0	%	10	At once	2772
L8-04	Setpoint Y2 of multi-point curve module A	–600.0 to +600.0	%	10	At once	2782

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L8-05	Setpoint X3 of multi-point curve module A	–600.0 to +600.0	%	20	At once	2773
L8-06	Setpoint Y3 of multi-point curve module A	–600.0 to +600.0	%	20	At once	2783
L8-07	Setpoint X4 of multi-point curve module A	–600.0 to +600.0	%	30	At once	2774
L8-08	Setpoint Y4 of multi-point curve module A	–600.0 to +600.0	%	30	At once	2784
L8-09	Setpoint X5 of multi-point curve module A	–600.0 to +600.0	%	40	At once	2775
L8-10	Setpoint Y5 of multi-point curve module A	–600.0 to +600.0	%	40	At once	2785
L8-11	Setpoint X6 of multi-point curve module A	–600.0 to +600.0	%	50	At once	2776
L8-12	Setpoint Y6 of multi-point curve module A	–600.0 to +600.0	%	50	At once	2786
L8-13	Setpoint X7 of multi-point curve module A	–600.0 to +600.0	%	60	At once	2777
L8-14	Setpoint Y7 of multi-point curve module A	–600.0 to +600.0	%	60	At once	2787
L8-15	Setpoint X8 of multi-point curve module A	–600.0 to +600.0	%	70	At once	2778
L8-16	Setpoint Y8 of multi-point curve module A	–600.0 to +600.0	%	70	At once	2788
L8-17	Setpoint X9 of multi-point curve module A	–600.0 to +600.0	%	80	At once	2779
L8-18	Setpoint Y9 of multi-point curve module A	–600.0 to +600.0	%	80	At once	2789
L8-19	Setpoint X10 of multi-point curve module A	–600.0 to +600.0	%	90	At once	2780
L8-20	Setpoint Y10 of multi-point curve module A	–600.0 to +600.0	%	90	At once	2790
L8-21	Input of multi-point curve module B	0: Module disabled Other: K connector	-	0	At once	2791
L8-22	Setpoint X1 of multi-point curve module B	–600.0 to +600.0	%	0	At once	2792
L8-23	Setpoint Y1 of multi-point curve module B	–600.0 to +600.0	%	0	At once	2802
L8-24	Setpoint X2 of multi-point curve module B	–600.0 to +600.0	%	10	At once	2793
L8-25	Setpoint Y2 of multi-point curve module B	–600.0 to +600.0	%	10	At once	2803
L8-26	Setpoint X3 of multi-point curve module B	–600.0 to +600.0	%	20	At once	2794
L8-27	Setpoint Y3 of multi-point curve module B	–600.0 to +600.0	%	20	At once	2804
L8-28	Setpoint X4 of multi-point curve module B	–600.0 to +600.0	%	30	At once	2795

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L8-29	Setpoint Y4 of multi-point curve module B	–600.0 to +600.0	%	30	At once	2805
L8-30	Setpoint X5 of multi-point curve module B	–600.0 to +600.0	%	40	At once	2796
L8-31	Setpoint Y5 of multi-point curve module B	–600.0 to +600.0	%	40	At once	2806
L8-32	Setpoint X6 of multi-point curve module B	–600.0 to +600.0	%	50	At once	2797
L8-33	Setpoint Y6 of multi-point curve module B	–600.0 to +600.0	%	50	At once	2807
L8-34	Setpoint X7 of multi-point curve module B	–600.0 to +600.0	%	60	At once	2798
L8-35	Setpoint Y7 of multi-point curve module B	–600.0 to +600.0	%	60	At once	2808
L8-36	Setpoint X8 of multi-point curve module B	–600.0 to +600.0	%	70	At once	2799
L8-37	Setpoint Y8 of multi-point curve module B	–600.0 to +600.0	%	70	At once	2809
L8-38	Setpoint X9 of multi-point curve module B	–600.0 to +600.0	%	80	At once	2800
L8-39	Setpoint Y9 of multi-point curve module B	–600.0 to +600.0	%	80	At once	2810
L8-40	Setpoint X10 of multi-point curve module B	–600.0 to +600.0	%	90	At once	2801
L8-41	Setpoint Y10 of multi-point curve module B	–600.0 to +600.0	%	90	At once	2811
Group L9: Constant setting module						
L9-00	Constant setpoint 1 (U7-47)	–600.0 to +600.0	%	0	At once	3429
L9-01	Constant setpoint 2 (U7-48)	–600.0 to +600.0	%	0	At once	3430
L9-02	Constant setpoint 3 (U7-49)	–600.0 to +600.0	%	0	At once	3431
L9-03	Constant setpoint 4 (U7-50)	–600.0 to +600.0	%	0	At once	3432
L9-04	Constant setpoint 5 (U7-51)	–600.0 to +600.0	%	0	At once	3433
L9-05	Constant setpoint 6 (U9-51)	–300.00 to +300.00	%	0	At once	3434
L9-06	Constant setpoint 7 (U9-52)	–300.00 to +300.00	%	0	At once	3435
L9-07	Constant setpoint 8 (U9-53)	–300.00 to +300.00	%	0	At once	3436
L9-08	Constant setpoint 9 (U9-54)	–300.00 to +300.00	%	0	At once	3437
L9-09	Constant setpoint 10 (U9-55)	–300.00 to +300.00	%	0	At once	3438
Group L10: Parameter monitoring and modification						

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L10-00	Parameter monitoring parameter address 1	0 to 65535	-	0	At once	3067
L10-01	Parameter monitoring parameter address 2	0 to 65535	-	0	At once	3068
L10-02	Parameter monitoring parameter address 3	0 to 65535	-	0	At once	3069
L10-03	Parameter monitoring parameter address 4	0 to 65535	-	0	At once	3070
L10-04	Parameter monitoring parameter address 5	0 to 65535	-	0	At once	3071
L10-05	Parameter monitoring parameter address 6	0 to 65535	-	0	At once	3072
L10-06	Parameter monitoring parameter address 7	0 to 65535	-	0	At once	3073
L10-07	Parameter monitoring parameter address 8	0 to 65535	-	0	At once	3074
L10-08	Parameter monitoring parameter address 9	0 to 65535	-	0	At once	3075
L10-09	Parameter monitoring parameter address 10	0 to 65535	-	0	At once	3076

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L10-16	Parameter mapping modification save EEPROM	Bit00: Parameter mapping modification 1 0: Not save 1: Save Bit01: Parameter mapping modification 2 0: Not save 1: Save Bit02: Parameter mapping modification 3 0: Not save 1: Save Bit04: Parameter mapping modification 5 0: Not save 1: Save Bit05: Parameter mapping modification 6 0: Not save 1: Save Bit06: Parameter mapping modification 7 0: Not save 1: Save Bit07: Parameter mapping modification 8 0: Not save 1: Save Bit08: Parameter mapping modification 9 0: Not save 1: Save Bit09: Parameter mapping modification 10 0: Not save 1: Save	-	0	At once	3776

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L10-16	Parameter mapping modification save EEPROM	Bit10: Parameter mapping modification 11 0: Not save 1: Save Bit11: Parameter mapping modification 12 0: Not save 1: Save Bit12: Parameter mapping modification 13 0: Not save 1: Save Bit13: Parameter mapping modification 14 0: Not save 1: Save Bit14: Parameter mapping modification 15 0: Not save 1: Save Bit15: Parameter mapping modification 16 0: Not save 1: Save	-	0	At once	3776

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L10-17	Modification range overlimit	Bit00: Parameter mapping modification 1 0: Invalidate modification 1: Upper or lower limit Bit01: Parameter mapping modification 2 0: Invalidate modification 1: Upper or lower limit Bit02: Parameter mapping modification 3 0: Invalidate modification 1: Upper or lower limit Bit03: Parameter mapping modification 4 0: Invalidate modification 1: Upper or lower limit Bit04: Parameter mapping modification 5 0: Invalidate modification 1: Upper or lower limit Bit05: Parameter mapping modification 6 0: Invalidate modification 1: Upper or lower limit Bit06: Parameter mapping modification 7 0: Invalidate modification 1: Upper or lower limit Bit07: Parameter mapping modification 8 0: Invalidate modification 1: Upper or lower limit	-	0	At once	3825

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L10-17	Modification range overlimit	Bit08: Parameter mapping modification 9 0: Invalidate modification 1: Upper or lower limit Bit09: Parameter mapping modification 10 0: Invalidate modification 1: Upper or lower limit Bit10: Parameter mapping modification 11 0: Invalidate modification 1: Upper or lower limit Bit11: Parameter mapping modification 12 0: Invalidate modification 1: Upper or lower limit Bit12: Parameter mapping modification 13 0: Invalidate modification 1: Upper or lower limit Bit13: Parameter mapping modification 14 0: Invalidate modification 1: Upper or lower limit Bit14: Parameter mapping modification 15 0: Invalidate modification 1: Upper or lower limit Bit15: Parameter mapping modification 16 0: Invalidate modification 1: Upper or lower limit	-	0	At once	3825
L10-18	Parameter mapping modification parameter address 1	0 to 65535	-	0	At once	3777
L10-19	Parameter mapping modification source 1	0: Disable Other: K connector	-	0	At once	3793
L10-20	Parameter mapping modification parameter address 2	0 to 65535	-	0	At once	3778
L10-21	Parameter mapping modification source 2	0: Disable Other: K connector	-	0	At once	3794
L10-22	Parameter mapping modification parameter address 3	0 to 65535	-	0	At once	3779

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L10-23	Parameter mapping modification source 3	0: Disable Other: K connector	-	0	At once	3795
L10-24	Parameter mapping modification parameter address 4	0 to 65535	-	0	At once	3780
L10-25	Parameter mapping modification source 4	0: Disable Other: K connector	-	0	At once	3796
L10-26	Parameter mapping modification parameter address 5	0 to 65535	-	0	At once	3781
L10-27	Parameter mapping modification source 5	0: Disable Other: K connector	-	0	At once	3797
L10-28	Parameter mapping modification parameter address 6	0 to 65535	-	0	At once	3782
L10-29	Parameter mapping modification source 6	0: Disable Other: K connector	-	0	At once	3798
L10-30	Parameter mapping modification parameter address 7	0 to 65535	-	0	At once	3783
L10-31	Parameter mapping modification source 7	0: Disable Other: K connector	-	0	At once	3799
L10-32	Parameter mapping modification parameter address 8	0 to 65535	-	0	At once	3784
L10-33	Parameter mapping modification source 8	0: Disable Other: K connector	-	0	At once	3800
L10-34	Parameter mapping modification parameter address 9	0 to 65535	-	0	At once	3785
L10-35	Parameter mapping modification source 9	0: Disable Other: K connector	-	0	At once	3801
L10-36	Parameter mapping modification parameter address 10	0 to 65535	-	0	At once	3786
L10-37	Parameter mapping modification source 10	0: Disable Other: K connector	-	0	At once	3802
L10-38	Parameter mapping modification parameter address 11	0 to 65535	-	0	At once	3787
L10-39	Parameter mapping modification source 11	0: Disable Other: K connector	-	0	At once	3803
L10-40	Parameter mapping modification parameter address 12	0 to 65535	-	0	At once	3788
L10-41	Parameter mapping modification source 12	0: Disable Other: K connector	-	0	At once	3804

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L10-42	Parameter mapping modification parameter address 13	0 to 65535	-	0	At once	3789
L10-43	Parameter mapping modification source 13	0: Disable Other: K connector	-	0	At once	3805
L10-44	Parameter mapping modification parameter address 14	0 to 65535	-	0	At once	3790
L10-45	Parameter mapping modification source 14	0: Disable Other: K connector	-	0	At once	3806
L10-46	Parameter mapping modification parameter address 15	0 to 65535	-	0	At once	3791
L10-47	Parameter mapping modification source 15	0: Disable Other: K connector	-	0	At once	3807
L10-48	Parameter mapping modification parameter address 16	0 to 65535	-	0	At once	3792
L10-49	Parameter mapping modification source 16	0: Disable Other: K connector	-	0	At once	3808
Group L11: Arithmetic function block 2						
L11-00	Calculation method of proportion module	Bit00: Proportion module 1 0: Raw value 1: Per-unit value Bit01: Proportion module 2 0: Raw value 1: Per-unit value Bit02: Proportion module 3 0: Raw value 1: Per-unit value	-	0	At once	3824

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L11-00	Calculation method of proportion module	Bit03: Proportion module 4 0: Raw value 1: Per-unit value Bit04: Proportion module 5 0: Raw value 1: Per-unit value Bit05: Proportion module 6 0: Raw value 1: Per-unit value Bit06: Proportion module 7 0: Raw value 1: Per-unit value Bit07: Proportion module 8 0: Raw value 1: Per-unit value Bit08: Proportion module 9 0: Raw value 1: Per-unit value Bit09: Proportion module 10 0: Raw value 1: Per-unit value Bit10: Proportion module 11 0: Raw value 1: Per-unit value Bit11: Proportion module 12 0: Raw value 1: Per-unit value Bit12: Proportion module 13 0: Raw value 1: Per-unit value Bit14: Proportion module 15 0: Raw value 1: Per-unit value Bit15: Reserved 0: Reserved 1: Reserved	-	0	At once	3824

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L11-01	Data type of numerical value source (raw value method)	Bit00: Proportion module 1 0: Signed 1: Unsigned Bit01: Proportion module 2 0: Signed 1: Unsigned	-	0	At once	4228

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L11-01	Data type of numerical value source (raw value method)	Bit02: Proportion module 3 0: Signed 1: Unsigned Bit03: Proportion module 4 0: Signed 1: Unsigned Bit04: Proportion module 5 0: Signed 1: Unsigned Bit05: Proportion module 6 0: Signed 1: Unsigned Bit06: Proportion module 7 0: Signed 1: Unsigned Bit07: Proportion module 8 0: Signed 1: Unsigned Bit08: Proportion module 9 0: Signed 1: Unsigned Bit09: Proportion module 10 0: Signed 1: Unsigned Bit10: Proportion module 11 0: Signed 1: Unsigned Bit11: Proportion module 12 0: Signed 1: Unsigned Bit12: Proportion module 13 0: Signed 1: Unsigned Bit13: Proportion module 14 0: Signed 1: Unsigned Bit14: Proportion module 15 0: Signed 1: Unsigned Bit15: Reserved 0: Reserved 1: Reserved	-	0	At once	4228

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L11-02	Numerical value source input 1 of proportion module 1	0: Disable Other: K connector	-	0	At once	3909
L11-03	Input 2 of proportion module 1 (MULTIPLY)	–32768 to +32767	-	1	At once	3919
L11-04	Input 3 of proportion module 1 (DIVIDE)	1 to 65535	-	1	At once	3929
L11-05	Numerical value source input 1 of proportion module 2	0: Disable Other: K connector	-	0	At once	3910
L11-06	Input 2 of proportion module 2 (MULTIPLY)	–32768 to +32767	-	1	At once	3920
L11-07	Input 3 of proportion module 2 (DIVIDE)	1 to 65535	-	1	At once	3930
L11-08	Numerical value source input 1 of proportion module 3	0: Disable Other: K connector	-	0	At once	3911
L11-09	Input 2 of proportion module 3 (MULTIPLY)	–32768 to +32767	-	1	At once	3921
L11-10	Input 3 of proportion module 3 (DIVIDE)	1 to 65535	-	1	At once	3931
L11-11	Numerical value source input 1 of proportion module 4	0: Disable Other: K connector	-	0	At once	3912
L11-12	Input 2 of proportion module 4 (MULTIPLY)	–32768 to +32767	-	1	At once	3922
L11-13	Input 3 of proportion module 4 (DIVIDE)	1 to 65535	-	1	At once	3932
L11-14	Numerical value source input 1 of proportion module 5	0: Disable Other: K connector	-	0	At once	3913
L11-15	Input 2 of proportion module 5 (MULTIPLY)	–32768 to +32767	-	1	At once	3923
L11-16	Input 3 of proportion module 5 (DIVIDE)	1 to 65535	-	1	At once	3933
L11-17	Numerical value source input 1 of proportion module 6	0: Disable Other: K connector	-	0	At once	3914
L11-18	Input 2 of proportion module 6 (MULTIPLY)	–32768 to +32767	-	1	At once	3924
L11-19	Input 3 of proportion module 6 (DIVIDE)	1 to 65535	-	1	At once	3934
L11-20	Numerical value source input 1 of proportion module 7	0: Disable Other: K connector	-	0	At once	3915
L11-21	Input 2 of proportion module 7 (MULTIPLY)	–32768 to +32767	-	1	At once	3925
L11-22	Input 3 of proportion module 7 (DIVIDE)	1 to 65535	-	1	At once	3935

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L11-23	Numerical value source input 1 of proportion module 8	0: Disable Other: K connector	-	0	At once	3916
L11-24	Input 2 of proportion module 8 (MULTIPLY)	–32768 to +32767	-	1	At once	3926
L11-25	Input 3 of proportion module 8 (DIVIDE)	1 to 65535	-	1	At once	3936
L11-26	Numerical value source input 1 of proportion module 9	0: Disable Other: K connector	-	0	At once	3917
L11-27	Input 2 of proportion module 9 (MULTIPLY)	–32768 to +32767	-	1	At once	3927
L11-28	Input 3 of proportion module 9 (DIVIDE)	1 to 65535	-	1	At once	3937
L11-29	Numerical value source input 1 of proportion module 10	0: Disable Other: K connector	-	0	At once	3918
L11-30	Input 2 of proportion module 10 (MULTIPLY)	–32768 to +32767	-	1	At once	3928
L11-31	Input 3 of proportion module 10 (DIVIDE)	1 to 65535	-	1	At once	3938
L11-32	Numerical value source input 1 of proportion module 11	0: Disable Other: K connector	-	0	At once	3809
L11-33	Input 2 of proportion module 11 (MULTIPLY)	–32768 to +32767	-	1	At once	3814
L11-34	Input 3 of proportion module 11 (DIVIDE)	1 to 65535	-	1	At once	3819
L11-35	Numerical value source input 1 of proportion module 12	0: Disable Other: K connector	-	0	At once	3810
L11-36	Input 2 of proportion module 12 (MULTIPLY)	–32768 to +32767	-	1	At once	3815
L11-37	Input 3 of proportion module 12 (DIVIDE)	1 to 65535	-	1	At once	3820
L11-38	Numerical value source input 1 of proportion module 13	0: Disable Other: K connector	-	0	At once	3811
L11-39	Input 2 of proportion module 13 (MULTIPLY)	–32768 to +32767	-	1	At once	3816
L11-40	Input 3 of proportion module 13 (DIVIDE)	1 to 65535	-	1	At once	3821
L11-41	Numerical value source input 1 of proportion module 14	0: Disable Other: K connector	-	0	At once	3812
L11-42	Input 2 of proportion module 14 (MULTIPLY)	–32768 to +32767	-	1	At once	3817
L11-43	Input 3 of proportion module 14 (DIVIDE)	1 to 65535	-	1	At once	3822

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L11-44	Numerical value source input 1 of proportion module 15	0: Disable Other: K connector	-	0	At once	3813
L11-45	Input 2 of proportion module 15 (MULTIPLY)	–32768 to +32767	-	1	At once	3818
L11-46	Input 3 of proportion module 15 (DIVIDE)	1 to 65535	-	1	At once	3823
Group L12: Data type conversion module						
L12-00	Input of data type conversion module 1	0: Disable 1: 16-bit signed integer 2: 16-bit unsigned integer 3: 32-bit signed integer 4: 32-bit unsigned integer 5: Single precision floating point	-	0	At once	1998
L12-01	Output of data type conversion module 1	1: 16-bit signed integer 2: 16-bit unsigned integer 3: 32-bit signed integer 4: 32-bit unsigned integer 5: Single precision floating point	-	1	At once	6386
L12-02	Input high bit of data type conversion module 1	0: Disable Other: K connector	-	0	At once	2014
L12-03	Input low bit of data type conversion module 1	0: Disable Other: K connector	-	0	At once	2030
L12-04	Input coefficient 1 (multiply) of data type conversion module 1	–32768 to +32767	-	1	At once	1696
L12-05	Input coefficient 2 (divide) of data type conversion module 1	1 to 65535	-	1	At once	1712
L12-06	Input of data type conversion module 2	0: Disable 1: 16-bit signed integer 2: 16-bit unsigned integer 3: 32-bit signed integer 4: 32-bit unsigned integer 5: Single precision floating point	-	0	At once	1999
L12-07	Output of data type conversion module 2	1: 16-bit signed integer 2: 16-bit unsigned integer 3: 32-bit signed integer 4: 32-bit unsigned integer 5: Single precision floating point	-	1	At once	6387
L12-08	Input high bit of data type conversion module 2	0: Disable Other: K connector	-	0	At once	2015

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L12-09	Input low bit of data type conversion module 2	0: Disable Other: K connector	-	0	At once	2031
L12-10	Input coefficient 2 (multiply) of data type conversion module 1	–32768 to +32767	-	1	At once	1697
L12-11	Input coefficient 2 (divide) of data type conversion module 2	1 to 65535	-	1	At once	1713
L12-12	Input of data type conversion module 3	0: Disable 1: 16-bit signed integer 2: 16-bit unsigned integer 3: 32-bit signed integer 4: 32-bit unsigned integer 5: Single precision floating point	-	0	At once	2000
L12-13	Output of data type conversion module 3	1: 16-bit signed integer 2: 16-bit unsigned integer 3: 32-bit signed integer 4: 32-bit unsigned integer 5: Single precision floating point	-	1	At once	6388
L12-14	Input high bit of data type conversion module 3	0: Disable Other: K connector	-	0	At once	2016
L12-15	Input low bit of data type conversion module 3	0: Disable Other: K connector	-	0	At once	2032
L12-16	Input coefficient 3 (multiply) of data type conversion module 1	–32768 to +32767	-	1	At once	1698
L12-17	Input coefficient 2 (divide) of data type conversion module 3	1 to 65535	-	1	At once	1714
L12-18	Input of data type conversion module 4	0: Disable 1: 16-bit signed integer 2: 16-bit unsigned integer 3: 32-bit signed integer 4: 32-bit unsigned integer 5: Single precision floating point	-	0	At once	2001
L12-19	Output of data type conversion module 4	1: 16-bit signed integer 2: 16-bit unsigned integer 3: 32-bit signed integer 4: 32-bit unsigned integer 5: Single precision floating point	-	1	At once	6389
L12-20	Input high bit of data type conversion module 4	0: Disable Other: K connector	-	0	At once	2017

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L12-21	Input low bit of data type conversion module 4	0: Disable Other: K connector	-	0	At once	2033
L12-22	Input coefficient 4 (multiply) of data type conversion module 1	–32768 to +32767	-	1	At once	1699
L12-23	Input coefficient 2 (divide) of data type conversion module 4	1 to 65535	-	1	At once	1715
L12-24	Input of data type conversion module 5	0: Disable 1: 16-bit signed integer 2: 16-bit unsigned integer 3: 32-bit signed integer 4: 32-bit unsigned integer 5: Single precision floating point	-	0	At once	2002
L12-25	Output of data type conversion module 5	1: 16-bit signed integer 2: 16-bit unsigned integer 3: 32-bit signed integer 4: 32-bit unsigned integer 5: Single precision floating point	-	1	At once	6390
L12-26	Input high bit of data type conversion module 5	0: Disable Other: K connector	-	0	At once	2018
L12-27	Input low bit of data type conversion module 5	0: Disable Other: K connector	-	0	At once	2034
L12-28	Input coefficient 5 (multiply) of data type conversion module 1	–32768 to +32767	-	1	At once	1700
L12-29	Input coefficient 2 (divide) of data type conversion module 5	1 to 65535	-	1	At once	1716
L12-30	Input of data type conversion module 6	0: Disable 1: 16-bit signed integer 2: 16-bit unsigned integer 3: 32-bit signed integer 4: 32-bit unsigned integer 5: Single precision floating point	-	0	At once	2003
L12-31	Output of data type conversion module 6	1: 16-bit signed integer 2: 16-bit unsigned integer 3: 32-bit signed integer 4: 32-bit unsigned integer 5: Single precision floating point	-	1	At once	6391
L12-32	Input high bit of data type conversion module 6	0: Disable Other: K connector	-	0	At once	2019

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L12-33	Input low bit of data type conversion module 6	0: Disable Other: K connector	-	0	At once	2035
L12-34	Input coefficient 6 (multiply) of data type conversion module 1	–32768 to +32767	-	1	At once	1701
L12-35	Input coefficient 2 (divide) of data type conversion module 6	1 to 65535	-	1	At once	1717
L12-36	Input of data type conversion module 7	0: Disable 1: 16-bit signed integer 2: 16-bit unsigned integer 3: 32-bit signed integer 4: 32-bit unsigned integer 5: Single precision floating point	-	0	At once	2004
L12-37	Output of data type conversion module 7	1: 16-bit signed integer 2: 16-bit unsigned integer 3: 32-bit signed integer 4: 32-bit unsigned integer 5: Single precision floating point	-	1	At once	6392
L12-38	Input high bit of data type conversion module 7	0: Disable Other: K connector	-	0	At once	2020
L12-39	Input low bit of data type conversion module 7	0: Disable Other: K connector	-	0	At once	2036
L12-40	Input coefficient 7 (multiply) of data type conversion module 1	–32768 to +32767	-	1	At once	1702
L12-41	Input coefficient 2 (divide) of data type conversion module 7	1 to 65535	-	1	At once	1718
L12-42	Input of data type conversion module 8	0: Disable 1: 16-bit signed integer 2: 16-bit unsigned integer 3: 32-bit signed integer 4: 32-bit unsigned integer 5: Single precision floating point	-	0	At once	2005
L12-43	Output of data type conversion module 8	1: 16-bit signed integer 2: 16-bit unsigned integer 3: 32-bit signed integer 4: 32-bit unsigned integer 5: Single precision floating point	-	1	At once	6393
L12-44	Input high bit of data type conversion module 8	0: Disable Other: K connector	-	0	At once	2021

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L12-45	Input low bit of data type conversion module 8	0: Disable Other: K connector	-	0	At once	2037
L12-46	Input coefficient 8 (multiply) of data type conversion module 1	–32768 to +32767	-	1	At once	1703
L12-47	Input coefficient 2 (divide) of data type conversion module 8	1 to 65535	-	1	At once	1719
L12-48	Input of data type conversion module 9	0: Disable 1: 16-bit signed integer 2: 16-bit unsigned integer 3: 32-bit signed integer 4: 32-bit unsigned integer 5: Single precision floating point	-	0	At once	2006
L12-49	Output of data type conversion module 9	1: 16-bit signed integer 2: 16-bit unsigned integer 3: 32-bit signed integer 4: 32-bit unsigned integer 5: Single precision floating point	-	1	At once	6394
L12-50	Input high bit of data type conversion module 9	0: Disable Other: K connector	-	0	At once	2022
L12-51	Input low bit of data type conversion module 9	0: Disable Other: K connector	-	0	At once	2038
L12-52	Input coefficient 9 (multiply) of data type conversion module 1	–32768 to +32767	-	1	At once	1704
L12-53	Input coefficient 2 (divide) of data type conversion module 9	1 to 65535	-	1	At once	1720
L12-54	Input of data type conversion module 10	0: Disable 1: 16-bit signed integer 2: 16-bit unsigned integer 3: 32-bit signed integer 4: 32-bit unsigned integer 5: Single precision floating point	-	0	At once	2007
L12-55	Output of data type conversion module 10	1: 16-bit signed integer 2: 16-bit unsigned integer 3: 32-bit signed integer 4: 32-bit unsigned integer 5: Single precision floating point	-	1	At once	6395
L12-56	Input high bit of data type conversion module 10	0: Disable Other: K connector	-	0	At once	2023

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L12-57	Input low bit of data type conversion module 10	0: Disable Other: K connector	-	0	At once	2039
L12-58	Input coefficient 10 (multiply) of data type conversion module 1	–32768 to +32767	-	1	At once	1705
L12-59	Input coefficient 2 (divide) of data type conversion module 10	1 to 65535	-	1	At once	1721
L12-60	Input of data type conversion module 11	0: Disable 1: 16-bit signed integer 2: 16-bit unsigned integer 3: 32-bit signed integer 4: 32-bit unsigned integer 5: Single precision floating point	-	0	At once	2008
L12-61	Output of data type conversion module 11	1: 16-bit signed integer 2: 16-bit unsigned integer 3: 32-bit signed integer 4: 32-bit unsigned integer 5: Single precision floating point	-	1	At once	6396
L12-62	Input high bit of data type conversion module 11	0: Disable Other: K connector	-	0	At once	2024
L12-63	Input low bit of data type conversion module 11	0: Disable Other: K connector	-	0	At once	2040
L12-64	Input coefficient 11 (multiply) of data type conversion module 1	–32768 to +32767	-	1	At once	1706
L12-65	Input coefficient 2 (divide) of data type conversion module 11	1 to 65535	-	1	At once	1722
L12-66	Input of data type conversion module 12	0: Disable 1: 16-bit signed integer 2: 16-bit unsigned integer 3: 32-bit signed integer 4: 32-bit unsigned integer 5: Single precision floating point	-	0	At once	2009
L12-67	Output of data type conversion module 12	1: 16-bit signed integer 2: 16-bit unsigned integer 3: 32-bit signed integer 4: 32-bit unsigned integer 5: Single precision floating point	-	1	At once	6397
L12-68	Input high bit of data type conversion module 12	0: Disable Other: K connector	-	0	At once	2025

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L12-69	Input low bit of data type conversion module 12	0: Disable Other: K connector	-	0	At once	2041
L12-70	Input coefficient 12 (multiply) of data type conversion module 1	–32768 to +32767	-	1	At once	1707
L12-71	Input coefficient 2 (divide) of data type conversion module 12	1 to 65535	-	1	At once	1723
L12-72	Input of data type conversion module 13	0: Disable 1: 16-bit signed integer 2: 16-bit unsigned integer 3: 32-bit signed integer 4: 32-bit unsigned integer 5: Single precision floating point	-	0	At once	2010
L12-73	Output of data type conversion module 13	1: 16-bit signed integer 2: 16-bit unsigned integer 3: 32-bit signed integer 4: 32-bit unsigned integer 5: Single precision floating point	-	1	At once	6398
L12-74	Input high bit of data type conversion module 13	0: Disable Other: K connector	-	0	At once	2026
L12-75	Input low bit of data type conversion module 13	0: Disable Other: K connector	-	0	At once	2042
L12-76	Input coefficient 13 (multiply) of data type conversion module 1	–32768 to +32767	-	1	At once	1708
L12-77	Input coefficient 2 (divide) of data type conversion module 13	1 to 65535	-	1	At once	1724
L12-78	Input of data type conversion module 14	0: Disable 1: 16-bit signed integer 2: 16-bit unsigned integer 3: 32-bit signed integer 4: 32-bit unsigned integer 5: Single precision floating point	-	0	At once	2011
L12-79	Output of data type conversion module 14	1: 16-bit signed integer 2: 16-bit unsigned integer 3: 32-bit signed integer 4: 32-bit unsigned integer 5: Single precision floating point	-	1	At once	6399
L12-80	Input high bit of data type conversion module 14	0: Disable Other: K connector	-	0	At once	2027

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L12-81	Input low bit of data type conversion module 14	0: Disable Other: K connector	-	0	At once	2043
L12-82	Input coefficient 14 (multiply) of data type conversion module 1	–32768 to +32767	-	1	At once	1709
L12-83	Input coefficient 2 (divide) of data type conversion module 14	1 to 65535	-	1	At once	1725
L12-84	Input of data type conversion module 15	0: Disable 1: 16-bit signed integer 2: 16-bit unsigned integer 3: 32-bit signed integer 4: 32-bit unsigned integer 5: Single precision floating point	-	0	At once	2012
L12-85	Output of data type conversion module 15	1: 16-bit signed integer 2: 16-bit unsigned integer 3: 32-bit signed integer 4: 32-bit unsigned integer 5: Single precision floating point	-	1	At once	6400
L12-86	Input high bit of data type conversion module 15	0: Disable Other: K connector	-	0	At once	2028
L12-87	Input low bit of data type conversion module 15	0: Disable Other: K connector	-	0	At once	2044
L12-88	Input coefficient 15 (multiply) of data type conversion module 1	–32768 to +32767	-	1	At once	1710
L12-89	Input coefficient 2 (divide) of data type conversion module 15	1 to 65535	-	1	At once	1726
L12-90	Input of data type conversion module 16	0: Disable 1: 16-bit signed integer 2: 16-bit unsigned integer 3: 32-bit signed integer 4: 32-bit unsigned integer 5: Single precision floating point	-	0	At once	2013
L12-91	Output of data type conversion module 16	1: 16-bit signed integer 2: 16-bit unsigned integer 3: 32-bit signed integer 4: 32-bit unsigned integer 5: Single precision floating point	-	1	At once	6401
L12-92	Input high bit of data type conversion module 16	0: Disable Other: K connector	-	0	At once	2029

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L12-93	Input low bit of data type conversion module 16	0: Disable Other: K connector	-	0	At once	2045
L12-94	Input coefficient 16 (multiply) of data type conversion module 1	–32768 to +32767	-	1	At once	1711
L12-95	Input coefficient 2 (divide) of data type conversion module 16	1 to 65535	-	1	At once	1727
Group L14: Ramp function generator (RFG) module						
L14-00	Enable RFG module	0: Disable 1: Enable Other: B connector	-	0	At once	6600
L14-01	Input of RFG module A	0: 0 Other: K connector	-	0	At once	6601
L14-02	Acceleration time of RFG module A	0.0 to 1000.0	s	20	At once	6603
L14-03	Deceleration time of RFG module A	0.0 to 1000.0	s	20	At once	6604
L14-04	Acceleration start arc of RFG module A	0.000 to 20.000	s	0	At once	6605
L14-05	Acceleration end arc of RFG module A	0.000 to 20.000	s	0	At once	6606
L14-06	Deceleration start arc of RFG module A	0.000 to 20.000	s	0	At once	6607
L14-07	Deceleration end arc of RFG module A	0.000 to 20.000	s	0	At once	6608
L14-08	Enable output force of RFG module A	0: Disable 1: Enable Other: B connector	-	0	At once	6615
L14-09	Output force reference of RFG module A	0: 0 Other: K connector	-	0	At once	6617
L14-10	Enable pause of RFG module A	0: Enable 1: Disable Other: B connector	-	1	At once	6619
L14-11	Input of RFG module B	0: 0 Other: K connector	-	0	At once	6602
L14-12	Acceleration time of RFG module B	0.0 to 1000.0	s	20	At once	6609
L14-13	Deceleration time of RFG module B	0.0 to 1000.0	s	20	At once	6610
L14-14	Acceleration start arc of RFG module B	0.000 to 20.000	s	0	At once	6611
L14-15	Acceleration end arc of RFG module B	0.000 to 20.000	s	0	At once	6612
L14-16	Deceleration start arc of RFG module B	0.000 to 20.000	s	0	At once	6613
L14-17	Deceleration end arc of RFG module B	0.000 to 20.000	s	0	At once	6614

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L14-18	Enable output force of RFG module B	0: Disable 1: Enable Other: B connector	-	0	At once	6616
L14-19	Output force reference of RFG module B	0: 0 Other: K connector	-	0	At once	6618
L14-20	Enable pause of RFG module B	0: Enable 1: Disable Other: B connector	-	1	At once	6620
Group L15: Load monitoring module						
L15-00	Load monitoring signal	0: Monitor prohibited 1: Output current (U6-00) 2: Output torque (U6-01) 3: Output power (U6-99) Other: K connector	-	0	At once	6621
L15-01	Load monitoring status	0: Inactive 1: Active	-	0	Unmodifia-ble	36264
L15-02	Load monitoring overload action	0: No alarm/no fault 1: Warning 2: Fault 3: Alarm/fault	-	0	At once	6622
L15-03	Load monitoring underload action	0: No alarm/no fault 1: Warning 2: Fault 3: Alarm/fault	-	0	At once	6623
L15-04	Load monitoring speed point 1	0.0 to 600.0	%	10	At once	6624
L15-05	Load monitoring speed point 2	0.0 to 600.0	%	50	At once	6625
L15-06	Load monitoring speed point 3	0.0 to 600.0	%	86	At once	6626
L15-07	Load monitoring speed point 4	0.0 to 600.0	%	100	At once	6627
L15-08	Load monitoring speed point 5	0.0 to 600.0	%	120	At once	6628
L15-09	Load monitoring underload threshold 1	0.0 to 400.0	%	10	At once	6629
L15-10	Load monitoring overload threshold 1	0.0 to 400.0	%	100	At once	6634
L15-11	Load monitoring underload threshold 2	0.0 to 400.0	%	15	At once	6630
L15-12	Load monitoring overload threshold 2	0.0 to 400.0	%	100	At once	6635
L15-13	Load monitoring underload threshold 3	0.0 to 400.0	%	25	At once	6631
L15-14	Load monitoring overload threshold 3	0.0 to 400.0	%	100	At once	6636

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L15-15	Load monitoring underload threshold 4	0.0 to 400.0	%	35	At once	6632
L15-16	Load monitoring overload threshold 4	0.0 to 400.0	%	100	At once	6637
L15-17	Load monitoring underload threshold 5	0.0 to 400.0	%	50	At once	6633
L15-18	Load monitoring overload threshold 5	0.0 to 400.0	%	100	At once	6638
L15-19	Load monitoring overload delay	0.0 to 1000.0	s	10	At once	6639
L15-20	Load monitoring underload delay	0.0 to 1000.0	s	10	At once	6640
Group L16: Pulse counter module						
L16-00	Enable pulse counter module	0: Disable 1: Enable Other: B connector	-	0	At once	6405
L16-01	Initial value source of pulse counter	0: L16-02 1: Value retained upon power failure	-	0	At once	6450
L16-02	Pulse counter initial setpoint	–2147483648 to +2147483647	-	0	At once	6451
L16-03	Pulse counter source	0: Encoder detection module 1 1: Encoder detection module 2 2: Encoder detection module 3	-	0	At once	6453
L16-04	Pulse counter scale coefficient numerator	1 to 65535	-	1	At once	6406
L16-05	Pulse counter scale coefficient denominator	1 to 65535	-	1	At once	6407
L16-06	Pulse counter direction	0: Forward 1: Reverse Other: B connector	-	0	At once	6417
L16-07	Enable pulse counter force	0: Disable 1: Enable Other: B connector	-	0	At once	6408
L16-08	Pulse counter forced setpoint source	0: 0 1: Set by L16-09 Other: K connector	-	0	At once	6409
L16-09	Pulse counter forced setpoint	–2147483648 to +2147483647	-	0	At once	6410
L16-10	Enable pause of pulse counter	0: Disable 1: Enable Other: B connector	-	0	At once	6412
L16-11	Enable pulse counter reset	0: Disable 1: Enable Other: B connector	-	0	At once	6413

Para.	Name	Value Range	Unit	Default	Change Mode	Address
L16-12	Pulse counter reset setpoint source	0: 0 1: Set by L16-13 Other: K connector	-	0	At once	6414
L16-13	Pulse counter reset setpoint	–2147483648 to +2147483647	-	0	At once	6415

7.2.9 Group n: Fieldbus Adapter and Expansion Module

Para.	Name	Value Range	Unit	Default	Change Mode	Address
Group n0: InoLink communication						
n0-00	InoLink communication enable	0: Disable 1: Enable Other: B connector	-	0	At once	1377
n0-01	Local node address	0 to 16	-	0	At once	1378
n0-02	Communication mode	0: Standard mode 1: No fault prompt Other: B connector	-	0	At once	2911
n0-03	Received data 1 source node	0: Disable 1: Node 1 2: Node 2 3: Node 3 4: Node 4 5: Node 5 6: Node 6 7: Node 7 8: Node 8 9: Node 9 10: Node 10 11: Node 11 12: Node 12 13: Node 13 14: Node 14 15: Node 15 16: Node 16	-	0	At once	2175

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n0-04	Received data 1 data selection	1: Data 1 2: Data 2 3: Data 3 4: Data 4 5: Data 5 6: Data 6 7: Data 7 8: Data 8	-	1	At once	1379
n0-05	Received data 2 source node	0: Disable 1: Node 1 2: Node 2 3: Node 3 4: Node 4 5: Node 5 6: Node 6 7: Node 7 8: Node 8 9: Node 9 10: Node 10 11: Node 11 12: Node 12 13: Node 13 14: Node 14 15: Node 15 16: Node 16	-	0	At once	2176
n0-06	Received data 2 data selection	1: Data 1 2: Data 2 3: Data 3 4: Data 4 5: Data 5 6: Data 6 7: Data 7 8: Data 8	-	1	At once	1380

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n0-07	Received data 3 source node	0: Disable 1: Node 1 2: Node 2 3: Node 3 4: Node 4 5: Node 5 6: Node 6 7: Node 7 8: Node 8 9: Node 9 10: Node 10 11: Node 11 12: Node 12 13: Node 13 14: Node 14 15: Node 15 16: Node 16	-	0	At once	2177
n0-08	Received data 3 data selection	1: Data 1 2: Data 2 3: Data 3 4: Data 4 5: Data 5 6: Data 6 7: Data 7 8: Data 8	-	1	At once	1381
n0-09	Received data 4 source node	0: Disable 1: Node 1 2: Node 2 3: Node 3 4: Node 4 5: Node 5 6: Node 6 7: Node 7	-	0	At once	2178
n0-09	Received data 4 source node	8: Node 8 9: Node 9 10: Node 10 11: Node 11 12: Node 12 13: Node 13 14: Node 14 15: Node 15 16: Node 16	-	0	At once	2178

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n0-10	Received data 4 data selection	1: Data 1 2: Data 2 3: Data 3 4: Data 4 5: Data 5 6: Data 6 7: Data 7 8: Data 8	-	1	At once	1382
n0-11	Received data 5 source node	0: Disable 1: Node 1 2: Node 2 3: Node 3 4: Node 4 5: Node 5 6: Node 6 7: Node 7 8: Node 8 9: Node 9 10: Node 10 11: Node 11 12: Node 12 13: Node 13 14: Node 14 15: Node 15 16: Node 16	-	0	At once	2179
n0-12	Received data 5 data selection	1: Data 1 2: Data 2 3: Data 3 4: Data 4 5: Data 5 6: Data 6 7: Data 7 8: Data 8	-	1	At once	1383

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n0-13	Received data 6 source node	0: Disable 1: Node 1 2: Node 2 3: Node 3 4: Node 4 5: Node 5 6: Node 6 7: Node 7 8: Node 8 9: Node 9 10: Node 10 11: Node 11 12: Node 12 13: Node 13 14: Node 14 15: Node 15 16: Node 16	-	0	At once	2180
n0-14	Received data 6 data selection	1: Data 1 2: Data 2 3: Data 3 4: Data 4 5: Data 5 6: Data 6 7: Data 7 8: Data 8	-	1	At once	1384

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n0-15	Received data 7 source node	0: Disable 1: Node 1 2: Node 2 3: Node 3 4: Node 4 5: Node 5 6: Node 6 7: Node 7 8: Node 8 9: Node 9 10: Node 10 11: Node 11 12: Node 12 13: Node 13 14: Node 14 15: Node 15 16: Node 16	-	0	At once	2181
n0-16	Received data 7 data selection	1: Data 1 2: Data 2 3: Data 3 4: Data 4 5: Data 5 6: Data 6 7: Data 7 8: Data 8	-	1	At once	1385

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n0-17	Received data 8 source node	0: Disable 1: Node 1 2: Node 2 3: Node 3 4: Node 4 5: Node 5 6: Node 6 7: Node 7 8: Node 8 9: Node 9 10: Node 10 11: Node 11 12: Node 12 13: Node 13 14: Node 14 15: Node 15 16: Node 16	-	0	At once	2182
n0-18	Received data 8 data selection	1: Data 1 2: Data 2 3: Data 3 4: Data 4 5: Data 5 6: Data 6 7: Data 7 8: Data 8	-	1	At once	1386
n0-19	Received data 1 scaling	–8.000 to +8.000	-	1	At once	1387
n0-20	Received data 2 scaling	–8.000 to +8.000	-	1	At once	1388
n0-21	Received data 3 scaling	–8.000 to +8.000	-	1	At once	1389
n0-22	Received data 4 scaling	–8.000 to +8.000	-	1	At once	1390
n0-23	Received data 5 scaling	–8.000 to +8.000	-	1	At once	1391
n0-24	Received data 6 scaling	–8.000 to +8.000	-	1	At once	1392
n0-25	Received data 7 scaling	–8.000 to +8.000	-	1	At once	1393
n0-26	Received data 8 scaling	–8.000 to +8.000	-	1	At once	1394
n0-27	Sent data 1 selection	0: 0 Other: K connector	-	0	At once	1395
n0-28	Sent data 2 selection	0: 0 Other: K connector	-	0	At once	1396
n0-29	Sent data 3 selection	0: 0 Other: K connector	-	0	At once	1397
n0-30	Sent data 4 selection	0: 0 Other: K connector	-	0	At once	1398
n0-31	Sent data 5 selection	0: 0 Other: K connector	-	0	At once	1399

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n0-32	Sent data 6 selection	0: 0 Other: K connector	-	0	At once	1400
n0-33	Sent data 7 selection	0: 0 Other: K connector	-	0	At once	1401
n0-34	Sent data 8 selection	0: 0 Other: K connector	-	0	At once	1402
Group n1: Fieldbus adapter A						
n1-00	Bus type of fieldbus adapter A	0: None 1: Modbus RTU module	-	0	At stop	1403
n1-00	Bus type of fieldbus adapter A	2: CANlink module 3: CANopen module 5: EtherCAT module 6: HDVN module 7: PROFIBUS-DP module 8: PROFINET IO module 9: Customized communication module	-	0	At stop	1403
n1-01	Disconnection detection delay of fieldbus adapter A	0.00 to 60.00	s	0.01	At once	1404
n1-02	Communication mode of fieldbus adapter A	0: Standard mode 1: No fault prompt Other: B connector	-	0	At once	3907
n1-03	Continuous CRC error detection setting	0 to 5000	-	0	At once	1406
n1-04	Process data output 1	0: 0 Other: K connector	-	0	At once	1407
n1-05	Process data output 2	0: 0 Other: K connector	-	0	At once	1408
n1-06	Process data output 3	0: 0 Other: K connector	-	0	At once	1409
n1-07	Process data output 4	0: 0 Other: K connector	-	0	At once	1410
n1-08	Process data output 5	0: 0 Other: K connector	-	0	At once	1411
n1-09	Process data output 6	0: 0 Other: K connector	-	0	At once	1412
n1-10	Process data output 7	0: 0 Other: K connector	-	0	At once	1413
n1-11	Process data output 8	0: 0 Other: K connector	-	0	At once	1414
n1-12	Process data output 9	0: 0 Other: K connector	-	0	At once	1415
n1-13	Process data output 10	0: 0 Other: K connector	-	0	At once	1416

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n1-14	Process data output 11	0: 0 Other: K connector	-	0	At once	1417
n1-15	Process data output 12	0: 0 Other: K connector	-	0	At once	1418
n1-16	Process data output 13	0: 0 Other: K connector	-	0	At once	1419
n1-17	Process data output 14	0: 0 Other: K connector	-	0	At once	1420
n1-18	Process data output 15	0: 0 Other: K connector	-	0	At once	1421
n1-19	Process data output 16	0: 0 Other: K connector	-	0	At once	1422
n1-20	Communication base value for process data output 1	0 to 65535	-	0	At once	1439
n1-21	Communication base value for process data output 2	0 to 65535	-	0	At once	1440
n1-22	Communication base value for process data output 3	0 to 65535	-	0	At once	1441
n1-23	Communication base value for process data output 4	0 to 65535	-	0	At once	1442
n1-24	Communication base value for process data output 5	0 to 65535	-	0	At once	1443
n1-25	Communication base value for process data output 6	0 to 65535	-	0	At once	1444
n1-26	Communication base value for process data output 7	0 to 65535	-	0	At once	1445
n1-27	Communication base value for process data output 8	0 to 65535	-	0	At once	1446
n1-28	Communication base value for process data output 9	0 to 65535	-	0	At once	1447
n1-29	Communication base value for process data output 10	0 to 65535	-	0	At once	1448
n1-30	Communication base value for process data output 11	0 to 65535	-	0	At once	1449
n1-31	Communication base value for process data output 12	0 to 65535	-	0	At once	1450

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n1-32	Communication base value for process data output 13	0 to 65535	-	0	At once	1451
n1-33	Communication base value for process data output 14	0 to 65535	-	0	At once	1452
n1-34	Communication base value for process data output 15	0 to 65535	-	0	At once	1453
n1-35	Communication base value for process data output 16	0 to 65535	-	0	At once	1454
n1-36	Communication base value for process data input 1	0 to 65535	-	0	At once	1423
n1-37	Communication base value for process data input 2	0 to 65535	-	0	At once	1424
n1-38	Communication base value for process data input 3	0 to 65535	-	0	At once	1425
n1-39	Communication base value for process data input 4	0 to 65535	-	0	At once	1426
n1-40	Communication base value for process data input 5	0 to 65535	-	0	At once	1427
n1-41	Communication base value for process data input 6	0 to 65535	-	0	At once	1428
n1-42	Communication base value for process data input 7	0 to 65535	-	0	At once	1429
n1-43	Communication base value for process data input 8	0 to 65535	-	0	At once	1430
n1-44	Communication base value for process data input 9	0 to 65535	-	0	At once	1431
n1-45	Communication base value for process data input 10	0 to 65535	-	0	At once	1432
n1-46	Communication base value for process data input 11	0 to 65535	-	0	At once	1433
n1-47	Communication base value for process data input 12	0 to 65535	-	0	At once	1434
n1-48	Communication base value for process data input 13	0 to 65535	-	0	At once	1435

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n1-49	Communication base value for process data input 14	0 to 65535	-	0	At once	1436
n1-50	Communication base value for process data input 15	0 to 65535	-	0	At once	1437
n1-51	Communication base value for process data input 16	0 to 65535	-	0	At once	1438
n1-52	Display of process data output 1	0x0000 to 0xFFFF	-	0	Unmodifiable	33823
n1-53	Display of process data output 2	0x0000 to 0xFFFF	-	0	Unmodifiable	33824
n1-54	Display of process data output 3	0x0000 to 0xFFFF	-	0	Unmodifiable	33825
n1-55	Display of process data output 4	0x0000 to 0xFFFF	-	0	Unmodifiable	33826
n1-56	Display of process data output 5	0x0000 to 0xFFFF	-	0	Unmodifiable	33827
n1-57	Display of process data output 6	0x0000 to 0xFFFF	-	0	Unmodifiable	33828
n1-58	Display of process data output 7	0x0000 to 0xFFFF	-	0	Unmodifiable	33829
n1-59	Display of process data output 8	0x0000 to 0xFFFF	-	0	Unmodifiable	33830
n1-60	Display of process data output 9	0x0000 to 0xFFFF	-	0	Unmodifiable	33831
n1-61	Display of process data output 10	0x0000 to 0xFFFF	-	0	Unmodifiable	33832
n1-62	Display of process data output 11	0x0000 to 0xFFFF	-	0	Unmodifiable	33833
n1-63	Display of process data output 12	0x0000 to 0xFFFF	-	0	Unmodifiable	33834
n1-64	Display of process data output 13	0x0000 to 0xFFFF	-	0	Unmodifiable	33835
n1-65	Display of process data output 14	0x0000 to 0xFFFF	-	0	Unmodifiable	33836
n1-66	Display of process data output 15	0x0000 to 0xFFFF	-	0	Unmodifiable	33837
n1-67	Display of process data output 16	0x0000 to 0xFFFF	-	0	Unmodifiable	33838
n1-68	Display of process data input 1	0x0000 to 0xFFFF	-	0	Unmodifiable	33807
n1-69	Display of process data input 2	0x0000 to 0xFFFF	-	0	Unmodifiable	33808
n1-70	Display of process data input 3	0x0000 to 0xFFFF	-	0	Unmodifiable	33809
n1-71	Display of process data input 4	0x0000 to 0xFFFF	-	0	Unmodifiable	33810

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n1-72	Display of process data input 5	0x0000 to 0xFFFF	-	0	Unmodifiable	33811
n1-73	Display of process data input 6	0x0000 to 0xFFFF	-	0	Unmodifiable	33812
n1-74	Display of process data input 7	0x0000 to 0xFFFF	-	0	Unmodifiable	33813
n1-75	Display of process data input 8	0x0000 to 0xFFFF	-	0	Unmodifiable	33814
n1-76	Display of process data input 9	0x0000 to 0xFFFF	-	0	Unmodifiable	33815
n1-77	Display of process data input 10	0x0000 to 0xFFFF	-	0	Unmodifiable	33816
n1-78	Display of process data input 11	0x0000 to 0xFFFF	-	0	Unmodifiable	33817
n1-79	Display of process data input 12	0x0000 to 0xFFFF	-	0	Unmodifiable	33818
n1-80	Display of process data input 13	0x0000 to 0xFFFF	-	0	Unmodifiable	33819
n1-81	Display of process data input 14	0x0000 to 0xFFFF	-	0	Unmodifiable	33820
n1-82	Display of process data input 15	0x0000 to 0xFFFF	-	0	Unmodifiable	33821
n1-83	Display of process data input 16	0x0000 to 0xFFFF	-	0	Unmodifiable	33822
n1-90	Adapter A mail box write data save selection	0: Do not save to EEPROM 1: Save to EEPROM	-	1	At once	4189
n1-91	Upload of device diagnosis information for adapter A	0: Enable 1: Disable	-	1	At once	1809
Group n2: Fieldbus adapter B						
n2-00	Bus type of fieldbus adapter B	0: None 1: Modbus RTU module 2: CANlink module 3: CANopen module 5: EtherCAT module 6: HDVN module 7: PROFIBUS-DP module 8: PROFINET IO module 9: Customized communication module	-	0	At once	1455
n2-01	Disconnection detection delay of fieldbus adapter B	0.00 to 60.00	s	0.01	At once	1456
n2-02	Communication mode of fieldbus adapter B	0: Standard mode 1: No fault prompt Other: B connector	-	0	At once	3908

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n2-03	Continuous CRC error detection setting	0 to 5000	-	0	At once	1458
n2-04	Process data output 1	0: 0 Other: K connector	-	0	At once	1459
n2-05	Process data output 2	0: 0 Other: K connector	-	0	At once	1460
n2-06	Process data output 3	0: 0 Other: K connector	-	0	At once	1461
n2-07	Process data output 4	0: 0 Other: K connector	-	0	At once	1462
n2-08	Process data output 5	0: 0 Other: K connector	-	0	At once	1463
n2-09	Process data output 6	0: 0 Other: K connector	-	0	At once	1464
n2-10	Process data output 7	0: 0 Other: K connector	-	0	At once	1465
n2-11	Process data output 8	0: 0 Other: K connector	-	0	At once	1466
n2-12	Process data output 9	0: 0 Other: K connector	-	0	At once	1467
n2-13	Process data output 10	0: 0 Other: K connector	-	0	At once	1468
n2-14	Process data output 11	0: 0 Other: K connector	-	0	At once	1469
n2-15	Process data output 12	0: 0 Other: K connector	-	0	At once	1470
n2-16	Process data output 13	0: 0 Other: K connector	-	0	At once	1471
n2-17	Process data output 14	0: 0 Other: K connector	-	0	At once	1472
n2-18	Process data output 15	0: 0 Other: K connector	-	0	At once	1473
n2-19	Process data output 16	0: 0 Other: K connector	-	0	At once	1474
n2-20	Communication base value for process data output 1	0 to 65535	-	0	At once	1491
n2-21	Communication base value for process data output 2	0 to 65535	-	0	At once	1492
n2-22	Communication base value for process data output 3	0 to 65535	-	0	At once	1493
n2-23	Communication base value for process data output 4	0 to 65535	-	0	At once	1494

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n2-24	Communication base value for process data output 5	0 to 65535	-	0	At once	1495
n2-25	Communication base value for process data output 6	0 to 65535	-	0	At once	1496
n2-26	Communication base value for process data output 7	0 to 65535	-	0	At once	1497
n2-27	Communication base value for process data output 8	0 to 65535	-	0	At once	1498
n2-28	Communication base value for process data output 9	0 to 65535	-	0	At once	1499
n2-29	Communication base value for process data output 10	0 to 65535	-	0	At once	1500
n2-30	Communication base value for process data output 11	0 to 65535	-	0	At once	1501
n2-31	Communication base value for process data output 12	0 to 65535	-	0	At once	1502
n2-32	Communication base value for process data output 13	0 to 65535	-	0	At once	1503
n2-33	Communication base value for process data output 14	0 to 65535	-	0	At once	1504
n2-34	Communication base value for process data output 15	0 to 65535	-	0	At once	1505
n2-35	Communication base value for process data output 16	0 to 65535	-	0	At once	1506
n2-36	Communication base value for process data input 1	0 to 65535	-	0	At once	1475
n2-37	Communication base value for process data input 2	0 to 65535	-	0	At once	1476
n2-38	Communication base value for process data input 3	0 to 65535	-	0	At once	1477
n2-39	Communication base value for process data input 4	0 to 65535	-	0	At once	1478
n2-40	Communication base value for process data input 5	0 to 65535	-	0	At once	1479

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n2-41	Communication base value for process data input 6	0 to 65535	-	0	At once	1480
n2-42	Communication base value for process data input 7	0 to 65535	-	0	At once	1481
n2-43	Communication base value for process data input 8	0 to 65535	-	0	At once	1482
n2-44	Communication base value for process data input 9	0 to 65535	-	0	At once	1483
n2-45	Communication base value for process data input 10	0 to 65535	-	0	At once	1484
n2-46	Communication base value for process data input 11	0 to 65535	-	0	At once	1485
n2-47	Communication base value for process data input 12	0 to 65535	-	0	At once	1486
n2-48	Communication base value for process data input 13	0 to 65535	-	0	At once	1487
n2-49	Communication base value for process data input 14	0 to 65535	-	0	At once	1488
n2-50	Communication base value for process data input 15	0 to 65535	-	0	At once	1489
n2-51	Communication base value for process data input 16	0 to 65535	-	0	At once	1490
n2-52	Display of process data output 1	0x0000 to 0xFFFF	-	0	Unmodifiable	33855
n2-53	Display of process data output 2	0x0000 to 0xFFFF	-	0	Unmodifiable	33856
n2-54	Display of process data output 3	0x0000 to 0xFFFF	-	0	Unmodifiable	33857
n2-55	Display of process data output 4	0x0000 to 0xFFFF	-	0	Unmodifiable	33858
n2-56	Display of process data output 5	0x0000 to 0xFFFF	-	0	Unmodifiable	33859
n2-57	Display of process data output 6	0x0000 to 0xFFFF	-	0	Unmodifiable	33860
n2-58	Display of process data output 7	0x0000 to 0xFFFF	-	0	Unmodifiable	33861
n2-59	Display of process data output 8	0x0000 to 0xFFFF	-	0	Unmodifiable	33862

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n2-60	Display of process data output 9	0x0000 to 0xFFFF	-	0	Unmodifiable	33863
n2-61	Display of process data output 10	0x0000 to 0xFFFF	-	0	Unmodifiable	33864
n2-62	Display of process data output 11	0x0000 to 0xFFFF	-	0	Unmodifiable	33865
n2-63	Display of process data output 12	0x0000 to 0xFFFF	-	0	Unmodifiable	33866
n2-64	Display of process data output 13	0x0000 to 0xFFFF	-	0	Unmodifiable	33867
n2-65	Display of process data output 14	0x0000 to 0xFFFF	-	0	Unmodifiable	33868
n2-66	Display of process data output 15	0x0000 to 0xFFFF	-	0	Unmodifiable	33869
n2-67	Display of process data output 16	0x0000 to 0xFFFF	-	0	Unmodifiable	33870
n2-68	Display of process data input 1	0x0000 to 0xFFFF	-	0	Unmodifiable	33839
n2-69	Display of process data input 2	0x0000 to 0xFFFF	-	0	Unmodifiable	33840
n2-70	Display of process data input 3	0x0000 to 0xFFFF	-	0	Unmodifiable	33841
n2-71	Display of process data input 4	0x0000 to 0xFFFF	-	0	Unmodifiable	33842
n2-72	Display of process data input 5	0x0000 to 0xFFFF	-	0	Unmodifiable	33843
n2-73	Display of process data input 6	0x0000 to 0xFFFF	-	0	Unmodifiable	33844
n2-74	Display of process data input 7	0x0000 to 0xFFFF	-	0	Unmodifiable	33845
n2-75	Display of process data input 8	0x0000 to 0xFFFF	-	0	Unmodifiable	33846
n2-76	Display of process data input 9	0x0000 to 0xFFFF	-	0	Unmodifiable	33847
n2-77	Display of process data input 10	0x0000 to 0xFFFF	-	0	Unmodifiable	33848
n2-78	Display of process data input 11	0x0000 to 0xFFFF	-	0	Unmodifiable	33849
n2-79	Display of process data input 12	0x0000 to 0xFFFF	-	0	Unmodifiable	33850
n2-80	Display of process data input 13	0x0000 to 0xFFFF	-	0	Unmodifiable	33851
n2-81	Display of process data input 14	0x0000 to 0xFFFF	-	0	Unmodifiable	33852
n2-82	Display of process data input 15	0x0000 to 0xFFFF	-	0	Unmodifiable	33853
n2-83	Display of process data input 16	0x0000 to 0xFFFF	-	0	Unmodifiable	33854

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n2-90	Adapter B mail box write data save selection	0: Do not save to EEPROM 1: Save to EEPROM	-	1	At once	4190
n2-91	Upload of device diagnosis information for adapter B	0: Enable 1: Disable	-	1	At once	1808
Group n3: Fieldbus adapter C						
n3-00	Function of fieldbus adapter C	0: Bind to HETN-10 1: Bind to fieldbus adapter A 2: Bind to fieldbus adapter B	-	0	At once	1507
n3-03	Adapter C mail box write data save selection	0: Do not save to EEPROM 1: Save to EEPROM	-	0	At once	4191
Group n4: Encoder detection module 1						
n4-00	Expansion slot	0: Disable 1: Expansion slot 1_1 2: Expansion slot 1_2 3: Expansion slot 1_3 4: Expansion slot 2_1 5: Expansion slot 2_2 6: Expansion slot 2_3 7: Expansion slot 3_1	-	0	At stop	1509
n4-01	Module online/offline state	0: Offline 1: Online	-	0	Unmodifia-ble	32825
n4-02	Encoder type	0: Invalid 1: Ordinary ABZ encoder 3: Resolver	-	0	At stop	1512
n4-03	Input A/B phase sequence	0: Forward 1: Reverse	-	0	At stop	1515
n4-04	Speed test mode	0: Quadruplicated frequency 1: A pulse	-	1	At stop	1518
n4-05	Output A/B phase sequence	0: Forward 1: Reverse	-	0	At stop	1521
n4-06	Output Z phase sequence	0: Forward 1: Reverse	-	0	At stop	1524
n4-07	Encoder resolution (pulses/revolutions)	0 to 16000	-	2500	At stop	1527
n4-08	Enable PG quadrature interlock	0: Disable 1: Enable	-	1	At stop	1530
n4-09	Pulse frequency-division output coefficient	1 to 64	-	1	At stop	1533

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n4-10	Disconnection detection mode for ABZ encoder	0: No detection 1: ABZ differential signal 2: AB differential signal 3: ABZ single-end positive signal 4: AB single-end positive signal	-	2	At once	1536
n4-11	PG disconnection detection time during speed feedback	0.0 to 10.0	s	0.5	At once	1554
n4-12	Encoder installation position angle	0.0 to 359.9	°	0	At once	1539
n4-13	[U/V/W encoder] U/V/W phase sequence	0: Forward 1: Reverse	-	0	At stop	1542
n4-14	[U/V/W encoder] Zero point position angle	0.0 to 359.9	°	0	At once	1545
n4-15	Resolver pole pairs	0 to 32	-	1	At stop	1548
n4-16	UVW pole pairs	0 to 32	-	4	At once	1551
n4-17	Filter time of encoder speed test	0 to 100	ms	4	At once	1557
n4-18	Trigger setpoint of encoder initial angle	0: 0 Other: K connector	-	0	At once	2428
n4-19	Reverse calculation of encoder angle	0: Disable 1: Enable	-	1	At once	2451
n4-20	Enable software detection of encoder signal error	0: Disable 1: Enable	-	0	At once	1237
n4-21	Encoder signal error software detection coefficient	0.0 to 800.0	%	100	At once	1240
n4-22	Software detection threshold of encoder signal error	0.0 to 6553.5	%	0	Unmodifia-ble	33094
n4-23	Threshold of encoder signal error count	1 to 100	-	10	At once	3176
n4-25	Resolver type	0: 7Vp-p, ratio 0.5 1: 7Vrms, ratio 0.5 2: 7Vrms, ratio 0.286 3: 4Vrms, ratio 0.3	-	0	At stop	3191
n4-26	Resolver excitation signal frequency	0: 10 1: 12 2: 15 3: 20	kHz	0	At stop	3899
n4-27	Resolver disconnection detection time	0 to 2000	ms	50	At once	3896
n4-28	Enable burr removal for encoder speed test	0: Disable 1: Enable	-	1	At once	2869

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n4-29	Enable Z signal loss detection for ABZ encoder	0: Disable 1: Enable	-	1	At once	1590
n4-30	Enable Z signal interference detection for ABZ encoder	0: Disable 1: Enable	-	0	At once	1593
n4-31	Threshold of abnormal resolver signals	1 to 100	-	4	At once	6302
n4-36	Retention of encoder pulses upon power failure	0: Disable 1: Save pulse number 2: Save angle turns	-	0	At once	6305
n4-38	Encoder position setting switch	0: Disable Other: B connector	-	0	At once	6311
n4-39	Encoder position setpoint	0: 0 Other: K connector	-	0	At once	6314
Group n5: Encoder detection module 2						
n5-00	Expansion slot	0: Disable 1: Expansion slot 1_1 2: Expansion slot 1_2 3: Expansion slot 1_3 4: Expansion slot 2_1 5: Expansion slot 2_2 6: Expansion slot 2_3 7: Expansion slot 3_1	-	0	At stop	1510
n5-01	Module online/offline state	0: Offline 1: Online	-	0	Unmodifia-ble	32826
n5-02	Encoder type	0: Invalid 1: Ordinary ABZ encoder 3: Resolver	-	0	At stop	1513
n5-03	Input A/B phase sequence	0: Forward 1: Reverse	-	0	At stop	1516
n5-04	Speed test mode	0: Quadruplicated frequency 1: A pulse	-	1	At stop	1519
n5-05	Output A/B phase sequence	0: Forward 1: Reverse	-	0	At stop	1522
n5-06	Output Z phase sequence	0: Forward 1: Reverse	-	0	At stop	1525
n5-07	Encoder resolution (pulses/revolutions)	0 to 16000	-	2500	At stop	1528
n5-08	Enable PG quadrature interlock	0: Disable 1: Enable	-	1	At stop	1531
n5-09	Pulse frequency-division output coefficient	1 to 64	-	1	At stop	1534

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n5-10	Disconnection detection mode for ABZ encoder	0: No detection 1: ABZ differential signal 2: AB differential signal 3: ABZ single-end positive signal 4: AB single-end positive signal	-	2	At once	1537
n5-11	PG disconnection detection time during speed feedback	0.0 to 10.0	s	0.5	At once	1555
n5-12	Encoder installation position angle	0.0 to 359.9	°	0	At once	1540
n5-13	[U/V/W encoder] U/V/W phase sequence	0: Forward 1: Reverse	-	0	At stop	1543
n5-14	[U/V/W encoder] Zero point position angle	0.0 to 359.9	°	0	At once	1546
n5-15	Resolver pole pairs	0 to 32	-	1	At stop	1549
n5-16	UVW pole pairs	0 to 32	-	4	At once	1552
n5-17	Filter time of encoder speed test	0 to 100	ms	4	At once	1558
n5-18	Trigger setpoint of encoder initial angle	0: 0 Other: K connector	-	0	At once	2429
n5-19	Reverse calculation of encoder angle	0: Disable 1: Enable	-	1	At once	2452
n5-20	Enable software detection of encoder signal error	0: Disable 1: Enable	-	0	At once	1238
n5-21	Encoder signal error software detection coefficient	0.0 to 800.0	%	100	At once	1241
n5-22	Software detection threshold of encoder signal error	0.0 to 6553.5	%	0	Unmodifia-ble	33094
n5-23	Threshold of encoder signal error count	1 to 100	-	10	At once	3177
n5-25	Resolver type	0: 7Vp-p, ratio 0.5 1: 7Vrms, ratio 0.5 2: 7Vrms, ratio 0.286 3: 4Vrms, ratio 0.3	-	0	At stop	3192
n5-26	Resolver excitation signal frequency	0: 10 1: 12 2: 15 3: 20	kHz	0	At stop	3900
n5-27	Resolver disconnection detection time	0 to 2000	ms	50	At once	3897
n5-28	Enable burr removal for encoder speed test	0: Disable 1: Enable	-	1	At once	2870

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n5-29	Enable Z signal loss detection for ABZ encoder	0: Disable 1: Enable	-	1	At once	1591
n5-30	Enable Z signal interference detection for ABZ encoder	0: Disable 1: Enable	-	0	At once	1594
n5-31	Threshold of abnormal resolver signals	1 to 100	-	4	At once	6303
n5-36	Retention of encoder pulses upon power failure	0: Disable 1: Save pulse number 2: Save angle turns	-	0	At once	6306
n5-38	Encoder position setting switch	0: Disable Other: B connector	-	0	At once	6312
n5-39	Encoder position setpoint	0: 0 Other: K connector	-	0	At once	6315
Group n6: Encoder detection module 3						
n6-00	Expansion slot	0: Disable 1: Expansion slot 1_1 2: Expansion slot 1_2 3: Expansion slot 1_3 4: Expansion slot 2_1 5: Expansion slot 2_2 6: Expansion slot 2_3 7: Expansion slot 3_1	-	0	At stop	1511
n6-01	Module online/offline state	0: Offline 1: Online	-	0	Unmodifia-ble	32827
n6-02	Encoder type	0: Invalid 1: Ordinary ABZ encoder 3: Resolver	-	0	At stop	1514
n6-03	Input A/B phase sequence	0: Forward 1: Reverse	-	0	At stop	1517
n6-04	Speed test mode	0: Quadruplicated frequency 1: A pulse	-	1	At stop	1520
n6-05	Output A/B phase sequence	0: Forward 1: Reverse	-	0	At stop	1523
n6-06	Output Z phase sequence	0: Forward 1: Reverse	-	0	At stop	1526
n6-07	Encoder resolution (pulses/revolutions)	0 to 16000	-	2500	At stop	1529
n6-08	Enable PG quadrature interlock	0: Disable 1: Enable	-	1	At stop	1532
n6-09	Pulse frequency-division output coefficient	1 to 64	-	1	At stop	1535

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n6-10	Disconnection detection mode for ABZ encoder	0: No detection 1: ABZ differential signal 2: AB differential signal 3: ABZ single-end positive signal 4: AB single-end positive signal	-	2	At once	1538
n6-11	PG disconnection detection time during speed feedback	0.0 to 10.0	s	0.5	At once	1556
n6-12	Encoder installation position angle	0.0 to 359.9	°	0	At once	1541
n6-13	[U/V/W encoder] U/V/W phase sequence	0: Forward 1: Reverse	-	0	At stop	1544
n6-14	[U/V/W encoder] Zero point position angle	0.0 to 359.9	°	0	At once	1547
n6-15	Resolver pole pairs	0 to 32	-	1	At stop	1550
n6-16	UVW pole pairs	0 to 32	-	4	At once	1553
n6-17	Filter time of encoder speed test	0 to 100	ms	4	At once	1559
n6-18	Trigger setpoint of encoder initial angle	0: 0	-	0	At once	2430
n6-19	Reverse calculation of encoder angle	0: Disable 1: Enable	-	1	At once	2453
n6-20	Enable software detection of encoder signal error	0: Disable 1: Enable	-	0	At once	1239
n6-21	Encoder signal error software detection coefficient	0.0 to 800.0	%	100	At once	1242
n6-22	Software detection threshold of encoder signal error	0.0 to 6553.5	%	0	Unmodifia-ble	33094
n6-23	Threshold of encoder signal error count	1 to 100	-	10	At once	3178
n6-25	Resolver type	0: 7Vp-p, ratio 0.5 1: 7Vrms, ratio 0.5 2: 7Vrms, ratio 0.286 3: 4Vrms, ratio 0.3	-	0	At stop	3193
n6-26	Resolver excitation signal frequency	0: 10 1: 12 2: 15 3: 20	kHz	0	At stop	3901
n6-27	Resolver disconnection detection time	0 to 2000	ms	50	At once	3898
n6-28	Enable burr removal for encoder speed test	0: Disable 1: Enable	-	1	At once	2871

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n6-29	Enable Z signal loss detection for ABZ encoder	0: Disable 1: Enable	-	1	At once	1592
n6-30	Enable Z signal interference detection for ABZ encoder	0: Disable 1: Enable	-	0	At once	1595
n6-31	Threshold of abnormal resolver signals	1 to 100	-	4	At once	6304
n6-36	Retention of encoder pulses upon power failure	0: Disable 1: Save pulse number 2: Save angle turns	-	0	At once	6307
n6-38	Encoder position setting switch	0: Disable Other: B connector	-	0	At once	6313
n6-39	Encoder position setpoint	0: 0 Other: K connector	-	0	At once	6316
Group n7: Configuration of HIO module 1						
n7-00	Expansion slot	0: Disable 1: Expansion slot 1_1 2: Expansion slot 1_2 3: Expansion slot 1_3 4: Expansion slot 2_1 5: Expansion slot 2_2 6: Expansion slot 2_3 7: Expansion slot 3_1	-	0	At stop	3439
n7-01	Module online/offline state	0: Disable 1: Expansion module not found 2: Module communication normal	-	0	Unmodifiable	35116
n7-02	Module type	0: Disable 1: HIO-10 2: HIO-20 3: HIO-30	-	0	At stop	3673
n7-10	Configuration for DIO used as output	0x0000 to 0xFFFF	-	0	Unmodifiable	35167
n7-11	DI/DIO input original status	0x0000 to 0xFFFF	-	0	Unmodifiable	35119
n7-12	DI/DIO input final status	0x0000 to 0xFFFF	-	0	Unmodifiable	35122
n7-13	RO/DIO output setting status	0x0000 to 0xFFFF	-	0	Unmodifiable	35290
n7-14	RO/DIO output final status	0x0000 to 0xFFFF	-	0	Unmodifiable	35128
n7-15	AI input status word	0x0000 to 0xFFFF	-	0	Unmodifiable	35125
n7-20	AI1 input value	–327.68 to +327.67	-	0	Unmodifiable	35131

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n7-21	AI1 input proportion	–3276.8 to +3276.7	%	0	Unmodifiable	35245
n7-22	AI2 input value	–327.68 to +327.67	-	0	Unmodifiable	35137
n7-23	AI2 input proportion	–3276.8 to +3276.7	%	0	Unmodifiable	35248
n7-24	AI3 input value	–327.68 to +327.67	-	0	Unmodifiable	35143
n7-25	AI3 input proportion	–3276.8 to +3276.7	%	0	Unmodifiable	35251
n7-30	AO1 output proportion	–3276.8 to +3276.7	%	0	Unmodifiable	35254
n7-31	Actual AO1 output value	–327.68 to +327.67	-	0	Unmodifiable	35149
n7-32	AO2 output proportion	–3276.8 to +3276.7	%	0	Unmodifiable	35257
n7-33	Actual AO2 output value	–327.68 to +327.67	-	0	Unmodifiable	35155
n7-34	AO3 output proportion	–3276.8 to +3276.7	%	0	Unmodifiable	35260
n7-35	Actual AO3 output value	–327.68 to +327.67	-	0	Unmodifiable	35161
Group n8: Configuration of HIO module 2						
n8-00	Expansion slot	0: Disable 1: Expansion slot 1_1 2: Expansion slot 1_2 3: Expansion slot 1_3 4: Expansion slot 2_1 5: Expansion slot 2_2 6: Expansion slot 2_3 7: Expansion slot 3_1	-	0	At stop	3440
n8-01	Module online/offline state	0: Disable 1: Expansion module not found 2: Module communication normal	-	0	Unmodifiable	35117
n8-02	Module type	0: Disable 1: HIO-10 2: HIO-20 3: HIO-30	-	0	At stop	3674
n8-10	Configuration for DIO used as output	0x0000 to 0xFFFF	-	0	Unmodifiable	35168
n8-11	DI/DIO input original status	0x0000 to 0xFFFF	-	0	Unmodifiable	35120
n8-12	DI/DIO input final status	0x0000 to 0xFFFF	-	0	Unmodifiable	35123
n8-13	RO/DIO output setting status	0x0000 to 0xFFFF	-	0	Unmodifiable	35291

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n8-14	RO/DIO output final status	0x0000 to 0xFFFF	-	0	Unmodifiable	35129
n8-15	AI input status word	0x0000 to 0xFFFF	-	0	Unmodifiable	35126
n8-20	AI1 input value	–327.68 to +327.67	-	0	Unmodifiable	35132
n8-21	AI1 input proportion	–3276.8 to +3276.7	%	0	Unmodifiable	35246
n8-22	AI2 input value	–327.68 to +327.67	-	0	Unmodifiable	35138
n8-23	AI2 input proportion	–3276.8 to +3276.7	%	0	Unmodifiable	35249
n8-24	AI3 input value	–327.68 to +327.67	-	0	Unmodifiable	35144
n8-25	AI3 input proportion	–3276.8 to +3276.7	%	0	Unmodifiable	35252
n8-30	AO1 output proportion	–3276.8 to +3276.7	%	0	Unmodifiable	35255
n8-31	Actual AO1 output value	–327.68 to +327.67	-	0	Unmodifiable	35150
n8-32	AO2 output proportion	–3276.8 to +3276.7	%	0	Unmodifiable	35258
n8-33	Actual AO2 output value	–327.68 to +327.67	-	0	Unmodifiable	35156
n8-34	AO3 output proportion	–3276.8 to +3276.7	%	0	Unmodifiable	35261
n8-35	Actual AO3 output value	–327.68 to +327.67	-	0	Unmodifiable	35162
Group n9: Configuration of HIO module 3						
n9-00	Expansion slot	0: Disable 1: Expansion slot 1_1	-	0	At stop	3441
n9-00	Expansion slot	2: Expansion slot 1_2 3: Expansion slot 1_3 4: Expansion slot 2_1 5: Expansion slot 2_2 6: Expansion slot 2_3 7: Expansion slot 3_1	-	0	At stop	3441
n9-01	Module online/offline state	0: Disable 1: Expansion module not found 2: Module communication normal	-	0	Unmodifiable	35118
n9-02	Module type	0: Disable 1: HIO-10 2: HIO-20 3: HIO-30	-	0	At stop	3675
n9-10	Configuration for DIO used as output	0x0000 to 0xFFFF	-	0	Unmodifiable	35169

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n9-11	DI/DIO input original status	0x0000 to 0xFFFF	-	0	Unmodifiable	35121
n9-12	DI/DIO input final status	0x0000 to 0xFFFF	-	0	Unmodifiable	35124
n9-13	RO/DIO output setting status	0x0000 to 0xFFFF	-	0	Unmodifiable	35292
n9-14	RO/DIO output final status	0x0000 to 0xFFFF	-	0	Unmodifiable	35130
n9-15	AI input status word	0x0000 to 0xFFFF	-	0	Unmodifiable	35127
n9-20	AI1 input value	–327.68 to +327.67	-	0	Unmodifiable	35133
n9-21	AI1 input proportion	–3276.8 to +3276.7	%	0	Unmodifiable	35247
n9-22	AI2 input value	–327.68 to +327.67	-	0	Unmodifiable	35139
n9-23	AI2 input proportion	–3276.8 to +3276.7	%	0	Unmodifiable	35250
n9-24	AI3 input value	–327.68 to +327.67	-	0	Unmodifiable	35145
n9-25	AI3 input proportion	–3276.8 to +3276.7	%	0	Unmodifiable	35253
n9-30	AO1 output proportion	–3276.8 to +3276.7	%	0	Unmodifiable	35256
n9-31	Actual AO1 output value	–327.68 to +327.67	-	0	Unmodifiable	35151
n9-32	AO2 output proportion	–3276.8 to +3276.7	%	0	Unmodifiable	35259
n9-33	Actual AO2 output value	–327.68 to +327.67	-	0	Unmodifiable	35157
n9-34	AO3 output proportion	–3276.8 to +3276.7	%	0	Unmodifiable	35262
n9-35	Actual AO3 output value	–327.68 to +327.67	-	0	Unmodifiable	35163
Group n10: Modbus RTU module						
n10-00	Expansion slot	0: Disable 1: Expansion slot 1_1 2: Expansion slot 1_2 3: Expansion slot 1_3 4: Expansion slot 2_1 5: Expansion slot 2_2 6: Expansion slot 2_3 7: Expansion slot 3_1	-	0	At stop	1728
n10-01	Module online/offline state	0: Offline 1: Online	-	0	Unmodifiable	33882

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n10-02	Modbus baud rate	0: 1200 bps 1: 2400 bps 2: 4800 bps 3: 9600 bps 4: 19200 bps 5: 38400 bps 6: 57600 bps 7: 115200 bps	-	7	At stop	1731
n10-03	Modbus data format	0: Even parity check (8-E-1) 1: Odd parity check (8-O-1) 2: No check (8-N-2) 3: 8-N-1	-	1	At stop	1732
n10-04	Modbus local address	1 to 255	-	1	At stop	1733
n10-05	Modbus response delay	0 to 20	ms	4	At stop	1734
n10-06	Modbus communication timeout	0.0 to 60.0	s	20	At stop	1735
n10-07	Reserved	0 to 65535	-	0	At stop	1736
n10-08	Reserved	0 to 65535	-	0	At stop	1737
n10-09	Reserved	0 to 65535	-	0	At stop	1738
n10-10	Reserved	0 to 65535	-	0	At stop	1739
Group n11: CANlink module						
n11-00	Expansion slot	0: Disable 1: Expansion slot 1_1 2: Expansion slot 1_2 3: Expansion slot 1_3 4: Expansion slot 2_1 5: Expansion slot 2_2 6: Expansion slot 2_3 7: Expansion slot 3_1	-	0	At stop	1740
n11-01	Module online/offline state	0: Offline 1: Online	-	0	Unmodifiable	33883
n11-02	CANlink slave station No.	0 to 63	-	1	At stop	1743
n11-03	Baud rate of CANlink slave station	0: 20 kbps 1: 50 kbps 2: 100 kbps 3: 125 kbps 4: 250 kbps 5: 500 kbps 6: 1 Mbps	-	5	At stop	1744

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n11-04	Number of CANlink frames received per unit time	1 to 65535	-	1	At stop	1745
n11-05	CAN receiving error count per unit time	0 to 255	-	0	At stop	1746
n11-06	CAN sending error count per unit time	0 to 255	-	0	At stop	1747
n11-07	Times of CAN disconnection from bus (since power-on)	0 to 65535	-	0	At stop	1748
n11-08	Reserved	0 to 65535	-	0	At stop	1749
n11-09	Reserved	0 to 65535	-	0	At stop	1750
n11-10	Reserved	0 to 65535	-	0	At stop	1751
Group n12: CANopen module						
n12-00	Expansion slot	0: Disable 1: Expansion slot 1_1 2: Expansion slot 1_2 3: Expansion slot 1_3 4: Expansion slot 2_1 5: Expansion slot 2_2 6: Expansion slot 2_3 7: Expansion slot 3_1	-	0	At stop	1752
n12-01	Module online/offline state	0: Offline 1: Online	-	0	Unmodifiable	33884
n12-02	CANopen node address	0 to 63	-	1	At stop	1755
n12-03	CANopen baud rate	0: 20 kbps 1: 50 kbps 2: 100 kbps 3: 125 kbps 4: 250 kbps 5: 500 kbps 6: 1 Mbps	-	5	At stop	1756
n12-04	Max. interval of adjacent RPDO frames	0 to 65535	ms	0	At once	33090
n12-05	Number of receiving errors per unit time	0 to 65535	-	0	At once	33091
n12-06	Number of sending errors per unit time	0 to 65535	-	0	At once	33092
n12-07	Auto entering OP upon power-on	0: Disable 1: Enable	-	0	At stop	1760
n12-08	Transmitting boot-up upon communication timeout	0: Disable 1: Enable	-	0	At stop	1761
n12-09	Communication timeout interval	0.0 to 60.0	s	0	At stop	1762

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n12-10	CANopen configuration source	0: Default configuration 1: User-defined configuration	-	0	At stop	1763
n12-11	RPDO1 CAN-ID	0x0180 to 0x057F	-	512	At once	3055
n12-12	RPDO1 mode	0 to 255	-	255	At once	3059
n12-13	Number of RPDO1 mappings	0 to 4	-	4	At once	3063
n12-14	RPDO2 CAN-ID	0x0180 to 0x057F	-	768	At once	3056
n12-15	RPDO2 mode	0 to 255	-	255	At once	3060
n12-16	Number of RPDO2 mappings	0 to 4	-	4	At once	3064
n12-17	RPDO3 CAN-ID	0x0180 to 0x057F	-	1024	At once	3057
n12-18	RPDO3 mode	0 to 255	-	255	At once	3061
n12-19	Number of RPDO3 mappings	0 to 4	-	0	At once	3065
n12-20	RPDO4 CAN-ID	0x0180 to 0x057F	-	1280	At once	3058
n12-21	RPDO4 mode	0 to 255	-	255	At once	3062
n12-22	Number of RPDO4 mappings	0 to 4	-	0	At once	3066
n12-23	TPDO1 CAN-ID	0x0180 to 0x057F	-	384	At once	3039
n12-24	TPDO1 mode	0 to 255	-	255	At once	3043
n12-25	Number of TPDO1 mappings	0 to 4	-	4	At once	3047
n12-26	TPDO1 transmit interval	1 to 65535	ms	50	At once	3051
n12-27	TPDO2 CAN-ID	0x0180 to 0x057F	-	640	At once	3040
n12-28	TPDO2 mode	0 to 255	-	255	At once	3044
n12-29	Number of TPDO2 mappings	0 to 4	-	4	At once	3048
n12-30	TPDO2 transmit interval	1 to 65535	ms	50	At once	3052
n12-31	TPDO3 CAN-ID	0x0180 to 0x057F	-	896	At once	3041
n12-32	TPDO3 mode	0 to 255	-	255	At once	3045
n12-33	Number of TPDO3 mappings	0 to 4	-	0	At once	3049
n12-34	TPDO3 transmit interval	1 to 65535	ms	1000	At once	3053
n12-35	TPDO4 CAN-ID	0x0180 to 0x057F	-	1152	At once	3042
n12-36	TPDO4 mode	0 to 255	-	255	At once	3046
n12-37	Number of TPDO4 mappings	0 to 4	-	0	At once	3050
n12-38	TPDO4 transmit interval	1 to 65535	ms	1000	At once	3054
Group n13: EtherNET module						

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n13-00	Expansion slot	0: Disable 1: Expansion slot 1_1 2: Expansion slot 1_2 3: Expansion slot 1_3 4: Expansion slot 2_1 5: Expansion slot 2_2 6: Expansion slot 2_3 7: Expansion slot 3_1	-	0	At stop	1764
n13-01	Module online/offline state	0: Offline 1: Online	-	0	Unmodifiable	33885
n13-02	Reserved	0 to 0	-	0	At stop	2122
n13-03	TCP/IP address 1	0 to 255	-	192	At stop	1767
n13-04	TCP/IP address 2	0 to 255	-	168	At stop	1768
n13-05	TCP/IP address 3	0 to 255	-	10	At stop	1769
n13-06	TCP/IP address 4	0 to 255	-	253	At stop	1770
n13-07	TCP/IP subnet mask address 1	0 to 255	-	255	At stop	2114
n13-08	TCP/IP subnet mask address 2	0 to 255	-	255	At stop	2115
n13-09	TCP/IP subnet mask address 3	0 to 255	-	255	At stop	2116
n13-10	TCP/IP subnet mask address 4	0 to 255	-	0	At stop	2117
n13-11	TCP/IP gateway address 1	0 to 255	-	0	At stop	2118
n13-12	TCP/IP gateway address 2	0 to 255	-	0	At stop	2119
n13-13	TCP/IP gateway address 3	0 to 255	-	0	At stop	2120
n13-14	TCP/IP gateway address 4	0 to 255	-	0	At stop	2121
n13-15	Reserved	0 to 65535	-	0	At stop	1774
Group n14: EtherCAT module						
n14-00	Expansion slot	0: Disable 1: Expansion slot 1_1 2: Expansion slot 1_2 3: Expansion slot 1_3 4: Expansion slot 2_1 5: Expansion slot 2_2 6: Expansion slot 2_3 7: Expansion slot 3_1	-	0	At stop	1776
n14-01	Module online/offline state	0: Offline 1: Online	-	0	Unmodifiable	33886
n14-02	EtherCAT slave name	0 to 65535	-	1	At stop	1779
n14-03	EtherCAT slave alias	0 to 65535	-	1	At stop	1780

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n14-04	This parameter defines the allowed times of EtherCAT sync interrupt loss.	4 to 20	-	4	At stop	1781
n14-05	Reserved	0 to 1	-	0	At stop	1782
n14-06	Alias setup function switch	0: n14-03 1: Host controller	-	0	At stop	1783
n14-07	Reserved	0 to 65535	-	0	At stop	1784
n14-08	Reserved	0 to 65535	-	0	At stop	1785
n14-09	Reserved	0 to 65535	-	0	At stop	1786
n14-10	Reserved	0 to 65535	-	0	At stop	1787
n14-11	Port 1_0 receiving error count	0 to 65535	-	0	At once	33336
n14-12	Port 1_ 0 invalid frame count	0 to 65535	-	0	At once	33337
n14-13	Max. number of forwarding errors for port 1_0	0 to 65535	-	0	At once	33338
n14-14	PDI and processing unit error count	0 to 65535	-	0	At once	33339
n14-15	Port 1_0 link loss count	0 to 65535	-	0	At once	33340
n14-16	Synchronization signal loss count	0 to 65535	-	0	At once	33341
n14-17	Application layer fault code	0 to 65535	-	0	At once	33342
n14-18	State machine and port link status	0 to 65535	-	0	At once	33343
n14-19	Reserved	0 to 65535	-	0	At once	33344
n14-20	Reserved	0 to 65535	-	0	At once	33345
n14-21	Reserved	0 to 65535	-	0	At once	33346
n14-22	InoBus scheduling period	500 to 1000	-	1000	At once	6717
Group n15: HDVN module						
n15-00	Expansion slot	0: Disable 1: Expansion slot 1_1 2: Expansion slot 1_2 3: Expansion slot 1_3 4: Expansion slot 2_1 5: Expansion slot 2_2 6: Expansion slot 2_3 7: Expansion slot 3_1	-	0	At stop	1788
n15-01	Module online/offline state	0: Offline 1: Online	-	0	Unmodifiable	33887
n15-02	HDVN node address configuration	0 to 63	-	63	At stop	1791
n15-03	HDVN actual address	0 to 65535	-	0	Unmodifiable	35552

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n15-04	Baud rate configuration of HDVN node	0: 125 kbps 1: 250 kbps 2: 500 kbps 3: Auto	-	0	At stop	1792
n15-05	Actual baud rate of HDVN node	0: 125 kbps 1: 250 kbps 2: 500 kbps 3: Auto	-	0	Unmodifiable	35553
n15-06	Configured number of I/O connection input words	0 to 40	-	0	At stop	4185
n15-07	Actual number of I/O connection input words	0 to 65535	-	0	Unmodifiable	35554
n15-08	Configured number of I/O connection output words	0 to 40	-	0	At stop	4186
n15-09	Actual number of I/O connection output words	0 to 65535	-	0	Unmodifiable	35555
n15-10	HDVN attribute code	0 to 65535	-	0	At stop	4188
n15-11	Explicit information timeout interval	0.0 to 60.0	-	0	At once	4187
n15-12	Bus disconnection judgment time threshold	0.0 to 60.0	-	0.3	At once	1793
n15-13	Function after bus disconnection	0: Remain in the disconnection state 1: Reset and continue the communication	-	1	At stop	1794
n15-14	VendorID	1 to 65535	-	1	At stop	1795
n15-15	ProductType	0 to 65535	-	0	At stop	1796
n15-16	ProductCode	0 to 65535	-	0	At stop	1797
n15-17	MajorRevision	0 to 255	-	0	At stop	1798
n15-18	MinorRevision	0 to 255	-	0	At stop	1799
Group n16: PROFIBUS DP module						
n16-00	Expansion slot	0: Disable 1: Expansion slot 1_1 2: Expansion slot 1_2 3: Expansion slot 1_3 4: Expansion slot 2_1 5: Expansion slot 2_2 6: Expansion slot 2_3 7: Expansion slot 3_1	-	0	At stop	1800
n16-01	Module online/offline state	0: Offline 1: Online	-	0	Unmodifiable	33888
n16-02	Expansion card ID	1 to 125	-	1	At stop	1803

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n16-03	Reserved	0 to 65535	-	0	At stop	1804
n16-04	Reserved	0 to 65535	-	0	At stop	1805
n16-05	Reserved	0 to 65535	-	0	At stop	1806
n16-09	Attribute code	0: Default 1: 0806 2: 0956 3: 8045 4: 0812 5: 0815 6: 6012 7: 80b5 8: 4149 9: 0572 10: 4150 11: 0612+JH 12: 0812+SL 13: 0959v2.145 14: 0959v2.161 15: Reserved 16: Reserved	-	0	At stop	1810
n16-10	DP data check bit	0: Default PZD1.Bit10 1: Disable 2: PZD1.Bit0 3: PZD1.Bit1 4: PZD1.Bit2 5: PZD1.Bit3 6: PZD1.Bit4 7: PZD1.Bit5 8: PZD1.Bit6 9: PZD1.Bit7 10: PZD1.Bit8 11: PZD1.Bit9 12: PZD1.Bit10 13: PZD1.Bit11 14: PZD1.Bit12 15: PZD1.Bit13 16: PZD1.Bit14 17: PZD1.Bit15	-	0	At stop	1811
Group n17: PROFINET IO module						

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n17-00	Expansion slot	0: Disable 1: Expansion slot 1_1 2: Expansion slot 1_2 3: Expansion slot 1_3 4: Expansion slot 2_1 5: Expansion slot 2_2 6: Expansion slot 2_3 7: Expansion slot 3_1	-	0	At stop	1812
n17-01	Module online/offline state	0: Offline 1: Online	-	0	Unmodifiable	33889
n17-02	Reserved	1 to 65535	-	1	At stop	1815
n17-03	MAC address word 1	0x0000 to 0xFFFF	-	0	Unmodifiable	34833
n17-04	MAC address word 2	0x0000 to 0xFFFF	-	0	Unmodifiable	34834
n17-05	MAC address word 3	0x0000 to 0xFFFF	-	0	Unmodifiable	34835
n17-06	Reserved	0 to 65535	-	0	At stop	1819
n17-07	Reserved	0 to 65535	-	0	At stop	1820
n17-08	Reserved	0 to 65535	-	0	At stop	1821
n17-09	Reserved	0 to 65535	-	0	At stop	1822
n17-10	Reserved	0 to 65535	-	0	At stop	1823
Group n18: Customized communication module						
n18-00	Expansion slot	0: Disable 1: Expansion slot 1_1 2: Expansion slot 1_2 3: Expansion slot 1_3 4: Expansion slot 2_1 5: Expansion slot 2_2 6: Expansion slot 2_3 7: Expansion slot 3_1	-	0	At stop	2163
n18-01	Module online/offline state	0: Offline 1: Online 2: Not supported	-	0	Unmodifiable	33925

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n18-02	Expansion slot module type	0: No expansion card 17: I/O module HIO-10 32: Encoder detection module PG-10 35: Encoder detection module PG-40 36: Encoder detection module PG-50 48: Sync voltage detection module HSVM-10 49: Sync voltage detection module HSVM-20 64: HINT module (HE200 rectifier) 96: HOFR module 112: PROFIBUS-DP module	-	0	Unmodifiable	33490
n18-02	Expansion slot module type	113: CANopen module 114: CANlink module 115: Modbus RTU module 116: Modbus TCP module 117: PROFINET IO module 118: EtherCAT module 121: EtherNET module 122: DeviceNet module 123: CAN listening module 124: IBA module 125: HYAS module	-	0	Unmodifiable	33490
n18-03	Customized communication module ID reference	0 to 65535	-	0	At stop	3828
n18-11	Customized communication card parameter 1	0 to 65535	-	0	At stop	2166
n18-12	Customized communication card parameter 2	0 to 65535	-	0	At stop	2164
n18-13	Customized communication card parameter 3	0 to 65535	-	0	At stop	2165
n18-14	Customized communication card parameter 4	0 to 65535	-	0	At stop	2167
n18-15	Customized communication card parameter 5	0 to 65535	-	0	At stop	2168
n18-16	Customized communication card parameter 6	0 to 65535	-	0	At stop	2169

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n18-17	Customized communication card parameter 7	0 to 65535	-	0	At stop	2170
n18-18	Customized communication card parameter 8	0 to 65535	-	0	At stop	2171
n18-19	Customized communication card parameter 9	0 to 65535	-	0	At stop	2172
n18-20	Customized communication card parameter 10	0 to 65535	-	0	At stop	2173
n18-21	Customized communication card parameter 11	0 to 65535	-	0	At stop	2174
n18-22	Customized communication card parameter 12	0 to 65535	-	0	At stop	2345
n18-23	Customized communication card parameter 13	0 to 65535	-	0	At stop	2346
n18-24	Customized communication card parameter 14	0 to 65535	-	0	At stop	2347
n18-25	Customized communication card parameter 15	0 to 65535	-	0	At stop	2348
n18-26	Customized communication card parameter 16	0 to 65535	-	0	At stop	2349
n18-27	Customized communication card parameter 17	0 to 65535	-	0	At stop	2350
n18-28	Customized communication card parameter 18	0 to 65535	-	0	At stop	2351
Group n19: Sync voltage detection module 1						
n19-00	Expansion slot	0: Disable 1: Expansion slot 1_1 2: Expansion slot 1_2 3: Expansion slot 1_3 4: Expansion slot 2_1 5: Expansion slot 2_2 6: Expansion slot 2_3 7: Expansion slot 3_1	-	0	At stop	2236
n19-01	Module online/offline state	0: Offline 1: Online	-	0	Unmodifiable	33945

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n19-02	[HSVM-10] Voltage sampling frequency	0: 40 K 1: 80 K 2: 160 K 3: 320 K	-	0	At stop	2237
n19-03	[HSVM-10] Voltage sampling delay selection	0: No delay 1: Delay	-	0	At stop	2238
n19-04	[HSVM-10] Data entries received by the module	0 to 65535	-	0	Unmodifiable	33946
n19-05	[HSVM-10] Module status register	0 to 65535	-	0	Unmodifiable	33947
n19-06	[HSVM-10] Module Urs sampling AD	0 to 65535	-	0	Unmodifiable	33948
n19-07	[HSVM-10] Module Ust sampling AD	0 to 65535	-	0	Unmodifiable	33949
n19-08	[HSVM-10] Module Utr sampling AD	0 to 65535	-	0	Unmodifiable	33950
n19-09	[HSVM-10] Module temperature sampling AD	0 to 65535	-	0	Unmodifiable	33951
n19-11	HSVM wiring error detection time	0.0 to 5.0	s	1	At once	1596
Group n22: Optical fiber routing control module						
n22-00	Start communication network	0: Disable 1: Enable Other: B connector	-	0	At once	2922
n22-01	Communication interrupt detection time	0.00 to 60.00	s	0.01	At once	2955
n22-02	Expansion slot	0: Disable 1: Expansion slot 1_1 2: Expansion slot 1_2 3: Expansion slot 1_3 4: Expansion slot 2_1 5: Expansion slot 2_2 6: Expansion slot 2_3 7: Expansion slot 3_1	-	0	At stop	2923
n22-03	Module online/offline state	0: Offline 1: Online	-	0	Unmodifiable	34303
n22-04	Online node-ID in the communication network	0x0000 to 0xFFFF	-	0	Unmodifiable	33512
n22-05	Local address	0 to 11	-	0	At stop	2924

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n22-06	Source node A of received data	0: Disable 1: Address 1 2: Address 2 3: Address 3 4: Address 4 5: Address 5 6: Address 6 7: Address 7 8: Address 8 9: Address 9 10: Address 10 11: Address 11	-	0	At once	2925
n22-07	Source node B of received data	0: Disable 1: Address 1 2: Address 2 3: Address 3 4: Address 4 5: Address 5 6: Address 6 7: Address 7 8: Address 8 9: Address 9 10: Address 10 11: Address 11	-	0	At once	2926
n22-08	Source node C of received data	0: Disable 1: Address 1 2: Address 2 3: Address 3 4: Address 4 5: Address 5 6: Address 6 7: Address 7 8: Address 8 9: Address 9 10: Address 10 11: Address 11	-	0	At once	2927

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n22-09	Received data 1 selection	Ones position: Data selection 1: Data 1 2: Data 2 3: Data 3 4: Data 4 5: Data 5 6: Data 6 7: Data 7 8: Data 8 Tens position: Data source node 0: Invalid 1: Node A 2: Node B 3: Node C	-	1	At once	2928
n22-10	Received data 2 selection	Ones position: Data selection 1: Data 1 2: Data 2 3: Data 3 4: Data 4 5: Data 5 6: Data 6 7: Data 7 8: Data 8 Tens position: Data source node 0: Invalid 1: Node A 2: Node B 3: Node C	-	1	At once	2929

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n22-11	Received data 3 selection	Ones position: Data selection 1: Data 1 2: Data 2 3: Data 3 4: Data 4 5: Data 5 6: Data 6 7: Data 7 8: Data 8 Tens position: Data source node 0: Invalid 1: Node A 2: Node B 3: Node C	-	1	At once	2930
n22-12	Received data 4 selection	Ones position: Data selection 1: Data 1 2: Data 2 3: Data 3 4: Data 4 5: Data 5 6: Data 6 7: Data 7 8: Data 8 Tens position: Data source node 0: Invalid 1: Node A 2: Node B 3: Node C	-	1	At once	2931

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n22-13	Received data 5 selection	Ones position: Data selection 1: Data 1 2: Data 2 3: Data 3 4: Data 4 5: Data 5 6: Data 6 7: Data 7 8: Data 8 Tens position: Data source node 0: Invalid 1: Node A 2: Node B 3: Node C	-	1	At once	2932
n22-14	Received data 6 selection	Ones position: Data selection 1: Data 1 2: Data 2 3: Data 3 4: Data 4 5: Data 5 6: Data 6 7: Data 7 8: Data 8 Tens position: Data source node 0: Invalid 1: Node A 2: Node B 3: Node C	-	1	At once	2933

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n22-15	Received data 7 selection	Ones position: Data selection 1: Data 1 2: Data 2 3: Data 3 4: Data 4 5: Data 5 6: Data 6 7: Data 7 8: Data 8 Tens position: Data source node 0: Invalid 1: Node A 2: Node B 3: Node C	-	1	At once	2934
n22-16	Received data 8 selection	Ones position: Data selection 1: Data 1 2: Data 2 3: Data 3 4: Data 4 5: Data 5 6: Data 6 7: Data 7 8: Data 8 Tens position: Data source node 0: Invalid 1: Node A 2: Node B 3: Node C	-	1	At once	2935
n22-17	Received data 1 scaling	–8.000 to +8.000	-	1	At once	2936
n22-18	Received data 2 scaling	–8.000 to +8.000	-	1	At once	2937
n22-19	Received data 3 scaling	–8.000 to +8.000	-	1	At once	2938
n22-20	Received data 4 scaling	–8.000 to +8.000	-	1	At once	2939
n22-21	Received data 5 scaling	–8.000 to +8.000	-	1	At once	2940
n22-22	Received data 6 scaling	–8.000 to +8.000	-	1	At once	2941
n22-23	Received data 7 scaling	–8.000 to +8.000	-	1	At once	2942
n22-24	Received data 8 scaling	–8.000 to +8.000	-	1	At once	2943
n22-25	Sent data 1 selection	0: 0 Other: K connector	-	0	At once	2944
n22-26	Sent data 2 selection	0: 0 Other: K connector	-	0	At once	2945
n22-27	Sent data 3 selection	0: 0 Other: K connector	-	0	At once	2946

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n22-28	Sent data 4 selection	0: 0 Other: K connector	-	0	At once	2947
n22-29	Sent data 5 selection	0: 0 Other: K connector	-	0	At once	2948
n22-30	Sent data 6 selection	0: 0 Other: K connector	-	0	At once	2949
n22-31	Sent data 7 selection	0: 0 Other: K connector	-	0	At once	2950
n22-32	Sent data 8 selection	0: 0 Other: K connector	-	0	At once	2951
Group n25: Parameter settings of HIO module 1 (HIO-30)						
n25-00	DI/DIO input filter time	0.000 to 1.000	s	0.001	At stop	3442
n25-01	DI positive and negative logic	bit00: DI1 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level bit01: DI2 positive and negative logic 0: Logic 1 corresponds to high level	-	0	At stop	3445

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n25-01	DI positive and negative logic	1: Logic 1 corresponds to low level bit02: DI3 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level bit03: DI4 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level bit04: DI5 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level bit05: DI6 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level	-	0	At stop	3445
n25-02	DI1 switch-on delay	0.00 to 360.00	s	0	At stop	3448
n25-03	DI1 switch-off delay	0.00 to 360.00	s	0	At stop	3451
n25-04	DI2 switch-on delay	0.00 to 360.00	s	0	At stop	3454
n25-05	DI2 switch-off delay	0.00 to 360.00	s	0	At stop	3457

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n25-09	DIO positive and negative logic	bit00: DIO1 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level bit01: DIO2 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level bit02: DIO3 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level bit03: DIO4 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level	-	0	At stop	3460
n25-09	DIO positive and negative logic	bit04: DIO5 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level bit05: DIO6 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level	-	0	At stop	3460
n25-10	DIO1 as DO signal source	0: DI Other: B connector	-	0	At stop	3463
n25-11	DIO1 switch-on delay	0.00 to 360.00	s	0	At stop	3466
n25-12	DIO1 switch-off delay	0.00 to 360.00	s	0	At stop	3469
n25-13	DIO2 as DO signal source	0: DI Other: B connector	-	0	At stop	3472
n25-14	DIO2 switch-on delay	0.00 to 360.00	s	0	At stop	3475
n25-15	DIO2 switch-off delay	0.00 to 360.00	s	0	At stop	3478
n25-16	DIO3 as DO signal source	0: DI Other: B connector	-	0	At stop	3481

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n25-17	DIO4 as DO signal source	0: DI Other: B connector	-	0	At stop	3484
n25-18	DIO5 as DO signal source	0: DI Other: B connector	-	0	At stop	3487
n25-19	DIO6 as DO signal source	0: DI Other: B connector	-	0	At stop	3490
n25-20	RO positive and negative logic	bit00: RO1 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level bit01: RO2 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level bit02: RO3 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level bit03: RO4 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level	-	0	At stop	3493
n25-21	RO1 signal source	0: Low level 1: High level Other: B connector	-	0	At stop	3496
n25-22	RO1 switch-on delay	0.00 to 360.00	s	0	At stop	3499
n25-23	RO1 switch-off delay	0.00 to 360.00	s	0	At stop	3502
n25-24	RO2 signal source	0: Low level 1: High level Other: B connector	-	0	At stop	3505
n25-25	RO2 switch-on delay	0.00 to 360.00	s	0	At stop	3508
n25-26	RO2 switch-off delay	0.00 to 360.00	s	0	At stop	3511
n25-27	RO3 signal source	0: Low level 1: High level Other: B connector	-	0	At stop	3514
n25-28	RO4 signal source	0: Low level 1: High level Other: B connector	-	0	At stop	3517

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n25-35	Setting for AI less than minimum input	Ones position: Setting for AI1 lower than minimum input 0: Minimum input proportion 1: 0.0% Tens position: Setting for AI2 lower than minimum input 0: Minimum input proportion 1: 0.0% Hundreds position: Setting for AI3 lower than minimum input 0: Minimum input proportion 1: 0.0%	-	0	At stop	3520
n25-36	AI disconnection monitoring enable	Ones position: AI1 disconnection monitoring enable 0: Disable 1: Enable Tens position: AI2 disconnection monitoring enable 0: Disable 1: Enable Hundreds position: AI3 disconnection monitoring enable 0: Disable 1: Enable	-	0	At stop	3523
n25-37	AI setting zero-crossing threshold	0.0 to 1.0	%	0	At stop	3526
n25-40	AI1 enable	0: Disable 1: Enable Other: B connector	-	1	At stop	3529
n25-41	AI1 type	0: －10 V to +10 V 1: 0 to 10 2: －20 mA to +20 mA 3: 0 mA to 20 mA 4: 4 mA to 20 mA	-	0	At stop	3532
n25-42	Min. input value of AI1 curve	–20.000 to +20.000	-	–10	At once	3535
n25-43	Min. input proportion of AI1 curve	–600.0 to +600.0	%	–100	At once	3538
n25-44	Max. input value of AI1 curve	–20.000 to +20.000	-	10	At once	3541
n25-45	Max. input proportion of AI1 curve	–600.0 to +600.0	%	100	At once	3544
n25-46	AI1 filter time	0.000 to 10.000	s	0	At once	3547
n25-47	AI1 denoising threshold	0.0 to 20.0	%	0	At once	3550

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n25-48	AI1 disconnection monitoring threshold	0.000 to 4.000	mA	2	At once	3553
n25-49	AI1 disconnection monitoring delay	0.00 to 10.00	s	1	At once	3556
n25-50	AI2 enable	0: Disable 1: Enable Other: B connector	-	1	At stop	3559
n25-51	AI2 type	0: －10 V to +10 V 1: 0 to 10 2: －20 mA to +20 mA 3: 0 mA to 20 mA 4: 4 mA to 20 mA	-	0	At stop	3562
n25-52	Min. input value of AI2 curve	–20.000 to +20.000	-	–10	At once	3565
n25-53	Min. input proportion of AI2 curve	–600.0 to +600.0	%	–100	At once	3568
n25-54	Max. input value of AI2 curve	–20.000 to +20.000	-	10	At once	3571
n25-55	Max. input proportion of AI2 curve	–600.0 to +600.0	%	100	At once	3574
n25-56	AI2 filter time	0.000 to 10.000	s	0	At once	3577
n25-57	AI2 denoising threshold	0.0 to 20.0	%	0	At once	3580
n25-58	AI2 disconnection monitoring threshold	0.000 to 4.000	mA	2	At once	3583
n25-59	AI2 disconnection monitoring delay	0.00 to 10.00	s	1	At once	3586
n25-60	AI3 enable	0: Disable 1: Enable Other: B connector	-	1	At stop	3589
n25-61	AI3 type	0: －10 V to +10 V 1: 0 to 10 2: －20 mA to +20 mA 3: 0 mA to 20 mA 4: 4 mA to 20 mA	-	0	At stop	3592
n25-62	Min. input value of AI3 curve	–20.000 to +20.000	-	–10	At once	3595
n25-63	Min. input proportion of AI3 curve	–600.0 to +600.0	%	–100	At once	3598
n25-64	Max. input value of AI3 curve	–20.000 to +20.000	-	10	At once	3601
n25-65	Max. input proportion of AI3 curve	–600.0 to +600.0	%	100	At once	3604
n25-66	AI3 filter time	0.000 to 10.000	s	0	At once	3607
n25-67	AI3 denoising threshold	0.0 to 20.0	%	0	At once	3610
n25-68	AI3 disconnection monitoring threshold	0.000 to 4.000	mA	2	At once	3613

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n25-69	AI3 disconnection monitoring delay	0.00 to 10.00	s	1	At once	3616
n25-70	AO1 signal source	0: 0 Other: K connector	-	0	At stop	3619
n25-71	AO1 type	0: 0 V to 10 V 1: 0 mA to 20 mA 2: 4 mA to 20 mA	-	0	At stop	3622
n25-72	Min. output proportion of AO1 curve	–600.0 to +600.0	%	0	At once	3625
n25-73	Min. output value of AO1 curve	0.000 to 20.000	-	0	At once	3628
n25-74	Max. output proportion of AO1 curve	–600.0 to +600.0	%	100	At once	3631
n25-75	Max. output value of AO1 curve	0.000 to 20.000	-	10	At once	3634
n25-80	AO2 signal source	0: 0 Other: K connector	-	0	At stop	3637
n25-81	AO2 type	0: 0 V to 10 V 1: 0 mA to 20 mA 2: 4 mA to 20 mA	-	0	At stop	3640
n25-82	Min. output proportion of AO2 curve	–600.0 to +600.0	%	0	At once	3643
n25-83	Min. output value of AO2 curve	0.000 to 20.000	-	0	At once	3646
n25-84	Max. output proportion of AO2 curve	–600.0 to +600.0	%	100	At once	3649
n25-85	Max. output value of AO2 curve	0.000 to 20.000	-	10	At once	3652
n25-90	AO3 signal source	0: 0 Other: K connector	-	0	At stop	3655
n25-91	AO3 type	0: 0 V to 10 V 1: 0 mA to 20 mA 2: 4 mA to 20 mA	-	0	At stop	3658
n25-92	Min. output proportion of AO3 curve	–600.0 to +600.0	%	0	At once	3661
n25-93	Min. output value of AO3 curve	0.000 to 20.000	-	0	At once	3664
n25-94	Max. output proportion of AO3 curve	–600.0 to +600.0	%	100	At once	3667
n25-95	Max. output value of AO3 curve	0.000 to 20.000	-	10	At once	3670
Group n28: Parameter settings of HIO module 2 (HIO-30)						
n28-00	DI/DIO input filter time	0.000 to 1.000	s	0.001	At stop	3443

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n28-01	DI positive and negative logic	bit00: DI1 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level bit01: DI2 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level bit02: DI3 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level bit03: DI4 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level bit04: DI5 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level bit05: DI6 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level	-	0	At stop	3446
n28-02	DI1 switch-on delay	0.00 to 360.00	s	0	At stop	3449
n28-03	DI1 switch-off delay	0.00 to 360.00	s	0	At stop	3452
n28-04	DI2 switch-on delay	0.00 to 360.00	s	0	At stop	3455
n28-05	DI2 switch-off delay	0.00 to 360.00	s	0	At stop	3458

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n28-09	DIO positive and negative logic	bit00: DIO1 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level bit01: DIO2 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level bit02: DIO3 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level bit03: DIO4 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level bit04: DIO5 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level	-	0	At stop	3461
n28-09	DIO positive and negative logic	bit05: DIO6 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level	-	0	At stop	3461
n28-10	DIO1 as DO signal source	0: DI Other: B connector	-	0	At stop	3464
n28-11	DIO1 switch-on delay	0.00 to 360.00	s	0	At stop	3467
n28-12	DIO1 switch-off delay	0.00 to 360.00	s	0	At stop	3470
n28-13	DIO2 as DO signal source	0: DI Other: B connector	-	0	At stop	3473
n28-14	DIO2 switch-on delay	0.00 to 360.00	s	0	At stop	3476
n28-15	DIO2 switch-off delay	0.00 to 360.00	s	0	At stop	3479
n28-16	DIO3 as DO signal source	0: DI Other: B connector	-	0	At stop	3482

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n28-17	DIO4 as DO signal source	0: DI Other: B connector	-	0	At stop	3485
n28-18	DIO5 as DO signal source	0: DI Other: B connector	-	0	At stop	3488
n28-19	DIO6 as DO signal source	0: DI Other: B connector	-	0	At stop	3491
n28-20	RO positive and negative logic	bit00: RO1 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level bit01: RO2 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level bit02: RO3 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level bit03: RO4 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level	-	0	At stop	3494
n28-21	RO1 signal source	0: Low level 1: High level Other: B connector	-	0	At stop	3497
n28-22	RO1 switch-on delay	0.00 to 360.00	s	0	At stop	3500
n28-23	RO1 switch-off delay	0.00 to 360.00	s	0	At stop	3503
n28-24	RO2 signal source	0: Low level 1: High level Other: B connector	-	0	At stop	3506
n28-25	RO2 switch-on delay	0.00 to 360.00	s	0	At stop	3509
n28-26	RO2 switch-off delay	0.00 to 360.00	s	0	At stop	3512
n28-27	RO3 signal source	0: Low level 1: High level Other: B connector	-	0	At stop	3515
n28-28	RO4 signal source	0: Low level 1: High level Other: B connector	-	0	At stop	3518

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n28-35	Setting for AI less than minimum input	Ones position: Setting for AI1 lower than minimum input 0: Minimum input proportion 1: 0.0% Tens position: Setting for AI2 lower than minimum input 0: Minimum input proportion 1: 0.0% Hundreds position: Setting for AI3 lower than minimum input 0: Minimum input proportion 1: 0.0%	-	0	At stop	3521
n28-36	AI disconnection monitoring enable	Ones position: AI1 disconnection monitoring enable 0: Disable 1: Enable Tens position: AI2 disconnection monitoring enable 0: Disable 1: Enable Hundreds position: AI3 disconnection monitoring enable 0: Disable 1: Enable	-	0	At stop	3524
n28-37	AI setting zero-crossing threshold	0.0 to 1.0	%	0	At stop	3527
n28-40	AI1 enable	0: Disable 1: Enable Other: B connector	-	1	At stop	3530
n28-41	AI1 type	0: －10 V to +10 V 1: 0 to 10 2: －20 mA to +20 mA 3: 0 mA to 20 mA 4: 4 mA to 20 mA	-	0	At stop	3533
n28-42	Min. input value of AI1 curve	–20.000 to +20.000	-	–10	At once	3536
n28-43	Min. input proportion of AI1 curve	–600.0 to +600.0	%	–100	At once	3539
n28-44	Max. input value of AI1 curve	–20.000 to +20.000	-	10	At once	3542
n28-45	Max. input proportion of AI1 curve	–600.0 to +600.0	%	100	At once	3545
n28-46	AI1 filter time	0.000 to 10.000	s	0	At once	3548
n28-47	AI1 denoising threshold	0.0 to 20.0	%	0	At once	3551

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n28-48	AI1 disconnection monitoring threshold	0.000 to 4.000	mA	2	At once	3554
n28-49	AI1 disconnection monitoring delay	0.00 to 10.00	s	1	At once	3557
n28-50	AI2 enable	0: Disable 1: Enable Other: B connector	-	1	At stop	3560
n28-51	AI2 type	0: －10 V to +10 V 1: 0 to 10 2: －20 mA to +20 mA 3: 0 mA to 20 mA 4: 4 mA to 20 mA	-	0	At stop	3563
n28-52	Min. input value of AI2 curve	–20.000 to +20.000	-	–10	At once	3566
n28-53	Min. input proportion of AI2 curve	–600.0 to +600.0	%	–100	At once	3569
n28-54	Max. input value of AI2 curve	–20.000 to +20.000	-	10	At once	3572
n28-55	Max. input proportion of AI2 curve	–600.0 to +600.0	%	100	At once	3575
n28-56	AI2 filter time	0.000 to 10.000	s	0	At once	3578
n28-57	AI2 denoising threshold	0.0 to 20.0	%	0	At once	3581
n28-58	AI2 disconnection monitoring threshold	0.000 to 4.000	mA	2	At once	3584
n28-59	AI2 disconnection monitoring delay	0.00 to 10.00	s	1	At once	3587
n28-60	AI3 enable	0: Disable 1: Enable Other: B connector	-	1	At stop	3590
n28-61	AI3 type	0: －10 V to +10 V 1: 0 to 10 2: －20 mA to +20 mA 3: 0 mA to 20 mA 4: 4 mA to 20 mA	-	0	At stop	3593
n28-62	Min. input value of AI3 curve	–20.000 to +20.000	-	–10	At once	3596
n28-63	Min. input proportion of AI3 curve	–600.0 to +600.0	%	–100	At once	3599
n28-64	Max. input value of AI3 curve	–20.000 to +20.000	-	10	At once	3602
n28-65	Max. input proportion of AI3 curve	–600.0 to +600.0	%	100	At once	3605
n28-66	AI3 filter time	0.000 to 10.000	s	0	At once	3608
n28-67	AI3 denoising threshold	0.0 to 20.0	%	0	At once	3611
n28-68	AI3 disconnection monitoring threshold	0.000 to 4.000	mA	2	At once	3614

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n28-69	AI3 disconnection monitoring delay	0.00 to 10.00	s	1	At once	3617
n28-70	AO1 signal source	0: 0 Other: K connector	-	0	At stop	3620
n28-71	AO1 type	0: 0 V to 10 V 1: 0 mA to 20 mA 2: 4 mA to 20 mA	-	0	At stop	3623
n28-72	Min. output proportion of AO1 curve	–600.0 to +600.0	%	0	At once	3626
n28-73	Min. output value of AO1 curve	0.000 to 20.000	-	0	At once	3629
n28-74	Max. output proportion of AO1 curve	–600.0 to +600.0	%	100	At once	3632
n28-75	Max. output value of AO1 curve	0.000 to 20.000	-	10	At once	3635
n28-80	AO2 signal source	0: 0 Other: K connector	-	0	At stop	3638
n28-81	AO2 type	0: 0 V to 10 V 1: 0 mA to 20 mA 2: 4 mA to 20 mA	-	0	At stop	3641
n28-82	Min. output proportion of AO2 curve	–600.0 to +600.0	%	0	At once	3644
n28-83	Min. output value of AO2 curve	0.000 to 20.000	-	0	At once	3647
n28-84	Max. output proportion of AO2 curve	–600.0 to +600.0	%	100	At once	3650
n28-85	Max. output value of AO2 curve	0.000 to 20.000	-	10	At once	3653
n28-90	AO3 signal source	0: 0 Other: K connector	-	0	At stop	3656
n28-91	AO3 type	0: 0 V to 10 V 1: 0 mA to 20 mA 2: 4 mA to 20 mA	-	0	At stop	3659
n28-92	Min. output proportion of AO3 curve	–600.0 to +600.0	%	0	At once	3662
n28-93	Min. output value of AO3 curve	0.000 to 20.000	-	0	At once	3665
n28-94	Max. output proportion of AO3 curve	–600.0 to +600.0	%	100	At once	3668
n28-95	Max. output value of AO3 curve	0.000 to 20.000	-	10	At once	3671
Group n31: Parameter settings of HIO module 3 (HIO-30)						
n31-00	DI/DIO input filter time	0.000 to 1.000	s	0.001	At stop	3444

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n31-01	DI positive and negative logic	bit00: DI1 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level bit01: DI2 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level bit02: DI3 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level bit03: DI4 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level bit04: DI5 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level bit05: DI6 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level	-	0	At stop	3447
n31-02	DI1 switch-on delay	0.00 to 360.00	s	0	At stop	3450
n31-03	DI1 switch-off delay	0.00 to 360.00	s	0	At stop	3453
n31-04	DI2 switch-on delay	0.00 to 360.00	s	0	At stop	3456
n31-05	DI2 switch-off delay	0.00 to 360.00	s	0	At stop	3459

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n31-09	DIO positive and negative logic	bit00: DIO1 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level bit01: DIO2 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level bit02: DIO3 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level	-	0	At stop	3462
n31-09	DIO positive and negative logic	bit03: DIO4 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level bit04: DIO5 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level bit05: DIO6 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level	-	0	At stop	3462
n31-10	DIO1 as DO signal source	0: DI Other: B connector	-	0	At stop	3465
n31-11	DIO1 switch-on delay	0.00 to 360.00	s	0	At stop	3468
n31-12	DIO1 switch-off delay	0.00 to 360.00	s	0	At stop	3471
n31-13	DIO2 as DO signal source	0: DI Other: B connector	-	0	At stop	3474
n31-14	DIO2 switch-on delay	0.00 to 360.00	s	0	At stop	3477
n31-15	DIO2 switch-off delay	0.00 to 360.00	s	0	At stop	3480
n31-16	DIO3 as DO signal source	0: DI Other: B connector	-	0	At stop	3483

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n31-17	DIO4 as DO signal source	0: DI Other: B connector	-	0	At stop	3486
n31-18	DIO5 as DO signal source	0: DI Other: B connector	-	0	At stop	3489
n31-19	DIO6 as DO signal source	0: DI Other: B connector	-	0	At stop	3492
n31-20	RO positive and negative logic	bit00: RO1 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level bit01: RO2 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level bit02: RO3 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level bit03: RO4 positive and negative logic 0: Logic 1 corresponds to high level 1: Logic 1 corresponds to low level	-	0	At stop	3495
n31-21	RO1 signal source	0: Low level 1: High level Other: B connector	-	0	At stop	3498
n31-22	RO1 switch-on delay	0.00 to 360.00	s	0	At stop	3501
n31-23	RO1 switch-off delay	0.00 to 360.00	s	0	At stop	3504
n31-24	RO2 signal source	0: Low level 1: High level Other: B connector	-	0	At stop	3507
n31-25	RO2 switch-on delay	0.00 to 360.00	s	0	At stop	3510
n31-26	RO2 switch-off delay	0.00 to 360.00	s	0	At stop	3513
n31-27	RO3 signal source	0: Low level 1: High level Other: B connector	-	0	At stop	3516
n31-28	RO4 signal source	0: Low level 1: High level Other: B connector	-	0	At stop	3519

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n31-35	Setting for AI less than minimum input	Ones position: Setting for AI1 lower than minimum input 0: Minimum input proportion 1: 0.0% Tens position: Setting for AI2 lower than minimum input 0: Minimum input proportion 1: 0.0% Hundreds position: Setting for AI3 lower than minimum input 0: Minimum input proportion 1: 0.0%	-	0	At stop	3522
n31-36	AI disconnection monitoring enable	Ones position: AI1 disconnection monitoring enable 0: Disable 1: Enable Tens position: AI2 disconnection monitoring enable 0: Disable 1: Enable Hundreds position: AI3 disconnection monitoring enable 0: Disable 1: Enable	-	0	At stop	3525
n31-37	AI setting zero-crossing threshold	0.0 to 1.0	%	0	At stop	3528
n31-40	AI1 enable	0: Disable 1: Enable Other: B connector	-	1	At stop	3531
n31-41	AI1 type	0: －10 V to +10 V 1: 0 to 10 2: －20 mA to +20 mA 3: 0 mA to 20 mA 4: 4 mA to 20 mA	-	0	At stop	3534
n31-42	Min. input value of AI1 curve	–20.000 to +20.000	-	–10	At once	3537
n31-43	Min. input proportion of AI1 curve	–600.0 to +600.0	%	–100	At once	3540
n31-44	Max. input value of AI1 curve	–20.000 to +20.000	-	10	At once	3543
n31-45	Max. input proportion of AI1 curve	–600.0 to +600.0	%	100	At once	3546
n31-46	AI1 filter time	0.000 to 10.000	s	0	At once	3549
n31-47	AI1 denoising threshold	0.0 to 20.0	%	0	At once	3552

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n31-48	AI1 disconnection monitoring threshold	0.000 to 4.000	mA	2	At once	3555
n31-49	AI1 disconnection monitoring delay	0.00 to 10.00	s	1	At once	3558
n31-50	AI2 enable	0: Disable 1: Enable Other: B connector	-	1	At stop	3561
n31-51	AI2 type	0: －10 V to +10 V 1: 0 to 10 2: －20 mA to +20 mA 3: 0 mA to 20 mA 4: 4 mA to 20 mA	-	0	At stop	3564
n31-52	Min. input value of AI2 curve	–20.000 to +20.000	-	–10	At once	3567
n31-53	Min. input proportion of AI2 curve	–600.0 to +600.0	%	–100	At once	3570
n31-54	Max. input value of AI2 curve	–20.000 to +20.000	-	10	At once	3573
n31-55	Max. input proportion of AI2 curve	–600.0 to +600.0	%	100	At once	3576
n31-56	AI2 filter time	0.000 to 10.000	s	0	At once	3579
n31-57	AI2 denoising threshold	0.0 to 20.0	%	0	At once	3582
n31-58	AI2 disconnection monitoring threshold	0.000 to 4.000	mA	2	At once	3585
n31-59	AI2 disconnection monitoring delay	0.00 to 10.00	s	1	At once	3588
n31-60	AI3 enable	0: Disable 1: Enable Other: B connector	-	1	At stop	3591
n31-61	AI3 type	0: －10 V to +10 V 1: 0 to 10 2: －20 mA to +20 mA 3: 0 mA to 20 mA 4: 4 mA to 20 mA	-	0	At stop	3594
n31-62	Min. input value of AI3 curve	–20.000 to +20.000	-	–10	At once	3597
n31-63	Min. input proportion of AI3 curve	–600.0 to +600.0	%	–100	At once	3600
n31-64	Max. input value of AI3 curve	–20.000 to +20.000	-	10	At once	3603
n31-65	Max. input proportion of AI3 curve	–600.0 to +600.0	%	100	At once	3606
n31-66	AI3 filter time	0.000 to 10.000	s	0	At once	3609
n31-67	AI3 denoising threshold	0.0 to 20.0	%	0	At once	3612
n31-68	AI3 disconnection monitoring threshold	0.000 to 4.000	mA	2	At once	3615

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n31-69	AI3 disconnection monitoring delay	0.00 to 10.00	s	1	At once	3618
n31-70	AO1 signal source	0: 0 Other: K connector	-	0	At stop	3621
n31-71	AO1 type	0: 0 V to 10 V 1: 0 mA to 20 mA 2: 4 mA to 20 mA	-	0	At stop	3624
n31-72	Min. output proportion of AO1 curve	–600.0 to +600.0	%	0	At once	3627
n31-73	Min. output value of AO1 curve	0.000 to 20.000	-	0	At once	3630
n31-74	Max. output proportion of AO1 curve	–600.0 to +600.0	%	100	At once	3633
n31-75	Max. output value of AO1 curve	0.000 to 20.000	-	10	At once	3636
n31-80	AO2 signal source	0: 0 Other: K connector	-	0	At stop	3639
n31-81	AO2 type	0: 0 V to 10 V 1: 0 mA to 20 mA 2: 4 mA to 20 mA	-	0	At stop	3642
n31-82	Min. output proportion of AO2 curve	–600.0 to +600.0	%	0	At once	3645
n31-83	Min. output value of AO2 curve	0.000 to 20.000	-	0	At once	3648
n31-84	Max. output proportion of AO2 curve	–600.0 to +600.0	%	100	At once	3651
n31-85	Max. output value of AO2 curve	0.000 to 20.000	-	10	At once	3654
n31-90	AO3 signal source	0: 0 Other: K connector	-	0	At stop	3657
n31-91	AO3 type	0: 0 V to 10 V 1: 0 mA to 20 mA 2: 4 mA to 20 mA	-	0	At stop	3660
n31-92	Min. output proportion of AO3 curve	–600.0 to +600.0	%	0	At once	3663
n31-93	Min. output value of AO3 curve	0.000 to 20.000	-	0	At once	3666
n31-94	Max. output proportion of AO3 curve	–600.0 to +600.0	%	100	At once	3669
n31-95	Max. output value of AO3 curve	0.000 to 20.000	-	10	At once	3672
Group n32: High-speed pulse detection module						

Para.	Name	Value Range	Unit	Default	Change Mode	Address
n32-00	Expansion slot	0: Disable 1: Expansion slot 1_1 2: Expansion slot 1_2 3: Expansion slot 1_3 4: Expansion slot 2_1 5: Expansion slot 2_2 6: Expansion slot 2_3 7: Expansion slot 3_1	-	0	At stop	6588
n32-01	Module online/offline state	0: Offline 1: Online	-	0	Unmodifiable	36222
n32-02	Module type	0: Invalid 1: High-speed pulse detection module	-	0	At stop	6589
n32-03	Pulse/frequency measurement mode	0: Single pulse 1: Single pulse + Direction (reserved) 2: Forward and reverse pulses (reserved) 3: A/B phase signal orthogonality (reserved)	-	0	At stop	6590
n32-04	Pulse measurement filter time	1 to 10	μs	2	At once	6591
n32-05	Pulse/frequency conversion offset	–32.768 to +32.767	kHz	0	At once	6592
n32-06	[Frequency/Torque curve] Min. input frequency	0.00 to 100.00	kHz	30	At once	6593
n32-07	[Frequency/Torque curve] Min. input proportion	–600.0 to +600.0	%	–100	At once	6594
n32-08	[Frequency/Torque curve] Max. input frequency	0.00 to 100.00	kHz	90	At once	6595
n32-09	[Frequency/Torque curve] Max. input proportion	–600.0 to +600.0	%	100	At once	6596
n32-10	[Frequency/Torque curve] Output filter time	0.000 to 10.000	s	0	At once	6597
n32-11	[Frequency/Torque curve] Output proportion coefficient 1 (multiply)	1 to 65535	-	1	At once	6598
n32-12	[Frequency/Torque curve] Output proportion coefficient 2 (divide)	1 to 65535	-	1	At once	6599

7.2.10 Group o: Process Parameters

Para.	Name	Value Range	Unit	Default	Change Mode	Address
Group o0: Process setting parameter group 1						
o0-00	Process setting word parameter 1	–300.00 to +300.00	%	0	At once	4721
o0-01	Process setting word parameter 2	–300.00 to +300.00	%	0	At once	4725
o0-02	Process setting word parameter 3	–300.00 to +300.00	%	0	At once	4729
o0-03	Process setting word parameter 4	–300.00 to +300.00	%	0	At once	4733
o0-04	Process setting word parameter 5	–300.00 to +300.00	%	0	At once	4737
o0-05	Process setting word parameter 6	–300.00 to +300.00	%	0	At once	4741
o0-06	Process setting word parameter 7	–300.00 to +300.00	%	0	At once	4745
o0-07	Process setting word parameter 8	–300.00 to +300.00	%	0	At once	4749
o0-08	Process setting word parameter 9	–300.00 to +300.00	%	0	At once	4753
o0-09	Process setting word parameter 10	–300.00 to +300.00	%	0	At once	4757
o0-10	Process setting word parameter 11	–300.00 to +300.00	%	0	At once	4761
o0-11	Process setting word parameter 12	–300.00 to +300.00	%	0	At once	4765
o0-12	Process setting word parameter 13	–300.00 to +300.00	%	0	At once	4769
o0-13	Process setting word parameter 14	–300.00 to +300.00	%	0	At once	4773
o0-14	Process setting bit parameter 1	0: Logic 0 1: Logic 1	-	0	At once	4777
o0-15	Process setting bit parameter 2	0: Logic 0 1: Logic 1	-	0	At once	4781
o0-16	Process setting bit parameter 3	0: Logic 0 1: Logic 1	-	0	At once	4785
o0-17	Process setting bit parameter 4	0: Logic 0 1: Logic 1	-	0	At once	4789
o0-18	Process setting bit parameter 5	0: Logic 0 1: Logic 1	-	0	At once	4793
o0-19	Process setting bit parameter 6	0: Logic 0 1: Logic 1	-	0	At once	4797
Group o1: Process controller parameter group 1						

Para.	Name	Value Range	Unit	Default	Change Mode	Address
o1-00	Enable process controller	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL	-	0	At once	4926
o1-00	Enable process controller	9: HDI1 10: HDI2 Other: B connector	-	0	At once	4926
o1-01	Process controller type	Ones position: 0: Integral control disabled 1: Integral control enabled Tens position: 0: Proportional control disabled 1: Proportional control enabled Hundreds position: 0: Improved differential control 1: Traditional differential control Thousands position: 0: Positive calculation 1: Negative calculation	-	11	At once	4899
o1-02	Process controller setpoint 1	0: 0 Other: K connector	-	0	At once	4919
o1-03	Process controller setpoint 2	0: 0 Other: K connector	-	0	At once	4920
o1-04	Process controller setpoint 3	0: 0 Other: K connector	-	0	At once	4921
o1-05	Process controller setpoint 4	0: 0 Other: K connector	-	0	At once	4922

Para.	Name	Value Range	Unit	Default	Change Mode	Address
o1-06	Enable process controller additional setpoint	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	4923
o1-07	Process controller additional setpoint	0: 0 Other: K connector	-	0	At once	4851
o1-08	Process controller filter time setpoint	0.00 to 60.00	s	0	At once	4855
o1-09	Process controller feedback value 1	0: 0 Other: K connector	-	0	At once	4915
o1-10	Process controller feedback value 2	0: 0 Other: K connector	-	0	At once	4916
o1-11	Process controller feedback value 3	0: 0 Other: K connector	-	0	At once	4917
o1-12	Process controller feedback value 4	0: 0 Other: K connector	-	0	At once	4918
o1-13	Process controller feedback filter time	0.00 to 60.00	s	0	At once	4839
o1-14	Process controller Td	0 to 100	-	0	At once	4843
o1-15	Unit of process controller Td	0: ms 1: s	-	0	At once	4847
o1-16	Enable process controller droop	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	4925
o1-17	Process controller droop coefficient	–600.0 to +600.0	%	0	At once	4887

Para.	Name	Value Range	Unit	Default	Change Mode	Address
o1-18	Process controller positive droop limit	0.00 to 300.00	%	100	At once	4891
o1-19	Process controller negative droop limit	–300.00 to +0.00	%	–100	At once	4895
o1-20	Process controller Kp setpoint	0.00 to 125.00	-	3	At once	4859
o1-21	Source of process controller Kp adaption	0: 0 Other: K connector	-	0	At once	4924
o1-22	Min. input value Kp adaption of process controller	0.00 to 200.00	%	0	At once	4863
o1-23	Max. input value Kp adaption of process controller	0.00 to 200.00	%	100	At once	4867
o1-24	Min. output value Kp adaption of process controller	0.10 to 30.00	-	1	At once	4871
o1-25	Max. output value Kp adaption of process controller	0.10 to 30.00	-	1	At once	4875
o1-26	Process controller Ti	1 to 10000	-	3000	At once	4879
o1-27	Process controller Ti unit	0: ms 1: s	-	0	At once	4883
o1-28	Enable process controller integral component force	0: Disable 1: Enable 2: DI1 3: DI2	-	0	At once	4928
o1-28	Enable process controller integral component force	4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	4928
o1-29	Process controller integral component force reference	1: 100% Other: K connector	-	0	At once	4927
o1-30	Process controller upper output limit	0.0 to 600.0	%	100	At once	4903
o1-31	Process controller upper output limit coefficient	0: 0 Other: K connector	-	1	At once	4929
o1-32	Process controller lower output limit	0.0 to 600.0	%	100	At once	4907
o1-33	Process controller lower output limit coefficient	2: –100% Other: K connector	-	2992	At once	4930

Para.	Name	Value Range	Unit	Default	Change Mode	Address
o1-34	Process controller output proportion	0.0 to 600.0	%	100	At once	4911
o1-35	Process controller output proportion coefficient	1: 100% Other: K connector	-	1	At once	4931
Group o2: Process setting parameter group 2						
o2-00	Process setting word parameter 1	–300.00 to +300.00	%	0	At once	4722
o2-01	Process setting word parameter 2	–300.00 to +300.00	%	0	At once	4726
o2-02	Process setting word parameter 3	–300.00 to +300.00	%	0	At once	4730
o2-03	Process setting word parameter 4	–300.00 to +300.00	%	0	At once	4734
o2-04	Process setting word parameter 5	–300.00 to +300.00	%	0	At once	4738
o2-05	Process setting word parameter 6	–300.00 to +300.00	%	0	At once	4742
o2-06	Process setting word parameter 7	–300.00 to +300.00	%	0	At once	4746
o2-07	Process setting word parameter 8	–300.00 to +300.00	%	0	At once	4750
o2-08	Process setting word parameter 9	–300.00 to +300.00	%	0	At once	4754
o2-09	Process setting word parameter 10	–300.00 to +300.00	%	0	At once	4758
o2-10	Process setting word parameter 11	–300.00 to +300.00	%	0	At once	4762
o2-11	Process setting word parameter 12	–300.00 to +300.00	%	0	At once	4766
o2-12	Process setting word parameter 13	–300.00 to +300.00	%	0	At once	4770
o2-13	Process setting word parameter 14	–300.00 to +300.00	%	0	At once	4774
o2-14	Process setting bit parameter 1	0: Logic 0 1: Logic 1	-	0	At once	4778
o2-15	Process setting bit parameter 2	0: Logic 0 1: Logic 1	-	0	At once	4782
o2-16	Process setting bit parameter 3	0: Logic 0 1: Logic 1	-	0	At once	4786
o2-17	Process setting bit parameter 4	0: Logic 0 1: Logic 1	-	0	At once	4790
o2-18	Process setting bit parameter 5	0: Logic 0 1: Logic 1	-	0	At once	4794
o2-19	Process setting bit parameter 6	0: Logic 0 1: Logic 1	-	0	At once	4798
Group o3: Process controller parameter group 2						

Para.	Name	Value Range	Unit	Default	Change Mode	Address
o3-00	Enable process controller	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	4926
o3-01	Process controller type	Ones position: 0: Integral control disabled 1: Integral control enabled Tens position: 0: Proportional control disabled 1: Proportional control enabled Hundreds position: 0: Improved differential control 1: Traditional differential control Thousands position: 0: Positive calculation 1: Negative calculation	-	11	At once	4900
o3-02	Process controller setpoint 1	0: 0 Other: K connector	-	0	At once	4919
o3-03	Process controller setpoint 2	0: 0 Other: K connector	-	0	At once	4920
o3-04	Process controller setpoint 3	0: 0 Other: K connector	-	0	At once	4921
o3-05	Process controller setpoint 4	0: 0 Other: K connector	-	0	At once	4922
o3-06	Enable process controller additional setpoint	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4	-	0	At once	4923

Para.	Name	Value Range	Unit	Default	Change Mode	Address
o3-06	Enable process controller additional setpoint	6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	4923
o3-07	Process controller additional setpoint	0: 0 Other: K connector	-	0	At once	4852
o3-08	Process controller filter time setpoint	0.00 to 60.00	s	0	At once	4856
o3-09	Process controller feedback value 1	0: 0 Other: K connector	-	0	At once	4915
o3-10	Process controller feedback value 2	0: 0 Other: K connector	-	0	At once	4916
o3-11	Process controller feedback value 3	0: 0 Other: K connector	-	0	At once	4917
o3-12	Process controller feedback value 4	0: 0 Other: K connector	-	0	At once	4918
o3-13	Process controller feedback filter time	0.00 to 60.00	s	0	At once	4840
o3-14	Process controller Td	0 to 100	-	0	At once	4844
o3-15	Unit of process controller Td	0: ms 1: s	-	0	At once	4848
o3-16	Enable process controller droop	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	4925
o3-17	Process controller droop coefficient	–600.0 to +600.0	%	0	At once	4888
o3-18	Process controller positive droop limit	0.00 to 300.00	%	100	At once	4892
o3-19	Process controller negative droop limit	–300.00 to +0.00	%	–100	At once	4896
o3-20	Process controller Kp setpoint	0.00 to 125.00	-	3	At once	4860
o3-21	Source of process controller Kp adaption	0: 0 Other: K connector	-	0	At once	4924

Para.	Name	Value Range	Unit	Default	Change Mode	Address
o3-22	Min. input value Kp adaption of process controller	0.00 to 200.00	%	0	At once	4864
o3-23	Max. input value Kp adaption of process controller	0.00 to 200.00	%	100	At once	4868
o3-24	Min. output value Kp adaption of process controller	0.10 to 30.00	-	1	At once	4872
o3-25	Max. output value Kp adaption of process controller	0.10 to 30.00	-	1	At once	4876
o3-26	Process controller Ti	1 to 10000	-	3000	At once	4880
o3-27	Process controller Ti unit	0: ms 1: s	-	0	At once	4884
o3-28	Enable process controller integral component force	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	4928
o3-29	Process controller integral component force reference	0: 0 Other: K connector	-	0	At once	4927
o3-30	Process controller upper output limit	0.0 to 600.0	%	100	At once	4904
o3-31	Process controller upper output limit coefficient	1: 100% Other: K connector	-	1	At once	4929
o3-32	Process controller lower output limit	0.0 to 600.0	%	100	At once	4908
o3-33	Process controller lower output limit coefficient	2: –100% Other: K connector	-	2992	At once	4930
o3-34	Process controller output proportion	0.0 to 600.0	%	100	At once	4912
o3-35	Process controller output proportion coefficient	1: 100% Other: K connector	-	1	At once	4931
Group o4: Process setting parameter group 3						
o4-00	Process setting word parameter 1	–300.00 to +300.00	%	0	At once	4723

Para.	Name	Value Range	Unit	Default	Change Mode	Address
o4-01	Process setting word parameter 2	–300.00 to +300.00	%	0	At once	4727
o4-02	Process setting word parameter 3	–300.00 to +300.00	%	0	At once	4731
o4-03	Process setting word parameter 4	–300.00 to +300.00	%	0	At once	4735
o4-04	Process setting word parameter 5	–300.00 to +300.00	%	0	At once	4739
o4-05	Process setting word parameter 6	–300.00 to +300.00	%	0	At once	4743
o4-06	Process setting word parameter 7	–300.00 to +300.00	%	0	At once	4747
o4-07	Process setting word parameter 8	–300.00 to +300.00	%	0	At once	4751
o4-08	Process setting word parameter 9	–300.00 to +300.00	%	0	At once	4755
o4-09	Process setting word parameter 10	–300.00 to +300.00	%	0	At once	4759
o4-10	Process setting word parameter 11	–300.00 to +300.00	%	0	At once	4763
o4-11	Process setting word parameter 12	–300.00 to +300.00	%	0	At once	4767
o4-12	Process setting word parameter 13	–300.00 to +300.00	%	0	At once	4771
o4-13	Process setting word parameter 14	–300.00 to +300.00	%	0	At once	4775
o4-14	Process setting bit parameter 1	0: Logic 0 1: Logic 1	-	0	At once	4779
o4-15	Process setting bit parameter 2	0: Logic 0 1: Logic 1	-	0	At once	4783
o4-16	Process setting bit parameter 3	0: Logic 0 1: Logic 1	-	0	At once	4787
o4-17	Process setting bit parameter 4	0: Logic 0 1: Logic 1	-	0	At once	4791
o4-18	Process setting bit parameter 5	0: Logic 0 1: Logic 1	-	0	At once	4795
o4-19	Process setting bit parameter 6	0: Logic 0 1: Logic 1	-	0	At once	4799
Group o5: Process controller parameter group 3						

Para.	Name	Value Range	Unit	Default	Change Mode	Address
o5-00	Enable process controller	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	4926
o5-01	Process controller type	Ones position: 0: Integral control disabled 1: Integral control enabled Tens position: 0: Proportional control disabled 1: Proportional control enabled Hundreds position: 0: Improved differential control 1: Traditional differential control	-	11	At once	4901
o5-01	Process controller type	Thousands position: 0: Positive calculation 1: Negative calculation	-	11	At once	4901
o5-02	Process controller setpoint 1	0: 0 Other: K connector	-	0	At once	4919
o5-03	Process controller setpoint 2	0: 0 Other: K connector	-	0	At once	4920
o5-04	Process controller setpoint 3	0: 0 Other: K connector	-	0	At once	4921
o5-05	Process controller setpoint 4	0: 0 Other: K connector	-	0	At once	4922

Para.	Name	Value Range	Unit	Default	Change Mode	Address
o5-06	Enable process controller additional setpoint	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	4923
o5-07	Process controller additional setpoint	0: 0 Other: K connector	-	0	At once	4853
o5-08	Process controller filter time setpoint	0.00 to 60.00	s	0	At once	4857
o5-09	Process controller feedback value 1	0: 0 Other: K connector	-	0	At once	4915
o5-10	Process controller feedback value 2	0: 0 Other: K connector	-	0	At once	4916
o5-11	Process controller feedback value 3	0: 0 Other: K connector	-	0	At once	4917
o5-12	Process controller feedback value 4	0: 0 Other: K connector	-	0	At once	4918
o5-13	Process controller feedback filter time	0.00 to 60.00	s	0	At once	4841
o5-14	Process controller Td	0 to 100	-	0	At once	4845
o5-15	Unit of process controller Td	0: ms 1: s	-	0	At once	4849
o5-16	Enable process controller droop	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL	-	0	At once	4925
o5-16	Enable process controller droop	9: HDI1 10: HDI2 Other: B connector	-	0	At once	4925
o5-17	Process controller droop coefficient	–600.0 to +600.0	%	0	At once	4889

Para.	Name	Value Range	Unit	Default	Change Mode	Address
o5-18	Process controller positive droop limit	0.00 to 300.00	%	100	At once	4893
o5-19	Process controller negative droop limit	–300.00 to +0.00	%	–100	At once	4897
o5-20	Process controller Kp setpoint	0.00 to 125.00	-	3	At once	4861
o5-21	Source of process controller Kp adaption	0: 0 Other: K connector	-	0	At once	4924
o5-22	Min. input value Kp adaption of process controller	0.00 to 200.00	%	0	At once	4865
o5-23	Max. input value Kp adaption of process controller	0.00 to 200.00	%	100	At once	4869
o5-24	Min. output value Kp adaption of process controller	0.10 to 30.00	-	1	At once	4873
o5-25	Max. output value Kp adaption of process controller	0.10 to 30.00	-	1	At once	4877
o5-26	Process controller Ti	1 to 10000	-	3000	At once	4881
o5-27	Process controller Ti unit	0: ms 1: s	-	0	At once	4885
o5-28	Enable process controller integral component force	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	4928
o5-29	Process controller integral component force reference	0: 0 Other: K connector	-	0	At once	4927
o5-30	Process controller upper output limit	0.0 to 600.0	%	100	At once	4905
o5-31	Process controller upper output limit coefficient	2: –100% Other: K connector	-	1	At once	4929
o5-32	Process controller lower output limit	0.0 to 600.0	%	100	At once	4909
o5-33	Process controller lower output limit coefficient	0: 0 Other: K connector	-	2992	At once	4930

Para.	Name	Value Range	Unit	Default	Change Mode	Address
o5-34	Process controller output proportion	0.0 to 600.0	%	100	At once	4913
o5-35	Process controller output proportion coefficient	1: 100% Other: K connector	-	1	At once	4931
Group o6: Process setting parameter group 4						
o6-00	Process setting word parameter 1	–300.00 to +300.00	%	0	At once	4724
o6-01	Process setting word parameter 2	–300.00 to +300.00	%	0	At once	4728
o6-02	Process setting word parameter 3	–300.00 to +300.00	%	0	At once	4732
o6-03	Process setting word parameter 4	–300.00 to +300.00	%	0	At once	4736
o6-04	Process setting word parameter 5	–300.00 to +300.00	%	0	At once	4740
o6-05	Process setting word parameter 6	–300.00 to +300.00	%	0	At once	4744
o6-06	Process setting word parameter 7	–300.00 to +300.00	%	0	At once	4748
o6-07	Process setting word parameter 8	–300.00 to +300.00	%	0	At once	4752
o6-08	Process setting word parameter 9	–300.00 to +300.00	%	0	At once	4756
o6-09	Process setting word parameter 10	–300.00 to +300.00	%	0	At once	4760
o6-10	Process setting word parameter 11	–300.00 to +300.00	%	0	At once	4764
o6-11	Process setting word parameter 12	–300.00 to +300.00	%	0	At once	4768
o6-12	Process setting word parameter 13	–300.00 to +300.00	%	0	At once	4772
o6-13	Process setting word parameter 14	–300.00 to +300.00	%	0	At once	4776
o6-14	Process setting bit parameter 1	0: Logic 0 1: Logic 1	-	0	At once	4780
o6-15	Process setting bit parameter 2	0: Logic 0 1: Logic 1	-	0	At once	4784
o6-16	Process setting bit parameter 3	0: Logic 0 1: Logic 1	-	0	At once	4788
o6-17	Process setting bit parameter 4	0: Logic 0 1: Logic 1	-	0	At once	4792
o6-18	Process setting bit parameter 5	0: Logic 0 1: Logic 1	-	0	At once	4796
o6-19	Process setting bit parameter 6	0: Logic 0 1: Logic 1	-	0	At once	4800
Group o7: Process controller parameter group 4						

Para.	Name	Value Range	Unit	Default	Change Mode	Address
o7-00	Enable process controller	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	4926
o7-01	Process controller type	Ones position: 0: Integral control disabled 1: Integral control enabled	-	11	At once	4902
o7-01	Process controller type	Tens position: 0: Proportional control disabled 1: Proportional control enabled Hundreds position: 0: Improved differential control 1: Traditional differential control Thousands position: 0: Positive calculation 1: Negative calculation	-	11	At once	4902
o7-02	Process controller setpoint 1	0: 0 Other: K connector	-	0	At once	4919
o7-03	Process controller setpoint 2	0: 0 Other: K connector	-	0	At once	4920
o7-04	Process controller setpoint 3	0: 0 Other: K connector	-	0	At once	4921
o7-05	Process controller setpoint 4	0: 0 Other: K connector	-	0	At once	4922

Para.	Name	Value Range	Unit	Default	Change Mode	Address
o7-06	Enable process controller additional setpoint	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	4923
o7-07	Process controller additional setpoint	0: 0 Other: K connector	-	0	At once	4854
o7-08	Process controller filter time setpoint	0.00 to 60.00	s	0	At once	4858
o7-09	Process controller feedback value 1	0: 0 Other: K connector	-	0	At once	4915
o7-10	Process controller feedback value 2	0: 0 Other: K connector	-	0	At once	4916
o7-11	Process controller feedback value 3	0: 0 Other: K connector	-	0	At once	4917
o7-12	Process controller feedback value 4	0: 0 Other: K connector	-	0	At once	4918
o7-13	Process controller feedback filter time	0.00 to 60.00	s	0	At once	4842
o7-14	Process controller Td	0 to 100	-	0	At once	4846
o7-15	Unit of process controller Td	0: ms 1: s	-	0	At once	4850
o7-16	Enable process controller droop	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	4925
o7-17	Process controller droop coefficient	–600.0 to +600.0	%	0	At once	4890

Para.	Name	Value Range	Unit	Default	Change Mode	Address
o7-18	Process controller positive droop limit	0.00 to 300.00	%	100	At once	4894
o7-19	Process controller negative droop limit	–300.00 to +0.00	%	–100	At once	4898
o7-20	Process controller Kp setpoint	0.00 to 125.00	-	3	At once	4862
o7-21	Source of process controller Kp adaption	0: 0 Other: K connector	-	0	At once	4924
o7-22	Min. input value Kp adaption of process controller	0.00 to 200.00	%	0	At once	4866
o7-23	Max. input value Kp adaption of process controller	0.00 to 200.00	%	100	At once	4870
o7-24	Min. output value Kp adaption of process controller	0.10 to 30.00	-	1	At once	4874
o7-25	Max. output value Kp adaption of process controller	0.10 to 30.00	-	1	At once	4878
o7-26	Process controller Ti	1 to 10000	-	3000	At once	4882
o7-27	Process controller Ti unit	0: ms 1: s	-	0	At once	4886
o7-28	Enable process controller integral component force	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	4928
o7-29	Process controller integral component force reference	0: 0 Other: K connector	-	0	At once	4927
o7-30	Process controller upper output limit	0.0 to 600.0	%	100	At once	4906
o7-31	Process controller upper output limit coefficient	1: 100% Other: K connector	-	1	At once	4929
o7-32	Process controller lower output limit	0.0 to 600.0	%	100	At once	4910
o7-33	Process controller lower output limit coefficient	2: –100% Other: K connector	-	2992	At once	4930

Para.	Name	Value Range	Unit	Default	Change Mode	Address
o7-34	Process controller output proportion	0.0 to 600.0	%	100	At once	4914
o7-35	Process controller output proportion coefficient	1: 100% Other: K connector	-	1	At once	4931
Group o10: Rotary control process						
o10-00	Slew motor selection	0: Slew motor 1: Walk motor Other: B connector	-	1027	At once	2826
o10-01	Slew control source	0: Communication 1: Analog Other: B connector	-	1026	At once	2827
o10-02	Slew communication setting source	0: 0 Other: K connector	-	1546	At once	2828
o10-03	Slew analog setting source	0: 0 Other: K connector	-	1518	At once	2829
o10-06	Max. slew speed reference	0.0 to 600.0	%	100	At once	2830

7.2.11 Group P: User-Defined Function Block

Para.	Name	Value Range	Unit	Default	Change Mode	Address
Group P0: User-defined conversion function block						
P0-00	[W2B 1] Execution sequence	0 to 65535	-	0	At once	3939
P0-01	[W2B 1] Input	0: Disable Other: K connector	-	0	At once	4239
P0-02	[W2B 2] Execution sequence	0 to 65535	-	0	At once	3940
P0-03	[W2B 2] Input	0: Disable Other: K connector	-	0	At once	4240
P0-04	[W2B 3] Execution sequence	0 to 65535	-	0	At once	3941
P0-05	[W2B 3] Input	0: Disable Other: K connector	-	0	At once	4241
P0-06	[B2W 1] Execution sequence	0 to 65535	-	0	At once	3942
P0-07	[B2W 1] Bit00	0: Disable Other: B connector	-	0	At once	4242
P0-08	[B2W 1] Bit01	0: Disable Other: B connector	-	0	At once	4243
P0-09	[B2W 1] Bit02	0: Disable Other: B connector	-	0	At once	4244
P0-10	[B2W 1] Bit03	0: Disable Other: B connector	-	0	At once	4245

Para.	Name	Value Range	Unit	Default	Change Mode	Address
P0-11	[B2W 1] Bit04	0: Disable Other: B connector	-	0	At once	4246
P0-12	[B2W 1] Bit05	0: Disable Other: B connector	-	0	At once	4247
P0-13	[B2W 1] Bit06	0: Disable Other: B connector	-	0	At once	4248
P0-14	[B2W 1] Bit07	0: Disable Other: B connector	-	0	At once	4249
P0-15	[B2W 1] Bit08	0: Disable Other: B connector	-	0	At once	4250
P0-16	[B2W 1] Bit09	0: Disable Other: B connector	-	0	At once	4251
P0-17	[B2W 1] Bit10	0: Disable Other: B connector	-	0	At once	4252
P0-18	[B2W 1] Bit11	0: Disable Other: B connector	-	0	At once	4253
P0-19	[B2W 1] Bit12	0: Disable Other: B connector	-	0	At once	4254
P0-20	[B2W 1] Bit13	0: Disable Other: B connector	-	0	At once	4255
P0-21	[B2W 1] Bit14	0: Disable Other: B connector	-	0	At once	4256
P0-22	[B2W 1] Bit15	0: Disable Other: B connector	-	0	At once	4257
P0-23	[B2W 2] Execution sequence	0 to 65535	-	0	At once	3943
P0-24	[B2W 2] Bit00	0: Disable Other: B connector	-	0	At once	4258
P0-25	[B2W 2] Bit01	0: Disable Other: B connector	-	0	At once	4259
P0-26	[B2W 2] Bit02	0: Disable Other: B connector	-	0	At once	4260
P0-27	[B2W 2] Bit03	0: Disable Other: B connector	-	0	At once	4261
P0-28	[B2W 2] Bit04	0: Disable Other: B connector	-	0	At once	4262
P0-29	[B2W 2] Bit05	0: Disable Other: B connector	-	0	At once	4263
P0-30	[B2W 2] Bit06	0: Disable Other: B connector	-	0	At once	4264
P0-31	[B2W 2] Bit07	0: Disable Other: B connector	-	0	At once	4265
P0-32	[B2W 2] Bit08	0: Disable Other: B connector	-	0	At once	4266

Para.	Name	Value Range	Unit	Default	Change Mode	Address
P0-33	[B2W 2] Bit09	0: Disable Other: B connector	-	0	At once	4267
P0-34	[B2W 2] Bit10	0: Disable Other: B connector	-	0	At once	4268
P0-35	[B2W 2] Bit11	0: Disable Other: B connector	-	0	At once	4269
P0-36	[B2W 2] Bit12	0: Disable Other: B connector	-	0	At once	4270
P0-37	[B2W 2] Bit13	0: Disable Other: B connector	-	0	At once	4271
P0-38	[B2W 2] Bit14	0: Disable Other: B connector	-	0	At once	4272
P0-39	[B2W 2] Bit15	0: Disable Other: B connector	-	0	At once	4273
P0-40	[B2W 3] Execution sequence	0 to 65535	-	0	At once	3944
P0-41	[B2W 3] Bit00	0: Disable Other: B connector	-	0	At once	4274
P0-42	[B2W 3] Bit01	0: Disable Other: B connector	-	0	At once	4275
P0-43	[B2W 3] Bit02	0: Disable Other: B connector	-	0	At once	4276
P0-44	[B2W 3] Bit03	0: Disable Other: B connector	-	0	At once	4277
P0-45	[B2W 3] Bit04	0: Disable Other: B connector	-	0	At once	4278
P0-46	[B2W 3] Bit05	0: Disable Other: B connector	-	0	At once	4279
P0-47	[B2W 3] Bit06	0: Disable Other: B connector	-	0	At once	4280
P0-48	[B2W 3] Bit07	0: Disable Other: B connector	-	0	At once	4281
P0-49	[B2W 3] Bit08	0: Disable Other: B connector	-	0	At once	4282
P0-50	[B2W 3] Bit09	0: Disable Other: B connector	-	0	At once	4283
P0-51	[B2W 3] Bit10	0: Disable Other: B connector	-	0	At once	4284
P0-52	[B2W 3] Bit11	0: Disable Other: B connector	-	0	At once	4285
P0-53	[B2W 3] Bit12	0: Disable Other: B connector	-	0	At once	4286
P0-54	[B2W 3] Bit13	0: Disable Other: B connector	-	0	At once	4287

Para.	Name	Value Range	Unit	Default	Change Mode	Address
P0-55	[B2W 3] Bit14	0: Disable Other: B connector	-	0	At once	4288
P0-56	[B2W 3] Bit15	0: Disable Other: B connector	-	0	At once	4289
P0-57	[B2W 4] Execution sequence	0 to 65535	-	0	At once	3945
P0-58	[B2W 4] Bit00	0: Disable Other: B connector	-	0	At once	4290
P0-59	[B2W 4] Bit01	0: Disable Other: B connector	-	0	At once	4291
P0-60	[B2W 4] Bit02	0: Disable Other: B connector	-	0	At once	4292
P0-61	[B2W 4] Bit03	0: Disable Other: B connector	-	0	At once	4293
P0-62	[B2W 4] Bit04	0: Disable Other: B connector	-	0	At once	4294
P0-63	[B2W 4] Bit05	0: Disable Other: B connector	-	0	At once	4295
P0-64	[B2W 4] Bit06	0: Disable Other: B connector	-	0	At once	4296
P0-65	[B2W 4] Bit07	0: Disable Other: B connector	-	0	At once	4297
P0-66	[B2W 4] Bit08	0: Disable Other: B connector	-	0	At once	4298
P0-67	[B2W 4] Bit09	0: Disable Other: B connector	-	0	At once	4299
P0-68	[B2W 4] Bit10	0: Disable Other: B connector	-	0	At once	4300
P0-69	[B2W 4] Bit11	0: Disable Other: B connector	-	0	At once	4301
P0-70	[B2W 4] Bit12	0: Disable Other: B connector	-	0	At once	4302
P0-71	[B2W 4] Bit13	0: Disable Other: B connector	-	0	At once	4303
P0-72	[B2W 4] Bit14	0: Disable Other: B connector	-	0	At once	4304
P0-73	[B2W 4] Bit15	0: Disable Other: B connector	-	0	At once	4305

Para.	Name	Value Range	Unit	Default	Change Mode	Address
P0-74	[W2DW 1] Base value coefficient	Bit00: W2DW 1 0: x65536 1: ×1 Bit01: W2DW 2 0: x65536 1: ×1 Bit02: W2DW 3 0: x65536 1: ×1	-	0	At once	4226
P0-75	[W2DW 1] Execution sequence	0 to 65535	-	0	At once	4046
P0-76	[W2DW 1] High word	0: Disable Other: K connector	-	0	At once	4622
P0-77	[W2DW 1] Low word	0: Disable Other: K connector	-	0	At once	4623
P0-78	[W2DW 1] Base value	0 to 65535	-	0	At once	4624
P0-79	[W2DW 2] Execution sequence	0 to 65535	-	0	At once	4047
P0-80	[W2DW 2] High word	0: Disable Other: K connector	-	0	At once	4625
P0-81	[W2DW 2] Low word	0: Disable Other: K connector	-	0	At once	4626
P0-82	[W2DW 2] Base value	0 to 65535	-	0	At once	4627
P0-83	[W2DW 3] Execution sequence	0 to 65535	-	0	At once	4048
P0-84	[W2DW 3] High word	0: Disable Other: K connector	-	0	At once	4628
P0-85	[W2DW 3] Low word	0: Disable Other: K connector	-	0	At once	4629
P0-86	[W2DW 3] Base value	0 to 65535	-	0	At once	4630
P0-87	[DW2W] Base value coefficient	Bit00: W2DW 1 0: x65536 1: ×1 Bit01: W2DW 2 0: x65536 1: ×1 Bit02: W2DW 3 0: x65536 1: ×1	-	0	At once	4227
P0-88	[DW2W 1] Execution sequence	0 to 65535	-	0	At once	4049
P0-89	[DW2W 1] Selection	0: Disable Other: K connector	-	0	At once	4631
P0-90	[DW2W 1] Base value	0 to 65535	-	0	At once	4632

Para.	Name	Value Range	Unit	Default	Change Mode	Address
P0-91	[DW2W 2] Execution sequence	0 to 65535	-	0	At once	4050
P0-92	[DW2W 2] Selection	0: Disable Other: K connector	-	0	At once	4633
P0-93	[DW2W 2] Base value	0 to 65535	-	0	At once	4634
P0-94	[DW2W 3] Execution sequence	0 to 65535	-	0	At once	4051
P0-95	[DW2W 3] Selection	0: Disable Other: K connector	-	0	At once	4635
P0-96	[DW2W 3] Base value	0 to 65535	-	0	At once	4636
Group P1: User-defined logic function block 1						
P1-00	[AND 1] Execution sequence	0 to 65535	-	0	At once	3946
P1-01	[AND 1] Input 1	1: Disable Other: B connector	-	1	At once	4306
P1-02	[AND 1] Input 2	1: Disable Other: B connector	-	1	At once	4307
P1-03	[AND 1] Input 3	1: Disable Other: B connector	-	1	At once	4308
P1-04	[AND 1] Input 4	1: Disable Other: B connector	-	1	At once	4309
P1-05	[AND 2] Execution sequence	0 to 65535	-	0	At once	3947
P1-06	[AND 2] Input 1	1: Disable Other: B connector	-	1	At once	4310
P1-07	[AND 2] Input 2	1: Disable Other: B connector	-	1	At once	4311
P1-08	[AND 2] Input 3	1: Disable Other: B connector	-	1	At once	4312
P1-09	[AND 2] Input 4	1: Disable Other: B connector	-	1	At once	4313
P1-10	[AND 3] Execution sequence	0 to 65535	-	0	At once	3948
P1-11	[AND 3] Input 1	1: Disable Other: B connector	-	1	At once	4314
P1-12	[AND 3] Input 2	1: Disable Other: B connector	-	1	At once	4315
P1-13	[AND 3] Input 3	1: Disable Other: B connector	-	1	At once	4316
P1-14	[AND 3] Input 4	1: Disable Other: B connector	-	1	At once	4317
P1-15	[AND 4] Execution sequence	0 to 65535	-	0	At once	3949
P1-16	[AND 4] Input 1	1: Disable Other: B connector	-	1	At once	4318

Para.	Name	Value Range	Unit	Default	Change Mode	Address
P1-17	[AND 4] Input 2	1: Disable Other: B connector	-	1	At once	4319
P1-18	[AND 4] Input 3	1: Disable Other: B connector	-	1	At once	4320
P1-19	[AND 4] Input 4	1: Disable Other: B connector	-	1	At once	4321
P1-20	[AND 5] Execution sequence	0 to 65535	-	0	At once	3950
P1-21	[AND 5] Input 1	1: Disable Other: B connector	-	1	At once	4322
P1-22	[AND 5] Input 2	1: Disable Other: B connector	-	1	At once	4323
P1-23	[AND 5] Input 3	1: Disable Other: B connector	-	1	At once	4324
P1-24	[AND 5] Input 4	1: Disable Other: B connector	-	1	At once	4325
P1-25	[AND 6] Execution sequence	0 to 65535	-	0	At once	3951
P1-26	[AND 6] Input 1	1: Disable Other: B connector	-	1	At once	4326
P1-27	[AND 6] Input 2	1: Disable Other: B connector	-	1	At once	4327
P1-28	[AND 6] Input 3	1: Disable Other: B connector	-	1	At once	4328
P1-29	[AND 6] Input 4	1: Disable Other: B connector	-	1	At once	4329
P1-30	[AND 7] Execution sequence	0 to 65535	-	0	At once	3952
P1-31	[AND 7] Input 1	1: Disable Other: B connector	-	1	At once	4330
P1-32	[AND 7] Input 2	1: Disable Other: B connector	-	1	At once	4331
P1-33	[AND 7] Input 3	1: Disable Other: B connector	-	1	At once	4332
P1-34	[AND 7] Input 4	1: Disable Other: B connector	-	1	At once	4333
P1-35	[AND 8] Execution sequence	0 to 65535	-	0	At once	3953
P1-36	[AND 8] Input 1	1: Disable Other: B connector	-	1	At once	4334
P1-37	[AND 8] Input 2	1: Disable Other: B connector	-	1	At once	4335
P1-38	[AND 8] Input 3	1: Disable Other: B connector	-	1	At once	4336
P1-39	[AND 8] Input 4	1: Disable Other: B connector	-	1	At once	4337

Para.	Name	Value Range	Unit	Default	Change Mode	Address
P1-40	[AND 9] Execution sequence	0 to 65535	-	0	At once	3954
P1-41	[AND 9] Input 1	1: Disable Other: B connector	-	1	At once	4338
P1-42	[AND 9] Input 2	1: Disable Other: B connector	-	1	At once	4339
P1-43	[AND 9] Input 3	1: Disable Other: B connector	-	1	At once	4340
P1-44	[AND 9] Input 4	1: Disable Other: B connector	-	1	At once	4341
P1-45	[AND 10] Execution sequence	0 to 65535	-	0	At once	3955
P1-46	[AND 10] Input 1	1: Disable Other: B connector	-	1	At once	4342
P1-47	[AND 10] Input 2	1: Disable Other: B connector	-	1	At once	4343
P1-48	[AND 10] Input 3	1: Disable Other: B connector	-	1	At once	4344
P1-49	[AND 10] Input 4	1: Disable Other: B connector	-	1	At once	4345
P1-50	[AND 11] Execution sequence	0 to 65535	-	0	At once	3956
P1-51	[AND 11] Input 1	1: Disable Other: B connector	-	1	At once	4346
P1-52	[AND 11] Input 2	1: Disable Other: B connector	-	1	At once	4347
P1-53	[AND 11] Input 3	1: Disable Other: B connector	-	1	At once	4348
P1-54	[AND 11] Input 4	1: Disable Other: B connector	-	1	At once	4349
P1-55	[AND 12] Execution sequence	0 to 65535	-	0	At once	3957
P1-56	[AND 12] Input 1	1: Disable Other: B connector	-	1	At once	4350
P1-57	[AND 12] Input 2	1: Disable Other: B connector	-	1	At once	4351
P1-58	[AND 12] Input 3	1: Disable Other: B connector	-	1	At once	4352
P1-59	[AND 12] Input 4	1: Disable Other: B connector	-	1	At once	4353
P1-60	[AND 13] Execution sequence	0 to 65535	-	0	At once	3958
P1-61	[AND 13] Input 1	1: Disable Other: B connector	-	1	At once	4354
P1-62	[AND 13] Input 2	1: Disable Other: B connector	-	1	At once	4355

Para.	Name	Value Range	Unit	Default	Change Mode	Address
P1-63	[AND 13] Input 3	1: Disable Other: B connector	-	1	At once	4356
P1-64	[AND 13] Input 4	1: Disable Other: B connector	-	1	At once	4357
P1-65	[AND 14] Execution sequence	0 to 65535	-	0	At once	3959
P1-66	[AND 14] Input 1	1: Disable Other: B connector	-	1	At once	4358
P1-67	[AND 14] Input 2	1: Disable Other: B connector	-	1	At once	4359
P1-68	[AND 14] Input 3	1: Disable Other: B connector	-	1	At once	4360
P1-69	[AND 14] Input 4	1: Disable Other: B connector	-	1	At once	4361
P1-70	[AND 15] Execution sequence	0 to 65535	-	0	At once	3960
P1-71	[AND 15] Input 1	1: Disable Other: B connector	-	1	At once	4362
P1-72	[AND 15] Input 2	1: Disable Other: B connector	-	1	At once	4363
P1-73	[AND 15] Input 3	1: Disable Other: B connector	-	1	At once	4364
P1-74	[AND 15] Input 4	1: Disable Other: B connector	-	1	At once	4365
P1-75	[AND 16] Execution sequence	0 to 65535	-	0	At once	3961
P1-76	[AND 16] Input 1	1: Disable Other: B connector	-	1	At once	4366
P1-77	[AND 16] Input 2	1: Disable Other: B connector	-	1	At once	4367
P1-78	[AND 16] Input 3	1: Disable Other: B connector	-	1	At once	4368
P1-79	[AND 16] Input 4	1: Disable Other: B connector	-	1	At once	4369
P1-80	[NOT 1] Execution sequence	0 to 65535	-	0	At once	3962
P1-81	[NOT 1] Input	0: Disable Other: B connector	-	0	At once	4370
P1-82	[NOT 2] Execution sequence	0 to 65535	-	0	At once	3963
P1-83	[NOT 2] Input	0: Disable Other: B connector	-	0	At once	4371
P1-84	[NOT 3] Execution sequence	0 to 65535	-	0	At once	3964
P1-85	[NOT 3] Input	0: Disable Other: B connector	-	0	At once	4372

Para.	Name	Value Range	Unit	Default	Change Mode	Address
P1-86	[NOT 4] Execution sequence	0 to 65535	-	0	At once	3965
P1-87	[NOT 4] Input	0: Disable Other: B connector	-	0	At once	4373
P1-88	[NOT 5] Execution sequence	0 to 65535	-	0	At once	3966
P1-89	[NOT 5] Input	0: Disable Other: B connector	-	0	At once	4374
P1-90	[NOT 6] Execution sequence	0 to 65535	-	0	At once	3967
P1-91	[NOT 6] Input	0: Disable Other: B connector	-	0	At once	4375
P1-92	[NOT 7] Execution sequence	0 to 65535	-	0	At once	3968
P1-93	[NOT 7] Input	0: Disable Other: B connector	-	0	At once	4376
P1-94	[NOT 8] Execution sequence	0 to 65535	-	0	At once	3969
P1-95	[NOT 8] Input	0: Disable Other: B connector	-	0	At once	4377
Group P2: User-defined logic function block 2						
P2-00	[OR 1] Execution sequence	0 to 65535	-	0	At once	3970
P2-01	[OR 1] Input 1	0: Disable Other: B connector	-	0	At once	4378
P2-02	[OR 1] Input 2	0: Disable Other: B connector	-	0	At once	4379
P2-03	[OR 1] Input 3	0: Disable Other: B connector	-	0	At once	4380
P2-04	[OR 1] Input 4	0: Disable Other: B connector	-	0	At once	4381
P2-05	[OR 2] Execution sequence	0 to 65535	-	0	At once	3971
P2-06	[OR 2] Input 1	0: Disable Other: B connector	-	0	At once	4382
P2-07	[OR 2] Input 2	0: Disable Other: B connector	-	0	At once	4383
P2-08	[OR 2] Input 3	0: Disable Other: B connector	-	0	At once	4384
P2-09	[OR 2] Input 4	0: Disable Other: B connector	-	0	At once	4385
P2-10	[OR 3] Execution sequence	0 to 65535	-	0	At once	3972
P2-11	[OR 3] Input 1	0: Disable Other: B connector	-	0	At once	4386

Para.	Name	Value Range	Unit	Default	Change Mode	Address
P2-12	[OR 3] Input 2	0: Disable Other: B connector	-	0	At once	4387
P2-13	[OR 3] Input 3	0: Disable Other: B connector	-	0	At once	4388
P2-14	[OR 3] Input 4	0: Disable Other: B connector	-	0	At once	4389
P2-15	[OR 4] Execution sequence	0 to 65535	-	0	At once	3973
P2-16	[OR 4] Input 1	0: Disable Other: B connector	-	0	At once	4390
P2-17	[OR 4] Input 2	0: Disable Other: B connector	-	0	At once	4391
P2-18	[OR 4] Input 3	0: Disable Other: B connector	-	0	At once	4392
P2-19	[OR 4] Input 4	0: Disable Other: B connector	-	0	At once	4393
P2-20	[OR 5] Execution sequence	0 to 65535	-	0	At once	3974
P2-21	[OR 5] Input 1	0: Disable Other: B connector	-	0	At once	4394
P2-22	[OR 5] Input 2	0: Disable Other: B connector	-	0	At once	4395
P2-23	[OR 5] Input 3	0: Disable Other: B connector	-	0	At once	4396
P2-24	[OR 5] Input 4	0: Disable Other: B connector	-	0	At once	4397
P2-25	[OR 6] Execution sequence	0 to 65535	-	0	At once	3975
P2-26	[OR 6] Input 1	0: Disable Other: B connector	-	0	At once	4398
P2-27	[OR 6] Input 2	0: Disable Other: B connector	-	0	At once	4399
P2-28	[OR 6] Input 3	0: Disable Other: B connector	-	0	At once	4400
P2-29	[OR 6] Input 4	0: Disable Other: B connector	-	0	At once	4401
P2-30	[OR 7] Execution sequence	0 to 65535	-	0	At once	3976
P2-31	[OR 7] Input 1	0: Disable Other: B connector	-	0	At once	4402
P2-32	[OR 7] Input 2	0: Disable Other: B connector	-	0	At once	4403
P2-33	[OR 7] Input 3	0: Disable Other: B connector	-	0	At once	4404
P2-34	[OR 7] Input 4	0: Disable Other: B connector	-	0	At once	4405

Para.	Name	Value Range	Unit	Default	Change Mode	Address
P2-35	[OR 8] Execution sequence	0 to 65535	-	0	At once	3977
P2-36	[OR 8] Input 1	0: Disable Other: B connector	-	0	At once	4406
P2-37	[OR 8] Input 2	0: Disable Other: B connector	-	0	At once	4407
P2-38	[OR 8] Input 3	0: Disable Other: B connector	-	0	At once	4408
P2-39	[OR 8] Input 4	0: Disable Other: B connector	-	0	At once	4409
P2-40	[OR 9] Execution sequence	0 to 65535	-	0	At once	3978
P2-41	[OR 9] Input 1	0: Disable Other: B connector	-	0	At once	4410
P2-42	[OR 9] Input 2	0: Disable Other: B connector	-	0	At once	4411
P2-43	[OR 9] Input 3	0: Disable Other: B connector	-	0	At once	4412
P2-44	[OR 9] Input 4	0: Disable Other: B connector	-	0	At once	4413
P2-45	[OR 10] Execution sequence	0 to 65535	-	0	At once	3979
P2-46	[OR 10] Input 1	0: Disable Other: B connector	-	0	At once	4414
P2-47	[OR 10] Input 2	0: Disable Other: B connector	-	0	At once	4415
P2-48	[OR 10] Input 3	0: Disable Other: B connector	-	0	At once	4416
P2-49	[OR 10] Input 4	0: Disable Other: B connector	-	0	At once	4417
P2-50	[OR 11] Execution sequence	0 to 65535	-	0	At once	3980
P2-51	[OR 11] Input 1	0: Disable Other: B connector	-	0	At once	4418
P2-52	[OR 11] Input 2	0: Disable Other: B connector	-	0	At once	4419
P2-53	[OR 11] Input 3	0: Disable Other: B connector	-	0	At once	4420
P2-54	[OR 11] Input 4	0: Disable Other: B connector	-	0	At once	4421
P2-55	[OR 12] Execution sequence	0 to 65535	-	0	At once	3981
P2-56	[OR 12] Input 1	0: Disable Other: B connector	-	0	At once	4422
P2-57	[OR 12] Input 2	0: Disable Other: B connector	-	0	At once	4423

Para.	Name	Value Range	Unit	Default	Change Mode	Address
P2-58	[OR 12] Input 3	0: Disable Other: B connector	-	0	At once	4424
P2-59	[OR 12] Input 4	0: Disable Other: B connector	-	0	At once	4425
P2-60	[XOR/XNOR 1] Execution sequence	0 to 65535	-	0	At once	3982
P2-61	[XOR/XNOR 1] Function selection	0: XOR 1: XNOR	-	0	At once	4426
P2-62	[XOR/XNOR 1] Input 1	0: Disable Other: B connector	-	0	At once	4427
P2-63	[XOR/XNOR 1] Input 2	0: Disable Other: B connector	-	0	At once	4428
P2-64	[XOR/XNOR 2] Execution sequence	0 to 65535	-	0	At once	3983
P2-65	[XOR/XNOR 2] Function selection	0: XOR 1: XNOR	-	0	At once	4429
P2-66	[XOR/XNOR 2] Input 1	0: Disable Other: B connector	-	0	At once	4430
P2-67	[XOR/XNOR 2] Input 2	0: Disable Other: B connector	-	0	At once	4431
P2-68	[XOR/XNOR 3] Execution sequence	0 to 65535	-	0	At once	3984
P2-69	[XOR/XNOR 3] Function selection	0: XOR 1: XNOR	-	0	At once	4432
P2-70	[XOR/XNOR 3] Input 1	0: Disable Other: B connector	-	0	At once	4433
P2-71	[XOR/XNOR 3] Input 2	0: Disable Other: B connector	-	0	At once	4434
P2-72	[XOR/XNOR 4] Execution sequence	0 to 65535	-	0	At once	3985
P2-73	[XOR/XNOR 4] Function selection	0: XOR 1: XNOR	-	0	At once	4435
P2-74	[XOR/XNOR 4] Input 1	0: Disable Other: B connector	-	0	At once	4436
P2-75	[XOR/XNOR 4] Input 2	0: Disable Other: B connector	-	0	At once	4437
P2-76	[NAND 1] Execution sequence	0 to 65535	-	0	At once	4056
P2-77	[NAND 1] Input 1	1: Disable Other: B connector	-	1	At once	4803
P2-78	[NAND 1] Input 2	1: Disable Other: B connector	-	1	At once	4804
P2-79	[NAND 1] Input 3	1: Disable Other: B connector	-	1	At once	4805
P2-80	[NAND 1] Input 4	1: Disable Other: B connector	-	1	At once	4806

Para.	Name	Value Range	Unit	Default	Change Mode	Address
P2-81	[NAND 2] Execution sequence	0 to 65535	-	0	At once	4057
P2-82	[NAND 2] Input 1	1: Disable Other: B connector	-	1	At once	4807
P2-83	[NAND 2] Input 2	1: Disable Other: B connector	-	1	At once	4808
P2-84	[NAND 2] Input 3	1: Disable Other: B connector	-	1	At once	4809
P2-85	[NAND 2] Input 4	1: Disable Other: B connector	-	1	At once	4810
P2-86	[NAND 3] Execution sequence	0 to 65535	-	0	At once	4058
P2-87	[NAND 3] Input 1	1: Disable Other: B connector	-	1	At once	4811
P2-88	[NAND 3] Input 2	1: Disable Other: B connector	-	1	At once	4812
P2-89	[NAND 3] Input 3	1: Disable Other: B connector	-	1	At once	4813
P2-90	[NAND 3] Input 4	1: Disable Other: B connector	-	1	At once	4814
P2-91	[NAND 4] Execution sequence	0 to 65535	-	0	At once	4059
P2-92	[NAND 4] Input 1	1: Disable Other: B connector	-	1	At once	4815
P2-93	[NAND 4] Input 2	1: Disable Other: B connector	-	1	At once	4816
P2-94	[NAND 4] Input 3	1: Disable Other: B connector	-	1	At once	4817
P2-95	[NAND 4] Input 4	1: Disable Other: B connector	-	1	At once	4818
Group P3: User-defined switch function block						
P3-00	Execution sequence of binary selector module 1	0 to 65535	-	0	At once	4026
P3-01	Input source of binary selector module 1	0: Input 1 1: Input 2 Other: B connector	-	0	At once	4562
P3-02	Input 1 of binary selector module 1	0: Disable Other: B connector	-	0	At once	4563
P3-03	Input 2 of binary selector module 1	0: Disable Other: B connector	-	0	At once	4564
P3-04	Execution sequence of binary selector module 2	0 to 65535	-	0	At once	4027

Para.	Name	Value Range	Unit	Default	Change Mode	Address
P3-05	Input source of binary selector module 2	0: Input 1 1: Input 2 Other: B connector	-	0	At once	4565
P3-06	Input 1 of binary selector module 2	0: Disable Other: B connector	-	0	At once	4566
P3-07	Input 2 of binary selector module 2	0: Disable Other: B connector	-	0	At once	4567
P3-08	Execution sequence of binary selector module 3	0 to 65535	-	0	At once	4028
P3-09	Input source of binary selector module 3	0: Input 1 1: Input 2 Other: B connector	-	0	At once	4568
P3-10	Input 1 of binary selector module 3	0: Disable Other: B connector	-	0	At once	4569
P3-11	Input 2 of binary selector module 3	0: Disable Other: B connector	-	0	At once	4570
P3-12	Execution sequence of binary selector module 4	0 to 65535	-	0	At once	4029
P3-13	Input source of binary selector module 4	0: Input 1 1: Input 2 Other: B connector	-	0	At once	4571
P3-14	Input 1 of binary selector module 4	0: Disable Other: B connector	-	0	At once	4572
P3-15	Input 2 of binary selector module 4	0: Disable Other: B connector	-	0	At once	4573
P3-16	Execution sequence of binary selector module 5	0 to 65535	-	0	At once	4030
P3-17	Input source of binary selector module 5	0: Input 1 1: Input 2 Other: B connector	-	0	At once	4574
P3-18	Input 1 of binary selector module 5	0: Disable Other: B connector	-	0	At once	4575
P3-19	Input 2 of binary selector module 5	0: Disable Other: B connector	-	0	At once	4576
P3-20	Execution sequence of binary selector module 6	0 to 65535	-	0	At once	4031
P3-21	Input source of binary selector module 6	0: Input 1 1: Input 2 Other: B connector	-	0	At once	4577
P3-22	Input 1 of binary selector module 6	0: Disable Other: B connector	-	0	At once	4578

Para.	Name	Value Range	Unit	Default	Change Mode	Address
P3-23	Input 2 of binary selector module 6	0: Disable Other: B connector	-	0	At once	4579
P3-24	Execution sequence of binary selector module 7	0 to 65535	-	0	At once	4032
P3-25	Input source of binary selector module 7	0: Input 1 1: Input 2 Other: B connector	-	0	At once	4580
P3-26	Input 1 of binary selector module 7	0: Disable Other: B connector	-	0	At once	4581
P3-27	Input 2 of binary selector module 7	0: Disable Other: B connector	-	0	At once	4582
P3-28	Execution sequence of binary selector module 8	0 to 65535	-	0	At once	4033
P3-29	Input source of binary selector module 8	0: Input 1 1: Input 2 Other: B connector	-	0	At once	4583
P3-30	Input 1 of binary selector module 8	0: Disable Other: B connector	-	0	At once	4584
P3-31	Input 2 of binary selector module 8	0: Disable Other: B connector	-	0	At once	4585
P3-32	Execution sequence of digital selector module 1	0 to 65535	-	0	At once	4034
P3-33	Input source of digital selector module 1	0: Input 1 1: Input 2 Other: B connector	-	0	At once	4586
P3-34	Input 1 of digital selector module 1	0: Disable Other: B connector	-	0	At once	4587
P3-35	Input 1 of digital selector module 2	0: Disable Other: B connector	-	0	At once	4588
P3-36	Execution sequence of digital selector module 2	0 to 65535	-	0	At once	4035
P3-37	Input source of digital selector module 2	0: Input 1 1: Input 2 Other: B connector	-	0	At once	4589
P3-38	Input 2 of digital selector module 1	0: Disable Other: B connector	-	0	At once	4590
P3-39	Input 2 of digital selector module 2	0: Disable Other: B connector	-	0	At once	4591
P3-40	Execution sequence of digital selector module 3	0 to 65535	-	0	At once	4036

Para.	Name	Value Range	Unit	Default	Change Mode	Address
P3-41	Input source of digital selector module 3	0: Input 1 1: Input 2 Other: B connector	-	0	At once	4592
P3-42	Input 3 of digital selector module 1	0: Disable Other: B connector	-	0	At once	4593
P3-43	Input 3 of digital selector module 2	0: Disable Other: B connector	-	0	At once	4594
P3-44	Execution sequence of digital selector module 4	0 to 65535	-	0	At once	4037
P3-45	Input source of digital selector module 4	0: Input 1 1: Input 2 Other: B connector	-	0	At once	4595
P3-46	Input 4 of digital selector module 1	0: Disable Other: B connector	-	0	At once	4596
P3-47	Input 4 of digital selector module 2	0: Disable Other: B connector	-	0	At once	4597
P3-48	Execution sequence of digital selector module 5	0 to 65535	-	0	At once	4038
P3-49	Input source of digital selector module 5	0: Input 1 1: Input 2 Other: B connector	-	0	At once	4598
P3-50	Input 5 of digital selector module 1	0: Disable Other: B connector	-	0	At once	4599
P3-51	Input 5 of digital selector module 2	0: Disable Other: B connector	-	0	At once	4600
P3-52	Execution sequence of digital selector module 6	0 to 65535	-	0	At once	4039
P3-53	Input source of digital selector module 6	0: Input 1 1: Input 2 Other: B connector	-	0	At once	4601
P3-54	Input 6 of digital selector module 1	0: Disable Other: B connector	-	0	At once	4602
P3-55	Input 6 of digital selector module 2	0: Disable Other: B connector	-	0	At once	4603
P3-56	Execution sequence of digital selector module 7	0 to 65535	-	0	At once	4040
P3-57	Input source of digital selector module 7	0: Input 1 1: Input 2 Other: B connector	-	0	At once	4604
P3-58	Input 7 of digital selector module 1	0: Disable Other: B connector	-	0	At once	4605

Para.	Name	Value Range	Unit	Default	Change Mode	Address
P3-59	Input 7 of digital selector module 2	0: Disable Other: B connector	-	0	At once	4606
P3-60	Execution sequence of digital selector module 8	0 to 65535	-	0	At once	4041
P3-61	Input source of digital selector module 8	0: Input 1 1: Input 2 Other: B connector	-	0	At once	4607
P3-62	Input 8 of digital selector module 1	0: Disable Other: B connector	-	0	At once	4608
P3-63	Input 8 of digital selector module 2	0: Disable Other: B connector	-	0	At once	4609
P3-64	Execution sequence of digital selector module 9	0 to 65535	-	0	At once	4042
P3-65	Input source of digital selector module 9	0: Input 1 1: Input 2 Other: B connector	-	0	At once	4610
P3-66	Input 9 of digital selector module 1	0: Disable Other: B connector	-	0	At once	4611
P3-67	Input 9 of digital selector module 2	0: Disable Other: B connector	-	0	At once	4612
P3-68	Execution sequence of digital selector module 10	0 to 65535	-	0	At once	4043
P3-69	Input source of digital selector module 10	0: Input 1 1: Input 2 Other: B connector	-	0	At once	4613
P3-70	Input 10 of digital selector module 1	0: Disable Other: B connector	-	0	At once	4614
P3-71	Input 10 of digital selector module 2	0: Disable Other: B connector	-	0	At once	4615
P3-72	Execution sequence of digital selector module 11	0 to 65535	-	0	At once	4044
P3-73	Input source of digital selector module 11	0: Input 1 1: Input 2 Other: B connector	-	0	At once	4616
P3-74	Input 11 of digital selector module 1	0: Disable Other: B connector	-	0	At once	4617
P3-75	Input 11 of digital selector module 2	0: Disable Other: B connector	-	0	At once	4618
P3-76	Execution sequence of digital selector module 12	0 to 65535	-	0	At once	4045

Para.	Name	Value Range	Unit	Default	Change Mode	Address
P3-77	Input source of digital selector module 12	0: Input 1 1: Input 2 Other: B connector	-	0	At once	4619
P3-78	Input 12 of digital selector module 1	0: Disable Other: B connector	-	0	At once	4620
P3-79	Input 12 of digital selector module 2	0: Disable Other: B connector	-	0	At once	4621
Group P4: User-defined control function block 1						
P4-00	[DELAY 1] Execution sequence	0 to 65535	-	0	At once	3986
P4-01	[DELAY 1] Input	0: Disable Other: B connector	-	0	At once	4438
P4-02	[DELAY 1] Function selection	0: Switch-on delay 1: Switch-off delay 2: Bidirectional delay	-	0	At once	4439
P4-03	[DELAY 1] Delay	0.00 to 600.00	s	0	At once	4440
P4-04	[DELAY 2] Execution sequence	0 to 65535	-	0	At once	3987
P4-05	[DELAY 2] Input	0: Disable Other: B connector	-	0	At once	4441
P4-06	[DELAY 2] Function selection	0: Switch-on delay 1: Switch-off delay 2: Bidirectional delay	-	0	At once	4442
P4-07	[DELAY 2] Delay	0.00 to 600.00	s	0	At once	4443
P4-08	[DELAY 3] Execution sequence	0 to 65535	-	0	At once	3988
P4-09	[DELAY 3] Input	0: Disable Other: B connector	-	0	At once	4444
P4-10	[DELAY 3] Function selection	0: Switch-on delay 1: Switch-off delay 2: Bidirectional delay	-	0	At once	4445
P4-11	[DELAY 3] Delay	0.00 to 600.00	s	0	At once	4446
P4-12	[DELAY 4] Execution sequence	0 to 65535	-	0	At once	3989
P4-13	[DELAY 4] Input	0: Disable Other: B connector	-	0	At once	4447
P4-14	[DELAY 4] Function selection	0: Switch-on delay 1: Switch-off delay 2: Bidirectional delay	-	0	At once	4448
P4-15	[DELAY 4] Delay	0.00 to 600.00	s	0	At once	4449
P4-16	[P_L 1] Execution sequence	0 to 65535	-	0	At once	3990
P4-17	[P_L 1] Function selection	0: Level to pulse 1: Pulse to level	-	0	At once	4450

Para.	Name	Value Range	Unit	Default	Change Mode	Address
P4-18	[P_L 1] Input	0: Disable Other: B connector	-	0	At once	4451
P4-19	[P_L 1] Pulse output time	0.00 to 600.00	s	0	At once	4452
P4-20	[P_L 2] Execution sequence	0 to 65535	-	0	At once	3991
P4-21	[P_L 2] Function selection	0: Level to pulse 1: Pulse to level	-	0	At once	4453
P4-22	[P_L 2] Input	0: Disable Other: B connector	-	0	At once	4454
P4-23	[P_L 2] Pulse output time	0.00 to 600.00	s	0	At once	4455
P4-24	[P_L 3] Execution sequence	0 to 65535	-	0	At once	3992
P4-25	[P_L 3] Function selection	0: Level to pulse 1: Pulse to level	-	0	At once	4456
P4-26	[P_L 3] Input	0: Disable Other: B connector	-	0	At once	4457
P4-27	[P_L 3] Pulse output time	0.00 to 600.00	s	0	At once	4458
P4-28	[P_L 4] Execution sequence	0 to 65535	-	0	At once	3993
P4-29	[P_L 4] Function selection	0: Level to pulse 1: Pulse to level	-	0	At once	4459
P4-30	[P_L 4] Input	0: Disable Other: B connector	-	0	At once	4460
P4-31	[P_L 4] Pulse output time	0.00 to 600.00	s	0	At once	4461
P4-32	[FILT 1] Execution sequence	0 to 65535	-	0	At once	4010
P4-33	[FILT 1] Function selection	0: Enable 1: Disable Other: B connector	-	0	At once	4518
P4-34	[FILT 1] Input	0: Disable Other: K connector	-	0	At once	4519
P4-35	[FILT 1] Filter time	0.000 to 60.000	s	0	At once	4520
P4-36	[FILT 2] Execution sequence	0 to 65535	-	0	At once	4011
P4-37	[FILT 2] Function selection	0: Enable 1: Disable Other: B connector	-	0	At once	4521
P4-38	[FILT 2] Input	0: Disable Other: K connector	-	0	At once	4522
P4-39	[FILT 2] Filter time	0.000 to 60.000	s	0	At once	4523
P4-40	[FILT 3] Execution sequence	0 to 65535	-	0	At once	4012

Para.	Name	Value Range	Unit	Default	Change Mode	Address
P4-41	[FILT 3] Function selection	0: Enable 1: Disable Other: B connector	-	0	At once	4524
P4-42	[FILT 3] Input	0: Disable Other: K connector	-	0	At once	4525
P4-43	[FILT 3] Filter time	0.000 to 60.000	s	0	At once	4526
P4-44	[FILT 4] Execution sequence	0 to 65535	-	0	At once	4013
P4-45	[FILT 4] Function selection	0: Enable 1: Disable Other: B connector	-	0	At once	4527
P4-46	[FILT 4] Input	0: Disable Other: K connector	-	0	At once	4528
P4-47	[FILT 4] Filter time	0.000 to 60.000	s	0	At once	4529
P4-48	[FILT 5] Execution sequence	0 to 65535	-	0	At once	4014
P4-49	[FILT 5] Function selection	0: Enable 1: Disable Other: B connector	-	0	At once	4530
P4-50	[FILT 5] Input	0: Disable Other: K connector	-	0	At once	4531
P4-51	[FILT 5] Filter time	0.000 to 60.000	s	0	At once	4532
P4-52	[FILT 6] Execution sequence	0 to 65535	-	0	At once	4015
P4-53	[FILT 6] Function selection	0: Enable 1: Disable Other: B connector	-	0	At once	4533
P4-54	[FILT 6] Input	0: Disable Other: K connector	-	0	At once	4534
P4-55	[FILT 6] Filter time	0.000 to 60.000	s	0	At once	4535
P4-56	[FILT 7] Execution sequence	0 to 65535	-	0	At once	4016
P4-57	[FILT 7] Function selection	0: Enable 1: Disable Other: B connector	-	0	At once	4536
P4-58	[FILT 7] Input	0: Disable Other: K connector	-	0	At once	4537
P4-59	[FILT 7] Filter time	0.000 to 60.000	s	0	At once	4538
P4-60	[FILT 8] Execution sequence	0 to 65535	-	0	At once	4017
P4-61	[FILT 8] Function selection	0: Enable 1: Disable Other: B connector	-	0	At once	4539
P4-62	[FILT 8] Input	0: Disable Other: K connector	-	0	At once	4540

Para.	Name	Value Range	Unit	Default	Change Mode	Address
P4-63	[FILT 8] Filter time	0.000 to 60.000	s	0	At once	4541
P4-64	[RS flip-flop module 1] Execution sequence	0 to 65535	-	0	At once	4064
P4-65	[RS flip-flop module 1] Setting input	0: Disable Other: B connector	-	0	At once	4831
P4-66	[RS flip-flop module 1] Reset input	0: Disable Other: B connector	-	0	At once	4832
P4-67	[RS flip-flop module 2] Execution sequence	0 to 65535	-	0	At once	4065
P4-68	[RS flip-flop module 2] Setting input	0: Disable Other: B connector	-	0	At once	4833
P4-69	[RS flip-flop module 2] Reset input	0: Disable Other: B connector	-	0	At once	4834
P4-70	[RS flip-flop module 3] Execution sequence	0 to 65535	-	0	At once	4066
P4-71	[RS flip-flop module 3] Setting input	0: Disable Other: B connector	-	0	At once	4835
P4-72	[RS flip-flop module 3] Reset input	0: Disable Other: B connector	-	0	At once	4836
P4-73	[RS flip-flop module 4] Execution sequence	0 to 65535	-	0	At once	4067
P4-74	[RS flip-flop module 4] Setting input	0: Disable Other: B connector	-	0	At once	4837
P4-75	[RS flip-flop module 4] Reset input	0: Disable Other: B connector	-	0	At once	4838
P4-76	[DFF module 1] Execution sequence	0 to 65535	-	0	At once	4097
P4-77	[DFF module 1] Input	0: Disable Other: B connector	-	0	At once	4964
P4-78	[DFF module 1] Reset input	0: Disable Other: B connector	-	0	At once	4965
P4-79	[DFF module 1] Setting input	0: Disable Other: B connector	-	0	At once	4966
P4-80	[DFF module 1] Clock input	0: Disable Other: B connector	-	0	At once	4967
P4-81	[DFF module 2] Execution sequence	0 to 65535	-	0	At once	4098
P4-82	[DFF module 2] Input	0: Disable Other: B connector	-	0	At once	4968
P4-83	[DFF module 2] Reset input	0: Disable Other: B connector	-	0	At once	4969
P4-84	[DFF module 2] Setting input	0: Disable Other: B connector	-	0	At once	4970
P4-85	[DFF module 2] Clock input	0: Disable Other: B connector	-	0	At once	4971

Para.	Name	Value Range	Unit	Default	Change Mode	Address
P4-86	[DFF module 3] Execution sequence	0 to 65535	-	0	At once	4099
P4-87	[DFF module 3] Input	0: Disable Other: B connector	-	0	At once	4972
P4-88	[DFF module 3] Reset input	0: Disable Other: B connector	-	0	At once	4973
P4-89	[DFF module 3] Setting input	0: Disable Other: B connector	-	0	At once	4974
P4-90	[DFF module 3] Clock input	0: Disable Other: B connector	-	0	At once	4975
P4-91	[DFF module 4] Execution sequence	0 to 65535	-	0	At once	4100
P4-92	[DFF module 4] Input	0: Disable Other: B connector	-	0	At once	4976
P4-93	[DFF module 4] Reset input	0: Disable Other: B connector	-	0	At once	4977
P4-94	[DFF module 4] Setting input	0: Disable Other: B connector	-	0	At once	4978
P4-95	[DFF module 4] Clock input	0: Disable Other: B connector	-	0	At once	4979
Group P5: User-defined control function block 2						
P5-00	[PULSE 1] Execution sequence	0 to 65535	-	0	At once	4089
P5-01	[PULSE 1] Function selection	0: Pulse width extension 1: Pulse width shortening	-	0	At once	4932
P5-02	[PULSE 1] Input	0: 0 Other: B connector	-	0	At once	4933
P5-03	[PULSE 1] Holding time	0.00 to 600.00	s	0	At once	4934
P5-04	[PULSE 1] Reset input of pulse extender	0: 0 Other: B connector	-	0	At once	4935
P5-05	[PULSE 2] Execution sequence	0 to 65535	-	0	At once	4090
P5-06	[PULSE 2] Function selection	0: Pulse width extension 1: Pulse width shortening	-	0	At once	4936
P5-07	[PULSE 2] Input	0: 0 Other: B connector	-	0	At once	4937
P5-08	[PULSE 2] Holding time	0.00 to 600.00	s	0	At once	4938
P5-09	[PULSE 2] Reset input of pulse extender	0: 0 Other: B connector	-	0	At once	4939
P5-10	[PULSE 3] Execution sequence	0 to 65535	-	0	At once	4091
P5-11	[PULSE 3] Function selection	0: Pulse width extension 1: Pulse width shortening	-	0	At once	4940

Para.	Name	Value Range	Unit	Default	Change Mode	Address
P5-12	[PULSE 3] Input	0: 0 Other: B connector	-	0	At once	4941
P5-13	[PULSE 3] Holding time	0.00 to 600.00	s	0	At once	4942
P5-14	[PULSE 3] Reset input of pulse extender	0: 0 Other: B connector	-	0	At once	4943
P5-15	[PULSE 4] Execution sequence	0 to 65535	-	0	At once	4092
P5-16	[PULSE 4] Function selection	0: Pulse width extension 1: Pulse width shortening	-	0	At once	4944
P5-17	[PULSE 4] Input	0: 0 Other: B connector	-	0	At once	4945
P5-18	[PULSE 4] Holding time	0.00 to 600.00	s	0	At once	4946
P5-19	[PULSE 4] Reset input of pulse extender	0: 0 Other: B connector	-	0	At once	4947
P5-20	[PULSE 5] Execution sequence	0 to 65535	-	0	At once	4093
P5-21	[PULSE 5] Function selection	0: Pulse width extension 1: Pulse width shortening	-	0	At once	4948
P5-22	[PULSE 5] Input	0: 0 Other: B connector	-	0	At once	4949
P5-23	[PULSE 5] Holding time	0.00 to 600.00	s	0	At once	4950
P5-24	[PULSE 5] Reset input of pulse extender	0: 0 Other: B connector	-	0	At once	4951
P5-25	[PULSE 6] Execution sequence	0 to 65535	-	0	At once	4094
P5-26	[PULSE 6] Function selection	0: Pulse width extension 1: Pulse width shortening	-	0	At once	4952
P5-27	[PULSE 6] Input	0: 0 Other: B connector	-	0	At once	4953
P5-28	[PULSE 6] Holding time	0.00 to 600.00	s	0	At once	4954
P5-29	[PULSE 6] Reset input of pulse extender	0: 0 Other: B connector	-	0	At once	4955
P5-30	[PULSE 7] Execution sequence	0 to 65535	-	0	At once	4095
P5-31	[PULSE 7] Function selection	0: Pulse width extension 1: Pulse width shortening	-	0	At once	4956
P5-32	[PULSE 7] Input	0: 0 Other: B connector	-	0	At once	4957
P5-33	[PULSE 7] Holding time	0.00 to 600.00	s	0	At once	4958
P5-34	[PULSE 7] Reset input of pulse extender	0: 0 Other: B connector	-	0	At once	4959

Para.	Name	Value Range	Unit	Default	Change Mode	Address
P5-35	[PULSE 8] Execution sequence	0 to 65535	-	0	At once	4096
P5-36	[PULSE 8] Function selection	0: Pulse width extension 1: Pulse width shortening	-	0	At once	4960
P5-37	[PULSE 8] Input	0: 0 Other: B connector	-	0	At once	4961
P5-38	[PULSE 8] Holding time	0.00 to 600.00	s	0	At once	4962
P5-39	[PULSE 8] Reset input of pulse extender	0: 0 Other: B connector	-	0	At once	4963
Group P6: User-defined arithmetic function block 1						
P6-00	[ADD_SUB 1] Execution sequence	0 to 65535	-	0	At once	3994
P6-01	[ADD_SUB 1] Input 1 (ADD)	0: Disable Other: K connector	-	0	At once	4462
P6-02	[ADD_SUB 1] Input 2 (ADD)	0: Disable Other: K connector	-	0	At once	4463
P6-03	[ADD_SUB 1] Input 3 (ADD)	0: Disable Other: K connector	-	0	At once	4464
P6-04	[ADD_SUB 1] Input 4 (SUBTRACT)	0: Disable Other: K connector	-	0	At once	4465
P6-05	[ADD_SUB 2] Execution sequence	0 to 65535	-	0	At once	3995
P6-06	[ADD_SUB 2] Input 1 (ADD)	0: Disable Other: K connector	-	0	At once	4466
P6-07	[ADD_SUB 2] Input 2 (ADD)	0: Disable Other: K connector	-	0	At once	4467
P6-08	[ADD_SUB 2] Input 3 (ADD)	0: Disable Other: K connector	-	0	At once	4468
P6-09	[ADD_SUB 2] Input 4 (SUBTRACT)	0: Disable Other: K connector	-	0	At once	4469
P6-10	[ADD_SUB 3] Execution sequence	0 to 65535	-	0	At once	3996
P6-11	[ADD_SUB 3] Input 1 (ADD)	0: Disable Other: K connector	-	0	At once	4470
P6-12	[ADD_SUB 3] Input 2 (ADD)	0: Disable Other: K connector	-	0	At once	4471
P6-13	[ADD_SUB 3] Input 3 (ADD)	0: Disable Other: K connector	-	0	At once	4472
P6-14	[ADD_SUB 3] Input 4 (SUBTRACT)	0: Disable Other: K connector	-	0	At once	4473
P6-15	[ADD_SUB 4] Execution sequence	0 to 65535	-	0	At once	3997
P6-16	[ADD_SUB 4] Input 1 (ADD)	0: Disable Other: K connector	-	0	At once	4474

Para.	Name	Value Range	Unit	Default	Change Mode	Address
P6-17	[ADD_SUB 4] Input 2 (ADD)	0: Disable Other: K connector	-	0	At once	4475
P6-18	[ADD_SUB 4] Input 3 (ADD)	0: Disable Other: K connector	-	0	At once	4476
P6-19	[ADD_SUB 4] Input 4 (SUBTRACT)	0: Disable Other: K connector	-	0	At once	4477
P6-20	[ADD_SUB 5] Execution sequence	0 to 65535	-	0	At once	3998
P6-21	[ADD_SUB 5] Input 1 (ADD)	0: Disable Other: K connector	-	0	At once	4478
P6-22	[ADD_SUB 5] Input 2 (ADD)	0: Disable Other: K connector	-	0	At once	4479
P6-23	[ADD_SUB 5] Input 3 (ADD)	0: Disable Other: K connector	-	0	At once	4480
P6-24	[ADD_SUB 5] Input 4 (SUBTRACT)	0: Disable Other: K connector	-	0	At once	4481
P6-25	[ADD_SUB 6] Execution sequence	0 to 65535	-	0	At once	3999
P6-26	[ADD_SUB 6] Input 1 (ADD)	0: Disable Other: K connector	-	0	At once	4482
P6-27	[ADD_SUB 6] Input 2 (ADD)	0: Disable Other: K connector	-	0	At once	4483
P6-28	[ADD_SUB 6] Input 3 (ADD)	0: Disable Other: K connector	-	0	At once	4484
P6-29	[ADD_SUB 6] Input 4 (SUBTRACT)	0: Disable Other: K connector	-	0	At once	4485
P6-30	[ADD_SUB 7] Execution sequence	0 to 65535	-	0	At once	4000
P6-31	[ADD_SUB 7] Input 1 (ADD)	0: Disable Other: K connector	-	0	At once	4486
P6-32	[ADD_SUB 7] Input 2 (ADD)	0: Disable Other: K connector	-	0	At once	4487
P6-33	[ADD_SUB 7] Input 3 (ADD)	0: Disable Other: K connector	-	0	At once	4488
P6-34	[ADD_SUB 7] Input 4 (SUBTRACT)	0: Disable Other: K connector	-	0	At once	4489
P6-35	[ADD_SUB 8] Execution sequence	0 to 65535	-	0	At once	4001
P6-36	[ADD_SUB 8] Input 1 (ADD)	0: Disable Other: K connector	-	0	At once	4490
P6-37	[ADD_SUB 8] Input 2 (ADD)	0: Disable Other: K connector	-	0	At once	4491
P6-38	[ADD_SUB 8] Input 3 (ADD)	0: Disable Other: K connector	-	0	At once	4492
P6-39	[ADD_SUB 8] Input 4 (SUBTRACT)	0: Disable Other: K connector	-	0	At once	4493

Para.	Name	Value Range	Unit	Default	Change Mode	Address
P6-40	[MUL_DIV 1] Execution sequence	0 to 65535	-	0	At once	4002
P6-41	[MUL_DIV 1] Input 1 (MULTIPLY)	0: Prohibited by module Other: K connector	-	0	At once	4494
P6-42	[MUL_DIV 1] Input 2 (MULTIPLY)	0: Not used for calculation Other: K connector	-	0	At once	4495
P6-43	[MUL_DIV 1] Input 3 (DIVIDE)	0: Not used for calculation Other: K connector	-	0	At once	4496
P6-44	[MUL_DIV 2] Execution sequence	0 to 65535	-	0	At once	4003
P6-45	[MUL_DIV 2] Input 1 (MULTIPLY)	0: Prohibited by module Other: K connector	-	0	At once	4497
P6-46	[MUL_DIV 2] Input 2 (MULTIPLY)	0: Not used for calculation Other: K connector	-	0	At once	4498
P6-47	[MUL_DIV 2] Input 3 (DIVIDE)	0: Not used for calculation Other: K connector	-	0	At once	4499
P6-48	[MUL_DIV 3] Execution sequence	0 to 65535	-	0	At once	4004
P6-49	[MUL_DIV 3] Input 1 (MULTIPLY)	0: Prohibited by module Other: K connector	-	0	At once	4500
P6-50	[MUL_DIV 3] Input 2 (MULTIPLY)	0: Not used for calculation Other: K connector	-	0	At once	4501
P6-51	[MUL_DIV 3] Input 3 (DIVIDE)	0: Not used for calculation Other: K connector	-	0	At once	4502
P6-52	[MUL_DIV 4] Execution sequence	0 to 65535	-	0	At once	4005
P6-53	[MUL_DIV 4] Input 1 (MULTIPLY)	0: Prohibited by module Other: K connector	-	0	At once	4503
P6-54	[MUL_DIV 4] Input 2 (MULTIPLY)	0: Not used for calculation Other: K connector	-	0	At once	4504
P6-55	[MUL_DIV 4] Input 3 (DIVIDE)	0: Not used for calculation Other: K connector	-	0	At once	4505
P6-56	[MUL_DIV 5] Execution sequence	0 to 65535	-	0	At once	4006
P6-57	[MUL_DIV 5] Input 1 (MULTIPLY)	0: Prohibited by module Other: K connector	-	0	At once	4506
P6-58	[MUL_DIV 5] Input 2 (MULTIPLY)	0: Not used for calculation Other: K connector	-	0	At once	4507
P6-59	[MUL_DIV 5] Input 3 (DIVIDE)	0: Not used for calculation Other: K connector	-	0	At once	4508
P6-60	[MUL_DIV 6] Execution sequence	0 to 65535	-	0	At once	4007
P6-61	[MUL_DIV 6] Input 1 (MULTIPLY)	0: Prohibited by module Other: K connector	-	0	At once	4509
P6-62	[MUL_DIV 6] Input 2 (MULTIPLY)	0: Not used for calculation Other: K connector	-	0	At once	4510

Para.	Name	Value Range	Unit	Default	Change Mode	Address
P6-63	[MUL_DIV 6] Input 3 (DIVIDE)	0: Not used for calculation Other: K connector	-	0	At once	4511
P6-64	[MUL_DIV 7] Execution sequence	0 to 65535	-	0	At once	4008
P6-65	[MUL_DIV 7] Input 1 (MULTIPLY)	0: Prohibited by module Other: K connector	-	0	At once	4512
P6-66	[MUL_DIV 7] Input 2 (MULTIPLY)	0: Not used for calculation Other: K connector	-	0	At once	4513
P6-67	[MUL_DIV 7] Input 3 (DIVIDE)	0: Not used for calculation Other: K connector	-	0	At once	4514
P6-68	[MUL_DIV 8] Execution sequence	0 to 65535	-	0	At once	4009
P6-69	[MUL_DIV 8] Input 1 (MULTIPLY)	0: Prohibited by module Other: K connector	-	0	At once	4515
P6-70	[MUL_DIV 8] Input 2 (MULTIPLY)	0: Not used for calculation Other: K connector	-	0	At once	4516
P6-71	[MUL_DIV 8] Input 3 (DIVIDE)	0: Not used for calculation Other: K connector	-	0	At once	4517
P6-72	[ABS 1] Execution sequence	0 to 65535	-	0	At once	4018
P6-73	[ABS 1] Input	0: Disable Other: K connector	-	0	At once	4542
P6-74	[ABS 2] Execution sequence	0 to 65535	-	0	At once	4019
P6-75	[ABS 2] Input	0: Disable Other: K connector	-	0	At once	4543
P6-76	[ABS 3] Execution sequence	0 to 65535	-	0	At once	4020
P6-77	[ABS 3] Input	0: Disable Other: K connector	-	0	At once	4544
P6-78	[ABS 4] Execution sequence	0 to 65535	-	0	At once	4021
P6-79	[ABS 4] Input	0: Disable Other: K connector	-	0	At once	4545
P6-80	[NCMP 1] Execution sequence	0 to 65535	-	0	At once	4022
P6-81	[NCMP 1] Function selection	0: Greater than (>) 1: Less than (<) 2: Equal to (=)	-	0	At once	4546
P6-82	[NCMP 1] Input 1	0: 0 Other: K connector	-	0	At once	4547
P6-83	[NCMP 1] Input 2	0: 0 Other: K connector	-	0	At once	4548
P6-84	[NCMP 1] Hysteresis input	0.0 to 100.0	%	0	At once	4549

Para.	Name	Value Range	Unit	Default	Change Mode	Address
P6-85	[NCMP 2] Execution sequence	0 to 65535	-	0	At once	4023
P6-86	[NCMP 2] Function selection	0: Greater than (>) 1: Less than (<) 2: Equal to (=)	-	0	At once	4550
P6-87	[NCMP 2] Input 1	0: 0 Other: K connector	-	0	At once	4551
P6-88	[NCMP 2] Input 2	0: 0 Other: K connector	-	0	At once	4552
P6-89	[NCMP 2] Hysteresis input	0.0 to 100.0	%	0	At once	4553
P6-90	[NCMP 3] Execution sequence	0 to 65535	-	0	At once	4024
P6-91	[NCMP 3] Function selection	0: Greater than (>) 1: Less than (<) 2: Equal to (=)	-	0	At once	4554
P6-92	[NCMP 3] Input 1	0: 0 Other: K connector	-	0	At once	4555
P6-93	[NCMP 3] Input 2	0: 0 Other: K connector	-	0	At once	4556
P6-94	[NCMP 3] Hysteresis input	0.0 to 100.0	%	0	At once	4557
P6-95	[NCMP 4] Execution sequence	0 to 65535	-	0	At once	4025
P6-96	[NCMP 4] Function selection	0: Greater than (>) 1: Less than (<) 2: Equal to (=)	-	0	At once	4558
P6-97	[NCMP 4] Input 1	0: 0 Other: K connector	-	0	At once	4559
P6-98	[NCMP 4] Input 2	0: 0 Other: K connector	-	0	At once	4560
P6-99	[NCMP 4] Hysteresis input	0.0 to 100.0	%	0	At once	4561
Group P7: User-defined arithmetic function block 2						
P7-00	[User-defined NEG 1] Execution sequence	0 to 65535	-	0	At once	4109
P7-01	[User-defined NEG 1] Input	0: 0 Other: K connector	-	0	At once	5012
P7-02	[User-defined NEG 2] Execution sequence	0 to 65535	-	0	At once	4110
P7-03	[User-defined NEG 2] Input	0: 0 Other: K connector	-	0	At once	5013
P7-04	[User-defined NEG 3] Execution sequence	0 to 65535	-	0	At once	4111
P7-05	[User-defined NEG 3] Input	0: 0 Other: K connector	-	0	At once	5014

Para.	Name	Value Range	Unit	Default	Change Mode	Address
P7-06	[User-defined NEG 4] Execution sequence	0 to 65535	-	0	At once	4112
P7-07	[User-defined NEG 4] Input	0: 0 Other: K connector	-	0	At once	5015
P7-08	[User-defined NEG 5] Execution sequence	0 to 65535	-	0	At once	4113
P7-09	[User-defined NEG 5] Input	0: 0 Other: K connector	-	0	At once	5016
P7-10	[User-defined NEG 6] Execution sequence	0 to 65535	-	0	At once	4114
P7-11	[User-defined NEG 6] Input	0: 0 Other: K connector	-	0	At once	5017
P7-12	[User-defined NEG 7] Execution sequence	0 to 65535	-	0	At once	4115
P7-13	[User-defined NEG 7] Input	0: 0 Other: K connector	-	0	At once	5018
P7-14	[User-defined NEG 8] Execution sequence	0 to 65535	-	0	At once	4116
P7-15	[User-defined NEG 8] Input	0: 0 Other: K connector	-	0	At once	5019
P7-16	[User-defined INTEGRAL 1] Execution sequence	0 to 65535	-	0	At once	4101
P7-17	[User-defined INTEGRAL 1] Input	0: 0 Other: K connector	-	0	At once	4980
P7-18	[User-defined INTEGRAL 1] Output upper limit	0: 0 Other: K connector	%	0	At once	4981
P7-19	[User-defined INTEGRAL 1] Output lower limit	0: 0 Other: K connector	%	0	At once	4982
P7-20	Enable user-defined INTEGRAL 1 output force	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	4984
P7-21	User-defined INTEGRAL 1 output force	0: 0 Other: K connector	%	0	At once	4983

Para.	Name	Value Range	Unit	Default	Change Mode	Address
P7-22	[User-defined INTEGRAL 1] Integral time	0.000 to 60.000	s	0	At once	4985
P7-23	[User-defined INTEGRAL 2] Execution sequence	0 to 65535	-	0	At once	4102
P7-24	[User-defined INTEGRAL 2] Input	0: 0 Other: K connector	-	0	At once	4986
P7-25	[User-defined INTEGRAL 2] Output upper limit	0: 0 Other: K connector	%	0	At once	4987
P7-26	[User-defined INTEGRAL 2] Output lower limit	0: 0 Other: K connector	%	0	At once	4988
P7-27	Enable user-defined INTEGRAL 2 output force	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	4990
P7-28	User-defined INTEGRAL 2 output force	0: 0 Other: K connector	%	0	At once	4989
P7-29	[User-defined INTEGRAL 2] Integral time	0.000 to 60.000	s	0	At once	4991
P7-30	[User-defined INTEGRAL 3] Execution sequence	0 to 65535	-	0	At once	4103
P7-31	[User-defined INTEGRAL 3] Input	0: 0 Other: K connector	-	0	At once	4992
P7-32	[User-defined INTEGRAL 3] Output upper limit	0: 0 Other: K connector	%	0	At once	4993
P7-33	[User-defined INTEGRAL 3] Output lower limit	0: 0 Other: K connector	%	0	At once	4994

Para.	Name	Value Range	Unit	Default	Change Mode	Address
P7-34	Enable user-defined INTEGRAL 3 output force	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6 8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	4996
P7-35	User-defined INTEGRAL 3 output force	0: 0 Other: K connector	%	0	At once	4995
P7-36	[User-defined INTEGRAL 3] Integral time	0.000 to 60.000	s	0	At once	4997
P7-37	[User-defined INTEGRAL 4] Execution sequence	0 to 65535	-	0	At once	4104
P7-38	[User-defined INTEGRAL 4] Input	0: 0 Other: K connector	-	0	At once	4998
P7-39	[User-defined INTEGRAL 4] Output upper limit	0: 0 Other: K connector	%	0	At once	4999
P7-40	[User-defined INTEGRAL 4] Output lower limit	0: 0 Other: K connector	%	0	At once	5000
P7-41	Enable user-defined INTEGRAL 4 output force	0: Disable 1: Enable 2: DI1 3: DI2 4: DI3 5: DI4 6: DI5 7: DI6	-	0	At once	5002
P7-41	Enable user-defined INTEGRAL 4 output force	8: DIL 9: HDI1 10: HDI2 Other: B connector	-	0	At once	5002
P7-42	User-defined INTEGRAL 4 output force	0: 0 Other: K connector	%	0	At once	5001

Para.	Name	Value Range	Unit	Default	Change Mode	Address
P7-43	[User-defined INTEGRAL 4] Integral time	0.000 to 60.000	s	0	At once	5003
P7-44	[User-defined DIFF 1] Execution sequence	0 to 65535	-	0	At once	4105
P7-45	[User-defined DIFF 1] Input	0: 0 Other: K connector	-	0	At once	5004
P7-46	[User-defined DIFF 1] Differential time	0.01 to 300.00	s	0.01	At once	5005
P7-47	[User-defined DIFF 2] Execution sequence	0 to 65535	-	0	At once	4106
P7-48	[User-defined DIFF 2] Input	0: 0 Other: K connector	-	0	At once	5006
P7-49	[User-defined DIFF 2] Differential time	0.01 to 300.00	s	0.01	At once	5007
P7-50	[User-defined DIFF 3] Execution sequence	0 to 65535	-	0	At once	4107
P7-51	[User-defined DIFF 3] Input	0: 0 Other: K connector	-	0	At once	5008
P7-52	[User-defined DIFF 3] Differential time	0.01 to 300.00	s	0.01	At once	5009
P7-53	[User-defined DIFF 4] Execution sequence	0 to 65535	-	0	At once	4108
P7-54	[User-defined DIFF 4] Input	0: 0 Other: K connector	-	0	At once	5010
P7-55	[User-defined DIFF 4] Differential time	0.01 to 300.00	s	0.01	At once	5011
P7-56	[LIM 1] Execution sequence	0 to 65535	-	0	At once	4060
P7-57	[LIM 1] Input	0: 0 Other: K connector	-	0	At once	4819
P7-58	[LIM 1] Upper limit	0: 0 Other: K connector	-	0	At once	4820
P7-59	[LIM 1] Lower limit	0: 0 Other: K connector	-	0	At once	4821
P7-60	[LIM 2] Execution sequence	0 to 65535	-	0	At once	4061
P7-61	[LIM 2] Input	0: 0 Other: K connector	-	0	At once	4822
P7-62	[LIM 2] Upper limit	0: 0 Other: K connector	-	0	At once	4823
P7-63	[LIM 2] Lower limit	0: 0 Other: K connector	-	0	At once	4824
P7-64	[LIM 3] Execution sequence	0 to 65535	-	0	At once	4062
P7-65	[LIM 3] Input	0: 0 Other: K connector	-	0	At once	4825
P7-66	[LIM 3] Upper limit	0: 0 Other: K connector	-	0	At once	4826

Para.	Name	Value Range	Unit	Default	Change Mode	Address
P7-67	[LIM 3] Lower limit	0: 0 Other: K connector	-	0	At once	4827
P7-68	[LIM 4] Execution sequence	0 to 65535	-	0	At once	4063
P7-69	[LIM 4] Input	0: 0 Other: K connector	-	0	At once	4828
P7-70	[LIM 4] Upper limit	0: 0 Other: K connector	-	0	At once	4829
P7-71	[LIM 4] Lower limit	0: 0 Other: K connector	-	0	At once	4830
Group P8: User-defined multi-point operation function block						
P8-00	[Multi-point curve module 1] Execution sequence	0 to 65535	-	0	At once	4052
P8-01	[Multi-point curve module 1] Input	0: 0 Other: K connector	-	0	At once	4637
P8-02	[Multi-point curve module 1] Setpoint X1	–600.0 to +600.0	%	0	At once	4638
P8-03	[Multi-point curve module 1] Setpoint Y1	–600.0 to +600.0	%	0	At once	4648
P8-04	[Multi-point curve module 1] Setpoint X2	–600.0 to +600.0	%	10	At once	4639
P8-05	[Multi-point curve module 1] Setpoint Y2	–600.0 to +600.0	%	10	At once	4649
P8-06	[Multi-point curve module 1] Setpoint X3	–600.0 to +600.0	%	20	At once	4640
P8-07	[Multi-point curve module 1] Setpoint Y3	–600.0 to +600.0	%	20	At once	4650
P8-08	[Multi-point curve module 1] Setpoint X4	–600.0 to +600.0	%	30	At once	4641
P8-09	[Multi-point curve module 1] Setpoint Y4	–600.0 to +600.0	%	30	At once	4651
P8-10	[Multi-point curve module 1] Setpoint X5	–600.0 to +600.0	%	40	At once	4642
P8-11	[Multi-point curve module 1] Setpoint Y5	–600.0 to +600.0	%	40	At once	4652
P8-12	[Multi-point curve module 1] Setpoint X6	–600.0 to +600.0	%	50	At once	4643
P8-13	[Multi-point curve module 1] Setpoint Y6	–600.0 to +600.0	%	50	At once	4653
P8-14	[Multi-point curve module 1] Setpoint X7	–600.0 to +600.0	%	60	At once	4644
P8-15	[Multi-point curve module 1] Setpoint Y7	–600.0 to +600.0	%	60	At once	4654
P8-16	[Multi-point curve module 1] Setpoint X8	–600.0 to +600.0	%	70	At once	4645
P8-17	[Multi-point curve module 1] Setpoint Y8	–600.0 to +600.0	%	70	At once	4655

Para.	Name	Value Range	Unit	Default	Change Mode	Address
P8-18	[Multi-point curve module 1] Setpoint X9	–600.0 to +600.0	%	80	At once	4646
P8-19	[Multi-point curve module 1] Setpoint Y9	–600.0 to +600.0	%	80	At once	4656
P8-20	[Multi-point curve module 1] Setpoint X10	–600.0 to +600.0	%	90	At once	4647
P8-21	[Multi-point curve module 1] Setpoint Y10	–600.0 to +600.0	%	90	At once	4657
P8-22	[Multi-point curve module 2] Execution sequence	0 to 65535	-	0	At once	4053
P8-23	[Multi-point curve module 2] Input	0: 0 Other: K connector	-	0	At once	4658
P8-24	[Multi-point curve module 2] Setpoint X1	–600.0 to +600.0	%	0	At once	4659
P8-25	[Multi-point curve module 2] Setpoint Y1	–600.0 to +600.0	%	0	At once	4669
P8-26	[Multi-point curve module 2] Setpoint X2	–600.0 to +600.0	%	10	At once	4660
P8-27	[Multi-point curve module 2] Setpoint Y2	–600.0 to +600.0	%	10	At once	4670
P8-28	[Multi-point curve module 2] Setpoint X3	–600.0 to +600.0	%	20	At once	4661
P8-29	[Multi-point curve module 2] Setpoint Y3	–600.0 to +600.0	%	20	At once	4671
P8-30	[Multi-point curve module 2] Setpoint X4	–600.0 to +600.0	%	30	At once	4662
P8-31	[Multi-point curve module 2] Setpoint Y4	–600.0 to +600.0	%	30	At once	4672
P8-32	[Multi-point curve module 2] Setpoint X5	–600.0 to +600.0	%	40	At once	4663
P8-33	[Multi-point curve module 2] Setpoint Y5	–600.0 to +600.0	%	40	At once	4673
P8-34	[Multi-point curve module 2] Setpoint X6	–600.0 to +600.0	%	50	At once	4664
P8-35	[Multi-point curve module 2] Setpoint Y6	–600.0 to +600.0	%	50	At once	4674
P8-36	[Multi-point curve module 2] Setpoint X7	–600.0 to +600.0	%	60	At once	4665
P8-37	[Multi-point curve module 2] Setpoint Y7	–600.0 to +600.0	%	60	At once	4675
P8-38	[Multi-point curve module 2] Setpoint X8	–600.0 to +600.0	%	70	At once	4666
P8-39	[Multi-point curve module 2] Setpoint Y8	–600.0 to +600.0	%	70	At once	4676
P8-40	[Multi-point curve module 2] Setpoint X9	–600.0 to +600.0	%	80	At once	4667

Para.	Name	Value Range	Unit	Default	Change Mode	Address
P8-41	[Multi-point curve module 2] Setpoint Y9	–600.0 to +600.0	%	80	At once	4677
P8-42	[Multi-point curve module 2] Setpoint X10	–600.0 to +600.0	%	90	At once	4668
P8-43	[Multi-point curve module 2] Setpoint Y10	–600.0 to +600.0	%	90	At once	4678
P8-44	[Multi-point curve module 3] Execution sequence	0 to 65535	-	0	At once	4054
P8-45	[Multi-point curve module 3] Input	0: 0 Other: K connector	-	0	At once	4679
P8-46	[Multi-point curve module 3] Setpoint X1	–600.0 to +600.0	%	0	At once	4680
P8-47	[Multi-point curve module 3] Setpoint Y1	–600.0 to +600.0	%	0	At once	4690
P8-48	[Multi-point curve module 3] Setpoint X2	–600.0 to +600.0	%	10	At once	4681
P8-49	[Multi-point curve module 3] Setpoint Y2	–600.0 to +600.0	%	10	At once	4691
P8-50	[Multi-point curve module 3] Setpoint X3	–600.0 to +600.0	%	20	At once	4682
P8-51	[Multi-point curve module 3] Setpoint Y3	–600.0 to +600.0	%	20	At once	4692
P8-52	[Multi-point curve module 3] Setpoint X4	–600.0 to +600.0	%	30	At once	4683
P8-53	[Multi-point curve module 3] Setpoint Y4	–600.0 to +600.0	%	30	At once	4693
P8-54	[Multi-point curve module 3] Setpoint X5	–600.0 to +600.0	%	40	At once	4684
P8-55	[Multi-point curve module 3] Setpoint Y5	–600.0 to +600.0	%	40	At once	4694
P8-56	[Multi-point curve module 3] Setpoint X6	–600.0 to +600.0	%	50	At once	4685
P8-57	[Multi-point curve module 3] Setpoint Y6	–600.0 to +600.0	%	50	At once	4695
P8-58	[Multi-point curve module 3] Setpoint X7	–600.0 to +600.0	%	60	At once	4686
P8-59	[Multi-point curve module 3] Setpoint Y7	–600.0 to +600.0	%	60	At once	4696
P8-60	[Multi-point curve module 3] Setpoint X8	–600.0 to +600.0	%	70	At once	4687
P8-61	[Multi-point curve module 3] Setpoint Y8	–600.0 to +600.0	%	70	At once	4697
P8-62	[Multi-point curve module 3] Setpoint X9	–600.0 to +600.0	%	80	At once	4688
P8-63	[Multi-point curve module 3] Setpoint Y9	–600.0 to +600.0	%	80	At once	4698

Para.	Name	Value Range	Unit	Default	Change Mode	Address
P8-64	[Multi-point curve module 3] Setpoint X10	–600.0 to +600.0	%	90	At once	4689
P8-65	[Multi-point curve module 1] Setpoint Y10	–600.0 to +600.0	%	90	At once	4699
P8-66	[Multi-point curve module 4] Execution sequence	0 to 65535	-	0	At once	4055
P8-67	[Multi-point curve module 4] Input	0: 0 Other: K connector	-	0	At once	4700
P8-68	[Multi-point curve module 4] Setpoint X1	–600.0 to +600.0	%	0	At once	4701
P8-69	[Multi-point curve module 4] Setpoint Y1	–600.0 to +600.0	%	0	At once	4711
P8-70	[Multi-point curve module 4] Setpoint X2	–600.0 to +600.0	%	10	At once	4702
P8-71	[Multi-point curve module 4] Setpoint Y2	–600.0 to +600.0	%	10	At once	4712
P8-72	[Multi-point curve module 4] Setpoint X3	–600.0 to +600.0	%	20	At once	4703
P8-73	[Multi-point curve module 4] Setpoint Y3	–600.0 to +600.0	%	20	At once	4713
P8-74	[Multi-point curve module 4] Setpoint X4	–600.0 to +600.0	%	30	At once	4704
P8-75	[Multi-point curve module 4] Setpoint Y4	–600.0 to +600.0	%	30	At once	4714
P8-76	[Multi-point curve module 4] Setpoint X5	–600.0 to +600.0	%	40	At once	4705
P8-77	[Multi-point curve module 4] Setpoint Y5	–600.0 to +600.0	%	40	At once	4715
P8-78	[Multi-point curve module 4] Setpoint X6	–600.0 to +600.0	%	50	At once	4706
P8-79	[Multi-point curve module 4] Setpoint Y6	–600.0 to +600.0	%	50	At once	4716
P8-80	[Multi-point curve module 4] Setpoint X7	–600.0 to +600.0	%	60	At once	4707
P8-81	[Multi-point curve module 4] Setpoint Y7	–600.0 to +600.0	%	60	At once	4717
P8-82	[Multi-point curve module 4] Setpoint X8	–600.0 to +600.0	%	70	At once	4708
P8-83	[Multi-point curve module 4] Setpoint Y8	–600.0 to +600.0	%	70	At once	4718
P8-84	[Multi-point curve module 4] Setpoint X9	–600.0 to +600.0	%	80	At once	4709
P8-85	[Multi-point curve module 4] Setpoint Y9	–600.0 to +600.0	%	80	At once	4719
P8-86	[Multi-point curve module 4] Setpoint X10	–600.0 to +600.0	%	90	At once	4710

Para.	Name	Value Range	Unit	Default	Change Mode	Address
P8-87	[Multi-point curve module 4] Setpoint Y10	–600.0 to +600.0	%	90	At once	4720
Group P9: User-defined process control function block						
P9-00	Type of execution sequence conflict module 1	0: No conflict 1: Group P0 W2B module 2: Group P0 B2W module 3: Group P0 W2DW module 4: Group P0 DW2W module 5: Group P1 AND module 6: Group P1 NOT module 7: Group P2 OR module 8: Group P2 XOR/XNOR module 9: Group P2 NAND module 10: Group P3 binary selector module 11: Group P3 value selector module 12: Group P4 DELAY module 13: Group P4 P_L conversion module 14: Group P4 FILT module 15: Group P4 RS flip-flop module 16: Group P4 DFF module 17: Group P5 PULSE module 18: Group P6 ADD_SUB module 19: Group P6 MUL_DIV module 20: Group P6 absolute value module 21: Group P6 NCMP module 22: Group P7 NEG module 23: Group P7 INTEGRAL module 24: Group P7 DIFF module 25: Group P7 LIM module 26: Group P8 Multi-point curve module 27: Group P9 process setting word parameter 28: Group P9 process setting bit parameter 29: Group P9 process controller	-	0	Unmodifiable	35799
P9-01	Group of execution sequence conflict module 1	0 to 65535	-	0	Unmodifiable	35800

Para.	Name	Value Range	Unit	Default	Change Mode	Address
P9-02	Type of execution sequence conflict module 2	0: No conflict 1: Group P0 W2B module 2: Group P0 B2W module 3: Group P0 W2DW module 4: Group P0 DW2W module 5: Group P1 AND module 6: Group P1 NOT module 7: Group P2 OR module 8: Group P2 XOR/XNOR module 9: Group P2 NAND module 10: Group P3 binary selector module 11: Group P3 value selector module 12: Group P4 DELAY module 13: Group P4 P_L conversion module 14: Group P4 FILT module 15: Group P4 RS flip-flop module 16: Group P4 DFF module 17: Group P5 PULSE module 18: Group P6 ADD_SUB module 19: Group P6 MUL_DIV module 20: Group P6 absolute value module 21: Group P6 NCMP module 22: Group P7 NEG module 23: Group P7 INTEGRAL module 24: Group P7 DIFF module 25: Group P7 LIM module 26: Group P8 Multi-point curve module 27: Group P9 process setting word parameter 28: Group P9 process setting bit parameter 29: Group P9 process controller	-	0	Unmodifiable	35801
P9-03	Group of execution sequence conflict module 2	0 to 65535	-	0	Unmodifiable	35802
P9-04	Execution sequence of process setting word parameter 1	0 to 65535	-	0	At once	4068

Para.	Name	Value Range	Unit	Default	Change Mode	Address
P9-05	Execution sequence of process setting word parameter 2	0 to 65535	-	0	At once	4069
P9-06	Execution sequence of process setting word parameter 3	0 to 65535	-	0	At once	4070
P9-07	Execution sequence of process setting word parameter 4	0 to 65535	-	0	At once	4071
P9-08	Execution sequence of process setting word parameter 5	0 to 65535	-	0	At once	4072
P9-09	Execution sequence of process setting word parameter 6	0 to 65535	-	0	At once	4073
P9-10	Execution sequence of process setting word parameter 7	0 to 65535	-	0	At once	4074
P9-11	Execution sequence of process setting word parameter 8	0 to 65535	-	0	At once	4075
P9-12	Execution sequence of process setting word parameter 9	0 to 65535	-	0	At once	4076
P9-13	Execution sequence of process setting word parameter 10	0 to 65535	-	0	At once	4077
P9-14	Execution sequence of process setting word parameter 11	0 to 65535	-	0	At once	4078
P9-15	Execution sequence of process setting word parameter 12	0 to 65535	-	0	At once	4079
P9-16	Execution sequence of process setting word parameter 13	0 to 65535	-	0	At once	4080
P9-17	Execution sequence of process setting word parameter 14	0 to 65535	-	0	At once	4081
P9-18	Execution sequence of process setting bit parameter 1	0 to 65535	-	0	At once	4082
P9-19	Execution sequence of process setting bit parameter 2	0 to 65535	-	0	At once	4083
P9-20	Execution sequence of process setting bit parameter 3	0 to 65535	-	0	At once	4084
P9-21	Execution sequence of process setting bit parameter 4	0 to 65535	-	0	At once	4085

Para.	Name	Value Range	Unit	Default	Change Mode	Address
P9-22	Execution sequence of process setting bit parameter 5	0 to 65535	-	0	At once	4086
P9-23	Execution sequence of process setting bit parameter 6	0 to 65535	-	0	At once	4087
P9-24	Execution sequence of process controller	0 to 65535	-	0	At once	4088

8 Connector Resources

8.1 Description of Common Connectors

Connectors are indicated by parameters in group U, which store and display the middle variables of system control. Connectors are divided into bit connectors (U0-00 to U4-99 and U10-00 to U11-99) and word connectors (U5-00 to U9-99, U15-00 to U16-99, U19-00 to U19-99, and U29-00 to U29-99) based on data types.

Word connectors are divided into single-word connectors (16 bits, occupying one storage address, corresponding to U5-00 to U8-99 and U15-00 to U16-99) and double-word connectors (32 bits, occupying two storage addresses, corresponding to U9-00 to U9-99, U19-00 to U19-99, and U29-00 to U29-99) based on data types. A double-word connector can indicate more valid digits, improving the numerical value accuracy.

Word connectors are divided into three categories based on units: per-unit value (expressed as percentage of a base value, indicating the speed, torque, and current), actual value (with meaningful units of V, A, and kW), and unitless numerical value (for example, communication data received, which is displayed as the original value, without actual meaning determined).

The per-unit value system is expressed based on the following rules:

- For single-word connectors, 0x1000 (decimal 4096) indicates 100%, which can be displayed as Value (actual value) or Percent (per-unit value). The conversion formula is as follows: Percent = Value/4096.
- For double-word connectors, 01000 0000 (4096x65536) indicates 100%, which can be displayed as Value (actual value) or Percent (per-unit value). The conversion formula is as follows: Percent = Value/4096/65536.
- Per-unit values expressed by single-word indicators and double-word indicators both range from –800.00% to +799.99%.
- Single-word connectors and double-word connectors can be converted to each other. When a single-word connector is granted to a double-word connector, the low word is 0 and the high word is the value of the single-word connector. When a double-word connector is granted to a single-word connector, the low word is discarded and the high word is granted to the single-word connector, indicating that the number of valid bits for the numerical value is reduced but the value range does not change.

8.1.1 Speed and Frequency

Para.	Name	Description
U5-00	Actual motor speed (100 ms filter)	100% corresponds to the rated motor speed processed with 100 ms filter smoothing.
U9-00	Actual motor speed	100% corresponds to the rated motor speed. It is not filtered.
U9-01	Final motor speed setpoint	100% corresponds to the rated motor speed. It is the speed reference before speed governing PID filter.
U9-13	Filtered speed setpoint	100% corresponds to the rated motor speed. It is the speed reference after speed governing PID filter.

Para.	Name	Description
U9-14	Filtered speed feedback	100% corresponds to the rated motor speed. It is the feedback speed after speed governing PID filter.
U9-20	Encoder feedback speed	100% corresponds to the rated motor speed. It is detected by the encoder.

8.1.2 Current and Voltage

Para.	Name	Description
U5-01	Output voltage (100 ms filter)	100% corresponds to the rated motor voltage processed with 100 ms filter smoothing.
U5-02	Output current (100 ms filter)	100% corresponds to the rated motor current processed with 100 ms filter smoothing.
U5-05	DC bus voltage (100 ms filter)	It is the actual value of the bus voltage, in 0.1 V, with 100 ms filter smoothing.
U5-26	Phase U current	Phase U current can be switched to the per-unit value, actual value, or unitless numerical value through display attribute switchover. 100% corresponds to the rated motor current.
U5-27	Phase V current	Phase V current can be switched to the per-unit value, actual value, or unitless numerical value through display attribute switchover. 100% corresponds to the rated motor current.
U5-28	Phase W current	Phase W current can be switched to the per-unit value, actual value, or unitless numerical value through display attribute switchover. 100% corresponds to the rated motor current.

8.1.3 Torque

Para.	Name	Description
U5-04	Output torque (100 ms filter)	100% corresponds to the rated motor torque (Rated power (kw) x 9550/Rated speed (RPM)) processed with 100 ms filter smoothing.
U6-07	[Torque control ramp] Main setpoint	It indicates the torque setpoint from U6-11 after the acceleration/deceleration time of the torque ramp. 100% corresponds to the rated motor torque.
U6-10	Main setpoint of torque control	It indicates the main setpoint of torque control for the reference channel. 100% corresponds to the rated motor torque.
U6-11	Main setpoint of torque control filter	It indicates the torque setpoint of U6-10 after filtering by the delay time indicated by C1-01/C3-01. 100% corresponds to the rated motor torque.
U6-12	Torque setpoint limited	It indicates the actually active torque setpoint after limits such as the torque reference limit, power limit, and Vdc control are applied. 100% corresponds to the rated motor torque.
U6-13	Torque setpoint before additional torque	It indicates the torque setpoint without the total additional torque U6-20. 100% corresponds to the rated motor torque.
U6-14	Max. output torque	It indicates the upper limit of the actually active torque setpoint of the speed governing module after limits such as the power limit and Vdc control are applied. 100% corresponds to the rated motor torque.

Para.	Name	Description
U6-15	Min. output torque	It indicates the lower limit of the actually active torque setpoint of the speed governing module after limits such as the power limit and Vdc control are applied. 100% corresponds to the rated motor torque.
U6-16	Positive torque limit value	It indicates the positive torque limit output after speed governing PID, which is limited by the torque upper limit U6-18 and anti-runaway regulator. 100% corresponds to the rated motor torque.
U6-17	Negative torque limit value	It indicates the negative torque limit output after speed governing PID, which is limited by the torque lower limit U6-19 and anti-runaway regulator. 100% corresponds to the rated motor torque.
U6-18	Torque upper limit	It indicates the smaller of the torque upper limit digital setpoint in E2-08 and torque upper limit setpoint selection in E2-10. 100% corresponds to the rated motor torque.
U6-19	Torque lower limit	It indicates the smaller of the torque lower limit digital setpoint in E2-09 and torque lower limit setpoint selection in E2-11. 100% corresponds to the rated motor torque.
U6-20	Total additional torque	It indicates the torque setpoint obtained after torque feedforward torque U6-27 is added to additional torque U6-26. 100% corresponds to the rated motor torque.
U6-21	Friction torque	It depends on the friction torque selection in C1-09/C3-09 (additional torque setpoint 3).
U6-22	PID output upon speed governing	It indicates the PID output value upon speed governing. 100% corresponds to the rated motor torque.
U6-23	Automatic torque memory value	It indicates the PID output upon speed governing in U6-22 before the brake is closed.
U6-24	PID integral upon speed governing	It indicates the integral of PID output upon speed governing. 100% corresponds to the rated motor torque.
U6-25	RFG inertia compensation torque	It indicates the compensation torque calculated based on the electromechanical time constant and RFG output acceleration rate. 100% corresponds to the rated motor torque.
U6-26	Additional torque	It indicates the torque setpoint obtained after torque setpoint 1 is added to additional torque setpoint 2. 100% corresponds to the rated motor torque.
U6-27	Feedforward torque	It indicates the feedforward torque calculate based on the RFG feedforward or speed differential. 100% corresponds to the rated motor torque.
U6-28	Calculated load and friction torque	It depends on the friction torque selection in C1-09/C3-09 (additional torque setpoint 3).
U6-29	Torque setpoint unlimited	It indicates the actually active torque setpoint before limits such as the torque reference limit and power limit, and after limits such as Vdc control and U6-18/ U6-19 are applied. 100% corresponds to the rated motor torque.
U6-30	Calculated torque for overspeed adjustment	It indicates the output after the speed feedback from filtering of the maximum positive speed or maximum negative speed by the speed regulator, which prevents the motor speed from exceeding the limits. 100% corresponds to the rated motor torque.
U6-39	Load observer output torque	It indicates the torque output by the load observer module. 100% corresponds to the rated motor torque.

8.1.4 Other Word Connectors

Para.	Name	Description
U8-00	Current state machine	Current status of the system
U8-07	Control word 1	A word composed of bit0 to bit15 of control word 1
U8-08	Control word 2	A word composed of bit0 to bit15 of control word 2
U8-09	Status word 1	A word composed of bit0 to bit15 of status word 1
U8-10	Status word 2	A word composed of bit0 to bit15 of status word 2
U5-40	Modbus communication reference 1	Writing data to address 34230 through Modbus can change the value of U5-40, which is used for speed setting.
U5-41	Modbus communication reference 2	Writing data to address 34231 through Modbus can change the value of U5-41, which is used for speed setting.
U9-50	Modbus communication double-word setpoint	Writing data to address 34232 through Modbus can change the value of high 16 bits of U9-50. Writing data to address 34233 through Modbus can change the value of low 16 bits of U9-50. It can set a 32-bit speed value.

8.1.5 Common Bit Connectors

Para.	Name	Description
U0-00	Logic 0	Constant 0
U0-01	Logic 1	Constant 1
U0-02/U0-12	DI1/DI1 inversion	Status of DI terminals after processing according to parameter settings in group F0
U0-03/U0-13	DI2/DI2 inversion	
U0-04/U0-14	DI3/DI3 inversion	
U0-05/U0-15	DI4/DI4 inversion	
U0-06/U0-16	DI5/DI5 inversion	
U0-07/U0-17	DI6/DI6 inversion	
U0-08/U0-18	DIL/DIL inversion	
U0-09/U0-19	HDI1/HDI1 inversion	Status of HDI terminals as DI terminals after processing according to parameter settings in group F0
U0-10/U0-20	HDI2/HDI2 inversion	
U1-00	Ready to switch on	bit0 of status word 1, indicating that no emergency stop or fault occurs in the system
U1-01	Ready to run	bit1 of status word 1, indicating that the system receives the OFF1 command, without the running permission signal, and that the bus voltage has been build-up
U1-02	Running	bit2 of status word 1, indicating the normal running state
U1-98	Ready to switch on status	Ready to switch on, with [U1-00] being 1 and [U1-01] being 0
U1-99	Ready to run status	Ready to run, with [U1-01] being 1 and [U1-02] being 0
U1-03	Fault activation	bit3 of status word 1, indicating that a fault is active
U1-04	OFF2 inactive	bit4 of status word 1, where value 0 indicates that the emergency stop command OFF2 is active

Para.	Name	Description
U1-05	OFF3 inactive	bit5 of status word 1, where value 0 indicates that the quick stop command OFF3 is active
U1-06	Switch-on prohibited	bit6 of status word 1, indicating that the system cannot become ready to switch on and cannot receive the OFF1 command. Typically, this is due to emergency stop or fault activation.
U1-07	Alarm/limit activation	bit7 of status word 1, indicating that an alarm or a limit is active
U1-08	Speed setpoint reached without deviation	bit8 of status word 1, where value 1 indicates that the feedback speed follows the speed reference
U1-09	Comparison value reached	bit10 of status word 1, where value 1 indicates that the feedback speed is greater than the value of E8-08
U1-10	Torque/current limit reached	bit11 of status word 1, where value 1 indicates that the torque or current has reached the limit
U1-11	Brake opening	bit12 of status word 1, where value 1 indicates braking open. For the brake control module, see group L1.
U1-12	Speed positive direction	bit13 of status word 1, where value 1 indicates that the speed is forward
U1-64	DC bus energized	1: DC bus voltage built-up
U1-65	Motor speed zero	1 = Absolute value of feedback speed smaller than E1-11
U1-75	Start/stop command (Modbus)	Writing 0 or 1 to the address 34196 through Modbus changes the value of U1-75. This parameter can be used for the user-defined OFF1 command.
U1-78	Remote control enable	1 = Normal control channel enabled 0 = IDS or SOP-20 local control activated
U2-00 to U2-15	Fieldbus adapter A.PZD1.0 to fieldbus adapter A.PZD1.15	Corresponding to each bit of connector U5-44 and typically used for control channel setting
U2-16 to U2-31	Fieldbus adapter B.PZD1.0 to fieldbus adapter B.PZD1.15	Corresponding to each bit of connector U5-60 and typically used for control channel setting
U2-32 to U2-47	InoLink.PZD1.0 to InoLink.PZD1.15	Corresponding to each bit of connector U5-32 and can be used for control channel setting

8.2 Connector Parameter List

Para.	Name	Value Range	Unit	Default	Change Mode	Address
Group U0: Bit connector 1						
U0-00	Logic 0	0 to 1	-	0	Unmodifiable	32896
U0-01	Logic 1	0 to 1	-	0	Unmodifiable	32897
U0-02	DI1	0 to 1	-	0	Unmodifiable	32898
U0-03	DI2	0 to 1	-	0	Unmodifiable	32899

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U0-04	DI3	0 to 1	-	0	Unmodifiable	32900
U0-05	DI4	0 to 1	-	0	Unmodifiable	32901
U0-06	DI5	0 to 1	-	0	Unmodifiable	32902
U0-07	DI6	0 to 1	-	0	Unmodifiable	32903
U0-08	DIL	0 to 1	-	0	Unmodifiable	32904
U0-09	HDI1	0 to 1	-	0	Unmodifiable	32905
U0-10	HDI2	0 to 1	-	0	Unmodifiable	32906
U0-12	DI1 inversion	0 to 1	-	0	Unmodifiable	32908
U0-13	DI2 inversion	0 to 1	-	0	Unmodifiable	32909
U0-14	DI3 inversion	0 to 1	-	0	Unmodifiable	32910
U0-15	DI4 inversion	0 to 1	-	0	Unmodifiable	32911
U0-16	DI5 inversion	0 to 1	-	0	Unmodifiable	32912
U0-17	DI6 inversion	0 to 1	-	0	Unmodifiable	32913
U0-18	DIL inversion	0 to 1	-	0	Unmodifiable	32914
U0-19	HDI1 inversion	0 to 1	-	0	Unmodifiable	32915
U0-20	HDI2 inversion	0 to 1	-	0	Unmodifiable	32916
U0-21	RO1	0 to 1	-	0	Unmodifiable	32917
U0-22	RO2	0 to 1	-	0	Unmodifiable	32918
U0-23	RO3	0 to 1	-	0	Unmodifiable	32919
U0-24	HDO1	0 to 1	-	0	Unmodifiable	32920
U0-25	HDO2	0 to 1	-	0	Unmodifiable	32921
U0-26	Current command channel	0: Command channel 1 1: Command channel 2	-	0	Unmodifiable	32922

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U0-27	Motor selection bit0	0 to 1	-	0	Unmodifiable	32923
U0-28	Motor selection bit1	0 to 1	-	0	Unmodifiable	32924
U0-29	RFG selection bit0	0 to 1	-	0	Unmodifiable	32925
U0-30	RFG selection bit1	0 to 1	-	0	Unmodifiable	32926
U0-31	Multi-reference selection 1	0 to 1	-	0	Unmodifiable	32927
U0-32	Multi-reference selection 2	0 to 1	-	0	Unmodifiable	32928
U0-33	Multi-reference selection 3	0 to 1	-	0	Unmodifiable	32929
U0-34	Multi-reference selection 4	0 to 1	-	0	Unmodifiable	32930
U0-35	AI1 disconnection monitoring	0 to 1	-	0	Unmodifiable	32931
U0-36	AI2 disconnection monitoring	0 to 1	-	0	Unmodifiable	32932
U0-37	Reserved	0 to 1	-	0	Unmodifiable	32933
U0-38	Reserved	0 to 1	-	0	Unmodifiable	32934
U0-39	Reserved	0 to 1	-	0	Unmodifiable	32935
U0-40	Reserved	0 to 1	-	0	Unmodifiable	32936
U0-41	Status of expansion slot 1_1	0 to 1	-	0	Unmodifiable	32937
U0-42	Status of expansion slot 1_2	0 to 1	-	0	Unmodifiable	32938
U0-43	Status of expansion slot 1_3	0 to 1	-	0	Unmodifiable	32939
U0-44	Status of expansion slot 2_1	0 to 1	-	0	Unmodifiable	32940
U0-45	Status of expansion slot 2_2	0 to 1	-	0	Unmodifiable	32941
U0-46	Status of expansion slot 2_3	0 to 1	-	0	Unmodifiable	32942
U0-47	Status of expansion slot 3_1	0 to 1	-	0	Unmodifiable	32943
U0-48	Process parameter group selection bit0	0 to 1	-	0	Unmodifiable	32944

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U0-49	Process parameter group selection bit1	0 to 1	-	0	Unmodifiable	32945
U0-51	Positive speed enable	0: Disable 1: Enable	-	0	Unmodifiable	32966
U0-52	Negative speed enable	0: Disable 1: Enable	-	0	Unmodifiable	32967
U0-53	Trigger oscilloscope status	0: Not triggered 1: Triggered	-	0	Unmodifiable	33784
U0-54	STO1 feedback status	0 to 1	-	0	Unmodifiable	32686
U0-55	STO2 feedback status	0 to 1	-	0	Unmodifiable	32687
U0-84	OF sync expansion module.PZD1.0	0 to 1	-	0	Unmodifiable	32980
U0-85	OF sync expansion module.PZD1.1	0 to 1	-	0	Unmodifiable	32981
U0-86	OF sync expansion module.PZD1.2	0 to 1	-	0	Unmodifiable	32982
U0-87	OF sync expansion module.PZD1.3	0 to 1	-	0	Unmodifiable	32983
U0-88	OF sync expansion module.PZD1.4	0 to 1	-	0	Unmodifiable	32984
U0-89	OF sync expansion module.PZD1.5	0 to 1	-	0	Unmodifiable	32985
U0-90	OF sync expansion module.PZD1.6	0 to 1	-	0	Unmodifiable	32986
U0-91	OF sync expansion module.PZD1.7	0 to 1	-	0	Unmodifiable	32987
U0-92	OF sync expansion module.PZD1.8	0 to 1	-	0	Unmodifiable	32988
U0-93	OF sync expansion module.PZD1.9	0 to 1	-	0	Unmodifiable	32989
U0-94	OF sync expansion module.PZD1.10	0 to 1	-	0	Unmodifiable	32990
U0-95	OF sync expansion module.PZD1.11	0 to 1	-	0	Unmodifiable	32991
U0-96	OF sync expansion module.PZD1.12	0 to 1	-	0	Unmodifiable	32992
U0-97	OF sync expansion module.PZD1.13	0 to 1	-	0	Unmodifiable	32993
U0-98	OF sync expansion module.PZD1.14	0 to 1	-	0	Unmodifiable	32994

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U0-99	OF sync expansion module.PZD1.15	0 to 1	-	0	Unmodifiable	32995
Group U1: Bit connector 2						
U1-00	Ready to switch on	0 to 1	-	0	Unmodifiable	32996
U1-01	Ready to run	0 to 1	-	0	Unmodifiable	32997
U1-02	Running	0 to 1	-	0	Unmodifiable	32998
U1-03	Fault activation	0 to 1	-	0	Unmodifiable	32999
U1-04	OFF2 inactive	0 to 1	-	0	Unmodifiable	33000
U1-05	OFF3 inactive	0 to 1	-	0	Unmodifiable	33001
U1-06	Switch-on prohibited	0 to 1	-	0	Unmodifiable	33002
U1-07	Alarm/limit activation	0 to 1	-	0	Unmodifiable	33003
U1-08	Speed setpoint reached without deviation	0 to 1	-	0	Unmodifiable	33004
U1-09	Comparison value reached	0 to 1	-	0	Unmodifiable	33005
U1-10	Torque/current limit reached	0 to 1	-	0	Unmodifiable	33006
U1-11	Brake opening	0 to 1	-	0	Unmodifiable	33007
U1-12	Speed positive direction	0 to 1	-	0	Unmodifiable	33008
U1-13	IGBT running	0 to 1	-	0	Unmodifiable	33009
U1-14	Jog active	0 to 1	-	0	Unmodifiable	33010
U1-15	Pre-excitation enable	0 to 1	-	0	Unmodifiable	33011
U1-16	DC injection braking enable	0 to 1	-	0	Unmodifiable	33012
U1-17	Flying start	0 to 1	-	0	Unmodifiable	33013
U1-18	Torque control active	0 to 1	-	0	Unmodifiable	33014
U1-19	Droop function enable	0 to 1	-	0	Unmodifiable	33015

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U1-20	Not ready to switch on	0 to 1	-	0	Unmodifiable	33016
U1-21	Not ready to run	0 to 1	-	0	Unmodifiable	33017
U1-22	Not running	0 to 1	-	0	Unmodifiable	33018
U1-23	No fault	0 to 1	-	0	Unmodifiable	33019
U1-24	OFF2 active	0 to 1	-	0	Unmodifiable	33020
U1-25	OFF3 active	0 to 1	-	0	Unmodifiable	33021
U1-26	Switch-on enable	0 to 1	-	0	Unmodifiable	33022
U1-27	No alarm/limit	0 to 1	-	0	Unmodifiable	33023
U1-28	Excessive speed deviation	0 to 1	-	0	Unmodifiable	33024
U1-29	Comparison value not reached	0 to 1	-	0	Unmodifiable	33025
U1-30	Torque/current limit not reached	0 to 1	-	0	Unmodifiable	33026
U1-31	Brake closing	0 to 1	-	0	Unmodifiable	33027
U1-32	Speed negative direction	0 to 1	-	0	Unmodifiable	33028
U1-33	IGBT inhibited	0 to 1	-	0	Unmodifiable	33029
U1-34	Jog inactive	0 to 1	-	0	Unmodifiable	33030
U1-35	Pre-excitation completed	0 to 1	-	0	Unmodifiable	33031
U1-36	DC injection braking completed	0 to 1	-	0	Unmodifiable	33032
U1-37	Flying start completed	0 to 1	-	0	Unmodifiable	33033
U1-38	Speed regulator enable	0 to 1	-	0	Unmodifiable	33034
U1-39	ASR hold I component	0 to 1	-	0	Unmodifiable	33035
U1-40	ASR set I component	0 to 1	-	0	Unmodifiable	33036
U1-41	RFG output disable	0 to 1	-	0	Unmodifiable	33037

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U1-42	RFG pause	0 to 1	-	0	Unmodifiable	33038
U1-43	RFG speed setpoint disable	0 to 1	-	0	Unmodifiable	33039
U1-44	RFG speed ramping up	0 to 1	-	0	Unmodifiable	33040
U1-45	RFG speed ramping down	0 to 1	-	0	Unmodifiable	33041
U1-46	RFG speed constant	0 to 1	-	0	Unmodifiable	33042
U1-47	RFG speed reference invalid	0 to 1	-	0	Unmodifiable	33043
U1-48	Vdc_min activated	0 to 1	-	0	Unmodifiable	33044
U1-49	Vdc_max activated	0 to 1	-	0	Unmodifiable	33045
U1-50	Torque upper limit reached	0 to 1	-	0	Unmodifiable	33046
U1-51	Torque lower limit reached	0 to 1	-	0	Unmodifiable	33047
U1-52	Torque current upper limit reached	0 to 1	-	0	Unmodifiable	33048
U1-53	Torque current lower limit reached	0 to 1	-	0	Unmodifiable	33049
U1-54	Imax regulator (V/f) activated	0 to 1	-	0	Unmodifiable	33050
U1-55	ACR output limit active	0 to 1	-	0	Unmodifiable	33051
U1-56	Voltage model active	0 to 1	-	0	Unmodifiable	33052
U1-57	Fan operating	0 to 1	-	0	Unmodifiable	33053
U1-58	Brake opened	0 to 1	-	0	Unmodifiable	33054
U1-59	Brake closed	0 to 1	-	0	Unmodifiable	33055
U1-60	Brake opening failed	0 to 1	-	0	Unmodifiable	33056
U1-61	Brake closing failed	0 to 1	-	0	Unmodifiable	33057
U1-62	Motor pre-overload status	0 to 1	-	0	Unmodifiable	33058
U1-63	Zero speed operation	0 to 1	-	0	Unmodifiable	33059

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U1-64	DC bus energized	0 to 1	-	0	Unmodifiable	33060
U1-65	Motor speed zero	0 to 1	-	0	Unmodifiable	33061
U1-66	PID activated	0 to 1	-	0	Unmodifiable	33062
U1-67	PID calculation enable	0 to 1	-	0	Unmodifiable	33063
U1-68	PID action direction	0 to 1	-	0	Unmodifiable	33064
U1-69	PID setpoint freeze	0 to 1	-	0	Unmodifiable	33065
U1-70	PID integral component forced	0 to 1	-	0	Unmodifiable	33066
U1-71	PID deviation dead zone enable	0 to 1	-	0	Unmodifiable	33067
U1-72	PID saturation status	0 to 1	-	0	Unmodifiable	33068
U1-73	Motor over-temperature protection flag	0 to 1	-	0	Unmodifiable	33069
U1-74	Motor over-temperature alarm flag	0 to 1	-	0	Unmodifiable	33070
U1-75	Start/stop command (Modbus)	0 to 1	-	0	Unmodifiable	33071
U1-76	Brake breakaway torque established	0 to 1	-	0	Unmodifiable	33072
U1-77	Overspeed	0 to 1	-	0	Unmodifiable	33073
U1-78	Remote control enable	0 to 1	-	0	Unmodifiable	33074
U1-79	HE rectifier running	0 to 1	-	0	Unmodifiable	33079
U1-80	HE rectifier switch-on completed	0 to 1	-	0	Unmodifiable	33080
U1-81	Rectifier enable	0 to 1	-	0	Unmodifiable	33566
U1-95	SOP-20 control permission	0: Disable 1: Enable	-	0	Unmodifiable	36315
U1-97	Target speed reached	0 to 1	-	0	Unmodifiable	33078
U1-98	Ready to switch on status	0 to 1	-	0	Unmodifiable	33076
U1-99	Ready to run status	0 to 1	-	0	Unmodifiable	33077

Para.	Name	Value Range	Unit	Default	Change Mode	Address
Group U2: Bit connector 3						
U2-00	Fieldbus adapter A.PZD1.0	0 to 1	-	0	Unmodifiable	33096
U2-01	Fieldbus adapter A.PZD1.1	0 to 1	-	0	Unmodifiable	33097
U2-02	Fieldbus adapter A.PZD1.2	0 to 1	-	0	Unmodifiable	33098
U2-03	Fieldbus adapter A.PZD1.3	0 to 1	-	0	Unmodifiable	33099
U2-04	Fieldbus adapter A.PZD1.4	0 to 1	-	0	Unmodifiable	33100
U2-05	Fieldbus adapter A.PZD1.5	0 to 1	-	0	Unmodifiable	33101
U2-06	Fieldbus adapter A.PZD1.6	0 to 1	-	0	Unmodifiable	33102
U2-07	Fieldbus adapter A.PZD1.7	0 to 1	-	0	Unmodifiable	33103
U2-08	Fieldbus adapter A.PZD1.8	0 to 1	-	0	Unmodifiable	33104
U2-09	Fieldbus adapter A.PZD1.9	0 to 1	-	0	Unmodifiable	33105
U2-10	Fieldbus adapter A.PZD1.10	0 to 1	-	0	Unmodifiable	33106
U2-11	Fieldbus adapter A.PZD1.11	0 to 1	-	0	Unmodifiable	33107
U2-12	Fieldbus adapter A.PZD1.12	0 to 1	-	0	Unmodifiable	33108
U2-13	Fieldbus adapter A.PZD1.13	0 to 1	-	0	Unmodifiable	33109
U2-14	Fieldbus adapter A.PZD1.14	0 to 1	-	0	Unmodifiable	33110
U2-15	Fieldbus adapter A.PZD1.15	0 to 1	-	0	Unmodifiable	33111
U2-16	Fieldbus adapter B.PZD1.0	0 to 1	-	0	Unmodifiable	33144
U2-17	Fieldbus adapter B.PZD1.1	0 to 1	-	0	Unmodifiable	33145
U2-18	Fieldbus adapter B.PZD1.2	0 to 1	-	0	Unmodifiable	33146
U2-19	Fieldbus adapter B.PZD1.3	0 to 1	-	0	Unmodifiable	33147
U2-20	Fieldbus adapter B.PZD1.4	0 to 1	-	0	Unmodifiable	33148

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U2-21	Fieldbus adapter B.PZD1.5	0 to 1	-	0	Unmodifiable	33149
U2-22	Fieldbus adapter B.PZD1.6	0 to 1	-	0	Unmodifiable	33150
U2-23	Fieldbus adapter B.PZD1.7	0 to 1	-	0	Unmodifiable	33151
U2-24	Fieldbus adapter B.PZD1.8	0 to 1	-	0	Unmodifiable	33152
U2-25	Fieldbus adapter B.PZD1.9	0 to 1	-	0	Unmodifiable	33153
U2-26	Fieldbus adapter B.PZD1.10	0 to 1	-	0	Unmodifiable	33154
U2-27	Fieldbus adapter B.PZD1.11	0 to 1	-	0	Unmodifiable	33155
U2-28	Fieldbus adapter B.PZD1.12	0 to 1	-	0	Unmodifiable	33156
U2-29	Fieldbus adapter B.PZD1.13	0 to 1	-	0	Unmodifiable	33157
U2-30	Fieldbus adapter B.PZD1.14	0 to 1	-	0	Unmodifiable	33158
U2-31	Fieldbus adapter B.PZD1.15	0 to 1	-	0	Unmodifiable	33159
U2-32	InoLink.PZD1.0	0 to 1	-	0	Unmodifiable	33176
U2-33	InoLink.PZD1.1	0 to 1	-	0	Unmodifiable	33177
U2-34	InoLink.PZD1.2	0 to 1	-	0	Unmodifiable	33178
U2-35	InoLink.PZD1.3	0 to 1	-	0	Unmodifiable	33179
U2-36	InoLink.PZD1.4	0 to 1	-	0	Unmodifiable	33180
U2-37	InoLink.PZD1.5	0 to 1	-	0	Unmodifiable	33181
U2-38	InoLink.PZD1.6	0 to 1	-	0	Unmodifiable	33182
U2-39	InoLink.PZD1.7	0 to 1	-	0	Unmodifiable	33183
U2-40	InoLink.PZD1.8	0 to 1	-	0	Unmodifiable	33184
U2-41	InoLink.PZD1.9	0 to 1	-	0	Unmodifiable	33185
U2-42	InoLink.PZD1.10	0 to 1	-	0	Unmodifiable	33186

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U2-43	InoLink.PZD1.11	0 to 1	-	0	Unmodifiable	33187
U2-44	InoLink.PZD1.12	0 to 1	-	0	Unmodifiable	33188
U2-45	InoLink.PZD1.13	0 to 1	-	0	Unmodifiable	33189
U2-46	InoLink.PZD1.14	0 to 1	-	0	Unmodifiable	33190
U2-47	InoLink.PZD1.15	0 to 1	-	0	Unmodifiable	33191
U2-48	Output bit0 of word-to-bit conversion function 1	0 to 1	-	0	Unmodifiable	33112
U2-49	Output bit1 of word-to-bit conversion function 1	0 to 1	-	0	Unmodifiable	33113
U2-50	Output bit2 of word-to-bit conversion function 1	0 to 1	-	0	Unmodifiable	33114
U2-51	Output bit3 of word-to-bit conversion function 1	0 to 1	-	0	Unmodifiable	33115
U2-52	Output bit4 of word-to-bit conversion function 1	0 to 1	-	0	Unmodifiable	33116
U2-53	Output bit5 of word-to-bit conversion function 1	0 to 1	-	0	Unmodifiable	33117
U2-54	Output bit6 of word-to-bit conversion function 1	0 to 1	-	0	Unmodifiable	33118
U2-55	Output bit7 of word-to-bit conversion function 1	0 to 1	-	0	Unmodifiable	33119
U2-56	Output bit8 of word-to-bit conversion function 1	0 to 1	-	0	Unmodifiable	33120
U2-57	Output bit9 of word-to-bit conversion function 1	0 to 1	-	0	Unmodifiable	33121
U2-58	Output bit10 of word-to-bit conversion function 1	0 to 1	-	0	Unmodifiable	33122
U2-59	Output bit11 of word-to-bit conversion function 1	0 to 1	-	0	Unmodifiable	33123
U2-60	Output bit12 of word-to-bit conversion function 1	0 to 1	-	0	Unmodifiable	33124
U2-61	Output bit13 of word-to-bit conversion function 1	0 to 1	-	0	Unmodifiable	33125
U2-62	Output bit14 of word-to-bit conversion function 1	0 to 1	-	0	Unmodifiable	33126
U2-63	Output bit15 of word-to-bit conversion function 1	0 to 1	-	0	Unmodifiable	33127
U2-64	Output bit0 of word-to-bit conversion function 2	0 to 1	-	0	Unmodifiable	33128

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U2-65	Output bit1 of word-to-bit conversion function 2	0 to 1	-	0	Unmodifiable	33129
U2-66	Output bit2 of word-to-bit conversion function 2	0 to 1	-	0	Unmodifiable	33130
U2-67	Output bit3 of word-to-bit conversion function 2	0 to 1	-	0	Unmodifiable	33131
U2-68	Output bit4 of word-to-bit conversion function 2	0 to 1	-	0	Unmodifiable	33132
U2-69	Output bit5 of word-to-bit conversion function 2	0 to 1	-	0	Unmodifiable	33133
U2-70	Output bit6 of word-to-bit conversion function 2	0 to 1	-	0	Unmodifiable	33134
U2-71	Output bit7 of word-to-bit conversion function 2	0 to 1	-	0	Unmodifiable	33135
U2-72	Output bit8 of word-to-bit conversion function 2	0 to 1	-	0	Unmodifiable	33136
U2-73	Output bit9 of word-to-bit conversion function 2	0 to 1	-	0	Unmodifiable	33137
U2-74	Output bit10 of word-to-bit conversion function 2	0 to 1	-	0	Unmodifiable	33138
U2-75	Output bit11 of word-to-bit conversion function 2	0 to 1	-	0	Unmodifiable	33139
U2-76	Output bit12 of word-to-bit conversion function 2	0 to 1	-	0	Unmodifiable	33140
U2-77	Output bit13 of word-to-bit conversion function 2	0 to 1	-	0	Unmodifiable	33141
U2-78	Output bit14 of word-to-bit conversion function 2	0 to 1	-	0	Unmodifiable	33142
U2-79	Output bit15 of word-to-bit conversion function 2	0 to 1	-	0	Unmodifiable	33143
U2-80	Output bit0 of word-to-bit conversion function 3	0 to 1	-	0	Unmodifiable	33160
U2-81	Output bit1 of word-to-bit conversion function 3	0 to 1	-	0	Unmodifiable	33161
U2-82	Output bit2 of word-to-bit conversion function 3	0 to 1	-	0	Unmodifiable	33162
U2-83	Output bit3 of word-to-bit conversion function 3	0 to 1	-	0	Unmodifiable	33163
U2-84	Output bit4 of word-to-bit conversion function 3	0 to 1	-	0	Unmodifiable	33164
U2-85	Output bit5 of word-to-bit conversion function 3	0 to 1	-	0	Unmodifiable	33165
U2-86	Output bit6 of word-to-bit conversion function 3	0 to 1	-	0	Unmodifiable	33166

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U2-87	Output bit7 of word-to-bit conversion function 3	0 to 1	-	0	Unmodifiable	33167
U2-88	Output bit8 of word-to-bit conversion function 3	0 to 1	-	0	Unmodifiable	33168
U2-89	Output bit9 of word-to-bit conversion function 3	0 to 1	-	0	Unmodifiable	33169
U2-90	Output bit10 of word-to-bit conversion function 3	0 to 1	-	0	Unmodifiable	33170
U2-91	Output bit11 of word-to-bit conversion function 3	0 to 1	-	0	Unmodifiable	33171
U2-92	Output bit12 of word-to-bit conversion function 3	0 to 1	-	0	Unmodifiable	33172
U2-93	Output bit13 of word-to-bit conversion function 3	0 to 1	-	0	Unmodifiable	33173
U2-94	Output bit14 of word-to-bit conversion function 3	0 to 1	-	0	Unmodifiable	33174
U2-95	Output bit15 of word-to-bit conversion function 3	0 to 1	-	0	Unmodifiable	33175
Group U3: Bit connector 4						
U3-00	Output of logic AND module A	0 to 1	-	0	Unmodifiable	33196
U3-01	Output of logic AND module B	0 to 1	-	0	Unmodifiable	33197
U3-02	Output of logic AND module C	0 to 1	-	0	Unmodifiable	33198
U3-03	Output of logic AND module D	0 to 1	-	0	Unmodifiable	33199
U3-04	Output of logic NOT module A	0 to 1	-	0	Unmodifiable	33200
U3-05	Output of logic NOT module B	0 to 1	-	0	Unmodifiable	33201
U3-06	Output of logic NOT module C	0 to 1	-	0	Unmodifiable	33202
U3-07	Output of logic NOT module D	0 to 1	-	0	Unmodifiable	33203
U3-08	Output of logic NOT module E	0 to 1	-	0	Unmodifiable	33204
U3-09	Output of logic NOT module F	0 to 1	-	0	Unmodifiable	33205
U3-10	Output of logic NOT module G	0 to 1	-	0	Unmodifiable	33206
U3-11	Output of logic NOT module H	0 to 1	-	0	Unmodifiable	33207

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U3-12	Output of logic OR module A	0 to 1	-	0	Unmodifiable	33208
U3-13	Output of logic OR module B	0 to 1	-	0	Unmodifiable	33209
U3-14	Output of logic OR module C	0 to 1	-	0	Unmodifiable	33210
U3-15	Output of logic OR module D	0 to 1	-	0	Unmodifiable	33211
U3-16	Output of logic XOR/XNOR module A	0 to 1	-	0	Unmodifiable	33216
U3-17	Output of logic XOR/XNOR module B	0 to 1	-	0	Unmodifiable	33217
U3-18	Output of logic XOR/XNOR module C	0 to 1	-	0	Unmodifiable	33218
U3-19	Output of logic XOR/XNOR module D	0 to 1	-	0	Unmodifiable	33219
U3-20	[BSW module A] Output	0 to 1	-	0	Unmodifiable	33220
U3-21	[BSW module B] Output	0 to 1	-	0	Unmodifiable	33221
U3-22	Output of level-to-pulse conversion module A	0 to 1	-	0	Unmodifiable	33222
U3-23	Output of level-to-pulse conversion module B	0 to 1	-	0	Unmodifiable	33223
U3-24	Output of level-to-pulse conversion module C	0 to 1	-	0	Unmodifiable	33224
U3-25	Output of level-to-pulse conversion module D	0 to 1	-	0	Unmodifiable	33225
U3-26	Output of logic delay module A	0 to 1	-	0	Unmodifiable	33212
U3-27	Output of logic delay module B	0 to 1	-	0	Unmodifiable	33213
U3-28	Output of logic delay module C	0 to 1	-	0	Unmodifiable	33214
U3-29	Output of logic delay module D	0 to 1	-	0	Unmodifiable	33215
U3-30	Negative number input flag of absolute value module A	0 to 1	-	0	Unmodifiable	33226
U3-31	Negative number input flag of absolute value module B	0 to 1	-	0	Unmodifiable	33227
U3-32	Negative number input flag of absolute value module C	0 to 1	-	0	Unmodifiable	33228
U3-33	Negative number input flag of absolute value module D	0 to 1	-	0	Unmodifiable	33229

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U3-34	Flag indicating whether divisor of MUL_DIV module A is 0	0 to 1	-	0	Unmodifiable	33230
U3-35	Flag indicating whether divisor of MUL_DIV module B is 0	0 to 1	-	0	Unmodifiable	33231
U3-36	Flag indicating whether divisor of MUL_DIV module C is 0	0 to 1	-	0	Unmodifiable	33232
U3-37	Flag indicating whether divisor of MUL_DIV module D is 0	0 to 1	-	0	Unmodifiable	33233
U3-38	Output of NCMP module A	0 to 1	-	0	Unmodifiable	33234
U3-39	Output of NCMP module B	0 to 1	-	0	Unmodifiable	33235
U3-40	Hardware fault	0 to 1	-	0	Unmodifiable	33236
U3-41	SD card fault	0 to 1	-	0	Unmodifiable	33237
U3-42	Low RTC battery voltage	0 to 1	-	0	Unmodifiable	33238
U3-43	Local control fault	0 to 1	-	0	Unmodifiable	33239
U3-44	Drive communication fault	0 to 1	-	0	Unmodifiable	33240
U3-45	Expansion card offline	0 to 1	-	0	Unmodifiable	33241
U3-46	Expansion card slot address conflict	0 to 1	-	0	Unmodifiable	33242
U3-47	Fieldbus adapter fault	0 to 1	-	0	Unmodifiable	33243
U3-48	Encoder fault	0 to 1	-	0	Unmodifiable	33244
U3-49	IGBT drive fault	0 to 1	-	0	Unmodifiable	33245
U3-50	Overcurrent	0 to 1	-	0	Unmodifiable	33246
U3-51	Overvoltage	0 to 1	-	0	Unmodifiable	33247
U3-52	Undervoltage	0 to 1	-	0	Unmodifiable	33248
U3-53	Input phase loss	0 to 1	-	0	Unmodifiable	33249
U3-54	Output phase loss	0 to 1	-	0	Unmodifiable	33250
U3-55	Self-test fault	0 to 1	-	0	Unmodifiable	33251

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U3-56	Drive overload	0 to 1	-	0	Unmodifiable	33252
U3-57	Short circuit to ground	0 to 1	-	0	Unmodifiable	33253
U3-58	Module over-temperature	0 to 1	-	0	Unmodifiable	33254
U3-59	Low module temperature	0 to 1	-	0	Unmodifiable	33255
U3-60	High ambient temperature	0 to 1	-	0	Unmodifiable	33256
U3-61	Incorrect parameter setting	0 to 1	-	0	Unmodifiable	33257
U3-62	Motor auto-tuning fault	0 to 1	-	0	Unmodifiable	33258
U3-63	Motor overload	0 to 1	-	0	Unmodifiable	33259
U3-64	Flying start failure	0 to 1	-	0	Unmodifiable	33260
U3-65	Motor overspeed	0 to 1	-	0	Unmodifiable	33261
U3-66	Excessive speed deviation	0 to 1	-	0	Unmodifiable	33262
U3-67	AC drive fuse fault	0 to 1	-	0	Unmodifiable	33263
U3-68	STO fault	0 to 1	-	0	Unmodifiable	33264
U3-69	PID feedback loss	0 to 1	-	0	Unmodifiable	33265
U3-70	External fault activation	0 to 1	-	0	Unmodifiable	33266
U3-71	External alarm activation	0 to 1	-	0	Unmodifiable	33267
U3-72	Pre-charge fault	0 to 1	-	0	Unmodifiable	33268
U3-73	EEPROM power failure	0 to 1	-	0	Unmodifiable	33269
U3-74	Excessive leakage current	0 to 1	-	0	Unmodifiable	33270
U3-75	Abnormal motor auto-tuning results	0 to 1	-	0	Unmodifiable	33271
U3-76	DC buffer fault	0 to 1	-	0	Unmodifiable	33272
U3-77	Inverter fan fault	0 to 1	-	0	Unmodifiable	33273

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U3-78	Master-slave communication error (InoLink and optical fiber synchronization)	0 to 1	-	0	Unmodifiable	33274
U3-79	Brake feedback error	0 to 1	-	0	Unmodifiable	33275
U3-80	Incorrect model parameter	0 to 1	-	0	Unmodifiable	33276
U3-81	Internal fault	0 to 1	-	0	Unmodifiable	33277
U3-82	Error	0 to 1	-	0	Unmodifiable	33278
U3-83	24 V voltage too low	0 to 1	-	0	Unmodifiable	33279
U3-84	Braking transistor fault	0 to 1	-	0	Unmodifiable	33280
U3-85	Parallel module alarm	0 to 1	-	0	Unmodifiable	33281
U3-86	Parallel module fault	0 to 1	-	0	Unmodifiable	33282
U3-87	Motor control fault	0 to 1	-	0	Unmodifiable	33283
U3-88	Fieldbus adapter alarm	0 to 1	-	0	Unmodifiable	33284
U3-89	Braking resistance too large	0 to 1	-	0	Unmodifiable	33285
U3-90	Braking resistance too small	0 to 1	-	0	Unmodifiable	33286
U3-91	Brake module error	0 to 1	-	0	Unmodifiable	33287
U3-92	Braking resistor over-temperature	0 to 1	-	0	Unmodifiable	33288
U3-93	Module pre-overtemperature	0 to 1	-	0	Unmodifiable	33289
U3-94	HE rectifier braking transistor short circuit flag	0 to 1	-	0	Unmodifiable	33291
U3-95	STO alarm	0 to 1	-	0	Unmodifiable	36257
U3-97	[BSW module C] Output	0 to 1	-	0	Unmodifiable	35067
U3-98	[BSW module D] Output	0 to 1	-	0	Unmodifiable	35068
U3-99	[BSW module E] Output	0 to 1	-	0	Unmodifiable	35069
Group U4: Bit connector 5						

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U4-00	<I/O module 1> DI1 input	0 to 1	-	0	Unmodifiable	35263
U4-01	<I/O module 1> DI2 input	0 to 1	-	0	Unmodifiable	35264
U4-02	<I/O module 1> DI3 input	0 to 1	-	0	Unmodifiable	35265
U4-03	<I/O module 1> DI4 input	0 to 1	-	0	Unmodifiable	35266
U4-04	<I/O module 1> DI5 input	0 to 1	-	0	Unmodifiable	35267
U4-05	<I/O module 1> DI6 input	0 to 1	-	0	Unmodifiable	35268
U4-06	<I/O module 1> DIO1 input	0 to 1	-	0	Unmodifiable	32946
U4-07	<I/O module 1> DIO2 input	0 to 1	-	0	Unmodifiable	32947
U4-08	<I/O module 1> DIO3 input	0 to 1	-	0	Unmodifiable	32948
U4-09	<I/O module 1> DIO4 input	0 to 1	-	0	Unmodifiable	32949
U4-10	<I/O module 1> DIO5 input	0 to 1	-	0	Unmodifiable	32950
U4-11	<I/O module 1> DIO6 input	0 to 1	-	0	Unmodifiable	32951
U4-12	<I/O module 2> DI1 input	0 to 1	-	0	Unmodifiable	35269
U4-13	<I/O module 2> DI2 input	0 to 1	-	0	Unmodifiable	35270
U4-14	<I/O module 2> DI3 input	0 to 1	-	0	Unmodifiable	35271
U4-15	<I/O module 2> DI4 input	0 to 1	-	0	Unmodifiable	35272
U4-16	<I/O module 2> DI5 input	0 to 1	-	0	Unmodifiable	35273
U4-17	<I/O module 2> DI6 input	0 to 1	-	0	Unmodifiable	35274
U4-18	<I/O module 2> DIO1 input	0 to 1	-	0	Unmodifiable	32952
U4-19	<I/O module 2> DIO2 input	0 to 1	-	0	Unmodifiable	32953
U4-20	<I/O module 2> DIO3 input	0 to 1	-	0	Unmodifiable	32954
U4-21	<I/O module 2> DIO4 input	0 to 1	-	0	Unmodifiable	32955

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U4-22	<I/O module 2> DIO5 input	0 to 1	-	0	Unmodifiable	32956
U4-23	<I/O module 2> DIO6 input	0 to 1	-	0	Unmodifiable	32957
U4-24	<I/O module 3> DI1 input	0 to 1	-	0	Unmodifiable	35275
U4-25	<I/O module 3> DI2 input	0 to 1	-	0	Unmodifiable	35276
U4-26	<I/O module 3> DI3 input	0 to 1	-	0	Unmodifiable	35277
U4-27	<I/O module 3> DI4 input	0 to 1	-	0	Unmodifiable	35278
U4-28	<I/O module 3> DI5 input	0 to 1	-	0	Unmodifiable	35279
U4-29	<I/O module 3> DI6 input	0 to 1	-	0	Unmodifiable	35280
U4-30	<I/O module 3> DIO1 input	0 to 1	-	0	Unmodifiable	32958
U4-31	<I/O module 3> DIO2 input	0 to 1	-	0	Unmodifiable	32959
U4-32	<I/O module 3> DIO3 input	0 to 1	-	0	Unmodifiable	32960
U4-33	<I/O module 3> DIO4 input	0 to 1	-	0	Unmodifiable	32961
U4-34	<I/O module 3> DIO5 input	0 to 1	-	0	Unmodifiable	32962
U4-35	<I/O module 3> DIO6 input	0 to 1	-	0	Unmodifiable	32963
U4-36	<I/O module 1> AI1 input disconnected	0 to 1	-	0	Unmodifiable	35281
U4-37	<I/O module 1> AI2 input disconnected	0 to 1	-	0	Unmodifiable	35282
U4-38	<I/O module 1> AI3 input disconnected	0 to 1	-	0	Unmodifiable	35283
U4-39	<I/O module 2> AI1 input disconnected	0 to 1	-	0	Unmodifiable	35284
U4-40	<I/O module 2> AI2 input disconnected	0 to 1	-	0	Unmodifiable	35285
U4-41	<I/O module 2> AI3 input disconnected	0 to 1	-	0	Unmodifiable	35286
U4-42	<I/O module 3> AI1 input disconnected	0 to 1	-	0	Unmodifiable	35287
U4-43	<I/O module 3> AI2 input disconnected	0 to 1	-	0	Unmodifiable	35288

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U4-44	<I/O module 3> AI3 input disconnected	0 to 1	-	0	Unmodifiable	35289
U4-45	[PULSE 1] Output	0 to 1	-	0	Unmodifiable	35303
U4-46	[PULSE 2] Output	0 to 1	-	0	Unmodifiable	35305
U4-47	[PULSE 3] Output	0 to 1	-	0	Unmodifiable	35306
U4-51	STO activation	0: Enable 1: Disable	-	0	Unmodifiable	35304
U4-69	Output of NCMP module C	0 to 1	-	0	Unmodifiable	35106
U4-70	Output of NCMP module D	0 to 1	-	0	Unmodifiable	35107
U4-71	Output of NCMP module E	0 to 1	-	0	Unmodifiable	35108
U4-72	Limit flag of limiting module A	0 to 1	-	0	Unmodifiable	35102
U4-73	Limit flag of limiting module B	0 to 1	-	0	Unmodifiable	35103
U4-74	Limit flag of limiting module C	0 to 1	-	0	Unmodifiable	35104
U4-75	Limit flag of limiting module D	0 to 1	-	0	Unmodifiable	35105
U4-76	Output bit0 of word-to-bit conversion function 4	0 to 1	-	0	Unmodifiable	35070
U4-77	Output bit1 of word-to-bit conversion function 4	0 to 1	-	0	Unmodifiable	35071
U4-78	Output bit2 of word-to-bit conversion function 4	0 to 1	-	0	Unmodifiable	35072
U4-79	Output bit3 of word-to-bit conversion function 4	0 to 1	-	0	Unmodifiable	35073
U4-80	Output bit4 of word-to-bit conversion function 4	0 to 1	-	0	Unmodifiable	35074
U4-81	Output bit5 of word-to-bit conversion function 4	0 to 1	-	0	Unmodifiable	35075
U4-82	Output bit6 of word-to-bit conversion function 4	0 to 1	-	0	Unmodifiable	35076
U4-83	Output bit7 of word-to-bit conversion function 4	0 to 1	-	0	Unmodifiable	35077
U4-84	Output bit8 of word-to-bit conversion function 4	0 to 1	-	0	Unmodifiable	35078
U4-85	Output bit9 of word-to-bit conversion function 4	0 to 1	-	0	Unmodifiable	35079

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U4-86	Output bit10 of word-to-bit conversion function 4	0 to 1	-	0	Unmodifiable	35080
U4-87	Output bit11 of word-to-bit conversion function 4	0 to 1	-	0	Unmodifiable	35081
U4-88	Output bit12 of word-to-bit conversion function 4	0 to 1	-	0	Unmodifiable	35082
U4-89	Output bit13 of word-to-bit conversion function 4	0 to 1	-	0	Unmodifiable	35083
U4-90	Output bit14 of word-to-bit conversion function 4	0 to 1	-	0	Unmodifiable	35084
U4-91	Output bit15 of word-to-bit conversion function 4	0 to 1	-	0	Unmodifiable	35085
U4-92	Output of logic AND-OR module A	0 to 1	-	0	Unmodifiable	35094
U4-93	Output of logic AND-OR module B	0 to 1	-	0	Unmodifiable	35095
U4-94	Output of logic AND-OR module C	0 to 1	-	0	Unmodifiable	35096
U4-95	Output of logic AND-OR module D	0 to 1	-	0	Unmodifiable	35097
U4-96	Output of logic AND-OR module E	0 to 1	-	0	Unmodifiable	35098
U4-97	Output of logic AND-OR module F	0 to 1	-	0	Unmodifiable	35099
U4-98	Output of logic AND-OR module G	0 to 1	-	0	Unmodifiable	35100
U4-99	Output of logic AND-OR module H	0 to 1	-	0	Unmodifiable	35101
Group U5: Word connector 1						
U5-00	Actual motor speed (100 ms filter)	–800% to +800%	%	0	Unmodifiable	34057
U5-01	Output voltage (100 ms filter)	–800% to +800%	%	0	Unmodifiable	34058
U5-02	Output current (100 ms filter)	–800% to +800%	%	0	Unmodifiable	34059
U5-03	Motor mechanical output power (100 ms filter)	–800% to +800%	%	0	Unmodifiable	34060
U5-04	Output torque (100 ms filter)	–800% to +800%	%	0	Unmodifiable	34061
U5-05	DC bus voltage (100 ms filter)	0.0 to 6553.5	V	0	Unmodifiable	34348
U5-06	Detected motor temperature	–3276.8 to +3276.7	°C	0	Unmodifiable	33396

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U5-07	Measured module temperature	–32768 to +32767	°C	0	Unmodifiable	33397
U5-08	Max. power unit cavity temperature	–32768 to +32767	°C	0	Unmodifiable	33398
U5-09	Measured rectifier temperature	–32768 to +32767	°C	0	Unmodifiable	33399
U5-10	(Reserved)	0 to 65535	-	0	Unmodifiable	33400
U5-11	Encoder measuring angle	0 to 65535	-	0	Unmodifiable	33478
U5-12	Number of revolutions of encoder	0 to 65535	-	0	Unmodifiable	33479
U5-13	PTC resistance of motor temperature detection	0.0 to 6553.5	Ω	0	Unmodifiable	33511
U5-14	Detected temperature of encoder board 1 (reserved)	–32768 to +32767	-	0	Unmodifiable	33482
U5-15	Reserved	–32768 to +32767	-	0	Unmodifiable	33483
U5-16	Reserved	–32768 to +32767	-	0	Unmodifiable	33484
U5-17	Estimated motor temperature	–3276.8 to +3276.7	°C	0	Unmodifiable	34575
U5-18	AI1 input proportion	–800% to +800%	%	0	Unmodifiable	33401
U5-19	AI2 input proportion	–800% to +800%	%	0	Unmodifiable	33402
U5-20	HDI1 input proportion	–800% to +800%	%	0	Unmodifiable	33403
U5-21	HDI2 input proportion	–800% to +800%	%	0	Unmodifiable	33404
U5-22	AO1 output proportion	–800% to +800%	%	0	Unmodifiable	33405
U5-23	AO2 output proportion	–800% to +800%	%	0	Unmodifiable	33406
U5-24	HDO1 output proportion	–800% to +800%	%	0	Unmodifiable	33407
U5-25	HDO2 output proportion	–800% to +800%	%	0	Unmodifiable	33408
U5-26	Phase U current	–800% to +800%	%	0	Unmodifiable	34365
U5-27	Phase V current	–800% to +800%	%	0	Unmodifiable	34366
U5-28	Phase W current	–800% to +800%	%	0	Unmodifiable	34367

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U5-29	Phase U voltage	–800% to +800%	%	0	Unmodifiable	34372
U5-30	Phase V voltage	–800% to +800%	%	0	Unmodifiable	34373
U5-31	Phase W voltage	–800% to +800%	%	0	Unmodifiable	34374
U5-32	InoLink.PZD1	0x0000 to 0xFFFF	-	0	Unmodifiable	33409
U5-33	InoLink.PZD2	0x0000 to 0xFFFF	-	0	Unmodifiable	33410
U5-34	InoLink.PZD3	0x0000 to 0xFFFF	-	0	Unmodifiable	33411
U5-35	InoLink.PZD4	0x0000 to 0xFFFF	-	0	Unmodifiable	33412
U5-36	InoLink.PZD5	0x0000 to 0xFFFF	-	0	Unmodifiable	33413
U5-37	InoLink.PZD6	0x0000 to 0xFFFF	-	0	Unmodifiable	33414
U5-38	InoLink.PZD7	0x0000 to 0xFFFF	-	0	Unmodifiable	33415
U5-39	InoLink.PZD8	0x0000 to 0xFFFF	-	0	Unmodifiable	33416
U5-40	Modbus communication setpoint 1	0x0000 to 0xFFFF	-	0	Unmodifiable	33449
U5-41	Modbus communication setpoint 2	0x0000 to 0xFFFF	-	0	Unmodifiable	33450
U5-42	Reserved	0x0000 to 0xFFFF	-	0	Unmodifiable	33451
U5-43	Reserved	0x0000 to 0xFFFF	-	0	Unmodifiable	33452
U5-44	Fieldbus adapter A.PZD1	0x0000 to 0xFFFF	-	0	Unmodifiable	33417
U5-45	Fieldbus adapter A.PZD2	0x0000 to 0xFFFF	-	0	Unmodifiable	33418
U5-46	Fieldbus adapter A.PZD3	0x0000 to 0xFFFF	-	0	Unmodifiable	33419
U5-47	Fieldbus adapter A.PZD4	0x0000 to 0xFFFF	-	0	Unmodifiable	33420
U5-48	Fieldbus adapter A.PZD5	0x0000 to 0xFFFF	-	0	Unmodifiable	33421
U5-49	Fieldbus adapter A.PZD6	0x0000 to 0xFFFF	-	0	Unmodifiable	33422
U5-50	Fieldbus adapter A.PZD7	0x0000 to 0xFFFF	-	0	Unmodifiable	33423

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U5-51	Fieldbus adapter A.PZD8	0x0000 to 0xFFFF	-	0	Unmodifiable	33424
U5-52	Fieldbus adapter A.PZD9	0x0000 to 0xFFFF	-	0	Unmodifiable	33425
U5-53	Fieldbus adapter A.PZD10	0x0000 to 0xFFFF	-	0	Unmodifiable	33426
U5-54	Fieldbus adapter A.PZD11	0x0000 to 0xFFFF	-	0	Unmodifiable	33427
U5-55	Fieldbus adapter A.PZD12	0x0000 to 0xFFFF	-	0	Unmodifiable	33428
U5-56	Fieldbus adapter A.PZD13	0x0000 to 0xFFFF	-	0	Unmodifiable	33429
U5-57	Fieldbus adapter A.PZD14	0x0000 to 0xFFFF	-	0	Unmodifiable	33430
U5-58	Fieldbus adapter A.PZD15	0x0000 to 0xFFFF	-	0	Unmodifiable	33431
U5-59	Fieldbus adapter A.PZD16	0x0000 to 0xFFFF	-	0	Unmodifiable	33432
U5-60	Fieldbus adapter B.PZD1	0x0000 to 0xFFFF	-	0	Unmodifiable	33433
U5-61	Fieldbus adapter B.PZD2	0x0000 to 0xFFFF	-	0	Unmodifiable	33434
U5-62	Fieldbus adapter B.PZD3	0x0000 to 0xFFFF	-	0	Unmodifiable	33435
U5-63	Fieldbus adapter B.PZD4	0x0000 to 0xFFFF	-	0	Unmodifiable	33436
U5-64	Fieldbus adapter B.PZD5	0x0000 to 0xFFFF	-	0	Unmodifiable	33437
U5-65	Fieldbus adapter B.PZD6	0x0000 to 0xFFFF	-	0	Unmodifiable	33438
U5-66	Fieldbus adapter B.PZD7	0x0000 to 0xFFFF	-	0	Unmodifiable	33439
U5-67	Fieldbus adapter B.PZD8	0x0000 to 0xFFFF	-	0	Unmodifiable	33440
U5-68	Fieldbus adapter B.PZD9	0x0000 to 0xFFFF	-	0	Unmodifiable	33441
U5-69	Fieldbus adapter B.PZD10	0x0000 to 0xFFFF	-	0	Unmodifiable	33442
U5-70	Fieldbus adapter B.PZD11	0x0000 to 0xFFFF	-	0	Unmodifiable	33443
U5-71	Fieldbus adapter B.PZD12	0x0000 to 0xFFFF	-	0	Unmodifiable	33444
U5-72	Fieldbus adapter B.PZD13	0x0000 to 0xFFFF	-	0	Unmodifiable	33445

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U5-73	Fieldbus adapter B.PZD14	0x0000 to 0xFFFF	-	0	Unmodifiable	33446
U5-74	Fieldbus adapter B.PZD15	0x0000 to 0xFFFF	-	0	Unmodifiable	33447
U5-75	Fieldbus adapter B.PZD16	0x0000 to 0xFFFF	-	0	Unmodifiable	33448
U5-76	Output high word of DW2W 1	0x0000 to 0xFFFF	-	0	Unmodifiable	33453
U5-77	Output low word of DW2W 1	0x0000 to 0xFFFF	-	0	Unmodifiable	33454
U5-78	Output high word of DW2W 2	0x0000 to 0xFFFF	-	0	Unmodifiable	33455
U5-79	Output low word of DW2W 2	0x0000 to 0xFFFF	-	0	Unmodifiable	33456
U5-80	Output high word of DW2W 3	0x0000 to 0xFFFF	-	0	Unmodifiable	33457
U5-81	Output low word of DW2W 3	0x0000 to 0xFFFF	-	0	Unmodifiable	33458
U5-82	Output high word of DW2W 4	0x0000 to 0xFFFF	-	0	Unmodifiable	33459
U5-83	Output low word of DW2W 4	0x0000 to 0xFFFF	-	0	Unmodifiable	33460
U5-84	Output high word of DW2W 5	0x0000 to 0xFFFF	-	0	Unmodifiable	33461
U5-85	Output low word of DW2W 5	0x0000 to 0xFFFF	-	0	Unmodifiable	33462
U5-86	Output of bit-to-word function 1	0x0000 to 0xFFFF	-	0	Unmodifiable	33463
U5-87	Output of bit-to-word function 2	0x0000 to 0xFFFF	-	0	Unmodifiable	33464
U5-88	Output of bit-to-word function 3	0x0000 to 0xFFFF	-	0	Unmodifiable	33465
U5-89	Output of bit-to-word function 4	0x0000 to 0xFFFF	-	0	Unmodifiable	33466
U5-91	<I/O module 1> AI1 input proportion	–800% to +800%	%	0	Unmodifiable	33467
U5-92	<I/O module 1> AI2 input proportion	–800% to +800%	%	0	Unmodifiable	33470
U5-93	<I/O module 1> AI3 input proportion	–800% to +800%	%	0	Unmodifiable	33473
U5-94	<I/O module 2> AI1 input proportion	–800% to +800%	%	0	Unmodifiable	33468
U5-95	<I/O module 2> AI2 input proportion	–800% to +800%	%	0	Unmodifiable	33471

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U5-96	<I/O module 2> AI3 input proportion	–800% to +800%	%	0	Unmodifiable	33474
U5-97	<I/O module 3> AI1 input proportion	–800% to +800%	%	0	Unmodifiable	33469
U5-98	<I/O module 3> AI2 input proportion	–800% to +800%	%	0	Unmodifiable	33472
U5-99	<I/O module 3> AI3 input proportion	–800% to +800%	%	0	Unmodifiable	33475
Group U6: Word connector 2						
U6-00	Valid output current	–800% to +800%	%	0	Unmodifiable	34353
U6-01	Calculated output torque	–800% to +800%	%	0	Unmodifiable	34449
U6-02	Output voltage	–800% to +800%	%	0	Unmodifiable	34355
U6-03	Motor model output synchronous frequency	–800% to +800%	%	0	Unmodifiable	34534
U6-04	Motor model slip output	–800% to +800%	%	0	Unmodifiable	34535
U6-05	Motor model estimated speed	–800% to +800%	%	0	Unmodifiable	34536
U6-06	Frequency of field weakening point	–800% to +800%	%	0	Unmodifiable	34513
U6-07	[Torque control ramp] Main setpoint	–800% to +800%	%	0	Unmodifiable	35315
U6-08	Speed droop output	–800% to +800%	%	0	Unmodifiable	34505
U6-09	Speed deviation	–800% to +800%	%	0	Unmodifiable	34506
U6-10	Main setpoint of torque control	–800% to +800%	%	0	Unmodifiable	33497
U6-11	Main setpoint of torque control filter	–800% to +800%	%	0	Unmodifiable	33496
U6-12	Torque setpoint limited	–800% to +800%	%	0	Unmodifiable	34485
U6-13	Torque setpoint before additional torque	–800% to +800%	%	0	Unmodifiable	34487
U6-14	Max. output torque	–800% to +800%	%	0	Unmodifiable	34503
U6-15	Min. output torque	–800% to +800%	%	0	Unmodifiable	34504
U6-16	Positive torque limit value	–800% to +800%	%	0	Unmodifiable	34499

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U6-17	Negative torque limit value	–800% to +800%	%	0	Unmodifiable	34500
U6-18	Torque upper limit	–800% to +800%	%	0	Unmodifiable	33488
U6-19	Torque lower limit	–800% to +800%	%	0	Unmodifiable	33489
U6-20	Total additional torque	–800% to +800%	%	0	Unmodifiable	34507
U6-21	Friction torque	–800% to +800%	%	0	Unmodifiable	34508
U6-22	PID output upon speed governing	–800% to +800%	%	0	Unmodifiable	34489
U6-23	Automatic torque memory value	–800% to +800%	%	0	Unmodifiable	33498
U6-24	PID integral upon speed governing	–800% to +800%	%	0	Unmodifiable	34490
U6-25	RFG inertia compensation torque	–800% to +800%	%	0	Unmodifiable	33491
U6-26	Additional torque	–800% to +800%	%	0	Unmodifiable	33492
U6-27	Feedforward torque	–800% to +800%	%	0	Unmodifiable	34447
U6-28	Calculated load and friction torque	–800% to +800%	%	0	Unmodifiable	33493
U6-29	Torque setpoint unlimited	–800% to +800%	%	0	Unmodifiable	34488
U6-30	Calculated torque for overspeed adjustment	–800% to +800%	%	0	Unmodifiable	34501
U6-31	Final flux setpoint	–800% to +800%	%	0	Unmodifiable	34519
U6-32	Flux setpoint	–800% to +800%	%	0	Unmodifiable	34514
U6-33	Output value of flux curve	–800% to +800%	%	0	Unmodifiable	34516
U6-34	Flux setpoint after efficiency optimization	–800% to +800%	%	0	Unmodifiable	34517
U6-35	Flux curve filtered	–800% to +800%	%	0	Unmodifiable	34518
U6-36	Output value of field weakening controller	–800% to +800%	%	0	Unmodifiable	34515
U6-37	Flux detection value	–800% to +800%	%	0	Unmodifiable	34533
U6-38	Load observer output speed	–800% to +800%	%	0	Unmodifiable	34509

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U6-39	Load observer output torque	–800% to +800%	%	0	Unmodifiable	34510
U6-40	Exciting current setpoint	–800% to +800%	%	0	Unmodifiable	34544
U6-41	Torque current setpoint	–800% to +800%	%	0	Unmodifiable	34545
U6-42	Exciting current feedback	–800% to +800%	%	0	Unmodifiable	34370
U6-43	Torque current feedback	–800% to +800%	%	0	Unmodifiable	34371
U6-44	Speed loop torque current output	–800% to +800%	%	0	Unmodifiable	34486
U6-45	Exciting current setpoint of excitation module	–800% to +800%	%	0	Unmodifiable	34523
U6-46	Torque per ampere	0% to 1600%	%	0	Unmodifiable	34574
U6-47	Steady state component of exciting current setpoint	–800% to +800%	%	0	Unmodifiable	34520
U6-48	Differential of exciting current setpoint	–800% to +800%	%	0	Unmodifiable	34521
U6-49	Flux controller output	–800% to +800%	%	0	Unmodifiable	34522
U6-50	SVC additional current setpoint	–800% to +800%	%	0	Unmodifiable	34524
U6-51	Current model flux limit	–800% to +800%	%	0	Unmodifiable	34537
U6-52	Voltage model flux limit	–800% to +800%	%	0	Unmodifiable	34538
U6-53	Upper limit of torque current	–800% to +800%	%	0	Unmodifiable	34493
U6-54	Lower limit of torque current	–800% to +800%	%	0	Unmodifiable	34494
U6-55	Max. possible output current	0% to 1600%	%	0	Unmodifiable	33494
U6-56	Max. available torque current	–800% to +800%	%	0	Unmodifiable	34495
U6-57	Calculated torque current limit	–800% to +800%	%	0	Unmodifiable	34496
U6-58	Upper limit of power-limited current	–800% to +800%	%	0	Unmodifiable	34497
U6-59	Lower limit of power-limited current	–800% to +800%	%	0	Unmodifiable	34498
U6-60	SVC observation phase of synchronous motor	–32768 to +32767	-	0	Unmodifiable	34539

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U6-61	SVC observation speed of synchronous motor	–800% to +800%	%	0	Unmodifiable	34540
U6-62	Alpha current	–800% to +800%	%	0	Unmodifiable	34368
U6-63	Beta current	–800% to +800%	%	0	Unmodifiable	34369
U6-64	Voltage amplitude setpoint unlimited	–800% to +800%	%	0	Unmodifiable	34558
U6-65	Voltage amplitude setpoint limited	–800% to +800%	%	0	Unmodifiable	34559
U6-66	V/f voltage setpoint	0% to 1600%	%	0	Unmodifiable	33495
U6-67	PLL output phase	–32768 to +32767	-	0	Unmodifiable	34541
U6-68	PLL output frequency	–800% to +800%	%	0	Unmodifiable	34542
U6-69	ACR output of axis D	–800% to +800%	%	0	Unmodifiable	34550
U6-70	ACR integral of axis D	–800% to +800%	%	0	Unmodifiable	34553
U6-71	ACR output of axis Q	–800% to +800%	%	0	Unmodifiable	34551
U6-72	ACR integral of axis Q	–800% to +800%	%	0	Unmodifiable	34552
U6-73	PLL output voltage amplitude	–800% to +800%	%	0	Unmodifiable	34561
U6-74	Feedforward voltage of axis D	–800% to +800%	%	0	Unmodifiable	34554
U6-75	Feedforward voltage of axis Q	–800% to +800%	%	0	Unmodifiable	34555
U6-76	DC bus voltage	–3276.8 to +3276.7	V	0	Unmodifiable	34379
U6-77	Max. available voltage	–800% to +800%	%	0	Unmodifiable	34512
U6-78	Max. possible output voltage	–800% to +800%	%	0	Unmodifiable	34440
U6-79	Voltage setpoint of axis D	–800% to +800%	%	0	Unmodifiable	34556
U6-80	Voltage setpoint of axis Q	–800% to +800%	%	0	Unmodifiable	34557
U6-81	Feedback voltage of axis D	–800% to +800%	%	0	Unmodifiable	34377
U6-82	Feedback voltage of axis Q	–800% to +800%	%	0	Unmodifiable	34378

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U6-83	Alpha voltage	–800% to +800%	%	0	Unmodifiable	34375
U6-84	Beta voltage	–800% to +800%	%	0	Unmodifiable	34376
U6-85	Sampled phase U current	–32768 to +32767	-	0	Unmodifiable	34384
U6-86	Sampled phase V current	–32768 to +32767	-	0	Unmodifiable	34385
U6-87	Sampled phase W current	–32768 to +32767	-	0	Unmodifiable	34386
U6-88	Voltage angle	–32768 to +32767	-	0	Unmodifiable	34356
U6-89	Synchronous rotation angle	–32768 to +32767	-	0	Unmodifiable	34358
U6-90	Unfiltered encoder feedback speed	–800% to +800%	%	0	Unmodifiable	34480
U6-91	Current pole position of synchronous motor	–32768 to +32767	-	0	Unmodifiable	34571
U6-92	Modulation depth output	–800% to +800%	%	0	Unmodifiable	34388
U6-93	Z signal position	–32768 to +32767	-	0	Unmodifiable	34572
U6-94	Flux phase angle	–32768 to +32767	-	0	Unmodifiable	34532
U6-95	IGBT trigger delay compensation angle	–32768 to +32767	-	0	Unmodifiable	34360
U6-96	Valid phase angle of output voltage	–32768 to +32767	-	0	Unmodifiable	34359
U6-97	Current output angle	–32768 to +32767	-	0	Unmodifiable	34354
U6-98	Motor mechanical power	–3276.8 to +3276.7	kW	0	Unmodifiable	34435
U6-99	Active power output	–800% to +800%	%	0	Unmodifiable	34357
Group U7: Word connector 3						
U7-00	Fixed value 0%	0% to 1600%	%	0	Unmodifiable	33520
U7-01	Fixed value 100%	0% to 1600%	%	0	Unmodifiable	33521
U7-02	Fixed value 200%	0% to 1600%	%	0	Unmodifiable	33522
U7-03	Fixed value 400%	0% to 1600%	%	0	Unmodifiable	33523

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U7-04	Fixed value 600%	0% to 1600%	%	0	Unmodifiable	33524
U7-05	Fixed value –100%	–800% to +800%	%	0	Unmodifiable	33525
U7-06	Fixed value –200%	–800% to +800%	%	0	Unmodifiable	33526
U7-07	Fixed value –400%	–800% to +800%	%	0	Unmodifiable	33527
U7-08	Fixed value –600%	–800% to +800%	%	0	Unmodifiable	33528
U7-09	Module phase U temperature	–32768 to +32767	°C	0	Unmodifiable	33529
U7-10	Module phase V temperature	–32768 to +32767	°C	0	Unmodifiable	33530
U7-11	Module phase W temperature	–32768 to +32767	°C	0	Unmodifiable	33531
U7-12	Current state machine	0 to 65535	-	0	Unmodifiable	33532
U7-13	Last 2nd state machine	0 to 65535	-	0	Unmodifiable	33533
U7-14	Last 3rd state machine	0 to 65535	-	0	Unmodifiable	33534
U7-15	Last 4th state machine	0 to 65535	-	0	Unmodifiable	33535
U7-16	Last 5th state machine	0 to 65535	-	0	Unmodifiable	33536
U7-17	Last 6th state machine	0 to 65535	-	0	Unmodifiable	33537
U7-18	Last 7th state machine	0 to 65535	-	0	Unmodifiable	33538
U7-19	Last 8th state machine	0 to 65535	-	0	Unmodifiable	33539
U7-20	Last 9th state machine	0 to 65535	-	0	Unmodifiable	33540
U7-21	Last 10th state machine	0 to 65535	-	0	Unmodifiable	33541
U7-22	Motor self-test result	0 to 65535	-	0	Unmodifiable	33542
U7-23	Single-step status	0 to 65535	-	0	Unmodifiable	33543
U7-24	Motor auto-tuning method	0 to 65535	-	0	Unmodifiable	33544
U7-25	Motor auto-tuning state	0 to 65535	-	0	Unmodifiable	33545

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U7-26	Module that is processing the model parameter	0: Single 1: Module 01 2: Module 02 3: Module 03 4: Module 04 5: Module 05 6: Module 06 7: Module 07 8: Module 08 9: Module 09 10: Module 10	-	0	Unmodifiable	33547
U7-27	Single model code	0 to 65535	-	0	Unmodifiable	33546
U7-28	Model code of module 01	0 to 65535	-	0	Unmodifiable	33548
U7-29	Model code of module 02	0 to 65535	-	0	Unmodifiable	33549
U7-30	Model code of module 03	0 to 65535	-	0	Unmodifiable	33550
U7-31	Model code of module 04	0 to 65535	-	0	Unmodifiable	33551
U7-32	Model code of module 05	0 to 65535	-	0	Unmodifiable	33552
U7-33	Model code of module 06	0 to 65535	-	0	Unmodifiable	33553
U7-34	Model code of module 07	0 to 65535	-	0	Unmodifiable	33554
U7-35	Model code of module 08	0 to 65535	-	0	Unmodifiable	33555
U7-36	Model code of module 09	0 to 65535	-	0	Unmodifiable	33556
U7-37	Model code of module 10	0 to 65535	-	0	Unmodifiable	33557
U7-38	Reserved	0 to 65535	-	0	Unmodifiable	33558
U7-39	Reserved	0 to 65535	-	0	Unmodifiable	33559
U7-40	Reserved	0 to 65535	-	0	Unmodifiable	33560
U7-41	Reserved	0 to 65535	-	0	Unmodifiable	33561
U7-42	Reserved	0 to 65535	-	0	Unmodifiable	33562

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U7-43	Reserved	0 to 65535	-	0	Unmodifiable	33563
U7-44	Reserved	0 to 65535	-	0	Unmodifiable	33564
U7-45	Regenerative power limit value	0% to 1600%	%	0	Unmodifiable	33499
U7-46	Motoring power limit value	0% to 1600%	%	0	Unmodifiable	33500
U7-47	Output of constant setpoint 1	–800% to +800%	%	0	Unmodifiable	33514
U7-48	Output of constant setpoint 2	–800% to +800%	%	0	Unmodifiable	33515
U7-49	Output of constant setpoint 3	–800% to +800%	%	0	Unmodifiable	33516
U7-50	Output of constant setpoint 4	–800% to +800%	%	0	Unmodifiable	35316
U7-51	Output of constant setpoint 5	–800% to +800%	%	0	Unmodifiable	35317
U7-52	Power-on monitoring	0 to 65535	-	0	Unmodifiable	33519
U7-53	Target DC voltage	–3276.8 to +3276.7	-	0	Unmodifiable	35047
U7-54	Current setpoint of DC voltage	–3276.8 to +3276.7	-	0	Unmodifiable	35048
U7-55	OF sync expansion module.PZD1	0 to 65535	-	0	Unmodifiable	33622
U7-56	OF sync expansion module.PZD2	0 to 65535	-	0	Unmodifiable	33623
U7-57	OF sync expansion module.PZD3	0 to 65535	-	0	Unmodifiable	33624
U7-58	OF sync expansion module.PZD4	0 to 65535	-	0	Unmodifiable	33625
U7-59	OF sync expansion module.PZD5	0 to 65535	-	0	Unmodifiable	33626
U7-60	OF sync expansion module.PZD6	0 to 65535	-	0	Unmodifiable	33627
U7-61	OF sync expansion module.PZD7	0 to 65535	-	0	Unmodifiable	33628
U7-62	OF sync expansion module.PZD8	0 to 65535	-	0	Unmodifiable	33629
U7-65	Value of parameter monitoring parameter 1	0 to 65535	-	0	Unmodifiable	34816
U7-66	Value of parameter monitoring parameter 2	0 to 65535	-	0	Unmodifiable	34817

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U7-67	Value of parameter monitoring parameter 3	0 to 65535	-	0	Unmodifiable	34818
U7-68	Value of parameter monitoring parameter 4	0 to 65535	-	0	Unmodifiable	34819
U7-69	Value of parameter monitoring parameter 5	–32768 to +32767	-	0	Unmodifiable	34820
U7-70	Value of parameter monitoring parameter 6	–32768 to +32767	-	0	Unmodifiable	34821
U7-71	Value of parameter monitoring parameter 7	–32768 to +32767	-	0	Unmodifiable	34822
U7-72	Value of parameter monitoring parameter 8	–32768 to +32767	-	0	Unmodifiable	34823
U7-73	Value of parameter monitoring parameter 9	–32768 to +32767	-	0	Unmodifiable	34824
U7-74	Value of parameter monitoring parameter 10	–32768 to +32767	-	0	Unmodifiable	34825
U7-80	HINT module DI/DO status	0x0000 to 0xFFFF	-	0	Unmodifiable	34156
U7-90	Variable monitoring value 1	–32768 to +32767	-	0	Unmodifiable	33508
U7-91	Variable monitoring value 2	–32768 to +32767	-	0	Unmodifiable	33509
U7-92	Variable monitoring value 3	–32768 to +32767	-	0	Unmodifiable	33510
U7-93	Voltage upper limit in DC regulator mode	–3276.8 to +3276.7	V	0	Unmodifiable	35049
U7-94	Voltage lower limit in DC regulator mode	–3276.8 to +3276.7	V	0	Unmodifiable	35050
U7-96	Online module provided with the STO function	0x0000 to 0xFFFF	-	0	Unmodifiable	33772
U7-97	Online module with activated STO	0x0000 to 0xFFFF	-	0	Unmodifiable	33773
U7-98	STO input terminal status of current module	0: STO1/STO2 not activated 1: STO1 activated 2: STO2 activated 3: STO1/STO2 activated	-	0	Unmodifiable	33480
U7-99	CODE_K0250	0x0000 to 0xFFFF	-	0	Unmodifiable	33513
Group U8: Word connector 4						

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U8-00	Current state machine	1: System initialization 2: Power-on check 3: Fault 4: Switch-on inhibited 5: Ready to switch on 6: Pre-charging 7: Ready to run 8: Waiting for demagnetization 9: Detection before running 10: Pre-excitation 11: Flying start 12: Running 13: OFF1 stop 14: OFF3 stop 15: DC injection braking at startup 16: Ready for self-test 17: Self-test 18: Ready for auto-tuning 19: Auto-tuning 20: Parameter restoration 21: Parameter download 22: Jogging 23: Jog stop 24: Stop with running permission 25: DC injection braking at stop 26: Waiting for DC injection braking at stop 27: Stop at fault 28: Motor parameter calculation 29: Switchover between speed control and torque control 30: Waiting for heat dissipation 31: Wait before operation	-	0	Unmodifiable	32768
U8-01	Active MDS	0: Motor 1 1: Motor 2 2: Motor 3 3: Motor 4	-	0	Unmodifiable	32894
U8-02	Active BDS	0: Command channel 1 1: Command channel 2	-	0	Unmodifiable	32895

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U8-03	Current RFG	0 to 65535	-	0	Unmodifiable	33570
U8-04	Current fault code	0 to 65535	-	0	Unmodifiable	33571
U8-05	Active limit code	0 to 65535	-	0	Unmodifiable	33572
U8-06	Current alarm code	0 to 65535	-	0	Unmodifiable	33573
U8-07	Control word 1	0x0000 to 0xFFFF	-	0	Unmodifiable	33574
U8-08	Control word 2	0x0000 to 0xFFFF	-	0	Unmodifiable	33575
U8-09	Status word 1	0x0000 to 0xFFFF	-	0	Unmodifiable	33576
U8-10	Status word 2	0x0000 to 0xFFFF	-	0	Unmodifiable	33577
U8-11	Terminal start/stop control word	0x0000 to 0xFFFF	-	0	Unmodifiable	33578
U8-12	SOP-20 start/stop control word	0x0000 to 0xFFFF	-	0	Unmodifiable	33579
U8-13	PC start/stop control word	0x0000 to 0xFFFF	-	0	Unmodifiable	33580
U8-14	User-defined start/stop control word	0x0000 to 0xFFFF	-	0	Unmodifiable	33581
U8-15	Reserved	0 to 65535	-	0	Unmodifiable	33582
U8-16	Reserved	0 to 65535	-	0	Unmodifiable	33583
U8-17	DI status	0x0000 to 0xFFFF	-	0	Unmodifiable	33584
U8-18	DO status	0x0000 to 0xFFFF	-	0	Unmodifiable	33585
U8-19	Encoder measuring revolutions (reserved)	0 to 65535	-	0	Unmodifiable	33586
U8-20	User-defined error word 1	0x0000 to 0xFFFF	-	0	Unmodifiable	34914
U8-21	User-defined error word 2	0x0000 to 0xFFFF	-	0	Unmodifiable	34915
U8-22	AI1 input value	–32768 to +32767	-	0	Unmodifiable	33589
U8-23	AI2 input value	–32768 to +32767	-	0	Unmodifiable	33590
U8-24	HDI1 input value	0 to 65535	-	0	Unmodifiable	33591

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U8-25	HDI2 input value	0 to 65535	-	0	Unmodifiable	33592
U8-26	AO1 output value	0 to 65535	-	0	Unmodifiable	33593
U8-27	AO2 output value	0 to 65535	-	0	Unmodifiable	33594
U8-28	HDO1 output value	0 to 65535	-	0	Unmodifiable	33595
U8-29	HDO2 output value	0 to 65535	-	0	Unmodifiable	33596
U8-30	Angle processing status word	0x0000 to 0xFFFF	-	0	Unmodifiable	34570
U8-31	Switchover frequency on single and double IGBT triggers	–32768 to +32767	-	0	Unmodifiable	34400
U8-33	Motor phase sequence switchover state	0 to 65535	-	0	Unmodifiable	34461
U8-34	Subcode of current fault	0 to 65535	-	0	Unmodifiable	36303
U8-35	Subcode of active limit	0 to 65535	-	0	Unmodifiable	36304
U8-36	Subcode of current alarm	0 to 65535	-	0	Unmodifiable	36305
U8-39	Single module HINT status word 1/ Parallel module master fault word 1	0x0000 to 0xFFFF	-	0	Unmodifiable	33606
U8-40	Single module HINT status word 2/ Parallel module master fault word 2	0x0000 to 0xFFFF	-	0	Unmodifiable	33607
U8-41	Fieldbus adapter A communication error count	0 to 65535	-	0	Unmodifiable	33608
U8-42	Fieldbus adapter B communication error count	0 to 65535	-	0	Unmodifiable	33609
U8-43	Fieldbus adapter C communication error count	0 to 65535	-	0	Unmodifiable	33610

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U8-44	Parameter setting error code	0: Parameter settings are correct. 1: The pulse-by-pulse current limit counts conflict. 2: The minimum and maximum values of the motor-driven potentiometer conflict. 3: RFG arc time 1 and acceleration time 1 conflict. 4: RFG arc time 1 and deceleration time 1 conflict. 5: RFG arc time 2 and acceleration time 2 conflict. 6: RFG arc time 2 and deceleration time 2 conflict. 7: RFG arc time 3 and acceleration time 3 conflict. 8: RFG arc time 3 and deceleration time 3 conflict. 9: RFG arc time 4 and acceleration time 4 conflict. 10: RFG arc time 4 and deceleration time 4 conflict.	-	0	Unmodifiable	33481
U8-44	Parameter setting error code	11: The maximum and minimum motor speeds conflict. 12: The lower and upper limits of skip frequency 1 conflict. 13: The lower and upper limits of skip frequency 2 conflict. 14: The lower and upper limits of torque limit digital setting conflict. 15: The lower and upper limits of speed loop Kp adaptive switchover conflict. 16: The lower frequency and upper frequency of speed loop switchover conflict. 17: The lower and upper limits of current loop proportion adaptive switchover conflict. 18: The lower frequency and upper frequency of model switchover conflict. 19: The lower frequency and upper frequency of FVC-to-SVC switchover conflict.	-	0	Unmodifiable	33481

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U8-44	Parameter setting error code	20: The minimum and maximum input values of AI1 curve conflict. 21: The minimum and maximum input values of AI2 curve conflict. 22: The minimum and maximum output proportions of AO1 curve conflict. 23: The minimum and maximum output proportions of AO2 curve conflict. 24: The minimum and maximum input proportions of HDI1 curve conflict. 25: The minimum and maximum input proportions of HDI2 curve conflict.	-	0	Unmodifiable	33481
U8-44	Parameter setting error code	26: The minimum and maximum output proportions of HDO1 curve conflict. 27: The minimum and maximum output proportions of HDO2 curve conflict. 28: The slot number of the communication module selected for fieldbus adapter A is not set. 29: The slot number of the communication module selected for fieldbus adapter B is not set. 30: The AC drive calibrated rated current is greater than 6 times the rated motor current.	-	0	Unmodifiable	33481

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U8-44	Parameter setting error code	31: The fault reset interval is greater than the time for clearing reset attempts. 32: The encoder module slot settings conflict. 33: The I/O expansion module slot settings conflict. 34: The fault error processing level settings conflict. 35: The frequency point of multi-point V/f curve is not incremental. 36: The X point of multi-point curve module A is not incremental. 37: The X point of multi-point curve module B is not incremental. 38: The brake enable threshold is incorrectly set. 39: The number of channels of the trigger oscilloscope (A12.20) is more than 8 during ADC cycle operation. 40: The AO1 reference signal source and motor temperature detection conflict. 41: The AO2 reference signal source and motor temperature detection conflict. 42: The function block execution sequences conflict. For details, see the parameters P9-00 to P9-03.	-	0	Unmodifiable	33481

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U8-44	Parameter setting error code	43: The X point of user-defined multi-point curve module is not incremental. 44: The brake full open point is incorrectly set. 45: The start/stop control word is fieldbus adapter. However, the DP data check bit (N16.10) is not bit10. 46: The parallel function is enabled (A15.00) but the number of enabled unit modules is 0. 47: Parameter settings of the I/O expansion module 1 (min. input of AI curve > max. input of AI curve, or min. output proportion of AO curve > max. output proportion of AO curve) conflict. 48: Parameter settings of the I/O expansion module 2 (min. input of AI curve > max. input of AI curve, or min. output proportion of AO curve > max. output proportion of AO curve) conflict. 49: Parameter settings of the I/O expansion module 3 (min. input of AI curve > max. input of AI curve, or min. output proportion of AO curve > max. output proportion of AO curve) conflict. 50: The forward current limit curve is incorrectly set (the voltage/current point is not incremental).	-	0	Unmodifiable	33481

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U8-44	Parameter setting error code	51: The low-voltage side current feedforward function is inactive (the current sampling channel is not set, and the corresponding current feedforward function is enabled). 52: The low-voltage side voltage detection source is not set. 53: The HSVM module corresponding to the low-voltage side voltage detection source is not set. 54: The HSVM module corresponding to the low-voltage side load voltage detection source is not set. 55: The HSVM module corresponding to the low-voltage side load current detection source is not set. 56: The HSVM module corresponding to the high-voltage side load current detection source is not set.	-	0	Unmodifiable	33481
U8-44	Parameter setting error code	57: The voltage point for low-voltage side undervoltage/overvoltage protection is not incremental. 60: The voltage point for the high-voltage side voltage stabilizer function is not incremental. 61: The low-voltage side voltage reference lower and upper limits of setpoint channel 1 conflict. 62: The high-voltage side voltage reference lower and upper limits of setpoint channel 1 conflict. 63: The low-voltage side voltage reference lower and upper limits of setpoint channel 2 conflict. 64: The high-voltage side voltage reference lower and upper limits of setpoint channel 2 conflict. 65: The high-voltage side current feedforward function is inactive (the current sampling channel is not set, and the corresponding current feedforward function is enabled or current feedforward function is not supported by sampling card).	-	0	Unmodifiable	33481

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U8-44	Parameter setting error code	66: The low-voltage side voltage detection source and the low-voltage side load voltage detection source conflict. 67: The low-voltage side load current detection source and the high-voltage side load current detection source conflict. 68: The read index settings of address mapping adapter A conflict. 69: The write index settings of address mapping adapter A conflict. 70: The write mapping internal address settings of address mapping adapter A conflict. 71: The read index settings of address mapping adapter B conflict. 72: The write index settings of address mapping adapter B conflict. 73: The write mapping internal address settings of address mapping adapter B conflict. 74: The write mapping internal address settings between address mapping adapters A and B conflict. 75: The DeviceNet module I/O quantity exceeds the maximum. 77: The card type of the user-defined communication card is incorrect.	-	0	Unmodifiable	33481

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U8-44	Parameter setting error code	78: The back EMF corresponding to the maximum speed of synchronous motor is too high. High-speed wave may damage the AC drive. If there are protective measures, H0-41 can be set to disable the alarm. 79: The setpoint of the maximum motor speed d0-06 exceeds the maximum allowable output of the current carrier frequency. Please increase the carrier frequency A4-02 or A4-40 (when A4-36 is 1), or reduce the minimum carrier frequency ratio A4-41. 80: The minimum carrier frequency ratio limit A4-41 is smaller than the minimum value allowed by the system. 81: The minimum input frequency of the frequency/torque curve in group n32 conflicts with the maximum input frequency. 82: d0-00 is set to synchronous motor and the control mode is set to V/f, but the synchronous motor actually runs in the SVC control mode. 90: The setting of position synchronous control is the same as that of feedback source.	-	0	Unmodifiable	33481

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U8-44	Parameter setting error code	91: The start position of multi-position reference is greater than the end position. 92: The position setpoint exceeds the maximum representation range. 93: The position feedback exceeds the maximum representation range. 94: The negative software limit is greater than the positive software limit. 95: The speed of each point in the load monitoring curve in group L15 is not incremental. 96: The underload point of the load monitoring curve in group L15 is greater than or equal to the overload point. 97: InoLink data interaction is too large. 98: The upper limit of limit module A conflicts with the lower limit. 99: The upper limit of limit module B conflicts with the lower limit. 100: The upper limit of limit module C conflicts with the lower limit.	-	0	Unmodifiable	33481

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U8-44	Parameter setting error code	101: The upper limit of limit module D conflicts with the lower limit. 501: The pole pairs of the motor are set incorrectly. 502: Parameter setting on motor nameplate is incorrect. Please check whether the rated voltage, current, and power are set correctly. 503: No-load current of asynchronous motor is too large. Please check the motor parameters and auto-tune all motor parameters. 504: Rated flux is incorrect. Check whether the mutual inductance or no-load current is correct. 505: The rotor resistance of asynchronous motor is abnormal or the rated speed setting is incorrect (d0-05 or d0-04 is set incorrectly). 506: The field weakening curve of asynchronous motor is abnormal. 507: The number of pole pairs of resolver does not match the number of motor pole pairs. The number of motor pole pairs must be an integer multiple of the number of pole pairs of resolver.	-	0	Unmodifiable	33481
U8-45	Carrier frequency (internal)	0 to 65535	-	0	Unmodifiable	34393
U8-46	Carrier cycle (internal)	0 to 65535	-	0	Unmodifiable	34394
U8-47	Phase U PWM comparison value (internal)	0 to 65535	-	0	Unmodifiable	34390
U8-48	Phase V PWM comparison value (internal)	0 to 65535	-	0	Unmodifiable	34391
U8-49	Phase W PWM comparison value (internal)	0 to 65535	-	0	Unmodifiable	34392
U8-50	Phase U dead zone compensation value (internal)	–32768 to +32767	-	0	Unmodifiable	34395
U8-51	Phase V dead zone compensation value (internal)	–32768 to +32767	-	0	Unmodifiable	34396
U8-52	Phase W dead zone compensation value (internal)	–32768 to +32767	-	0	Unmodifiable	34397
U8-53	Device status word (internal)	0x0000 to 0xFFFF	-	0	Unmodifiable	34336

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U8-54	Program control status word (internal)	0x0000 to 0xFFFF	-	0	Unmodifiable	34337
U8-55	Device protection status word (internal)	0x0000 to 0xFFFF	-	0	Unmodifiable	34404
U8-56	Motor main status word (internal)	0x0000 to 0xFFFF	-	0	Unmodifiable	34431
U8-57	Motor auxiliary status word (internal)	0x0000 to 0xFFFF	-	0	Unmodifiable	34432
U8-58	Motor protection status word (internal)	0x0000 to 0xFFFF	-	0	Unmodifiable	34464
U8-59	Speed controller status word (internal)	0x0000 to 0xFFFF	-	0	Unmodifiable	34484
U8-60	Vdc control status word (internal)	0x0000 to 0xFFFF	-	0	Unmodifiable	34502
U8-61	Excitation control status word (internal)	0x0000 to 0xFFFF	-	0	Unmodifiable	34511
U8-62	Motor model status word (internal)	0x0000 to 0xFFFF	-	0	Unmodifiable	34531
U8-63	Current loop status word (internal)	0x0000 to 0xFFFF	-	0	Unmodifiable	34543
U8-64	Drive main status word (internal)	0x0000 to 0xFFFF	-	0	Unmodifiable	34398
U8-65	Drive auxiliary status word (internal)	0x0000 to 0xFFFF	-	0	Unmodifiable	34399
U8-66	V/f control status word (internal)	0x0000 to 0xFFFF	-	0	Unmodifiable	34579
U8-67	Speed controller proportion coefficient (internal)	0 to 65535	-	0	Unmodifiable	34491
U8-68	Speed controller integral coefficient (internal)	0 to 65535	-	0	Unmodifiable	34492
U8-69	Proportional gain of application current loop (internal)	0 to 65535	-	0	Unmodifiable	34548
U8-70	Integral time of application current loop (internal)	0 to 65535	-	0	Unmodifiable	34549
U8-71	Fieldbus adapter A communication status	0x0000 to 0xFFFF	-	0	Unmodifiable	33611
U8-72	Fieldbus adapter B communication status	0x0000 to 0xFFFF	-	0	Unmodifiable	33612
U8-73	Fieldbus adapter C communication status	0x0000 to 0xFFFF	-	0	Unmodifiable	33613
U8-74	Status word of FPGA main control operation status control	0x0000 to 0xFFFF	-	0	Unmodifiable	33615
U8-75	Fault word 1 of FPGA main control operation status control	0x0000 to 0xFFFF	-	0	Unmodifiable	33616

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U8-76	Fault word 2 of FPGA main control operation status control	0x0000 to 0xFFFF	-	0	Unmodifiable	33617
U8-77	Raw value of encoder pulse count (FPGA-4-frequency multiplication)	0 to 65535	-	0	Unmodifiable	33618
U8-78	Low word of FPGA time	0 to 65535	-	0	Unmodifiable	33619
U8-79	High word of FPGA time	0 to 65535	-	0	Unmodifiable	33620
U8-80	[Imax controller] Frequency adjustment	–32768 to +32767	-	0	Unmodifiable	34580
U8-81	[Imax controller] Voltage adjustment	–32768 to +32767	-	0	Unmodifiable	34581
U8-82	Over-excitation output voltage adjustment	–32768 to +32767	-	0	Unmodifiable	34582
U8-83	Undervoltage suppression frequency adjustment	–32768 to +32767	-	0	Unmodifiable	34583
U8-84	Overvoltage suppression frequency adjustment	–32768 to +32767	-	0	Unmodifiable	34584
U8-85	Overvoltage suppression voltage adjustment	–32768 to +32767	-	0	Unmodifiable	34585
U8-86	Frequency compensation for slip compensation	–32768 to +32767	-	0	Unmodifiable	34586
U8-87	Voltage compensation for torque boost	–32768 to +32767	-	0	Unmodifiable	34587
U8-88	V/f output voltage after energy-saving control	–32768 to +32767	-	0	Unmodifiable	34588
U8-89	Oscillation suppression frequency superposition	–32768 to +32767	-	0	Unmodifiable	34589
U8-90	Monitoring variable 1	–32768 to +32767	-	0	Unmodifiable	34415
U8-91	Monitoring variable 2	–32768 to +32767	-	0	Unmodifiable	34416
U8-92	Monitoring variable 3	–32768 to +32767	-	0	Unmodifiable	34417
U8-93	Monitoring variable 4	–32768 to +32767	-	0	Unmodifiable	34418
U8-94	Monitoring variable 5	–32768 to +32767	-	0	Unmodifiable	34419
U8-95	Monitoring variable 6	–32768 to +32767	-	0	Unmodifiable	34420
U8-96	Monitoring variable 7	–32768 to +32767	-	0	Unmodifiable	34421

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U8-97	Monitoring variable 8	–32768 to +32767	-	0	Unmodifiable	34422
U8-98	Monitoring variable 9	–32768 to +32767	-	0	Unmodifiable	34423
U8-99	Monitoring variable 10	–32768 to +32767	-	0	Unmodifiable	34424
Group U9: Double-word connector 1						
U9-00	Actual motor speed	–800% to +800%	%	0	Unmodifiable	34702
U9-01	Final motor speed setpoint	–800% to +800%	%	0	Unmodifiable	34700
U9-02	Main speed setpoint	–800% to +800%	%	0	Unmodifiable	33630
U9-03	Auxiliary speed setpoint	–800% to +800%	%	0	Unmodifiable	33632
U9-04	Speed setpoint before forward/reverse rotation limiting	–800% to +800%	%	0	Unmodifiable	33634
U9-05	Speed setpoint before amplitude limiting	–800% to +800%	%	0	Unmodifiable	33636
U9-06	Speed setpoint after amplitude limiting	–800% to +800%	%	0	Unmodifiable	33638
U9-07	Speed setpoint after limiting	–800% to +800%	%	0	Unmodifiable	33640
U9-08	RFG input speed setpoint	–800% to +800%	%	0	Unmodifiable	33642
U9-09	RFG output speed setpoint	–800% to +800%	%	0	Unmodifiable	33644
U9-10	Additional speed reference	–800% to +800%	%	0	Unmodifiable	33646
U9-11	Speed setpoint superposed	–800% to +800%	%	0	Unmodifiable	33648
U9-12	Encoder pulse count position value (4-frequency multiplication)	–2147483648 to +2147483647	-	0	Unmodifiable	33774
U9-13	Filtered speed setpoint	–800% to +800%	%	0	Unmodifiable	34716
U9-14	Filtered speed feedback	–800% to +800%	%	0	Unmodifiable	34718
U9-15	Band-stop filtered speed feedback	–800% to +800%	%	0	Unmodifiable	34706
U9-16	Reserved	–2147483648 to +2147483647	-	0	Unmodifiable	34814
U9-17	Reserved	–2147483648 to +2147483647	-	0	Unmodifiable	34814

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U9-18	Max. positive speed	–800% to +800%	%	0	Unmodifiable	33650
U9-19	Max. negative speed	–800% to +800%	%	0	Unmodifiable	33652
U9-20	Encoder feedback speed	–800% to +800%	%	0	Unmodifiable	34708
U9-21	Calculated voltage model speed	–800% to +800%	%	0	Unmodifiable	34704
U9-22	Reserved	–2147483648 to +2147483647	-	0	Unmodifiable	34814
U9-23	Synchronous speed	–800% to +800%	%	0	Unmodifiable	34698
U9-24	Speed setpoint from keypad control	–800% to +800%	%	0	Unmodifiable	33654
U9-25	Speed setpoint from PC control	–800% to +800%	%	0	Unmodifiable	33656
U9-26	Output of W2DW 4	–800% to +800%	%	0	Unmodifiable	33776
U9-27	Output of W2DW 5	–800% to +800%	%	0	Unmodifiable	33778
U9-29	Motor-driven potentiometer output	–800% to +800%	%	0	Unmodifiable	33658
U9-30	Multi-reference selection output	–800% to +800%	%	0	Unmodifiable	33660
U9-31	Multi-reference value 1	–800% to +800%	%	0	Unmodifiable	33662
U9-32	Multi-reference value 2	–800% to +800%	%	0	Unmodifiable	33664
U9-33	Multi-reference value 3	–800% to +800%	%	0	Unmodifiable	33666
U9-34	Multi-reference value 4	–800% to +800%	%	0	Unmodifiable	33668
U9-35	Multi-reference value 5	–800% to +800%	%	0	Unmodifiable	33670
U9-36	Multi-reference value 6	–800% to +800%	%	0	Unmodifiable	33672
U9-37	Multi-reference value 7	–800% to +800%	%	0	Unmodifiable	33674
U9-38	Multi-reference value 8	–800% to +800%	%	0	Unmodifiable	33676
U9-39	Multi-reference value 9	–800% to +800%	%	0	Unmodifiable	33678
U9-40	Multi-reference value 10	–800% to +800%	%	0	Unmodifiable	33680

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U9-41	Multi-reference value 11	–800% to +800%	%	0	Unmodifiable	33682
U9-42	Multi-reference value 12	–800% to +800%	%	0	Unmodifiable	33684
U9-43	Multi-reference value 13	–800% to +800%	%	0	Unmodifiable	33686
U9-44	Multi-reference value 14	–800% to +800%	%	0	Unmodifiable	33688
U9-45	Multi-reference value 15	–800% to +800%	%	0	Unmodifiable	33690
U9-46	Multi-reference value 16	–800% to +800%	%	0	Unmodifiable	33692
U9-47	Output of W2DW 1	–800% to +800%	%	0	Unmodifiable	33694
U9-48	Output of W2DW 2	–800% to +800%	%	0	Unmodifiable	33696
U9-49	Output of W2DW 3	–800% to +800%	%	0	Unmodifiable	33698
U9-50	Modbus communication double-word setpoint	–800% to +800%	%	0	Unmodifiable	33700
U9-51	Output of constant setpoint 6	–800% to +800%	%	0	Unmodifiable	35318
U9-52	Output of constant setpoint 7	–800% to +800%	%	0	Unmodifiable	35320
U9-53	Output of constant setpoint 8	–800% to +800%	%	0	Unmodifiable	35322
U9-54	Output of constant setpoint 9	–800% to +800%	%	0	Unmodifiable	35324
U9-55	Output of constant setpoint 10	–800% to +800%	%	0	Unmodifiable	35326
U9-56	RFG acceleration rate	–2147483648 to +2147483647	-	0	Unmodifiable	33712
U9-57	Motor rotor angle setpoint (internal)	–2147483648 to +2147483647	-	0	Unmodifiable	34710
U9-58	Motor rotor feedback angle (internal)	–2147483648 to +2147483647	-	0	Unmodifiable	34712
U9-59	Carrier cycle change angle step (internal)	–2147483648 to +2147483647	-	0	Unmodifiable	34714
U9-60	PID input deviation (before additional deviation)	–800% to +800%	%	0	Unmodifiable	34066
U9-61	PID input deviation (after additional deviation)	–800% to +800%	%	0	Unmodifiable	34068
U9-62	PID proportional component	–800% to +800%	%	0	Unmodifiable	34070

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U9-63	PID integral component	–800% to +800%	%	0	Unmodifiable	34072
U9-64	PID differential component	–800% to +800%	%	0	Unmodifiable	34074
U9-65	PID output (before amplitude limiting)	–800% to +800%	%	0	Unmodifiable	34076
U9-66	PID output (after amplitude limiting)	–800% to +800%	%	0	Unmodifiable	34078
U9-67	Output of numeric switch module A	–800% to +800%	%	0	Unmodifiable	33716
U9-68	Output of numeric switch module B	–800% to +800%	%	0	Unmodifiable	33718
U9-69	Output of filter module A	–800% to +800%	%	0	Unmodifiable	33720
U9-70	Output of filter module B	–800% to +800%	%	0	Unmodifiable	33722
U9-71	Output of filter module C	–800% to +800%	%	0	Unmodifiable	33724
U9-72	Output of filter module D	–800% to +800%	%	0	Unmodifiable	33726
U9-73	Output of absolute value module A	–800% to +800%	%	0	Unmodifiable	33728
U9-74	Output of absolute value module B	–800% to +800%	%	0	Unmodifiable	33730
U9-75	Output of absolute value module C	–800% to +800%	%	0	Unmodifiable	33732
U9-76	Output of absolute value module D	–800% to +800%	%	0	Unmodifiable	33734
U9-77	Output of ADD_SUB module A	–800% to +800%	%	0	Unmodifiable	33736
U9-78	Output of ADD_SUB module B	–800% to +800%	%	0	Unmodifiable	33738
U9-79	Output of ADD_SUB module C	–800% to +800%	%	0	Unmodifiable	33740
U9-80	Output of ADD_SUB module D	–800% to +800%	%	0	Unmodifiable	33742
U9-81	Output of MUL_DIV module A	–800% to +800%	%	0	Unmodifiable	33744
U9-82	Output of MUL_DIV module B	–800% to +800%	%	0	Unmodifiable	33746
U9-83	Output of MUL_DIV module C	–800% to +800%	%	0	Unmodifiable	33748
U9-84	Output of MUL_DIV module D	–800% to +800%	%	0	Unmodifiable	33750

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U9-85	Output of multi-point curve module A	–800% to +800%	%	0	Unmodifiable	33752
U9-86	Output of multi-point curve module B	–800% to +800%	%	0	Unmodifiable	33754
U9-87	Output of numeric switch module C	–800% to +800%	%	0	Unmodifiable	35110
U9-88	Output of numeric switch module D	–800% to +800%	%	0	Unmodifiable	35112
U9-89	Output of numeric switch module E	–800% to +800%	%	0	Unmodifiable	35114
U9-90	Output of limiting module A	–800% to +800%	%	0	Unmodifiable	35086
U9-91	Output of limiting module B	–800% to +800%	%	0	Unmodifiable	35088
U9-92	Output of limiting module C	–800% to +800%	%	0	Unmodifiable	35090
U9-93	Output of limiting module D	–800% to +800%	%	0	Unmodifiable	35092
U9-94	Current power-on duration	0 to 4294967295	s	0	Unmodifiable	33764
U9-95	Current running duration	0 to 4294967295	s	0	Unmodifiable	33766
U9-96	Accumulative power-on duration	0 to 4294967295	s	0	Unmodifiable	33768
U9-97	Accumulative running duration	0 to 4294967295	s	0	Unmodifiable	33770
U9-98	Double word variable monitoring value 1	0x80000000 to 0x7FFFFFFF	-	0	Unmodifiable	33756
U9-99	Double word variable monitoring value 2	0x80000000 to 0x7FFFFFFF	-	0	Unmodifiable	33758
Group U10: Bit connector 6						
U10-00	[User-defined W2B 1] Output bit0	0 to 1	-	0	Unmodifiable	35628
U10-01	[User-defined W2B 1] Output bit1	0 to 1	-	0	Unmodifiable	35629
U10-02	[User-defined W2B 1] Output bit2	0 to 1	-	0	Unmodifiable	35630
U10-03	[User-defined W2B 1] Output bit3	0 to 1	-	0	Unmodifiable	35631
U10-04	[User-defined W2B 1] Output bit4	0 to 1	-	0	Unmodifiable	35632
U10-05	[User-defined W2B 1] Output bit5	0 to 1	-	0	Unmodifiable	35633

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U10-06	[User-defined W2B 1] Output bit6	0 to 1	-	0	Unmodifiable	35634
U10-07	[User-defined W2B 1] Output bit7	0 to 1	-	0	Unmodifiable	35635
U10-08	[User-defined W2B 1] Output bit8	0 to 1	-	0	Unmodifiable	35636
U10-09	[User-defined W2B 1] Output bit9	0 to 1	-	0	Unmodifiable	35637
U10-10	[User-defined W2B 1] Output bit10	0 to 1	-	0	Unmodifiable	35638
U10-11	[User-defined W2B 1] Output bit11	0 to 1	-	0	Unmodifiable	35639
U10-12	[User-defined W2B 1] Output bit12	0 to 1	-	0	Unmodifiable	35640
U10-13	[User-defined W2B 1] Output bit13	0 to 1	-	0	Unmodifiable	35641
U10-14	[User-defined W2B 1] Output bit14	0 to 1	-	0	Unmodifiable	35642
U10-15	[User-defined W2B 1] Output bit15	0 to 1	-	0	Unmodifiable	35643
U10-16	[User-defined W2B 2] Output bit0	0 to 1	-	0	Unmodifiable	35644
U10-17	[User-defined W2B 2] Output bit1	0 to 1	-	0	Unmodifiable	35645
U10-18	[User-defined W2B 2] Output bit2	0 to 1	-	0	Unmodifiable	35646
U10-19	[User-defined W2B 2] Output bit3	0 to 1	-	0	Unmodifiable	35647
U10-20	[User-defined W2B 2] Output bit4	0 to 1	-	0	Unmodifiable	35648
U10-21	[User-defined W2B 2] Output bit5	0 to 1	-	0	Unmodifiable	35649
U10-22	[User-defined W2B 2] Output bit6	0 to 1	-	0	Unmodifiable	35650
U10-23	[User-defined W2B 2] Output bit7	0 to 1	-	0	Unmodifiable	35651
U10-24	[User-defined W2B 2] Output bit8	0 to 1	-	0	Unmodifiable	35652
U10-25	[User-defined W2B 2] Output bit9	0 to 1	-	0	Unmodifiable	35653
U10-26	[User-defined W2B 2] Output bit10	0 to 1	-	0	Unmodifiable	35654
U10-27	[User-defined W2B 2] Output bit11	0 to 1	-	0	Unmodifiable	35655

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U10-28	[User-defined W2B 2] Output bit12	0 to 1	-	0	Unmodifiable	35656
U10-29	[User-defined W2B 2] Output bit13	0 to 1	-	0	Unmodifiable	35657
U10-30	[User-defined W2B 2] Output bit14	0 to 1	-	0	Unmodifiable	35658
U10-31	[User-defined W2B 2] Output bit15	0 to 1	-	0	Unmodifiable	35659
U10-32	[User-defined W2B 3] Output bit0	0 to 1	-	0	Unmodifiable	35660
U10-33	[User-defined W2B 3] Output bit1	0 to 1	-	0	Unmodifiable	35661
U10-34	[User-defined W2B 3] Output bit2	0 to 1	-	0	Unmodifiable	35662
U10-35	[User-defined W2B 3] Output bit3	0 to 1	-	0	Unmodifiable	35663
U10-36	[User-defined W2B 3] Output bit4	0 to 1	-	0	Unmodifiable	35664
U10-37	[User-defined W2B 3] Output bit5	0 to 1	-	0	Unmodifiable	35665
U10-38	[User-defined W2B 3] Output bit6	0 to 1	-	0	Unmodifiable	35666
U10-39	[User-defined W2B 3] Output bit7	0 to 1	-	0	Unmodifiable	35667
U10-40	[User-defined W2B 3] Output bit8	0 to 1	-	0	Unmodifiable	35668
U10-41	[User-defined W2B 3] Output bit9	0 to 1	-	0	Unmodifiable	35669
U10-42	[User-defined W2B 3] Output bit10	0 to 1	-	0	Unmodifiable	35670
U10-43	[User-defined W2B 3] Output bit11	0 to 1	-	0	Unmodifiable	35671
U10-44	[User-defined W2B 3] Output bit12	0 to 1	-	0	Unmodifiable	35672
U10-45	[User-defined W2B 3] Output bit13	0 to 1	-	0	Unmodifiable	35673
U10-46	[User-defined W2B 3] Output bit14	0 to 1	-	0	Unmodifiable	35674
U10-47	[User-defined W2B 3] Output bit15	0 to 1	-	0	Unmodifiable	35675
U10-48	[User-defined AND 1] Output	0 to 1	-	0	Unmodifiable	35676
U10-49	[User-defined AND 2] Output	0 to 1	-	0	Unmodifiable	35677

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U10-50	[User-defined AND 3] Output	0 to 1	-	0	Unmodifiable	35678
U10-51	[User-defined AND 4] Output	0 to 1	-	0	Unmodifiable	35679
U10-52	[User-defined AND 5] Output	0 to 1	-	0	Unmodifiable	35680
U10-53	[User-defined AND 6] Output	0 to 1	-	0	Unmodifiable	35681
U10-54	[User-defined AND 7] Output	0 to 1	-	0	Unmodifiable	35682
U10-55	[User-defined AND 8] Output	0 to 1	-	0	Unmodifiable	35683
U10-56	[User-defined AND 9] Output	0 to 1	-	0	Unmodifiable	35684
U10-57	[User-defined AND 10] Output	0 to 1	-	0	Unmodifiable	35685
U10-58	[User-defined AND 11] Output	0 to 1	-	0	Unmodifiable	35686
U10-59	[User-defined AND 12] Output	0 to 1	-	0	Unmodifiable	35687
U10-60	[User-defined AND 13] Output	0 to 1	-	0	Unmodifiable	35688
U10-61	[User-defined AND 14] Output	0 to 1	-	0	Unmodifiable	35689
U10-62	[User-defined AND 15] Output	0 to 1	-	0	Unmodifiable	35690
U10-63	[User-defined AND 16] Output	0 to 1	-	0	Unmodifiable	35691
U10-64	[User-defined NOT 1] Output	0 to 1	-	0	Unmodifiable	35692
U10-65	[User-defined NOT 2] Output	0 to 1	-	0	Unmodifiable	35693
U10-66	[User-defined NOT 3] Output	0 to 1	-	0	Unmodifiable	35694
U10-67	[User-defined NOT 4] Output	0 to 1	-	0	Unmodifiable	35695
U10-68	[User-defined NOT 5] Output	0 to 1	-	0	Unmodifiable	35696
U10-69	[User-defined NOT 6] Output	0 to 1	-	0	Unmodifiable	35697
U10-70	[User-defined NOT 7] Output	0 to 1	-	0	Unmodifiable	35698
U10-71	[User-defined NOT 8] Output	0 to 1	-	0	Unmodifiable	35699

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U10-72	[User-defined OR 1] Output	0 to 1	-	0	Unmodifiable	35700
U10-73	[User-defined OR 2] Output	0 to 1	-	0	Unmodifiable	35701
U10-74	[User-defined OR 3] Output	0 to 1	-	0	Unmodifiable	35702
U10-75	[User-defined OR 4] Output	0 to 1	-	0	Unmodifiable	35703
U10-76	[User-defined OR 5] Output	0 to 1	-	0	Unmodifiable	35704
U10-77	[User-defined OR 6] Output	0 to 1	-	0	Unmodifiable	35705
U10-78	[User-defined OR 7] Output	0 to 1	-	0	Unmodifiable	35706
U10-79	[User-defined OR 8] Output	0 to 1	-	0	Unmodifiable	35707
U10-80	[User-defined OR 9] Output	0 to 1	-	0	Unmodifiable	35708
U10-81	[User-defined OR 10] Output	0 to 1	-	0	Unmodifiable	35709
U10-82	[User-defined OR 11] Output	0 to 1	-	0	Unmodifiable	35710
U10-83	[User-defined OR 12] Output	0 to 1	-	0	Unmodifiable	35711
U10-84	[User-defined XOR/XNOR 1] Output	0 to 1	-	0	Unmodifiable	35712
U10-85	[User-defined XOR/XNOR 2] Output	0 to 1	-	0	Unmodifiable	35713
U10-86	[User-defined XOR/XNOR 3] Output	0 to 1	-	0	Unmodifiable	35714
U10-87	[User-defined XOR/XNOR 4] Output	0 to 1	-	0	Unmodifiable	35715
U10-88	[User-defined NAND 1] Output	0 to 1	-	0	Unmodifiable	35716
U10-89	[User-defined NAND 2] Output	0 to 1	-	0	Unmodifiable	35717
U10-90	[User-defined NAND 3] Output	0 to 1	-	0	Unmodifiable	35718
U10-91	[User-defined NAND 4] Output	0 to 1	-	0	Unmodifiable	35719
U10-92	[User-defined BSW module 1] Output	0 to 1	-	0	Unmodifiable	35720
U10-93	[User-defined BSW module 2] Output	0 to 1	-	0	Unmodifiable	35721

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U10-94	[User-defined BSW module 3] Output	0 to 1	-	0	Unmodifiable	35722
U10-95	[User-defined BSW module 4] Output	0 to 1	-	0	Unmodifiable	35723
U10-96	[User-defined BSW module 5] Output	0 to 1	-	0	Unmodifiable	35724
U10-97	[User-defined BSW module 6] Output	0 to 1	-	0	Unmodifiable	35725
U10-98	[User-defined BSW module 7] Output	0 to 1	-	0	Unmodifiable	35726
U10-99	[User-defined BSW module 8] Output	0 to 1	-	0	Unmodifiable	35727
Group U11: Bit connector 7						
U11-00	[User-defined logic delay 1] Output	0 to 1	-	0	Unmodifiable	35728
U11-01	[User-defined logic delay 2] Output	0 to 1	-	0	Unmodifiable	35729
U11-02	[User-defined logic delay 3] Output	0 to 1	-	0	Unmodifiable	35730
U11-03	[User-defined logic delay 4] Output	0 to 1	-	0	Unmodifiable	35731
U11-04	[User-defined P_L conversion module 1] Output	0 to 1	-	0	Unmodifiable	35732
U11-05	[User-defined P_L conversion module 2] Output	0 to 1	-	0	Unmodifiable	35733
U11-06	[User-defined P_L conversion module 3] Output	0 to 1	-	0	Unmodifiable	35734
U11-07	[User-defined P_L conversion module 4] Output	0 to 1	-	0	Unmodifiable	35735
U11-08	[User-defined RS flip-flop module 1] Setting flag	0 to 1	-	0	Unmodifiable	35736
U11-09	[User-defined RS flip-flop module 1] Reset flag	0 to 1	-	0	Unmodifiable	35737
U11-10	[User-defined RS flip-flop module 2] Setting flag	0 to 1	-	0	Unmodifiable	35738
U11-11	[User-defined RS flip-flop module 2] Reset flag	0 to 1	-	0	Unmodifiable	35739
U11-12	[User-defined RS flip-flop module 3] Setting flag	0 to 1	-	0	Unmodifiable	35740
U11-13	[User-defined RS flip-flop module 3] Reset flag	0 to 1	-	0	Unmodifiable	35741
U11-14	[User-defined RS flip-flop module 4] Setting flag	0 to 1	-	0	Unmodifiable	35742

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U11-15	[User-defined RS flip-flop module 4] Reset flag	0 to 1	-	0	Unmodifiable	35743
U11-16	[User-defined DFF module 1] Setting flag	0 to 1	-	0	Unmodifiable	35744
U11-17	[User-defined DFF module 1] Reset flag	0 to 1	-	0	Unmodifiable	35745
U11-18	[User-defined DFF module 2] Setting flag	0 to 1	-	0	Unmodifiable	35746
U11-19	[User-defined DFF module 2] Reset flag	0 to 1	-	0	Unmodifiable	35747
U11-20	[User-defined DFF module 3] Setting flag	0 to 1	-	0	Unmodifiable	35748
U11-21	[User-defined DFF module 3] Reset flag	0 to 1	-	0	Unmodifiable	35749
U11-22	[User-defined DFF module 4] Setting flag	0 to 1	-	0	Unmodifiable	35750
U11-23	[User-defined DFF module 4] Reset flag	0 to 1	-	0	Unmodifiable	35751
U11-24	[User-defined PULSE 1] Output	0 to 1	-	0	Unmodifiable	35752
U11-25	[User-defined PULSE 2] Output	0 to 1	-	0	Unmodifiable	35753
U11-26	[User-defined PULSE 3] Output	0 to 1	-	0	Unmodifiable	35754
U11-27	[User-defined PULSE 4] Output	0 to 1	-	0	Unmodifiable	35755
U11-28	[User-defined PULSE 5] Output	0 to 1	-	0	Unmodifiable	35756
U11-29	[User-defined PULSE 6] Output	0 to 1	-	0	Unmodifiable	35757
U11-30	[User-defined PULSE 7] Output	0 to 1	-	0	Unmodifiable	35758
U11-31	[User-defined PULSE 8] Output	0 to 1	-	0	Unmodifiable	35759
U11-32	[User-defined MUL_DIV 1] Divisor being 0 flag	0 to 1	-	0	Unmodifiable	35760
U11-33	[User-defined MUL_DIV 2] Divisor being 0 flag	0 to 1	-	0	Unmodifiable	35761
U11-34	[User-defined MUL_DIV 3] Divisor being 0 flag	0 to 1	-	0	Unmodifiable	35762
U11-35	[User-defined MUL_DIV 4] Divisor being 0 flag	0 to 1	-	0	Unmodifiable	35763
U11-36	[User-defined MUL_DIV 5] Divisor being 0 flag	0 to 1	-	0	Unmodifiable	35764

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U11-37	[User-defined MUL_DIV 6] Divisor being 0 flag	0 to 1	-	0	Unmodifiable	35765
U11-38	[User-defined MUL_DIV 7] Divisor being 0 flag	0 to 1	-	0	Unmodifiable	35766
U11-39	[User-defined MUL_DIV 8] Divisor being 0 flag	0 to 1	-	0	Unmodifiable	35767
U11-40	[User-defined ABS 1] Negative number input flag	0 to 1	-	0	Unmodifiable	35768
U11-41	[User-defined ABS 2] Negative number input flag	0 to 1	-	0	Unmodifiable	35769
U11-42	[User-defined ABS 3] Negative number input flag	0 to 1	-	0	Unmodifiable	35770
U11-43	[User-defined ABS 4] Negative number input flag	0 to 1	-	0	Unmodifiable	35771
U11-44	[User-defined NCMP 1] Output	0 to 1	-	0	Unmodifiable	35772
U11-45	[User-defined NCMP 2] Output	0 to 1	-	0	Unmodifiable	35773
U11-46	[User-defined NCMP 3] Output	0 to 1	-	0	Unmodifiable	35774
U11-47	[User-defined NCMP 4] Output	0 to 1	-	0	Unmodifiable	35775
U11-48	[User-defined INTEGRAL 1] Output upper limit reached flag	0 to 1	-	0	Unmodifiable	35776
U11-49	[User-defined INTEGRAL 1] Output lower limit reached flag	0 to 1	-	0	Unmodifiable	35777
U11-50	[User-defined INTEGRAL 2] Output upper limit reached flag	0 to 1	-	0	Unmodifiable	35778
U11-51	[User-defined INTEGRAL 2] Output lower limit reached flag	0 to 1	-	0	Unmodifiable	35779
U11-52	[User-defined INTEGRAL 3] Output upper limit reached flag	0 to 1	-	0	Unmodifiable	35780
U11-53	[User-defined INTEGRAL 3] Output lower limit reached flag	0 to 1	-	0	Unmodifiable	35781
U11-54	[User-defined INTEGRAL 4] Output upper limit reached flag	0 to 1	-	0	Unmodifiable	35782
U11-55	[User-defined INTEGRAL 4] Output lower limit reached flag	0 to 1	-	0	Unmodifiable	35783
U11-56	[User-defined LIM 1] Input upper limit reached flag	0 to 1	-	0	Unmodifiable	35784
U11-57	[User-defined LIM 1] Input lower limit reached flag	0 to 1	-	0	Unmodifiable	35785

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U11-58	[User-defined LIM 2] Input upper limit reached flag	0 to 1	-	0	Unmodifiable	35786
U11-59	[User-defined LIM 2] Input lower limit reached flag	0 to 1	-	0	Unmodifiable	35787
U11-60	[User-defined LIM 3] Input upper limit reached flag	0 to 1	-	0	Unmodifiable	35788
U11-61	[User-defined LIM 3] Input lower limit reached flag	0 to 1	-	0	Unmodifiable	35789
U11-62	[User-defined LIM 4] Input upper limit reached flag	0 to 1	-	0	Unmodifiable	35790
U11-63	[User-defined LIM 4] Input lower limit reached flag	0 to 1	-	0	Unmodifiable	35791
U11-64	[User-defined process setting bit parameter module 1] output	0 to 1	-	0	Unmodifiable	35792
U11-65	[User-defined process setting bit parameter module 2] output	0 to 1	-	0	Unmodifiable	35793
U11-66	[User-defined process setting bit parameter module 3] output	0 to 1	-	0	Unmodifiable	35794
U11-67	[User-defined process setting bit parameter module 4] output	0 to 1	-	0	Unmodifiable	35795
U11-68	[User-defined process setting bit parameter module 5] output	0 to 1	-	0	Unmodifiable	35796
U11-69	[User-defined process setting bit parameter module 6] output	0 to 1	-	0	Unmodifiable	35797
U11-70	[User-defined process controller module] Output limit reached flag	0 to 1	-	0	Unmodifiable	35798
U11-73	Startup stator resistance auto-tuning timeout	0 to 1	-	0	Unmodifiable	33087
U11-74	Startup stator resistance auto-tuning result abnormal	0 to 1	-	0	Unmodifiable	33088
U11-89	Sway control in progress	0 to 1	-	0	Unmodifiable	35864
U11-90	Sway control enable	0 to 1	-	0	Unmodifiable	35863
U11-91	Slew: RFG locked	0 to 1	-	0	Unmodifiable	33192
U11-92	Slew: Torque control mode	0 to 1	-	0	Unmodifiable	33193
Group U15: Word connector 5						
U15-00	[User-defined B2W 1] Output	0x0000 to 0xFFFF	-	0	Unmodifiable	35528
U15-01	[User-defined B2W 2] Output	0x0000 to 0xFFFF	-	0	Unmodifiable	35529

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U15-02	[User-defined B2W 3] Output	0x0000 to 0xFFFF	-	0	Unmodifiable	35530
U15-03	[User-defined B2W 4] Output	0x0000 to 0xFFFF	-	0	Unmodifiable	35531
U15-04	[User-defined DW2W module 1] Output high word	0x0000 to 0xFFFF	-	0	Unmodifiable	35532
U15-05	[User-defined DW2W module 1] Output low word	0x0000 to 0xFFFF	-	0	Unmodifiable	35533
U15-06	[User-defined DW2W module 2] Output high word	0x0000 to 0xFFFF	-	0	Unmodifiable	35534
U15-07	[User-defined DW2W module 2] Output low word	0x0000 to 0xFFFF	-	0	Unmodifiable	35535
U15-08	[User-defined DW2W module 3] Output high word	0x0000 to 0xFFFF	-	0	Unmodifiable	35536
U15-09	[User-defined DW2W module 3] Output low word	0x0000 to 0xFFFF	-	0	Unmodifiable	35537
U15-10	Output of proportion module 1	–800% to +800%	%	0	Unmodifiable	35293
U15-11	Output of proportion module 2	–800% to +800%	%	0	Unmodifiable	35294
U15-12	Output of proportion module 3	–800% to +800%	%	0	Unmodifiable	35295
U15-13	Output of proportion module 4	–800% to +800%	%	0	Unmodifiable	35296
U15-14	Output of proportion module 5	–800% to +800%	%	0	Unmodifiable	35297
U15-15	Output of proportion module 6	–800% to +800%	%	0	Unmodifiable	35298
U15-16	Output of proportion module 7	–800% to +800%	%	0	Unmodifiable	35299
U15-17	Output of proportion module 8	–800% to +800%	%	0	Unmodifiable	35300
U15-18	Output of proportion module 9	–800% to +800%	%	0	Unmodifiable	35301
U15-19	Output of proportion module 10	–800% to +800%	%	0	Unmodifiable	35302
U15-20	Device load rate	–800% to +800%	%	0	Unmodifiable	34465
U15-21	Motor load rate	–800% to +800%	%	0	Unmodifiable	34466
U15-22	Internal 15 V detection voltage of HCU control board	0.000 to 65.535	V	0	Unmodifiable	34832
U15-23	Port 24 V detection voltage of HCU control board	0.000 to 65.535	V	0	Unmodifiable	34831

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U15-25	[RFG module A] Running state	0: Constant speed 1: Acceleration 2: Decelerate	-	0	Unmodifiable	36247
U15-50	[RFG module A] Status word	0x0000 to 0xFFFF	-	0	Unmodifiable	36248
U15-51	[RFG module B] Operation status	0: Constant speed 1: Acceleration 2: Decelerate	-	0	Unmodifiable	36255
U15-52	[RFG module B] Status word	0x0000 to 0xFFFF	-	0	Unmodifiable	36256
U15-53	Slew: Torque control setpoint	–800% to +800%	%	0	Unmodifiable	33194
U15-54	Slew: Walk speed setpoint	–800% to +800%	%	0	Unmodifiable	33195
U15-55	[TRANS 1] Output high bit	0x0000 to 0xFFFF	-	0	Unmodifiable	35557
U15-56	[TRANS 1] Output low bit	0x0000 to 0xFFFF	-	0	Unmodifiable	35573
U15-57	[TRANS 2] Output high bit	0x0000 to 0xFFFF	-	0	Unmodifiable	35558
U15-58	[TRANS 2] Output low bit	0x0000 to 0xFFFF	-	0	Unmodifiable	35574
U15-59	[TRANS 3] Output high bit	0x0000 to 0xFFFF	-	0	Unmodifiable	35559
U15-60	[TRANS 3] Output low bit	0x0000 to 0xFFFF	-	0	Unmodifiable	35575
U15-61	[TRANS 4] Output high bit	0x0000 to 0xFFFF	-	0	Unmodifiable	35560
U15-62	[TRANS 4] Output low bit	0x0000 to 0xFFFF	-	0	Unmodifiable	35576
U15-63	[TRANS 5] Output high bit	0x0000 to 0xFFFF	-	0	Unmodifiable	35561
U15-64	[TRANS 5] Output low bit	0x0000 to 0xFFFF	-	0	Unmodifiable	35577
U15-65	[TRANS 6] Output high bit	0x0000 to 0xFFFF	-	0	Unmodifiable	35562
U15-66	[TRANS 6] Output low bit	0x0000 to 0xFFFF	-	0	Unmodifiable	35578
U15-67	[TRANS 7] Output high bit	0x0000 to 0xFFFF	-	0	Unmodifiable	35563
U15-68	[TRANS 7] Output low bit	0x0000 to 0xFFFF	-	0	Unmodifiable	35579

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U15-69	[TRANS 8] Output high bit	0x0000 to 0xFFFF	-	0	Unmodifiable	35564
U15-70	[TRANS 8] Output low bit	0x0000 to 0xFFFF	-	0	Unmodifiable	35580
U15-71	[TRANS 9] Output high bit	0x0000 to 0xFFFF	-	0	Unmodifiable	35565
U15-72	[TRANS 9] Output low bit	0x0000 to 0xFFFF	-	0	Unmodifiable	35581
U15-73	[TRANS 10] Output high bit	0x0000 to 0xFFFF	-	0	Unmodifiable	35566
U15-74	[TRANS 10] Output low bit	0x0000 to 0xFFFF	-	0	Unmodifiable	35582
U15-75	[TRANS 11] Output high bit	0x0000 to 0xFFFF	-	0	Unmodifiable	35567
U15-76	[TRANS 11] Output low bit	0x0000 to 0xFFFF	-	0	Unmodifiable	35583
U15-77	[TRANS 12] Output high bit	0x0000 to 0xFFFF	-	0	Unmodifiable	35568
U15-78	[TRANS 12] Output low bit	0x0000 to 0xFFFF	-	0	Unmodifiable	35584
U15-79	[TRANS 13] Output high bit	0x0000 to 0xFFFF	-	0	Unmodifiable	35569
U15-80	[TRANS 13] Output low bit	0x0000 to 0xFFFF	-	0	Unmodifiable	35585
U15-81	[TRANS 14] Output high bit	0x0000 to 0xFFFF	-	0	Unmodifiable	35570
U15-82	[TRANS 14] Output low bit	0x0000 to 0xFFFF	-	0	Unmodifiable	35586
U15-83	[TRANS 15] Output high bit	0x0000 to 0xFFFF	-	0	Unmodifiable	35571
U15-84	[TRANS 15] Output low bit	0x0000 to 0xFFFF	-	0	Unmodifiable	35587
U15-85	[TRANS 16] Output high bit	0x0000 to 0xFFFF	-	0	Unmodifiable	35572
U15-86	[TRANS 16] Output low bit	0x0000 to 0xFFFF	-	0	Unmodifiable	35588
U15-87	Load monitoring status word	0x0000 to 0xFFFF	-	0	Unmodifiable	36261
U15-88	Load monitoring underload curve output	0% to 1600%	%	0	Unmodifiable	36262
U15-89	Load monitoring overload curve output	0% to 1600%	%	0	Unmodifiable	36263
Group U16: Word connector 6 - process						

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U16-00	Light load high speed output ratio	–32768 to +32767	%	0	Unmodifiable	35840
U16-01	Light load high speed output speed	–800% to +800%	%	0	Unmodifiable	35841
U16-02	Light load high speed module status word	–32768 to +32767	-	0	Unmodifiable	35842
U16-03	Load torque	–800% to +800%	%	0	Unmodifiable	35843
U16-04	Real-time load torque	–800% to +800%	%	0	Unmodifiable	35849
U16-07	Sway compensation torque	–800% to +800%	%	0	Unmodifiable	35854
U16-08	Sway observation swing angle	–327.68 to +327.67	°	0	Unmodifiable	35855
U16-09	Speed setpoint before sway	–32.768 to +32.767	m/s	0	Unmodifiable	35859
U16-10	Speed setpoint after sway	–32.768 to +32.767	m/s	0	Unmodifiable	35860
U16-11	Sway weight speed	–32.768 to +32.767	m/s	0	Unmodifiable	35857
U16-12	Acceleration rate of sway weight	–32.768 to +32.767	m/s2	0	Unmodifiable	35856
U16-13	Sway feedback angle (unfiltered)	–327.68 to +327.67	°	0	Unmodifiable	35861
U16-14	Sway feedback angle (filtered)	–327.68 to +327.67	°	0	Unmodifiable	35862
U16-15	Sway lag distance	–32.768 to +32.767	m	0	Unmodifiable	35865
U16-16	Swing of sway weight	–32768 to +32767	mm	0	Unmodifiable	35858
U16-17	Sway max. swing	0 to 65535	mm	0	Unmodifiable	35866
U16-18	Sway current swing length	0.00 to 655.35	m	0	Unmodifiable	35867
U16-19	Sway feedback swing	–32.768 to +32.767	m	0	Unmodifiable	35868
U16-20	Sway current lifting weight	0.00 to 655.35	T	0	Unmodifiable	35869
U16-80	Pulse/frequency A conversion output (before offset)	0.00 to 655.35	kHz	0	Unmodifiable	36223
U16-81	Pulse/frequency A conversion output (after offset)	0.00 to 655.35	kHz	0	Unmodifiable	36224
U16-82	Frequency A/torque curve output ratio (unfiltered)	–800% to +800%	%	0	Unmodifiable	36225

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U16-83	Frequency A/torque curve output ratio (filtered)	–800% to +800%	%	0	Unmodifiable	36226
U16-84	Torque flange feedback torque A (physical)	–3276.8 to +3276.7	N·m	0	Unmodifiable	36227
U16-85	Torque flange feedback torque A (per unit)	–800% to +800%	%	0	Unmodifiable	36228
U16-86	Pulse/frequency B conversion output (before offset)	0.00 to 655.35	kHz	0	Unmodifiable	36229
U16-87	Pulse/frequency B conversion output (after offset)	0.00 to 655.35	kHz	0	Unmodifiable	36230
U16-88	Frequency B/torque curve output ratio (unfiltered)	–800% to +800%	%	0	Unmodifiable	36231
U16-89	Frequency B/torque curve output 1 ratio (filtered)	–800% to +800%	%	0	Unmodifiable	36232
U16-90	Torque flange feedback torque B (physical)	–3276.8 to +3276.7	N·m	0	Unmodifiable	36233
U16-91	Torque flange feedback torque B (per unit)	–800% to +800%	%	0	Unmodifiable	36234
U16-94	Encoder 1 measuring angle	0 to 65535	-	0	Unmodifiable	35981
U16-95	Measured revolutions of encoder 1	0 to 65535	-	0	Unmodifiable	35984
U16-96	Encoder 2 measuring angle	0 to 65535	-	0	Unmodifiable	35982
U16-97	Measured revolutions of encoder 2	0 to 65535	-	0	Unmodifiable	35985
U16-98	Encoder 3 measuring angle	0 to 65535	-	0	Unmodifiable	35983
U16-99	Measured revolutions of encoder 3	0 to 65535	-	0	Unmodifiable	35986
Group U19: Double-word connector 2						
U19-00	[User-defined W2DW module 1] Output	–800% to +800%	%	0	Unmodifiable	35328
U19-01	[User-defined W2DW module 2] Output	–800% to +800%	%	0	Unmodifiable	35330
U19-02	[User-defined W2DW module 3] Output	–800% to +800%	%	0	Unmodifiable	35332
U19-03	[User-defined NSW module 1] Output	–800% to +800%	%	0	Unmodifiable	35334
U19-04	[User-defined NSW module 2] Output	–800% to +800%	%	0	Unmodifiable	35336
U19-05	[User-defined NSW module 3] Output	–800% to +800%	%	0	Unmodifiable	35338

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U19-06	[User-defined NSW module 4] Output	–800% to +800%	%	0	Unmodifiable	35340
U19-07	[User-defined NSW module 5] Output	–800% to +800%	%	0	Unmodifiable	35342
U19-08	[User-defined NSW module 6] Output	–800% to +800%	%	0	Unmodifiable	35344
U19-09	[User-defined NSW module 7] Output	–800% to +800%	%	0	Unmodifiable	35346
U19-10	[User-defined NSW module 8] Output	–800% to +800%	%	0	Unmodifiable	35348
U19-11	[User-defined NSW module 9] Output	–800% to +800%	%	0	Unmodifiable	35350
U19-12	[User-defined NSW module 10] Output	–800% to +800%	%	0	Unmodifiable	35352
U19-13	[User-defined NSW module 11] Output	–800% to +800%	%	0	Unmodifiable	35354
U19-14	[User-defined NSW module 12] Output	–800% to +800%	%	0	Unmodifiable	35356
U19-15	[User-defined FILT 1] Output	–800% to +800%	%	0	Unmodifiable	35358
U19-16	[User-defined FILT 2] Output	–800% to +800%	%	0	Unmodifiable	35360
U19-17	[User-defined FILT 3] Output	–800% to +800%	%	0	Unmodifiable	35362
U19-18	[User-defined FILT 4] Output	–800% to +800%	%	0	Unmodifiable	35364
U19-19	[User-defined FILT 5] Output	–800% to +800%	%	0	Unmodifiable	35366
U19-20	[User-defined FILT 6] Output	–800% to +800%	%	0	Unmodifiable	35368
U19-21	[User-defined FILT 7] Output	–800% to +800%	%	0	Unmodifiable	35370
U19-22	[User-defined FILT 8] Output	–800% to +800%	%	0	Unmodifiable	35372
U19-23	[User-defined ADD_SUB 1] Output	–800% to +800%	%	0	Unmodifiable	35374
U19-24	[User-defined ADD_SUB 2] Output	–800% to +800%	%	0	Unmodifiable	35376
U19-25	[User-defined ADD_SUB 3] Output	–800% to +800%	%	0	Unmodifiable	35378
U19-26	[User-defined ADD_SUB 4] Output	–800% to +800%	%	0	Unmodifiable	35380
U19-27	[User-defined ADD_SUB 5] Output	–800% to +800%	%	0	Unmodifiable	35382

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U19-28	[User-defined ADD_SUB 6] Output	–800% to +800%	%	0	Unmodifiable	35384
U19-29	[User-defined ADD_SUB 7] Output	–800% to +800%	%	0	Unmodifiable	35386
U19-30	[User-defined ADD_SUB 8] Output	–800% to +800%	%	0	Unmodifiable	35388
U19-31	[User-defined MUL_DIV 1] Output	–800% to +800%	%	0	Unmodifiable	35390
U19-32	[User-defined MUL_DIV 2] Output	–800% to +800%	%	0	Unmodifiable	35392
U19-33	[User-defined MUL_DIV 3] Output	–800% to +800%	%	0	Unmodifiable	35394
U19-34	[User-defined MUL_DIV 4] Output	–800% to +800%	%	0	Unmodifiable	35396
U19-35	[User-defined MUL_DIV 5] Output	–800% to +800%	%	0	Unmodifiable	35398
U19-36	[User-defined MUL_DIV 6] Output	–800% to +800%	%	0	Unmodifiable	35400
U19-37	[User-defined MUL_DIV 7] Output	–800% to +800%	%	0	Unmodifiable	35402
U19-38	[User-defined MUL_DIV 8] Output	–800% to +800%	%	0	Unmodifiable	35404
U19-39	[User-defined ABS 1] Output	–800% to +800%	%	0	Unmodifiable	35406
U19-40	[User-defined ABS 2] Output	–800% to +800%	%	0	Unmodifiable	35408
U19-41	[User-defined ABS 3] Output	–800% to +800%	%	0	Unmodifiable	35410
U19-42	[User-defined ABS 4] Output	–800% to +800%	%	0	Unmodifiable	35412
U19-43	[User-defined NEG 1] Output	–800% to +800%	%	0	Unmodifiable	35414
U19-44	[User-defined NEG 2] Output	–800% to +800%	%	0	Unmodifiable	35416
U19-45	[User-defined NEG 3] Output	–800% to +800%	%	0	Unmodifiable	35418
U19-46	[User-defined NEG 4] Output	–800% to +800%	%	0	Unmodifiable	35420
U19-47	[User-defined NEG 5] Output	–800% to +800%	%	0	Unmodifiable	35422
U19-48	[User-defined NEG 6] Output	–800% to +800%	%	0	Unmodifiable	35424
U19-49	[User-defined NEG 7] Output	–800% to +800%	%	0	Unmodifiable	35426

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U19-50	[User-defined NEG 8] Output	–800% to +800%	%	0	Unmodifiable	35428
U19-51	[User-defined INTEGRAL 1] Output	–800% to +800%	%	0	Unmodifiable	35430
U19-52	[User-defined INTEGRAL 2] Output	–800% to +800%	%	0	Unmodifiable	35432
U19-53	[User-defined INTEGRAL 3] Output	–800% to +800%	%	0	Unmodifiable	35434
U19-54	[User-defined INTEGRAL 4] Output	–800% to +800%	%	0	Unmodifiable	35436
U19-55	[User-defined DIFF 1] Output	–800% to +800%	%	0	Unmodifiable	35438
U19-56	[User-defined DIFF 2] Output	–800% to +800%	%	0	Unmodifiable	35440
U19-57	[User-defined DIFF 3] Output	–800% to +800%	%	0	Unmodifiable	35442
U19-58	[User-defined DIFF 4] Output	–800% to +800%	%	0	Unmodifiable	35444
U19-59	[User-defined LIM 1] Output	–800% to +800%	%	0	Unmodifiable	35446
U19-60	[User-defined LIM 2] Output	–800% to +800%	%	0	Unmodifiable	35448
U19-61	[User-defined LIM 3] Output	–800% to +800%	%	0	Unmodifiable	35450
U19-62	[User-defined LIM 4] Output	–800% to +800%	%	0	Unmodifiable	35452
U19-63	[User-defined multi-point curve module 1] Output	–800% to +800%	%	0	Unmodifiable	35454
U19-64	[User-defined multi-point curve module 2] Output	–800% to +800%	%	0	Unmodifiable	35456
U19-65	[User-defined multi-point curve module 3] Output	–800% to +800%	%	0	Unmodifiable	35458
U19-66	[User-defined multi-point curve module 4] Output	–800% to +800%	%	0	Unmodifiable	35460
U19-67	User-defined process setting word parameter module 1 output	–800% to +800%	%	0	Unmodifiable	35462
U19-68	User-defined process setting word parameter module 2 output	–800% to +800%	%	0	Unmodifiable	35464
U19-69	User-defined process setting word parameter module 3 output	–800% to +800%	%	0	Unmodifiable	35466
U19-70	User-defined process setting word parameter module 4 output	–800% to +800%	%	0	Unmodifiable	35468

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U19-71	User-defined process setting word parameter module 5 output	–800% to +800%	%	0	Unmodifiable	35470
U19-72	User-defined process setting word parameter module 6 output	–800% to +800%	%	0	Unmodifiable	35472
U19-73	User-defined process setting word parameter module 7 output	–800% to +800%	%	0	Unmodifiable	35474
U19-74	User-defined process setting word parameter module 8 output	–800% to +800%	%	0	Unmodifiable	35476
U19-75	User-defined process setting word parameter module 9 output	–800% to +800%	%	0	Unmodifiable	35478
U19-76	User-defined process setting word parameter module 10 output	–800% to +800%	%	0	Unmodifiable	35480
U19-77	User-defined process setting word parameter module 11 output	–800% to +800%	%	0	Unmodifiable	35482
U19-78	User-defined process setting word parameter module 12 output	–800% to +800%	%	0	Unmodifiable	35484
U19-79	User-defined process setting word parameter module 13 output	–800% to +800%	%	0	Unmodifiable	35486
U19-80	User-defined process setting word parameter module 14 output	–800% to +800%	%	0	Unmodifiable	35488
U19-81	User-defined process controller feedback	–800% to +800%	%	0	Unmodifiable	35490
U19-82	Feedback with absolute value processing of user-defined process controller module	–800% to +800%	%	0	Unmodifiable	35492
U19-83	Differential component of user-defined process controller module	–800% to +800%	%	0	Unmodifiable	35494
U19-84	Setpoint of user-defined process controller module	–800% to +800%	%	0	Unmodifiable	35496
U19-85	Filtered setpoint of user-defined process controller module	–800% to +800%	%	0	Unmodifiable	35498
U19-86	Deviation of user-defined Process controller module	–800% to +800%	%	0	Unmodifiable	35500
U19-87	Deviation after droop of user-defined process controller module	–800% to +800%	%	0	Unmodifiable	35502
U19-88	Proportion component of user-defined process controller module	–800% to +800%	%	0	Unmodifiable	35504
U19-89	Integral component of user-defined process controller module	–800% to +800%	%	0	Unmodifiable	35506
U19-90	Upper limit of user-defined process controller module	–800% to +800%	%	0	Unmodifiable	35508
U19-91	Lower limit of user-defined process controller module	–800% to +800%	%	0	Unmodifiable	35510

Para.	Name	Value Range	Unit	Default	Change Mode	Address
U19-92	Upper limit inverted of user-defined process controller module	–800% to +800%	%	0	Unmodifiable	35512
U19-93	Output of user-defined process controller module	–800% to +800%	%	0	Unmodifiable	35514
U19-94	Output scaled-up of user-defined process controller module	–800% to +800%	%	0	Unmodifiable	35516
U19-95	Output of proportion module 11	–800% to +800%	%	0	Unmodifiable	35518
U19-96	Output of proportion module 12	–800% to +800%	%	0	Unmodifiable	35520
U19-97	Output of proportion module 13	–800% to +800%	%	0	Unmodifiable	35522
U19-98	Output of proportion module 14	–800% to +800%	%	0	Unmodifiable	35524
U19-99	Output of proportion module 15	–800% to +800%	%	0	Unmodifiable	35526
Group U29: Double-word connector 3						
U29-26	Pulse count position value	–2147483648 to +2147483647	-	0	Unmodifiable	36310
U29-40	Encoder 1 pulse position value (4-frequency multiplication)	–2147483648 to +2147483647	-	0	Unmodifiable	34047
U29-41	Encoder 2 pulse position value (4-frequency multiplication)	–2147483648 to +2147483647	-	0	Unmodifiable	34049
U29-42	Encoder 3 pulse position value (4-frequency multiplication)	–2147483648 to +2147483647	-	0	Unmodifiable	34051
U29-50	RFG A input setpoint	–800% to +800%	%	0	Unmodifiable	36241
U29-51	RFG A output setpoint	–800% to +800%	%	0	Unmodifiable	36243
U29-52	RFG A acceleration rate	–2147483648 to +2147483647	-	0	Unmodifiable	36245
U29-53	RFG B input setpoint	–800% to +800%	%	0	Unmodifiable	36249
U29-54	RFG B output setpoint	–800% to +800%	%	0	Unmodifiable	36251
U29-55	RFG B acceleration rate	–2147483648 to +2147483647	-	0	Unmodifiable	36253
U29-60	Torque flange pulse A position value	–2147483648 to +2147483647	-	0	Unmodifiable	36235
U29-61	Torque flange pulse B position value	–2147483648 to +2147483647	-	0	Unmodifiable	36237

9 Data Flow Diagrams

9.1 Overview of Data Flow Diagrams

Function	Description	Page
Description of Function Diagrams		
-	Diagram illustration 1	*"9.2.1.1 H010 - Diagram illustration 1" on page 676*
	Diagram illustration 2	*"9.2.1.2 H011 - Diagram illustration 2" on page 677*
State machine		
-	State machine overview	*"9.2.2.1 H030 - State machine overview" on page 678*
Input and output		
Input and output terminals	Digital input (DI)	*"9.2.3.1 H110 - Digital input" on page 679*
	Relay output (DO)	*"9.2.3.2 H112 - Relay output" on page 680*
	High-speed digital input (HDI)	*"9.2.3.3 H114 - High-speed digital input" on page 681*
	High-speed digital output (HDO)	*"9.2.3.4 H116 - High-speed digital output" on page 682*
	Analog input (AI)	*"9.2.3.5 H120 - Analog input" on page 683*
	Analog output (AO)	*"9.2.3.6 H122 - Analog output" on page 684*
InoLink communication	InoLink communication data reception	*"9.2.3.7 H130 - InoLink communication network - Process data reception" on page 685*
	InoLink communication data transmission	*"9.2.3.8 H134 - InoLink communication network - Process data transmission" on page 686*
Fieldbus adapter A	Process data reception	*"9.2.3.9 H140 - Fieldbus adapter A - Process data reception" on page 687*
	Process data transmission	*"9.2.3.10 H142 - Fieldbus adapter A - Process data transmission" on page 688*
Fieldbus adapter B	Process data reception	*"9.2.3.11 H144 - Fieldbus adapter B - Process data reception" on page 689*
	Process data transmission	*"9.2.3.12 H146 - Fieldbus adapter B - Process data transmission" on page 690*
Application functions		
Conversion function	Word-to-bit function	*"9.3.1 H160 - Word-to-bit function" on page 691*
	Bit-to-word function	*"9.3.2 H162 - Bit-to-word function" on page 692*
	W2DW conversion function	*"9.3.3 H164 - W2DW and DW2W" on page 693*
	Data type conversion module	*"9.3.4 H166 - Data type conversion module" on page 694*

Function	Description	Page
Logic processing	Logic AND or NOT	*"9.3.5 H170 - Logic NAND" on page 695*
	Logic OR	*"9.3.6 H172 - Logic OR" on page 696*
	Logic delay	*"9.3.8 H174 - Logic delay module" on page 698*
	XOR and XNOR	*"9.3.9 H176 - Logic XOR/XNOR" on page 699*
	Switch switchover function	*"9.3.10 H178 - Switch function block" on page 700*
	P_L conversion	*"9.3.10 H178 - Switch function block" on page 700*
Arithmetic operations	Absolute value calculation	*"9.3.13 H184 - Arithmetic function block - Absolute value submodule" on page 703*
	ADD/SUBTRACT operation	*"9.3.14 H186 - Arithmetic function block - ADD_SUB submodule" on page 704*
	MULTIPLY/DIVIDE operation	*"9.3.15 H188 - Arithmetic function block - MUL_DIV submodule" on page 705*
	NCMP module	*"9.3.16 H190 - Arithmetic function block - NCMP submodule" on page 706*
Control function block	Filter module	*"9.3.11 H180 - Control function block - Filter sub-module" on page 701*
	Process PID - Input and limit	*"9.3.17 H192 - Process PID controller - Input and limit" on page 707*
	Process PID - Operation	*"9.3.18 H194 - Process PID controller - Operation" on page 708*
	Multi-point curve	*"9.3.19 H196 - Multi-point curve" on page 709*
	RFG module A	*"9.3.20 H198 - RFG module A" on page 710*
	RFG module B	*"9.3.21 H200 - RFG module B" on page 711*
	Load monitoring module	*"9.3.22 H202 - Load monitoring module" on page 712*
	High-speed pulse detection module	*"9.3.23 H204 - High-speed pulse detection module" on page 713*
	Pulse counting module	*"9.3.24 H205 - Pulse counting module" on page 714*
Command and setting		
Control channel	Control word 1	*"9.4.1 H220 - Control word 1" on page 715*
	Status word 1	*"9.4.2 H230 - Status word 1" on page 716*
	SOP-20 start/stop control word	*"9.4.3 H240 - SOP-20 start/stop control word" on page 717*
	PC start/stop control word	*"9.4.4 H242 - PC start/stop control word" on page 718*
	Terminal start/stop control word	*"9.4.5 H244 - Terminal start/stop control word" on page 719*
	User-defined start/stop control word	*"9.4.6 H246 - User-defined start/stop control word" on page 720*
	Start/stop control word selection	*"9.4.7 H248 - Start/stop control word selection" on page 721*

Function	Description	Page
Reference channel	Motor-driven potentiometer	*"9.4.8 H302 - Motor-driven potentiometer" on page 722*
	Regular speed reference source	*"9.4.9 H310 - Regular speed reference source" on page 723*
	Speed limit	*"9.4.10 H312 - Speed limit" on page 724*
	Jog speed setting	*"9.4.11 H314 - Jog speed setting" on page 725*
	RFG - Acceleration/ Deceleration time selection	*"9.4.12 H322 - Acceleration/Deceleration time selection" on page 726*
	RFG - Ramp function generator	*"9.4.13 H326 - Ramp function generator" on page 727*
	Additional speed and limit	*"9.4.14 H328 - Additional speed and limit" on page 728*
	Additional torque and torque limit setting	*"9.4.15 H330 - Additional torque and torque limit setting" on page 729*
	Power limit setting	*"9.4.16 H332 - Power limit setting" on page 730*
Vector control		
Speed regulator	Speed setting and feedback	*"9.5.1 H400 - Speed setting" on page 731*
	ASR - Parameter adaptation	*"9.5.2 H410 - Parameter configuration" on page 732*
	ASR - PI regulator	*"9.5.3 H412 - Speed controller" on page 733*
	Torque reference and additional torque	*"9.5.7 H430 - Additional torque" on page 737*
	Torque current conversion	*"9.5.8 H432 - Torque current conversion" on page 738*
Torque limit	Torque current limit calculation	*"9.5.4 H420 - Torque current limit value calculation" on page 734*
	Torque limit value and runaway protection	*"9.5.5 H422 - Torque limit value and runaway protection" on page 735*
	Bus voltage control	*"9.5.5 H422 - Torque limit value and runaway protection" on page 735*
Flux control	Flux setting and field weakening control	*"9.5.9 H440 - Flux setting and field weakening control" on page 739*
	Flux current setting	*"9.5.10 H442 - Exciting current setting" on page 740*
Current control	Current regulator	*"9.5.11 H540 - Current regulator" on page 741*
	Output voltage conversion	*"9.5.12 H550 - Output voltage conversion" on page 742*
	Power unit interface	*"9.5.13 H560 - Power unit interface" on page 743*
V/f control		
V/f control	V/f control setting	*"9.6.1 H460 - Reference voltage in V/f control" on page 744*
	Vdc control in V/f mode	*"9.6.3 H462 - Vdc control in V/f mode" on page 746*
Auxiliary functions		

Function	Description	Page
Speed determination	Speed determination	*"9.7.1 H620 - Speed determination" on page 747*
Brake control	Brake opening and closing control	*"9.7.2 H630 - Brake opening and closing" on page 748*
	Brake status monitoring	*"9.7.3 H632 - Brake status detection" on page 749*
	Brake verification	*"9.7.4 H634 - Brake verification" on page 750*
Auxiliary control	Pulse inhibiting and motor fan control	*"9.7.5 H640 - Pulse inhibiting and motor fan control" on page 751*

9.2 Data Flow Diagrams

9.2.1 Description of Function Diagrams

9.2.1.1 H010 - Diagram illustration 1

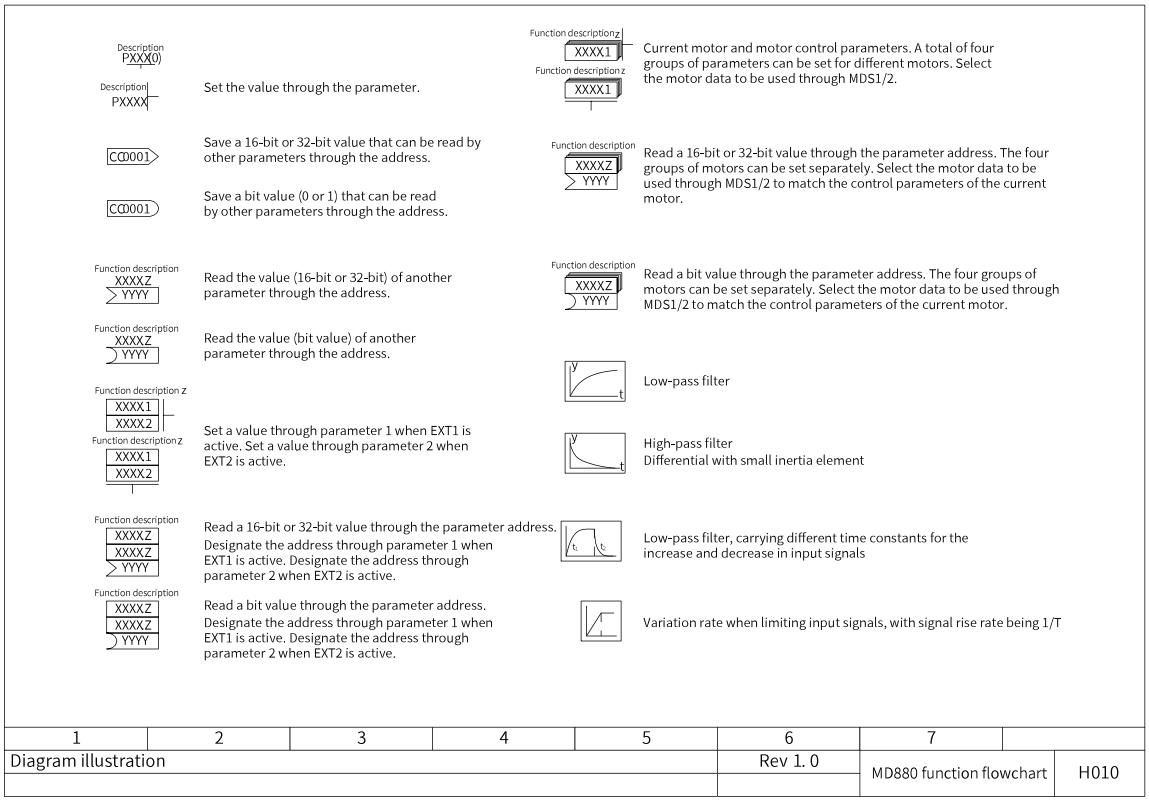
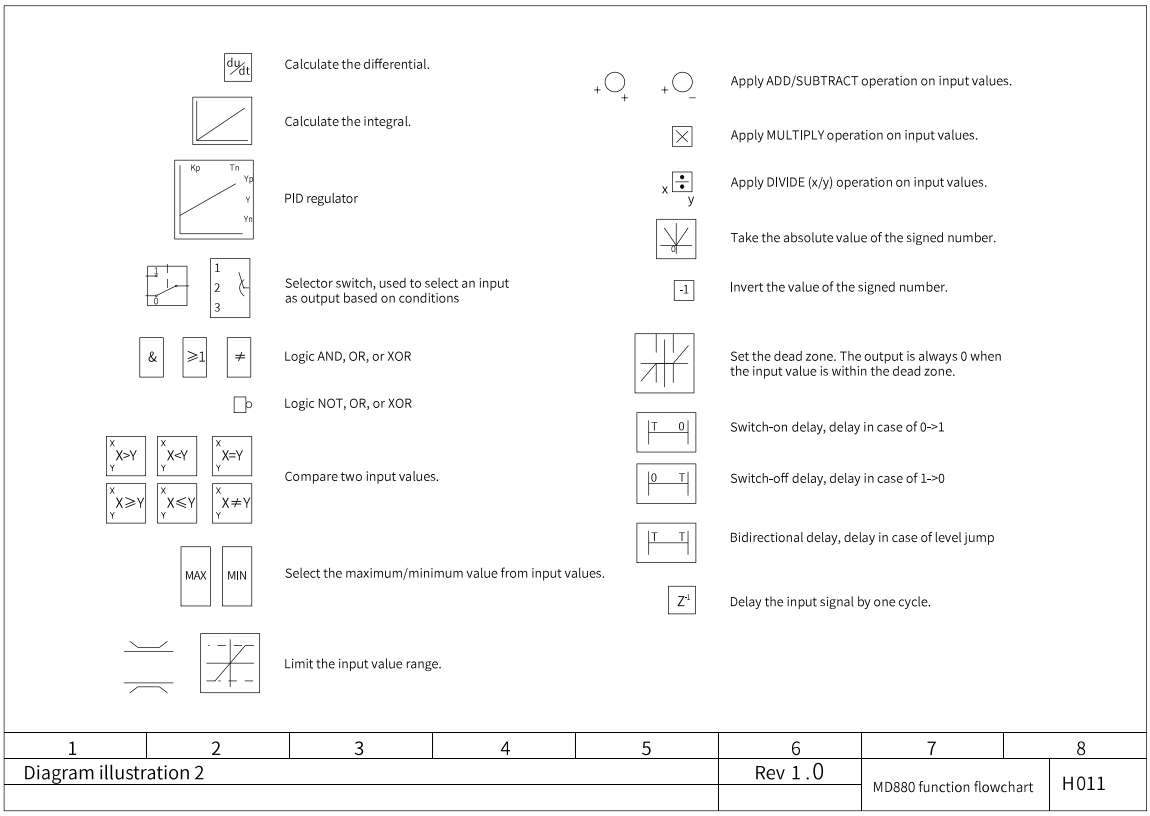


Figure 9-1 H010 - Diagram illustration 1

9.2.1.2 H011 - Diagram illustration 2



1	2	3	4	5	6	7	8
Diagram illustration 2					Rev 1.0	MD880 function flowchart	H011

Figure 9-2 H011 - Diagram illustration 2

9.2.2 State Machine

9.2.2.1 H030 - State machine overview

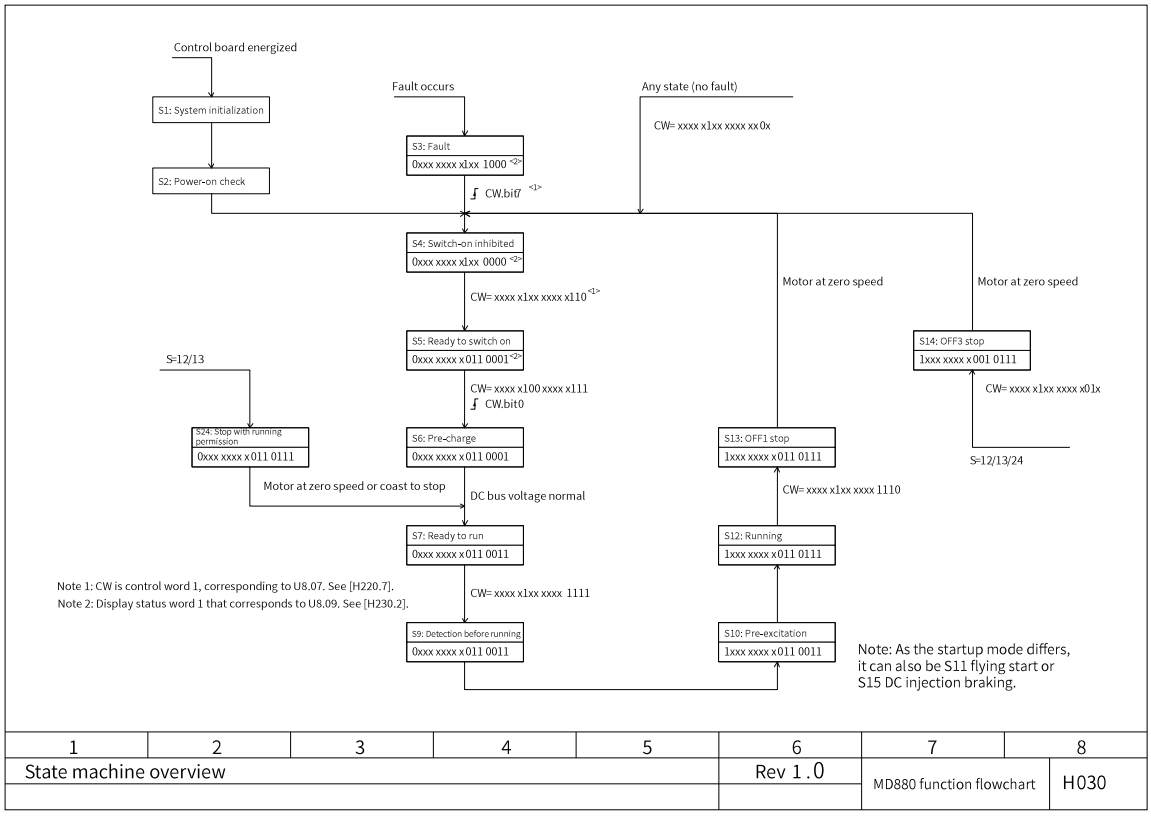


Figure 9-3 H030 - State machine overview

9.2.3 Input and Output

9.2.3.1 H110 - Digital input

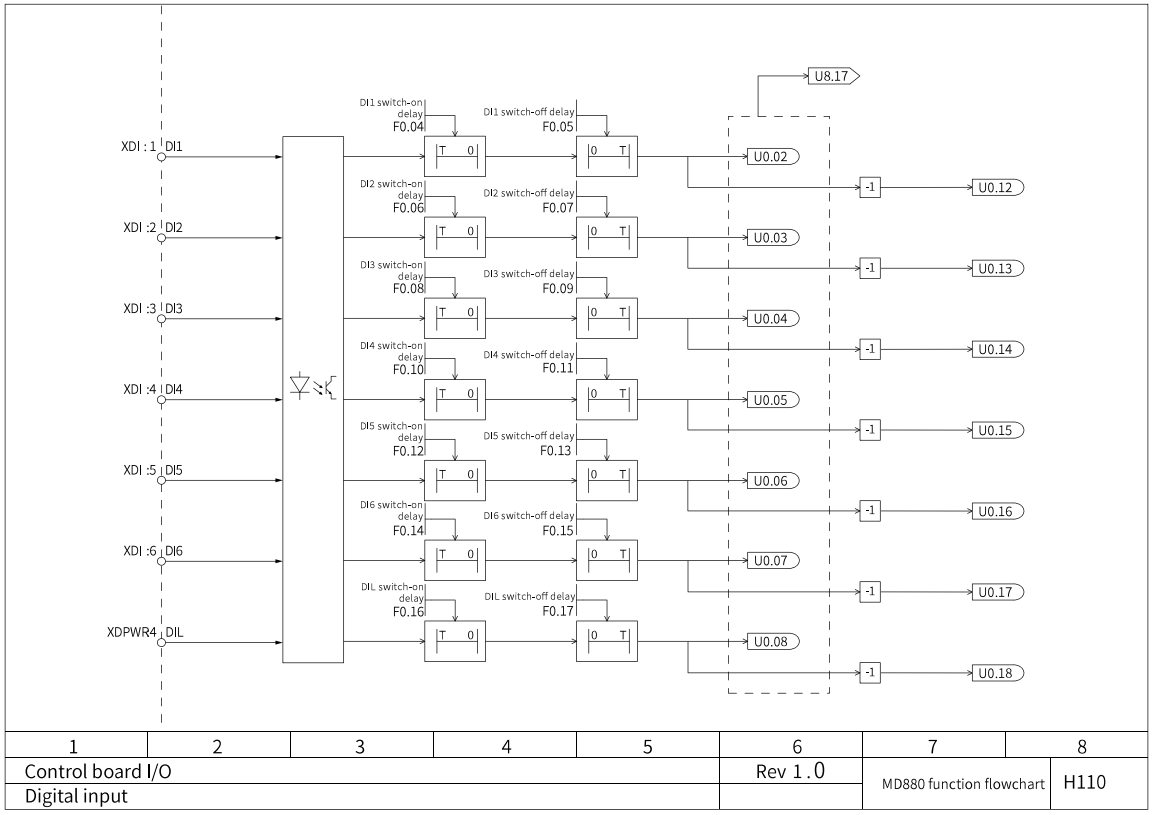
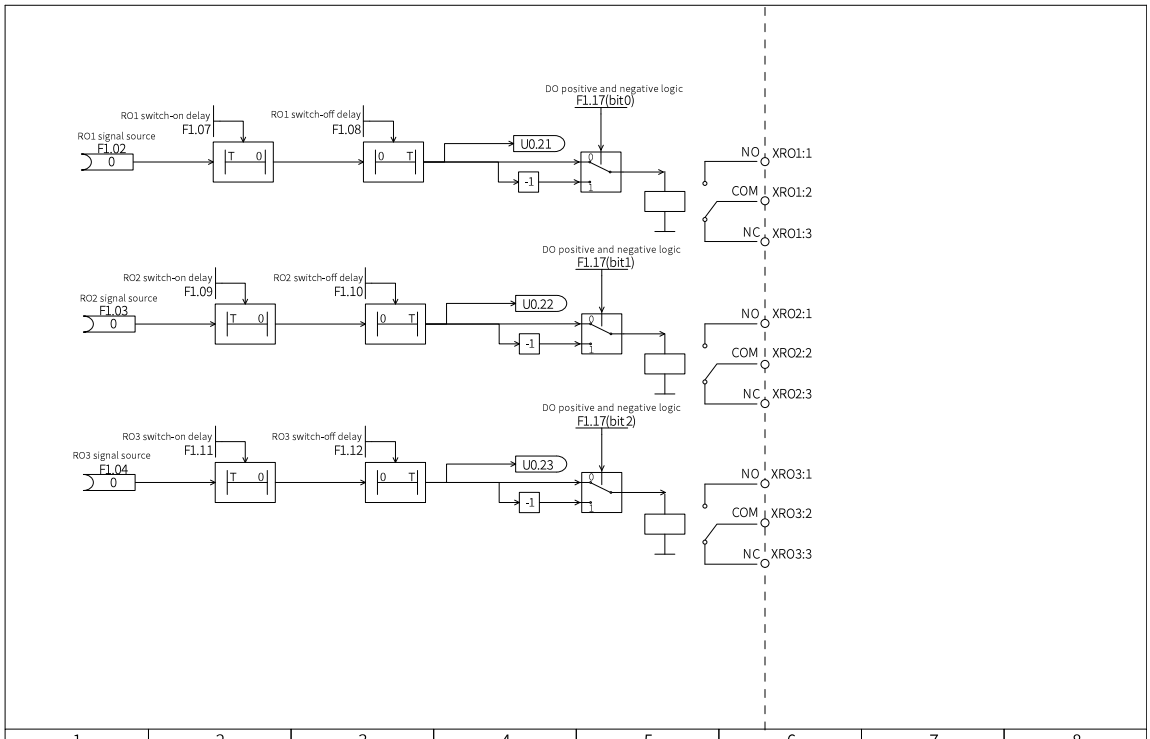


Figure 9-4 H110 - Digital input

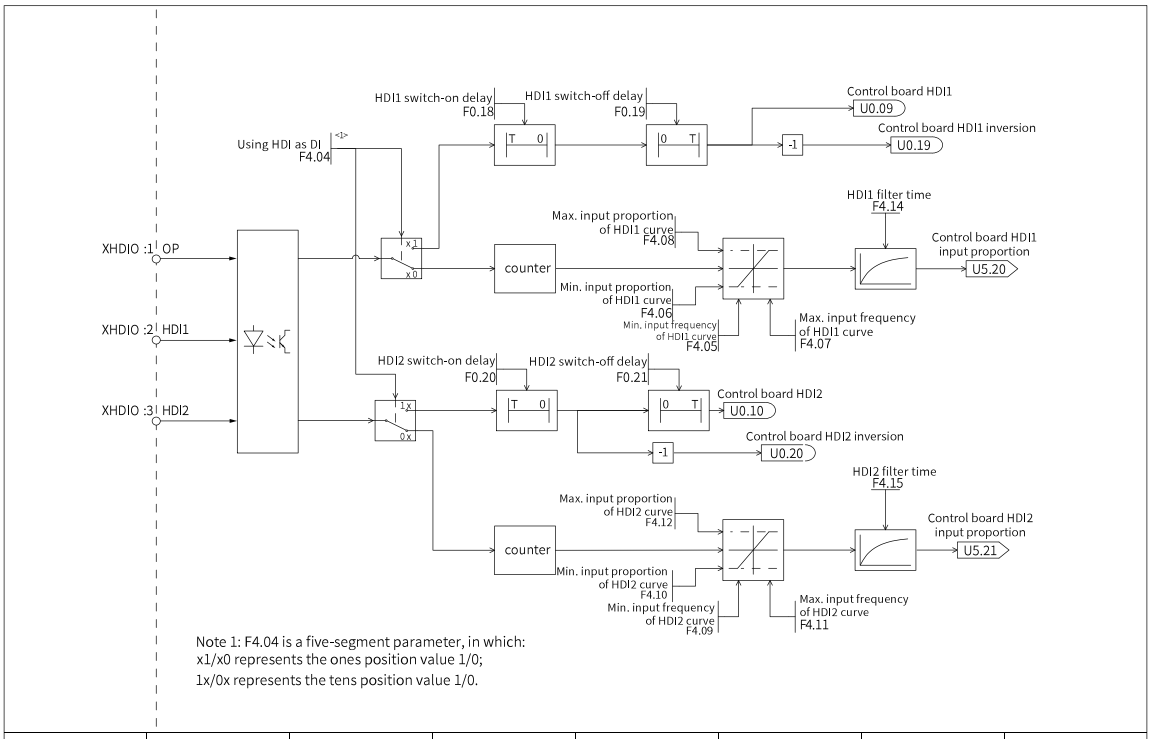
9.2.3.2 H112 - Relay output



1	2	3	4	5	6	7	8
Control board I/O					Rev 1. 03	MD880 function flowchart	H112
Relay output							

Figure 9-5 H112 - Relay output

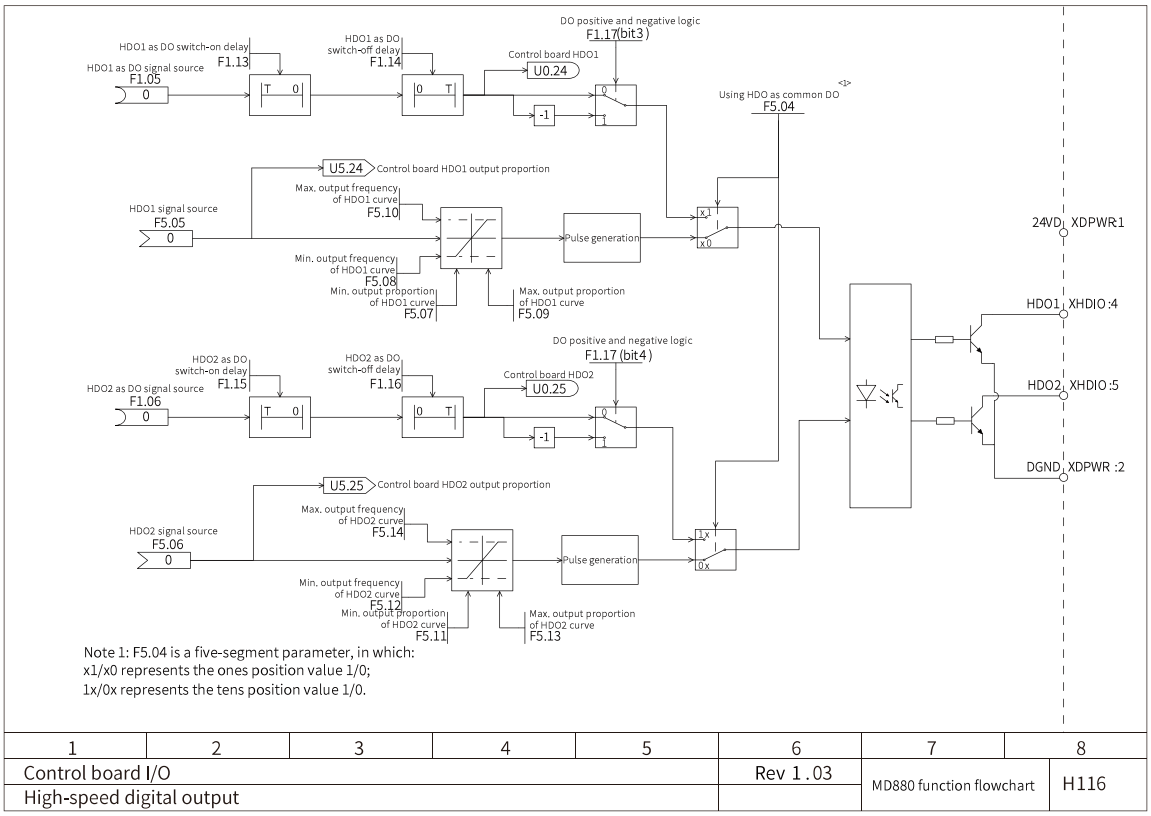
9.2.3.3 H114 - High-speed digital input



1	2	3	4	5	6	7	8
Control board I/O					Rev 1 . 03	MD880 function flowchart	H114
High-speed digital input							

Figure 9-6 H114 - High-speed digital input

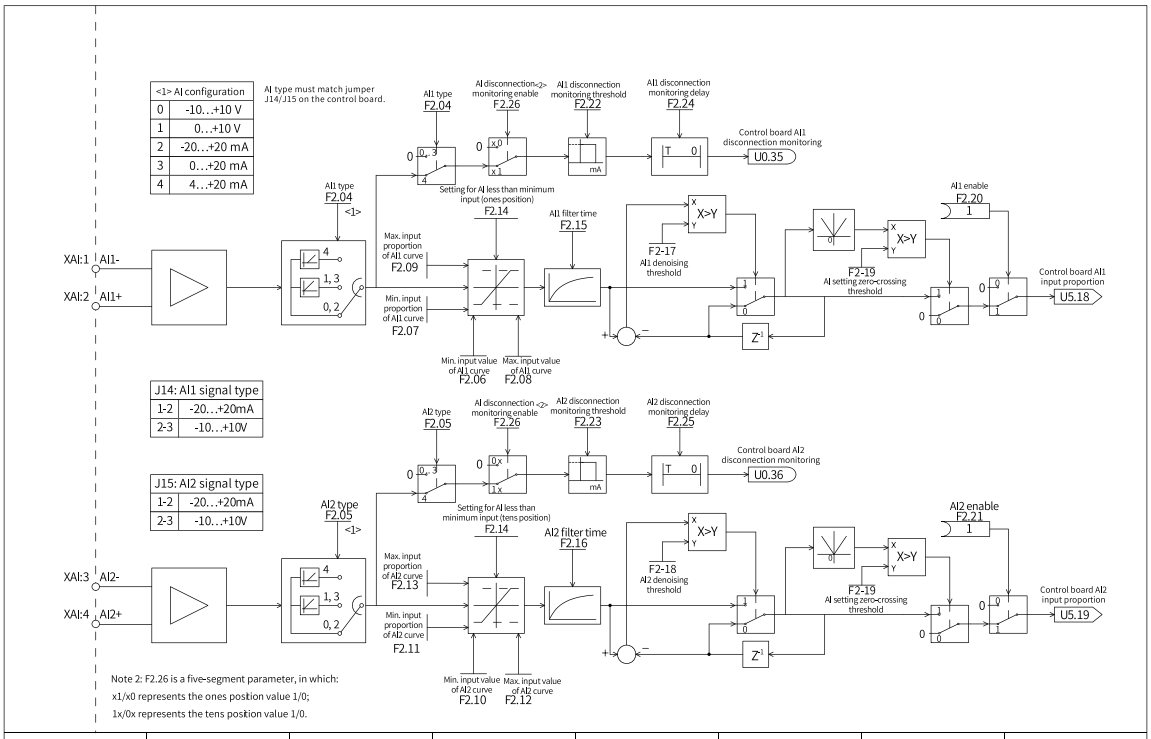
9.2.3.4 H116 - High-speed digital output



1	2	3	4	5	6	7	8
Control board I/O					Rev 1 . 03	MD880 function flowchart	H116
High-speed digital output							

Figure 9-7 H116 - High-speed digital output

9.2.3.5 H120 - Analog input



1	2	3	4	5	6	7	8
Control board I/O					Rev 1.03	MD880 function flowchart	H120
AI							

Figure 9-8 H120 - Analog input

9.2.3.6 H122 - Analog output

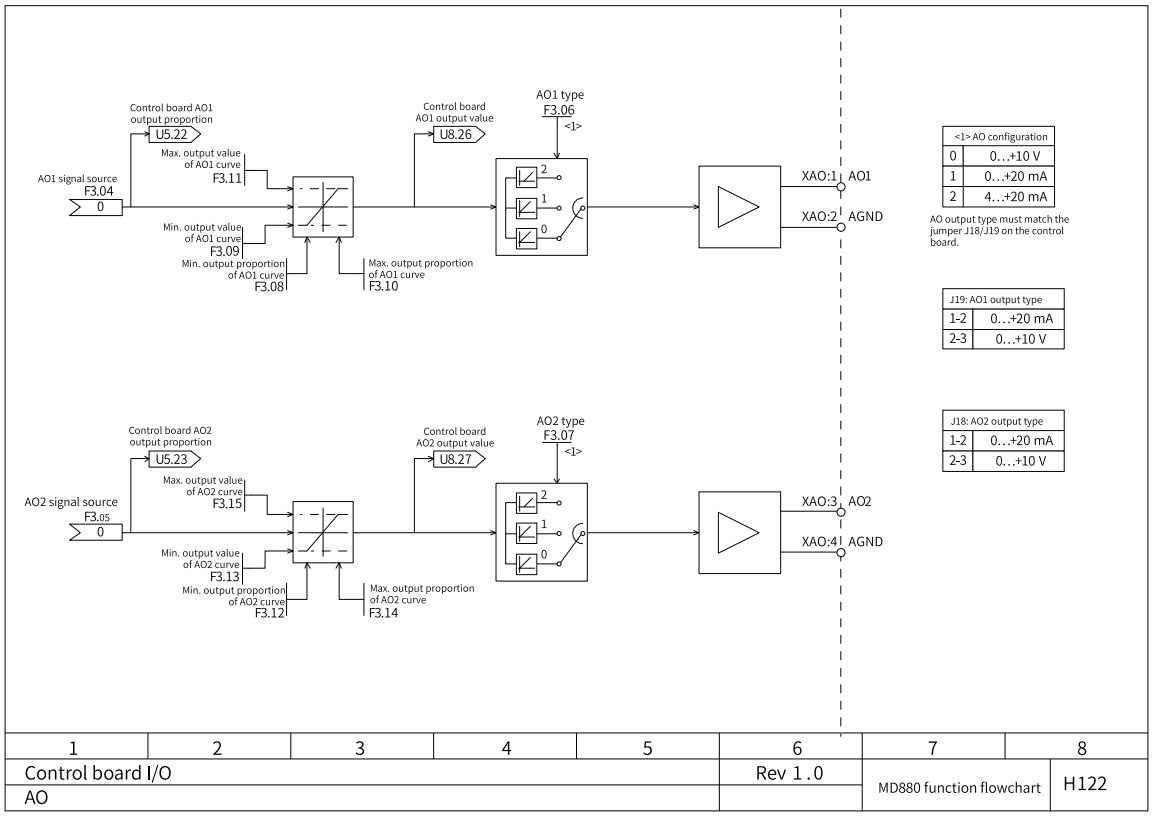
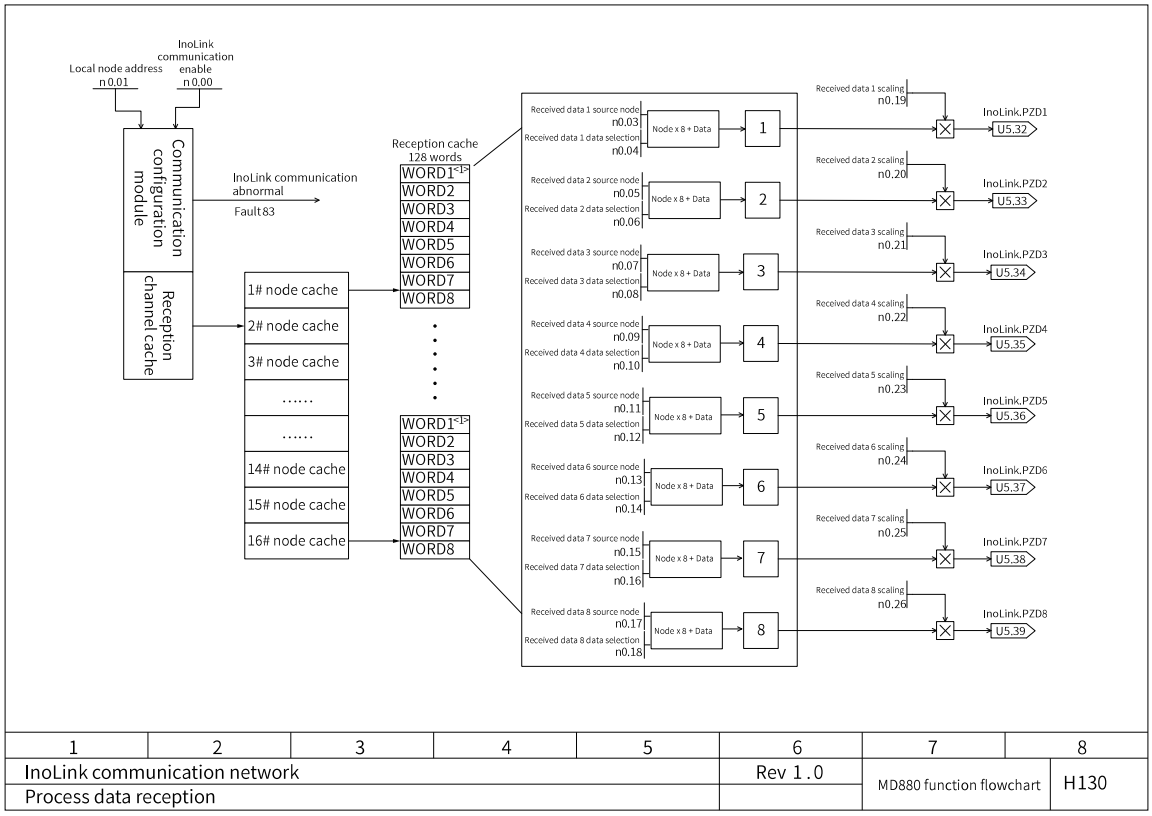


Figure 9-9 H122 - Analog output

9.2.3.7 H130 - InoLink communication network - Process data reception



1	2	3	4	5	6	7	8
InoLink communication network					Rev 1.0	MD880 function flowchart	H130
Process data reception							

Figure 9-10 H130 - InoLink communication network - Process data reception

9.2.3.8 H134 - InoLink communication network - Process data transmission

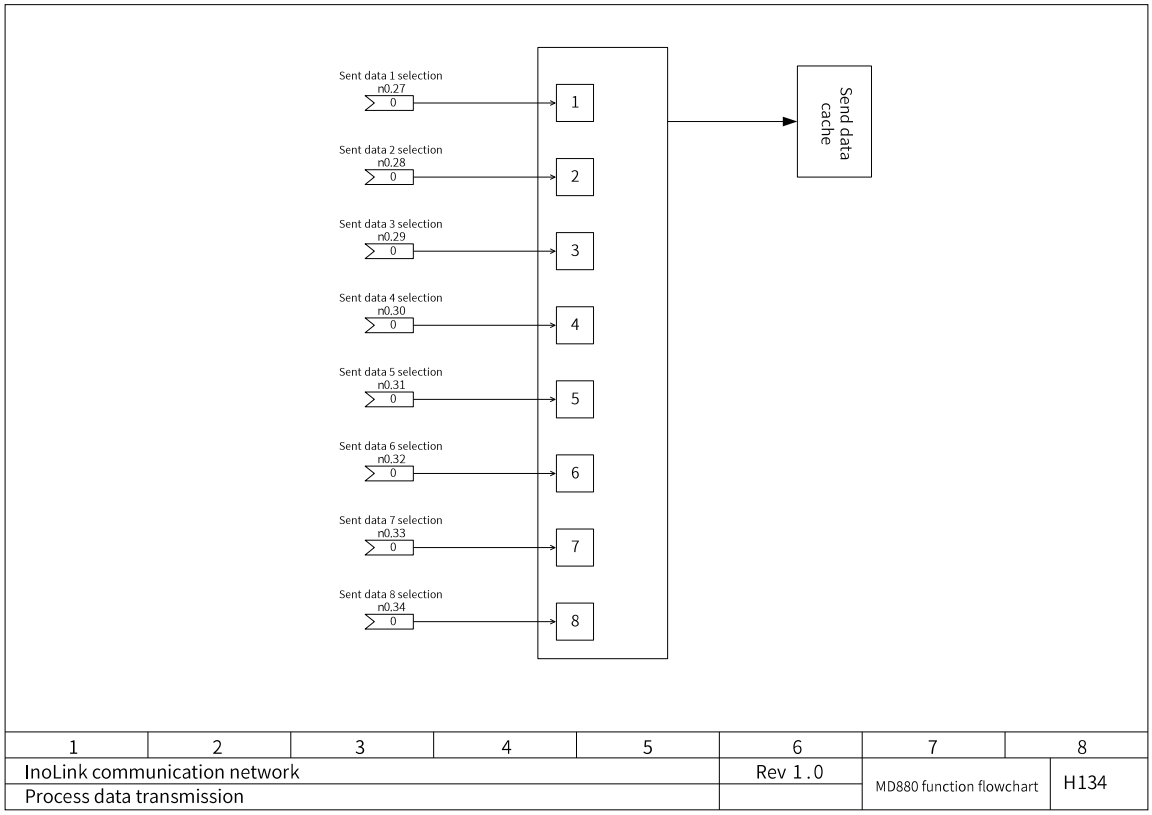
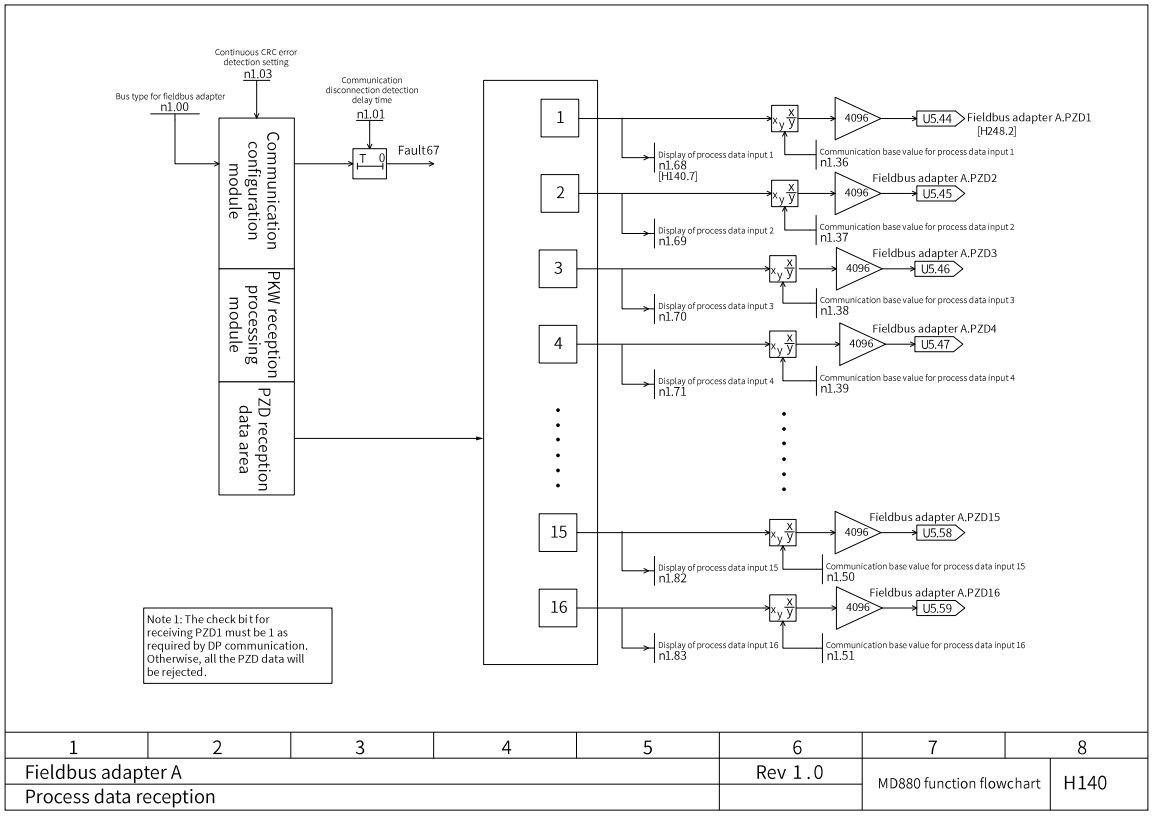


Figure 9-11 H134 - InoLink communication network - Process data transmission

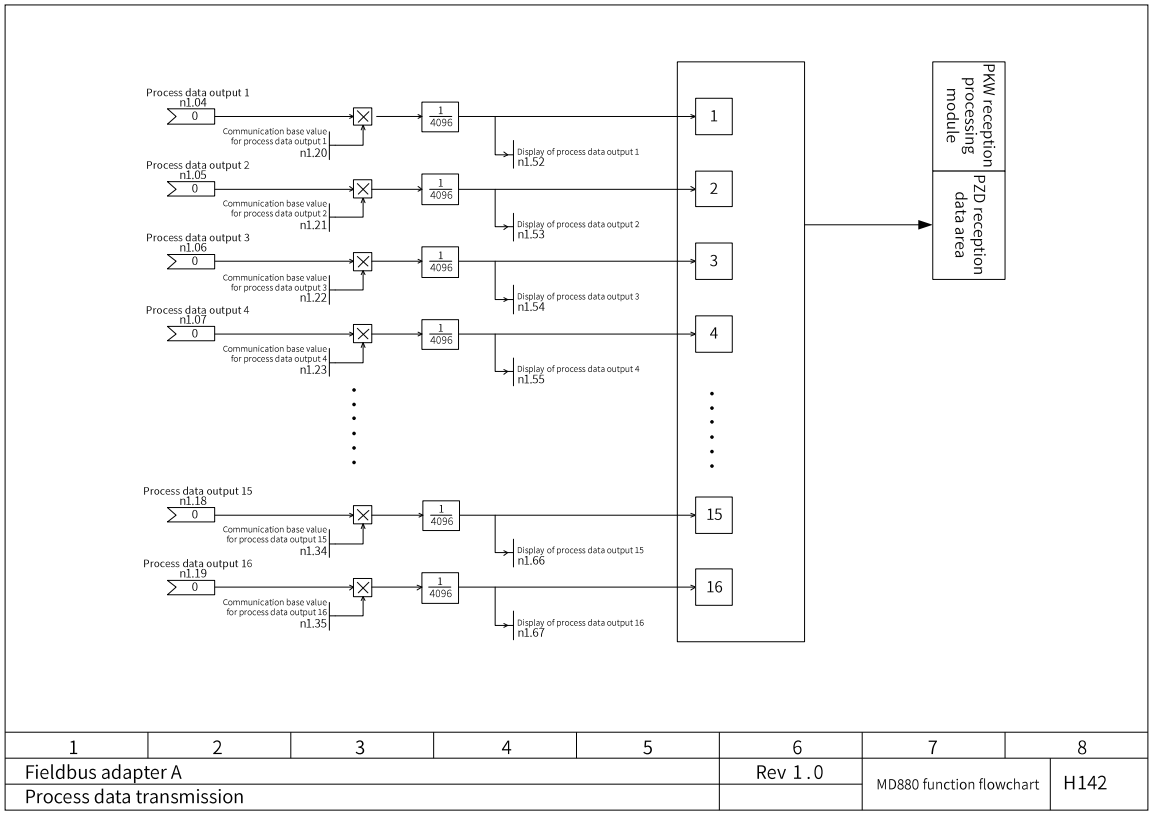
9.2.3.9 H140 - Fieldbus adapter A - Process data reception



1	2	3	4	5	6	7	8
Fieldbus adapter A Process data reception					Rev 1.0	MD880 function flowchart	H140

Figure 9-12 H140 - Fieldbus adapter A - Process data reception

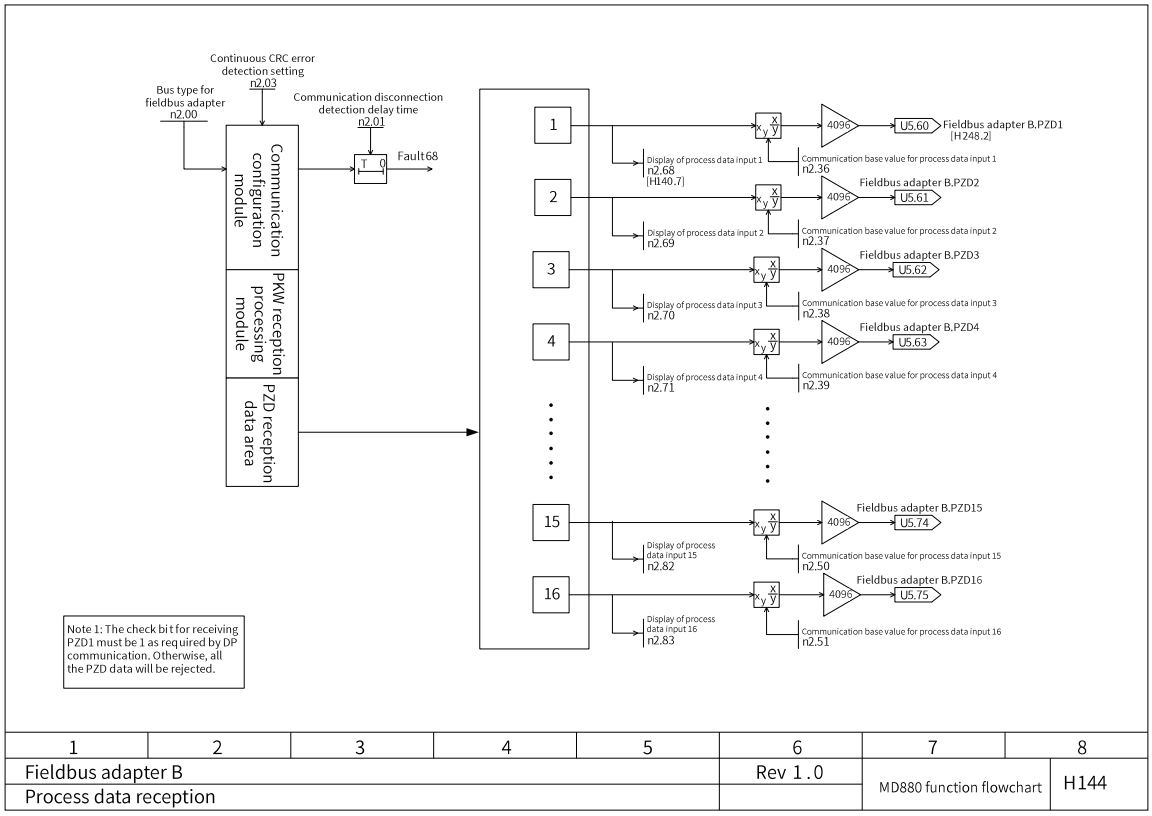
9.2.3.10 H142 - Fieldbus adapter A - Process data transmission



1	2	3	4	5	6	7	8
Fieldbus adapter A Process data transmission					Rev 1.0	MD880 function flowchart	H142

Figure 9-13 H142 - Fieldbus adapter A - Process data transmission

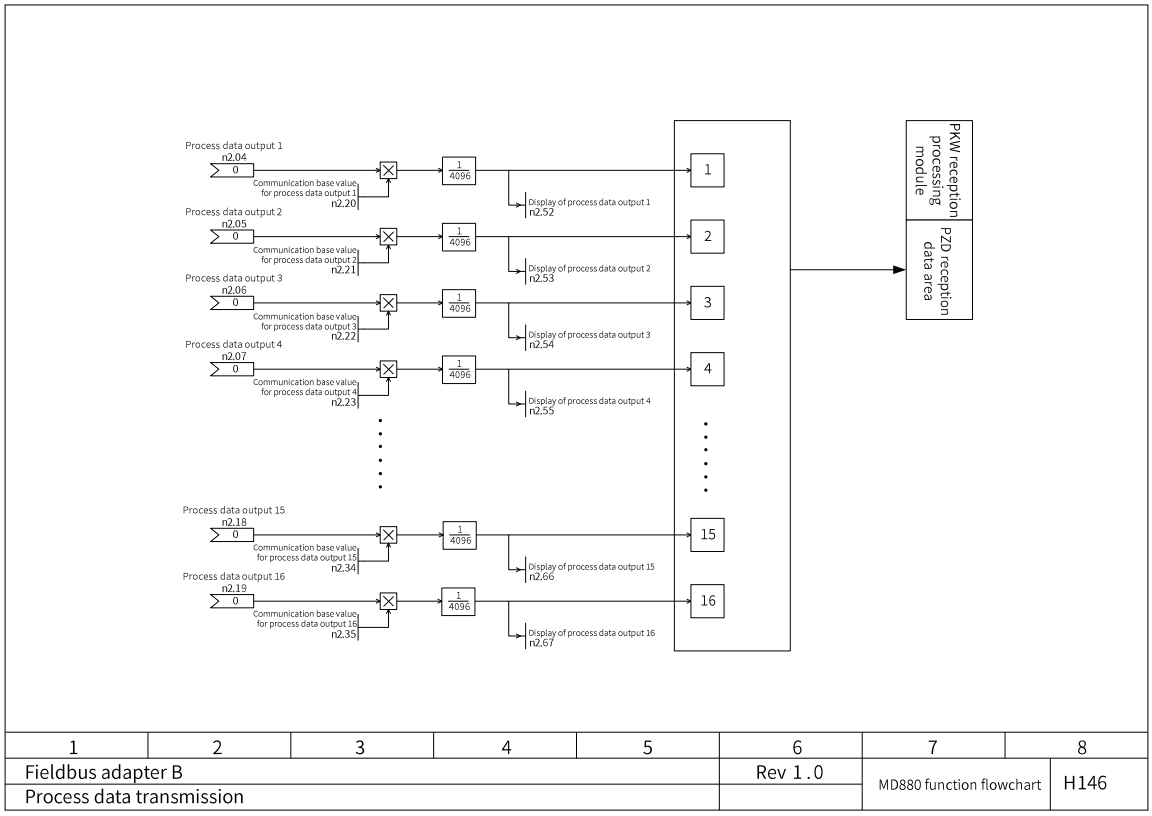
9.2.3.11 H144 - Fieldbus adapter B - Process data reception



1	2	3	4	5	6	7	8
Fieldbus adapter B Process data reception					Rev 1.0	MD880 function flowchart	H144

Figure 9-14 H144 - Fieldbus adapter B - Process data reception

9.2.3.12 H146 - Fieldbus adapter B - Process data transmission



1	2	3	4	5	6	7	8
Fieldbus adapter B					Rev 1.0	MD880 function flowchart	H146
Process data transmission							

Figure 9-15 H146 - Fieldbus adapter B - Process data transmission

9.3 Application Functions

9.3.1 H160 - Word-to-bit function

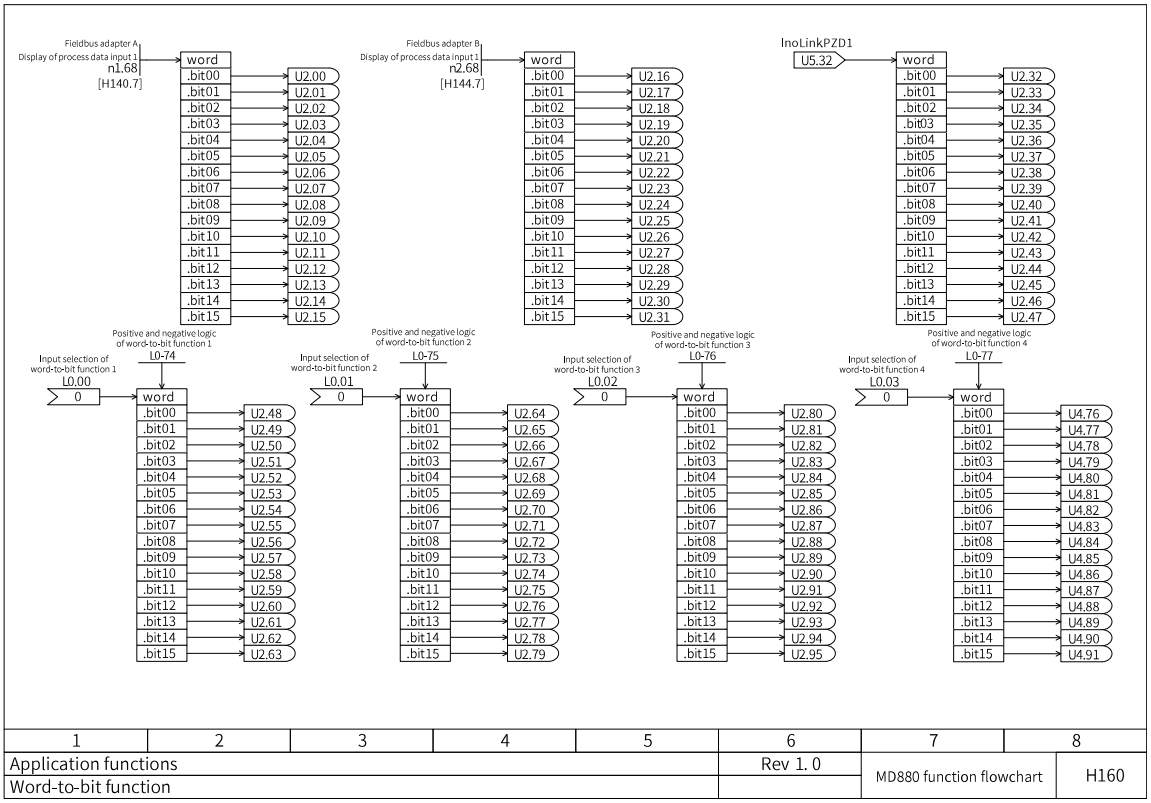


Figure 9-16 H160 - Word-to-bit function

9.3.2 H162 - Bit-to-word function

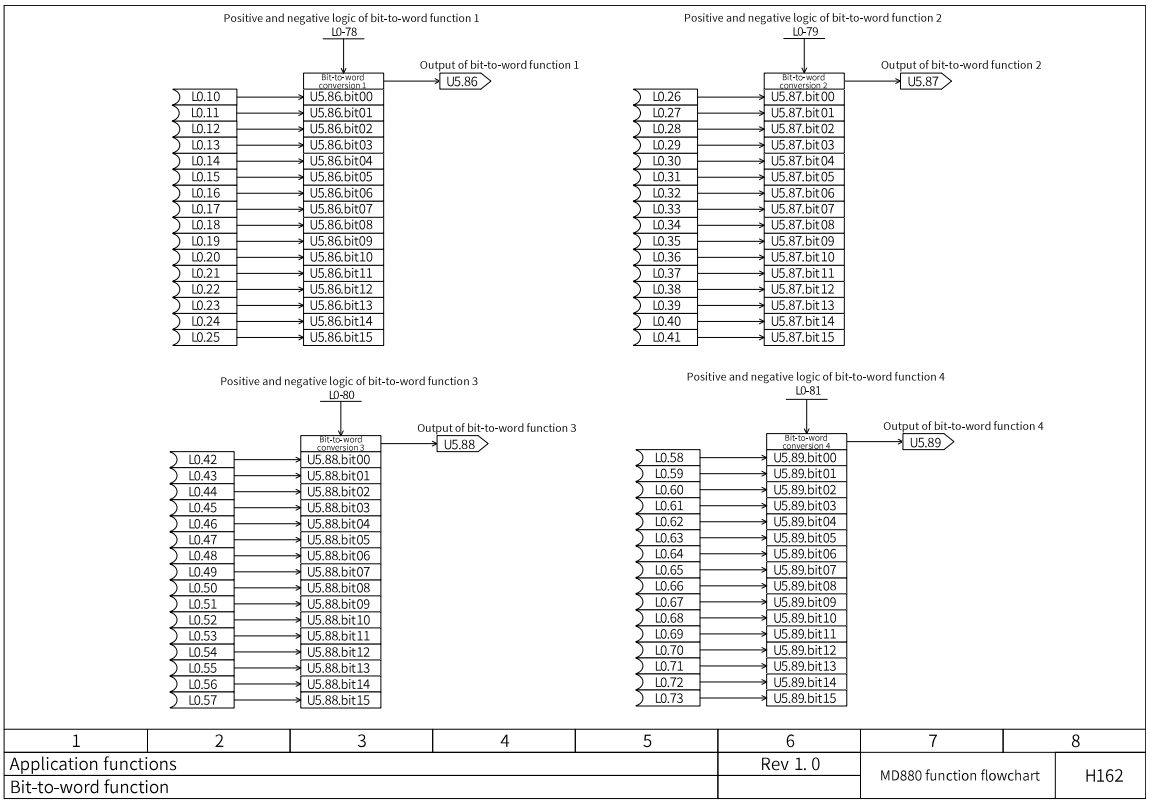
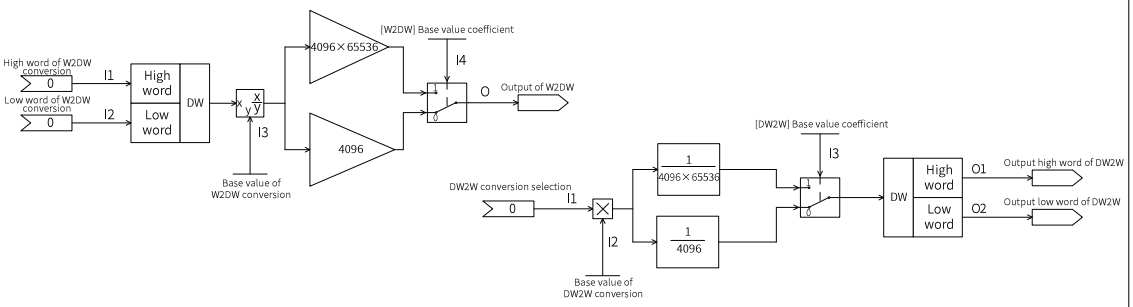


Figure 9-17 H162 - Bit-to-word function

9.3.3 H164 - W2DW and DW2W



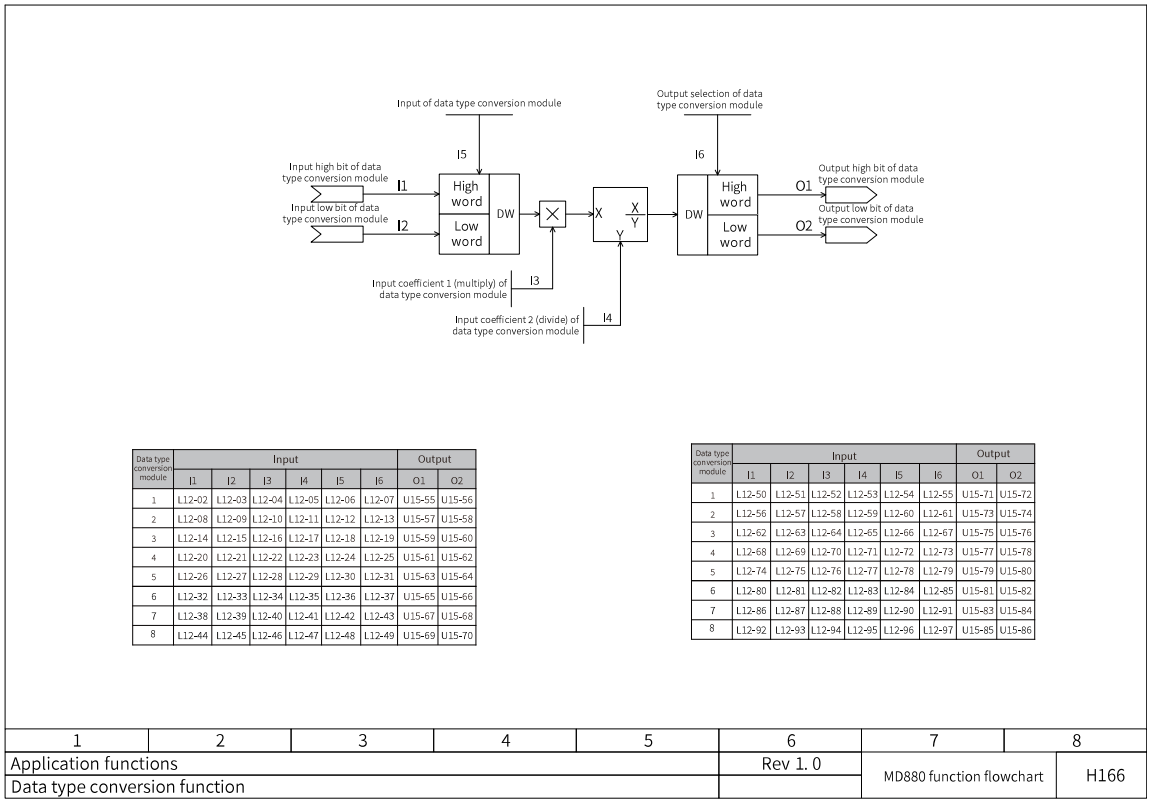
W2DW module	Input				Output
	I1	I2	I3	I4	O
1	L3-01	L3-02	L3-03	L3-00(bit0)	U9-47
2	L3-04	L3-05	L3-06	L3-00(bit1)	U9-48
3	L3-07	L3-08	L3-09	L3-00(bit2)	U9-49
4	L3-10	L3-11	L3-12	L3-00(bit3)	U0-26
5	L3-13	L3-14	L3-15	L3-00(bit4)	U9-27

DW2W module	Input				Output
	I1	I2	I3	O1	O2
1	L3-26	L3-27	L3-25(bit0)	U5-76	U5-77
2	L3-28	L3-29	L3-25(bit1)	U5-78	U5-79
3	L3-30	L3-31	L3-25(bit2)	U5-80	U5-81
4	L3-32	L3-33	L3-25(bit3)	U5-82	U5-83
5	L3-34	L3-35	L3-25(bit4)	U5-85	U5-85

1	2	3	4	5	6	7	8
Application functions W2DW and DW2W					Rev 1.0	MD880 function flowchart	H164

Figure 9-18 H164 - W2DW and DW2W

9.3.4 H166 - Data type conversion module



Data type conversion module	Input						Output	
	I1	I2	I3	I4	I5	I6	O1	O2
1	L12-02	L12-03	L12-04	L12-05	L12-06	L12-07	U15-55	U15-56
2	L12-08	L12-09	L12-10	L12-11	L12-12	L12-13	U15-57	U15-58
3	L12-14	L12-15	L12-16	L12-17	L12-18	L12-19	U15-59	U15-60
4	L12-20	L12-21	L12-22	L12-23	L12-24	L12-25	U15-61	U15-62
5	L12-26	L12-27	L12-28	L12-29	L12-30	L12-31	U15-63	U15-64
6	L12-32	L12-33	L12-34	L12-35	L12-36	L12-37	U15-65	U15-66
7	L12-38	L12-39	L12-40	L12-41	L12-42	L12-43	U15-67	U15-68
8	L12-44	L12-45	L12-46	L12-47	L12-48	L12-49	U15-69	U15-70

Data type conversion module	Input						Output	
	I1	I2	I3	I4	I5	I6	O1	O2
1	L12-50	L12-51	L12-52	L12-53	L12-54	L12-55	U15-71	U15-72
2	L12-56	L12-57	L12-58	L12-59	L12-60	L12-61	U15-73	U15-74
3	L12-62	L12-63	L12-64	L12-65	L12-66	L12-67	U15-75	U15-76
4	L12-68	L12-69	L12-70	L12-71	L12-72	L12-73	U15-77	U15-78
5	L12-74	L12-75	L12-76	L12-77	L12-78	L12-79	U15-79	U15-80
6	L12-80	L12-81	L12-82	L12-83	L12-84	L12-85	U15-81	U15-82
7	L12-86	L12-87	L12-88	L12-89	L12-90	L12-91	U15-83	U15-84
8	L12-92	L12-93	L12-94	L12-95	L12-96	L12-97	U15-85	U15-86

1	2	3	4	5	6	7	8
Application functions					Rev 1. 0	MD880 function flowchart	H166
Data type conversion function							

Figure 9-19 H166 - Data type conversion module

9.3.5 H170 - Logic NAND

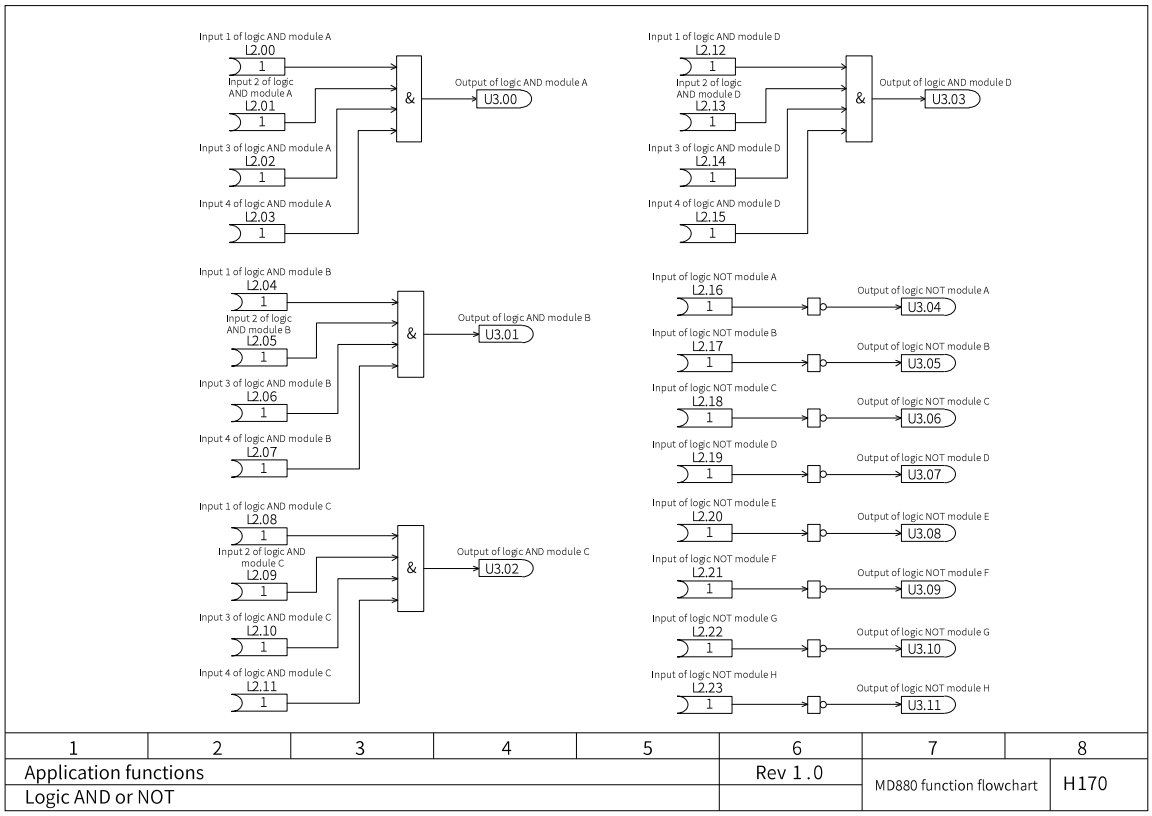
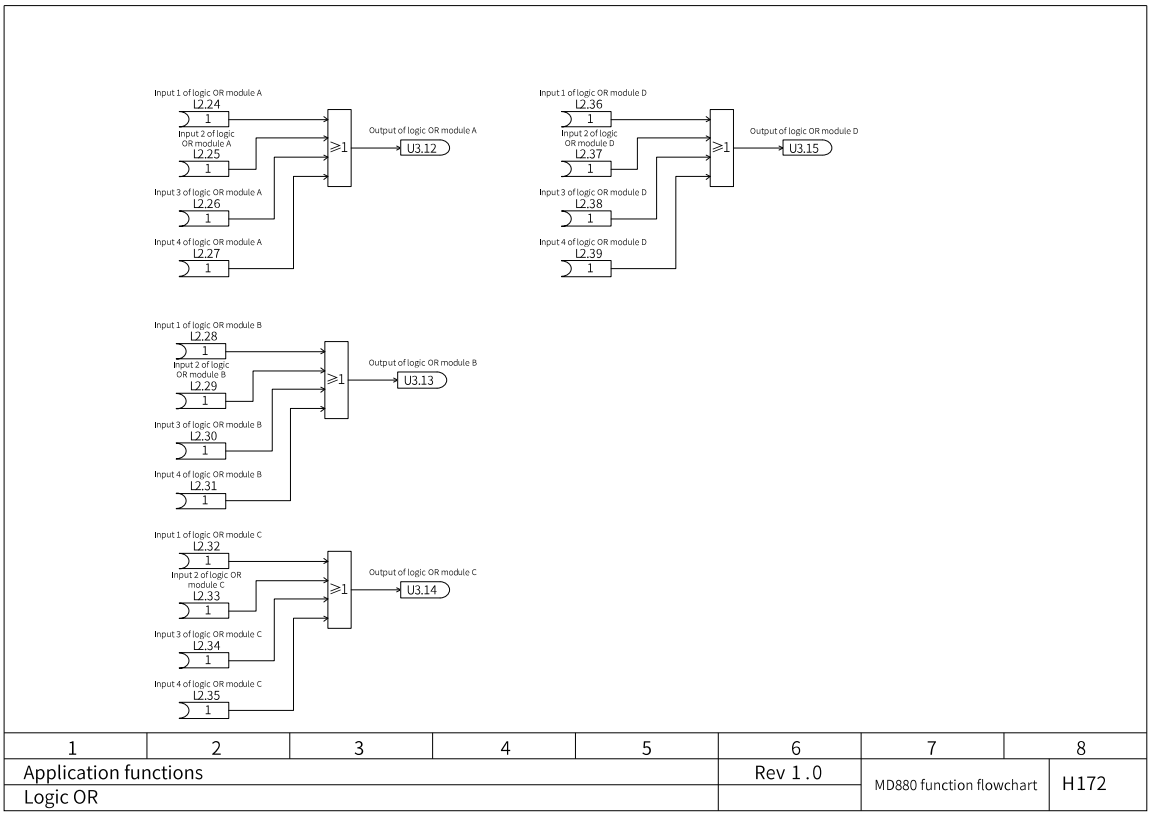


Figure 9-20 H170 - Logic NAND

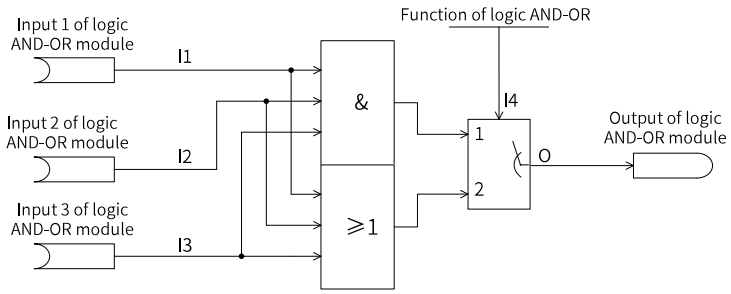
9.3.6 H172 - Logic OR



1	2	3	4	5	6	7	8
Application functions					Rev 1.0	MD880 function flowchart	H172
Logic OR							

Figure 9-21 H172 - Logic OR

9.3.7 H173 - Logic AND/OR

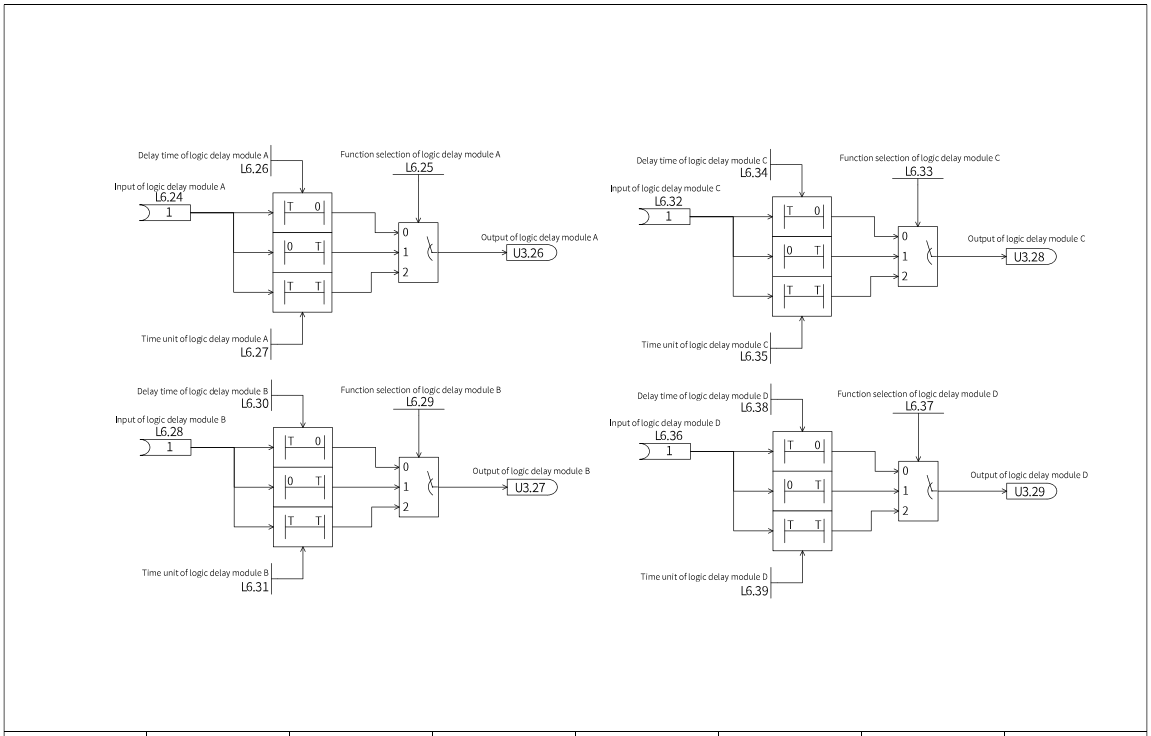


Logic AND-OR Module	Input				Output
	I1	I2	I3	I4	O
A	L2-61	L2-62	L2-63	L2-60	U4-92
B	L2-65	L2-66	L2-67	L2-64	U4-93
C	L2-69	L2-70	L2-71	L2-68	U4-94
D	L2-73	L2-74	L2-75	L2-72	U4-95
E	L2-77	L2-78	L2-79	L2-76	U4-96
F	L2-81	L2-82	L2-83	L2-80	U4-97
G	L2-85	L2-86	L2-87	L2-84	U4-98
H	L2-89	L2-90	L2-91	L2-88	U4-99

1	2	3	4	5	6	7	8
Application functions					Rev 1.0	MD880 function flowchart	H173
Logic AND/OR							

Figure 9-22 H173 - Logic AND/OR

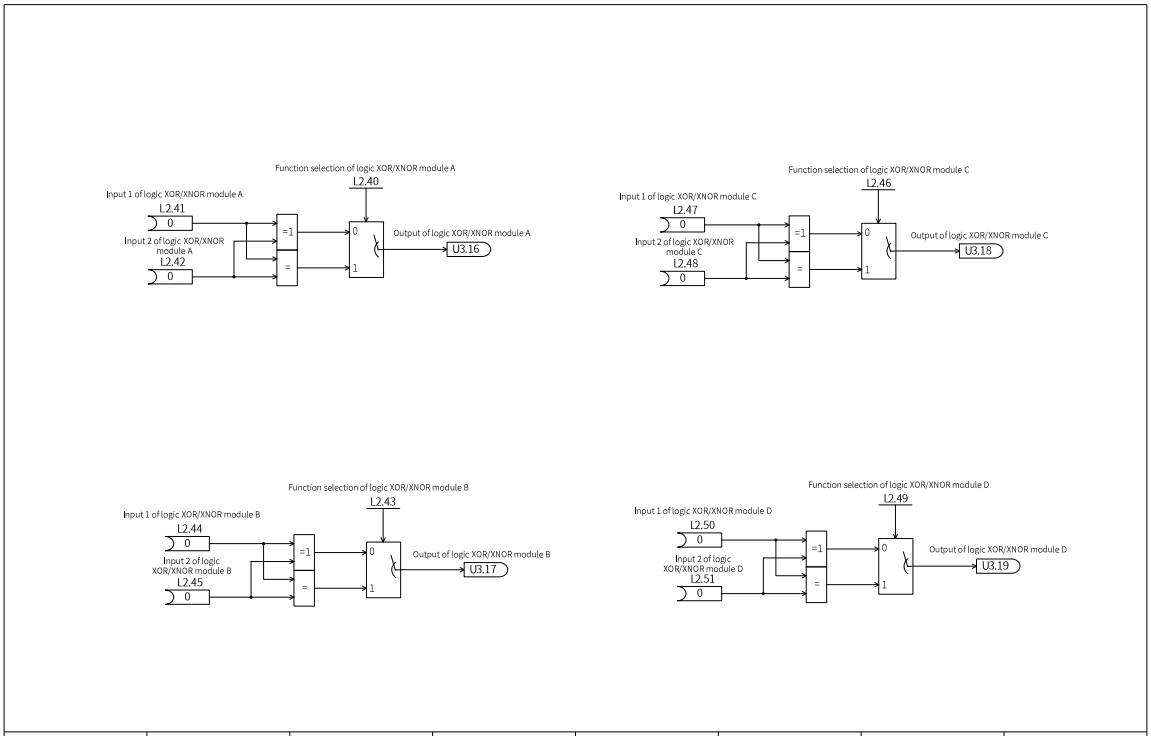
9.3.8 H174 - Logic delay module



1	2	3	4	5	6	7	8
Application functions					Rev 1.0	MD880 function flowchart	H174
Logic delay module							

Figure 9-23 H174 - Logic delay module

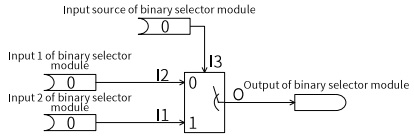
9.3.9 H176 - Logic XOR/XNOR

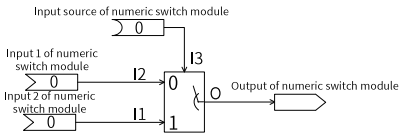


1	2	3	4	5	6	7	8
Application functions					Rev 1.0	MD880 function flowchart	H176
Logic XOR/XNOR							

Figure 9-24 H176 - Logic XOR/XNOR

9.3.10 H178 - Switch function block





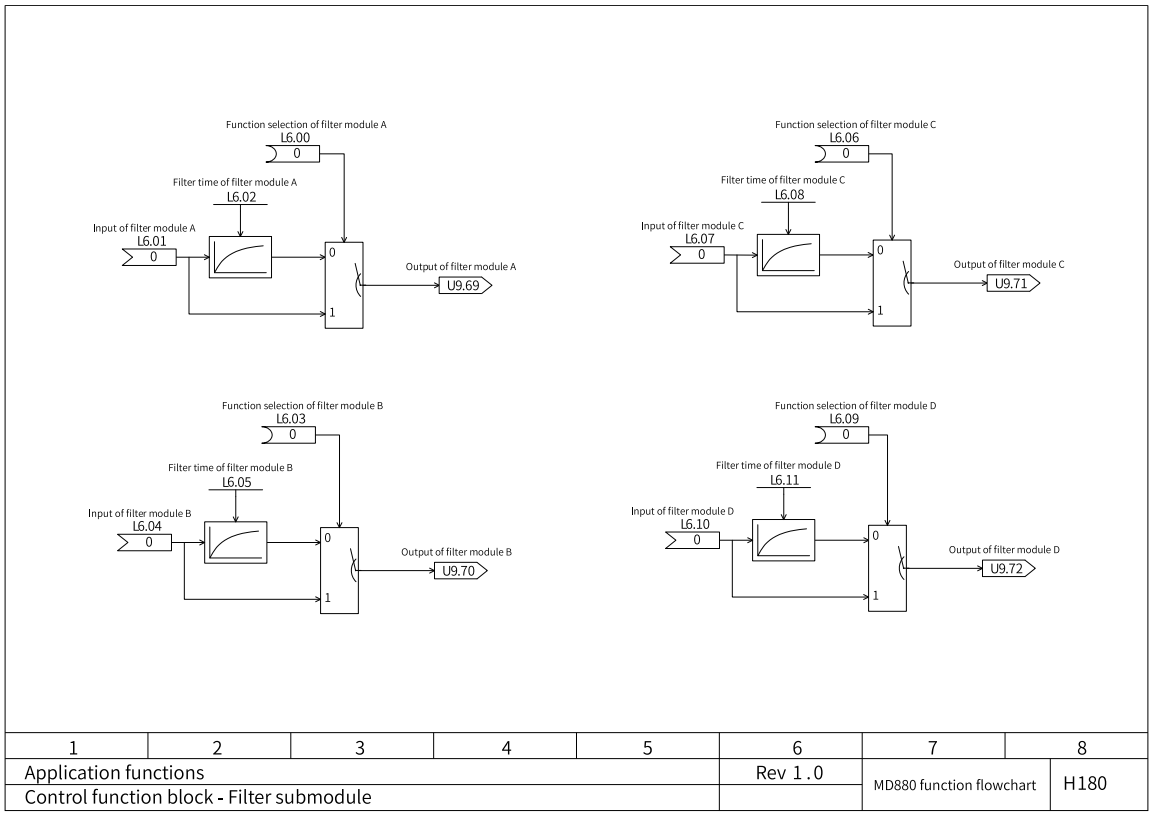
Binary selector module	Input			Output
	I1	I2	I3	O
A	L5-01	L5-02	L5-00	U3-20
B	L5-04	L5-05	L5-03	U3-21
C	L5-07	L5-08	L5-06	U3-97
D	L5-10	L5-11	L5-09	U3-98
E	L5-13	L5-14	L5-12	U3-99

Numeric switch module	Input			Output
	I1	I2	I3	O
A	L5-21	L5-22	L5-20	U9-67
B	L5-24	L5-25	L5-23	U9-68
C	L5-27	L5-28	L5-26	U9-87
D	L5-30	L5-31	L5-29	U9-88
E	L5-33	L5-34	L5-32	U9-89

1	2	3	4	5	6	7	8
Application functions					Rev 1. 01	MD880 function flowchart	H178
Switch function block							

Figure 9-25 H178 - Switch function block

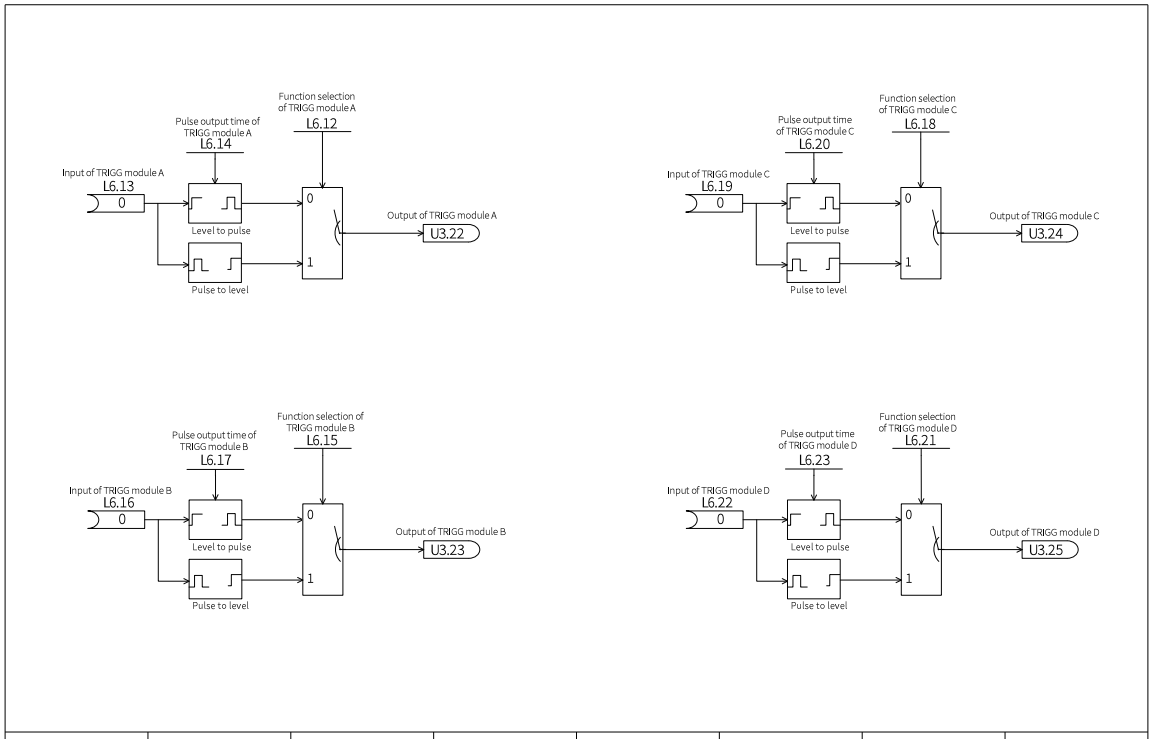
9.3.11 H180 - Control function block - Filter submodule



1	2	3	4	5	6	7	8
Application functions					Rev 1.0	MD880 function flowchart	H180
Control function block - Filter submodule							

Figure 9-26 H180 - Control function block - Filter submodule

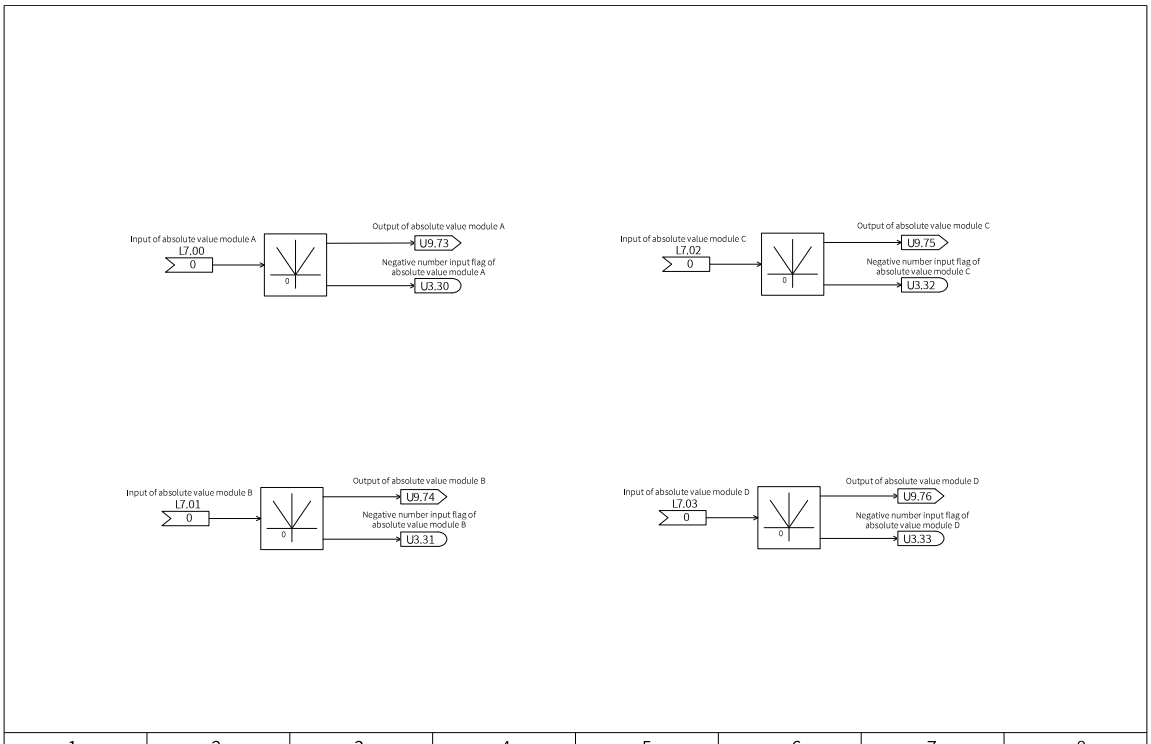
9.3.12 H182 - Control function block - P_L conversion submodule



1	2	3	4	5	6	7	8
Application functions					Rev 1.0	MD880 function flowchart	H182
Control function block - P_L conversion submodule							

Figure 9-27 H182 - Control function block - P_L conversion submodule

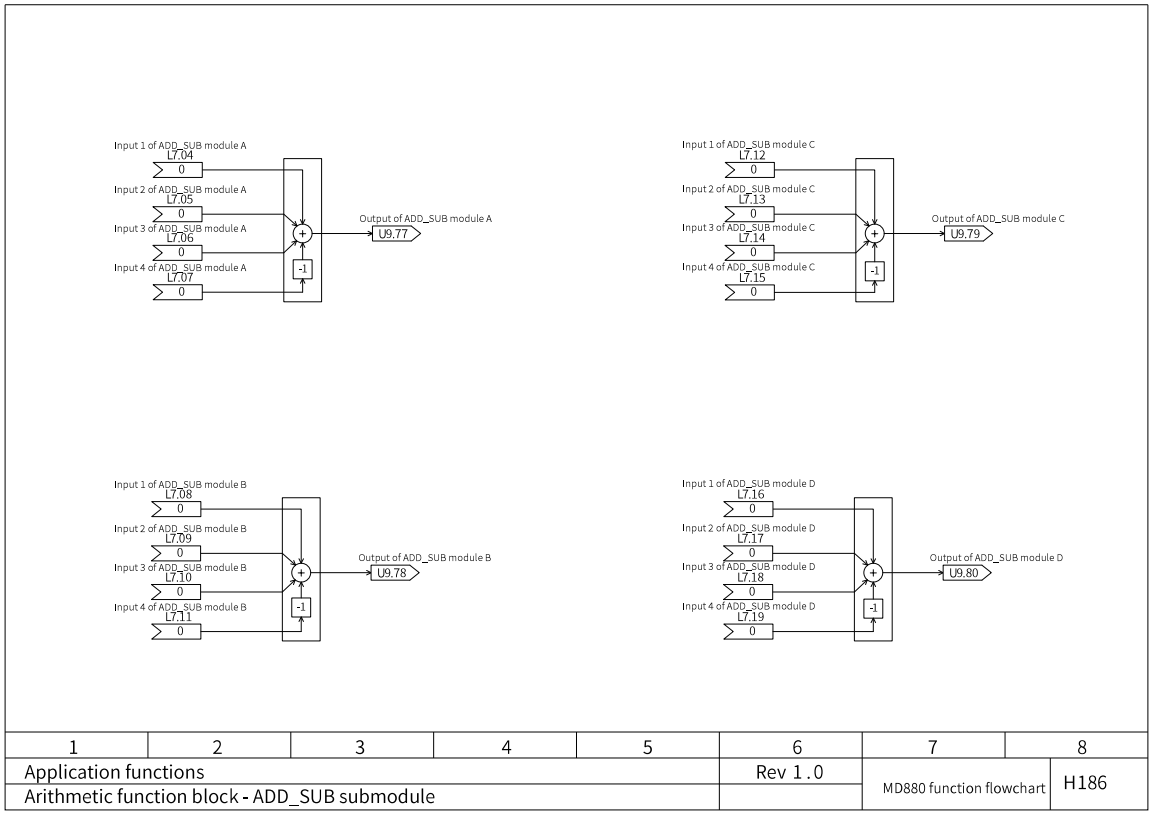
9.3.13 H184 - Arithmetic function block - Absolute value submodule



1	2	3	4	5	6	7	8
Application functions					Rev 1.0	MD880 function flowchart	H184
Arithmetic function block - Absolute value submodule							

Figure 9-28 H184 - Arithmetic function block - Absolute value submodule

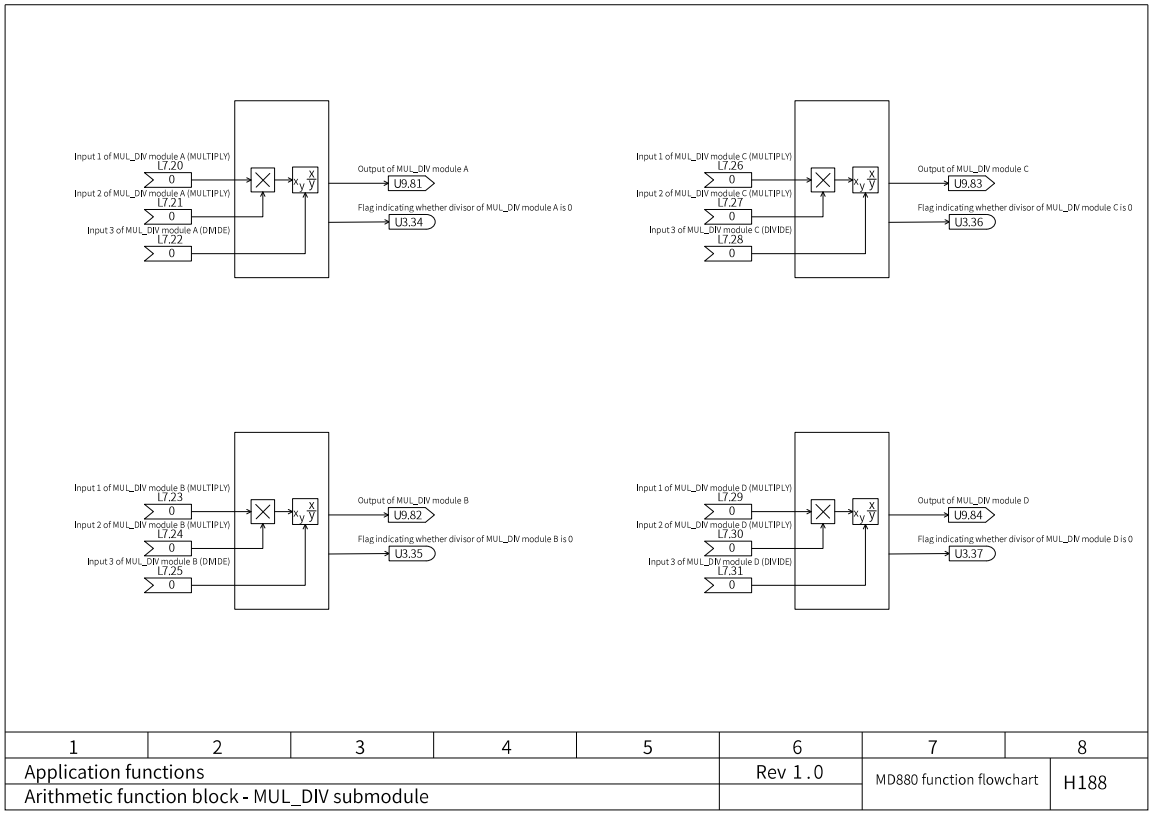
9.3.14 H186 - Arithmetic function block - ADD_SUB submodule



1	2	3	4	5	6	7	8
Application functions					Rev 1.0	MD880 function flowchart	H186
Arithmetic function block - ADD_SUB submodule							

Figure 9-29 H186 - Arithmetic function block - ADD_SUB submodule

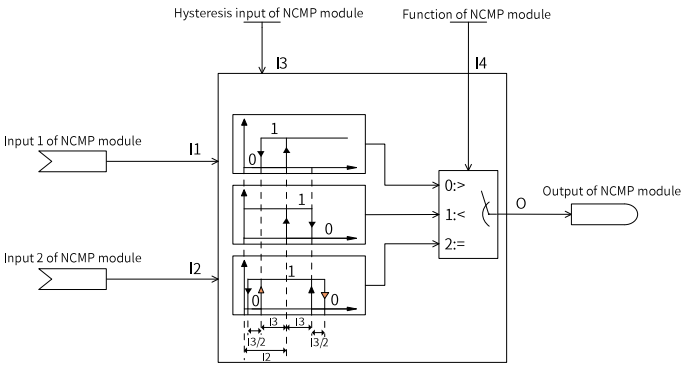
9.3.15 H188 - Arithmetic function block - MUL_DIV submodule



1	2	3	4	5	6	7	8
Application functions					Rev 1.0	MD880 function flowchart	H188
Arithmetic function block - MUL_DIV submodule							

Figure 9-30 H188 - Arithmetic function block - MUL_DIV submodule

9.3.16 H190 - Arithmetic function block - NCMP submodule



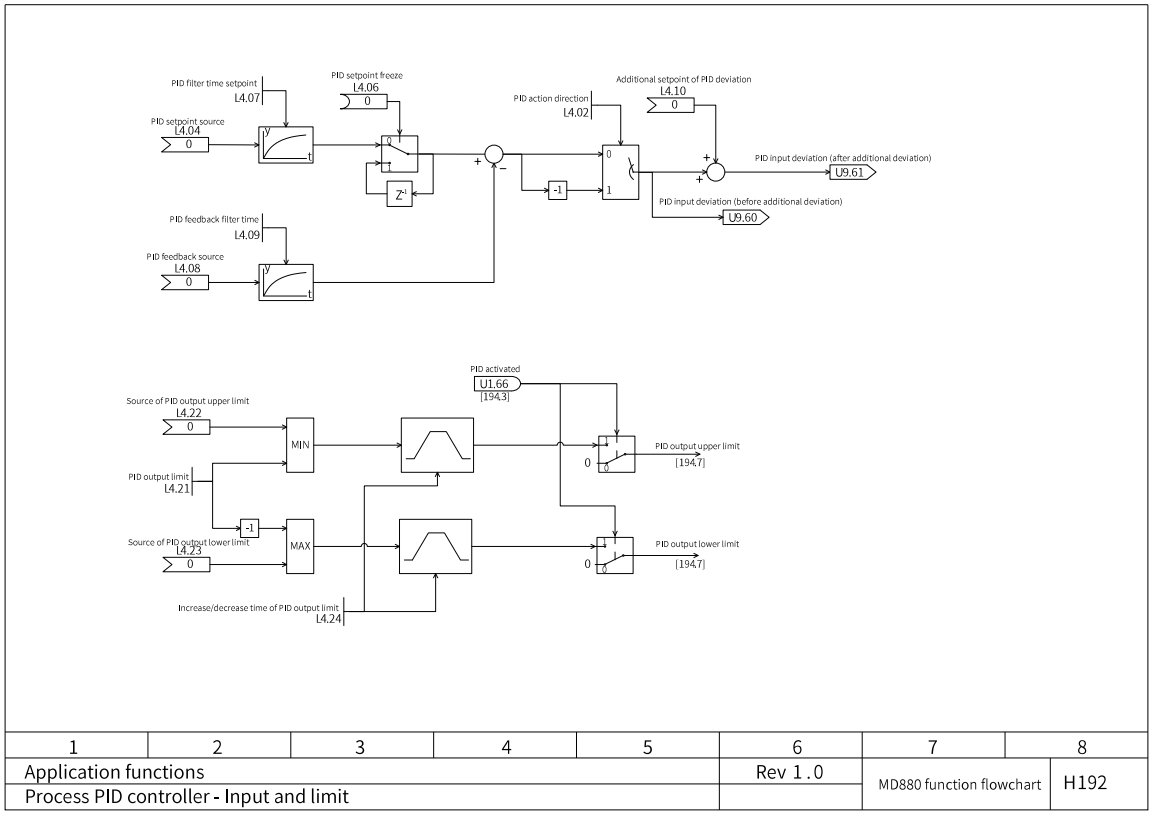
Comparison Module	Input				Output
	I1	I2	I3	I4	O
A	L7-33	L7-34	L7-35	L7-32	U3-38
B	L7-37	L7-38	L7-39	L7-36	U3-39
C	L7-41	L7-42	L7-43	L7-40	U4-69
D	L7-45	L7-46	L7-47	L7-44	U4-70
E	L7-49	L7-50	L7-51	L7-48	U4-71

Note: The symbol ">" represents input 1 > input 2.
The symbol "<" represents input 1 < input 2.
The symbol "=" represents input 1 = input 2.

1	2	3	4	5	6	7	8
Application functions					Rev 1.0	MD880 function flowchart	H190
Arithmetic function block - NCMP submodule							

Figure 9-31 H190 - Arithmetic function block - NCMP submodule

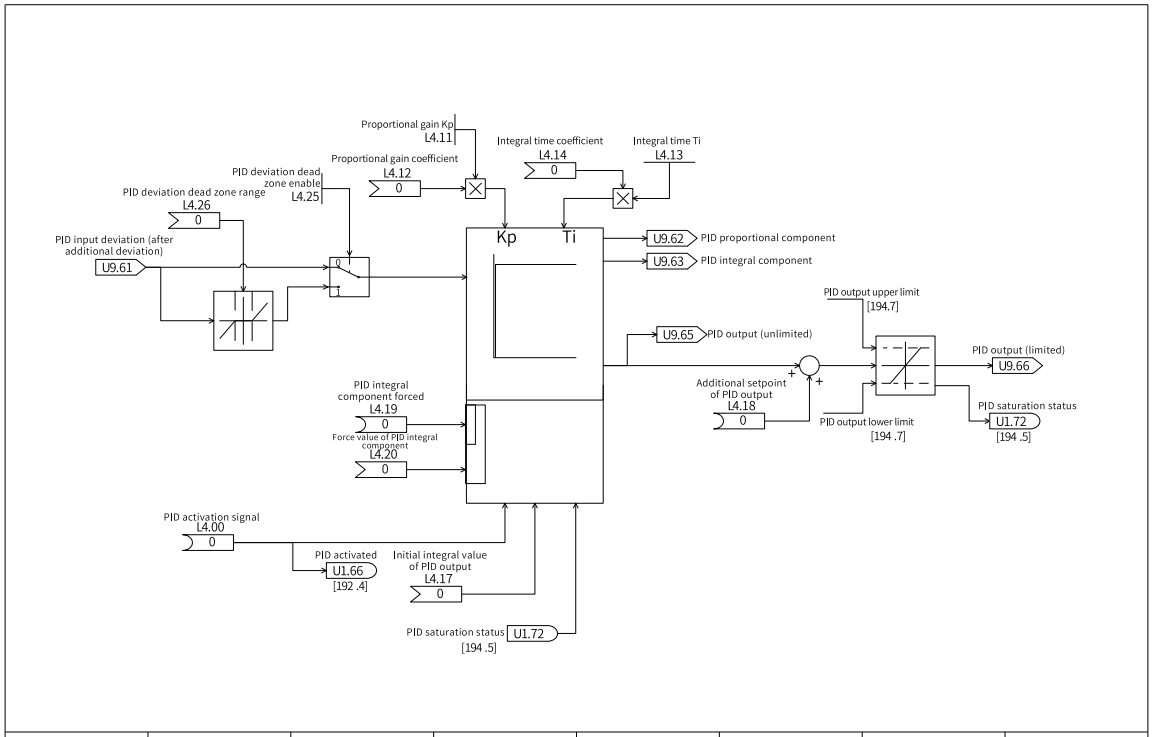
9.3.17 H192 - Process PID controller - Input and limit



1	2	3	4	5	6	7	8
Application functions					Rev 1.0	MD880 function flowchart	H192
Process PID controller - Input and limit							

Figure 9-32 H192 - Process PID controller - Input and limit

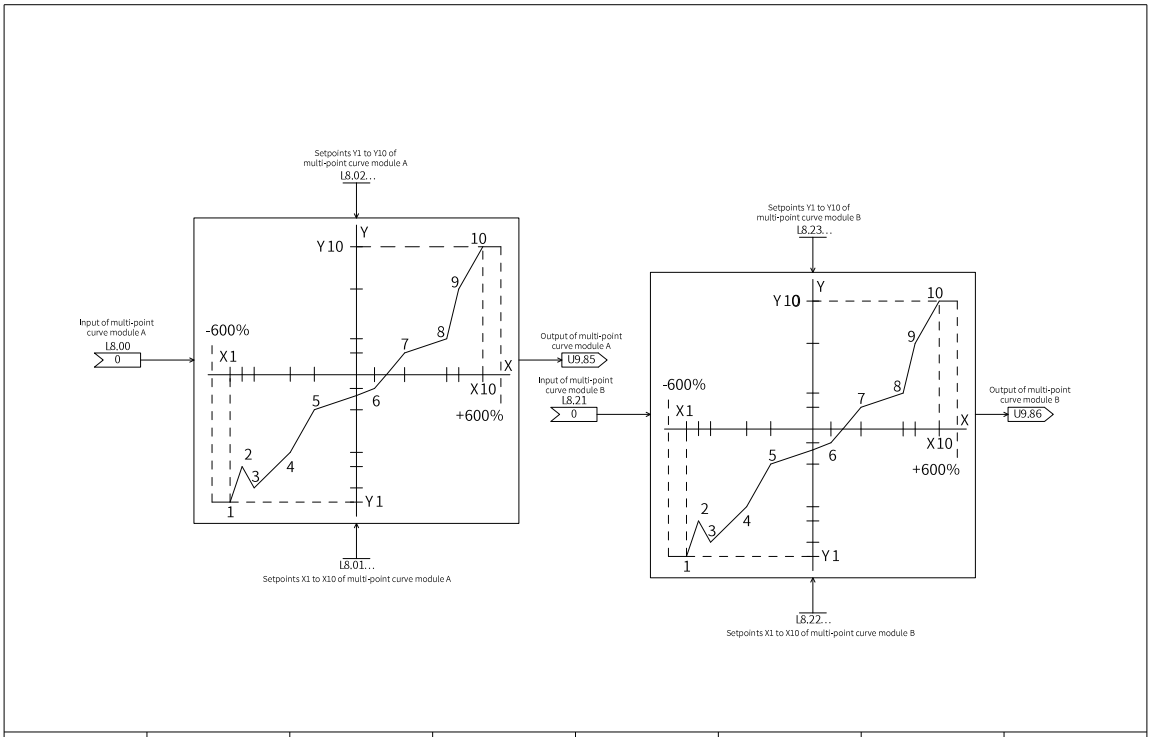
9.3.18 H194 - Process PID controller - Operation



1	2	3	4	5	6	7	8
Application functions					Rev 1.0	MD880 function flowchart	H194
Process PID controller - Operation							

Figure 9-33 H194 - Process PID controller - Operation

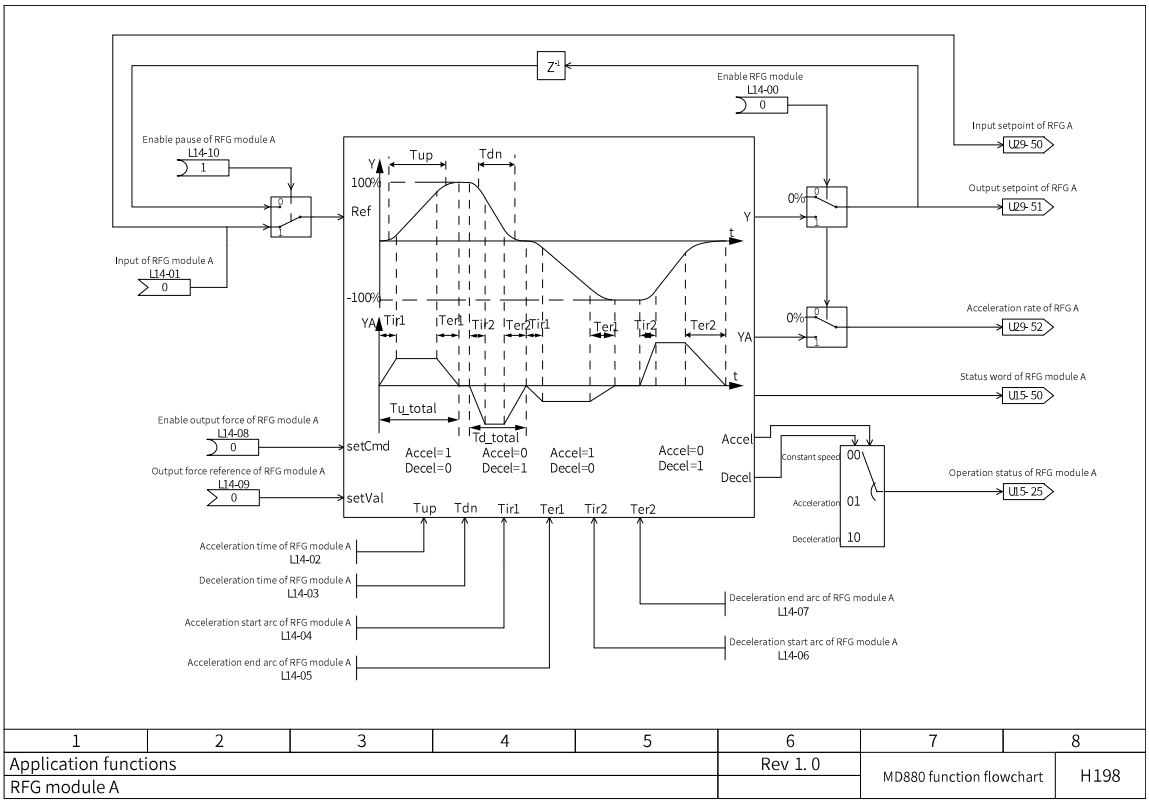
9.3.19 H196 - Multi-point curve



1	2	3	4	5	6	7	8
Application functions					Rev 1.01	MD880 function flowchart	H196
Multi-point curve							

Figure 9-34 H196 - Multi-point curve

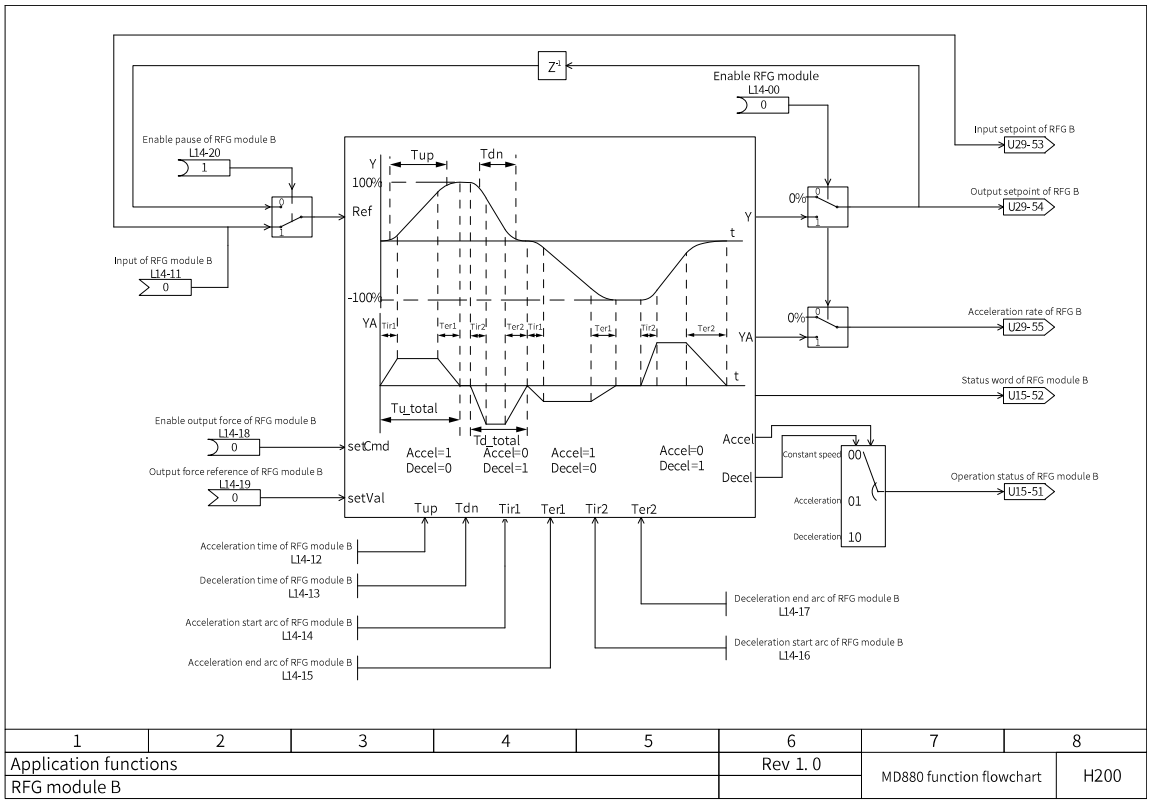
9.3.20 H198 - RFG module A



1	2	3	4	5	6	7	8
Application functions					Rev 1. 0	MD880 function flowchart	H198
RFG module A							

Figure 9-35 H198 - RFG module A

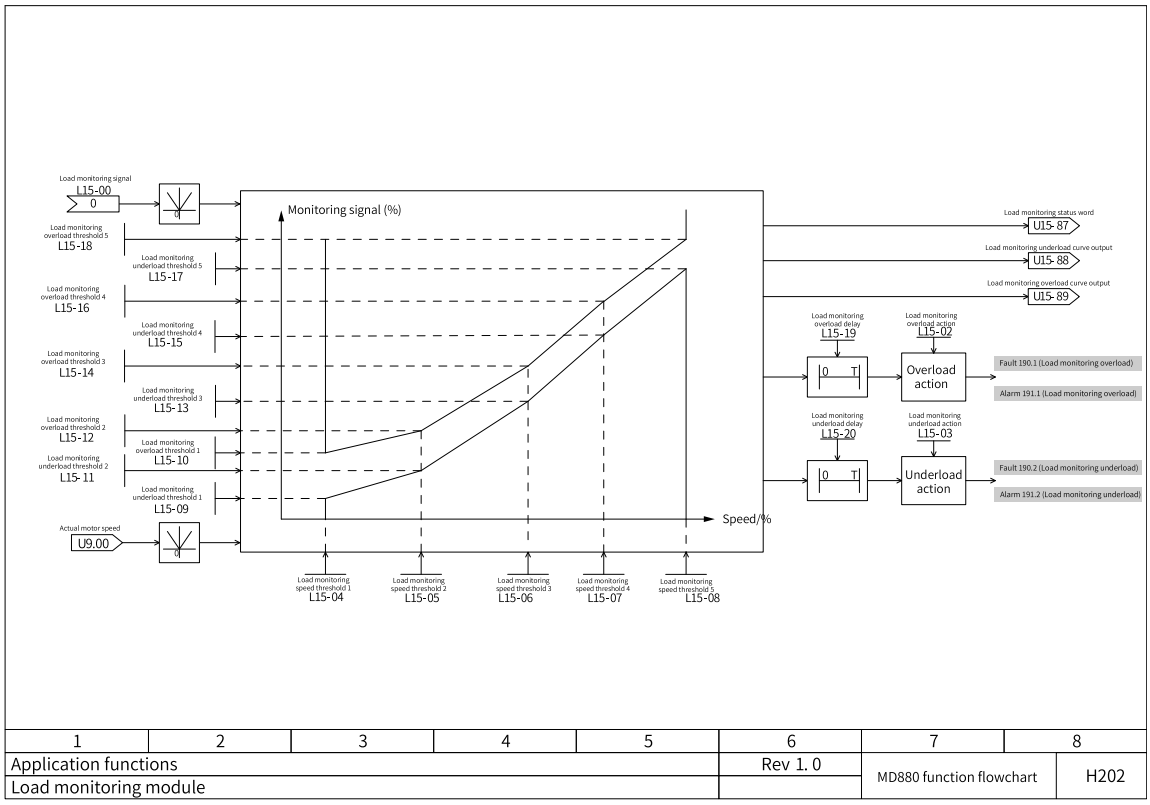
9.3.21 H200 - RFG module B



1	2	3	4	5	6	7	8
Application functions					Rev 1. 0	MD880 function flowchart	H200
RFG module B							

Figure 9-36 H200 - RFG module B

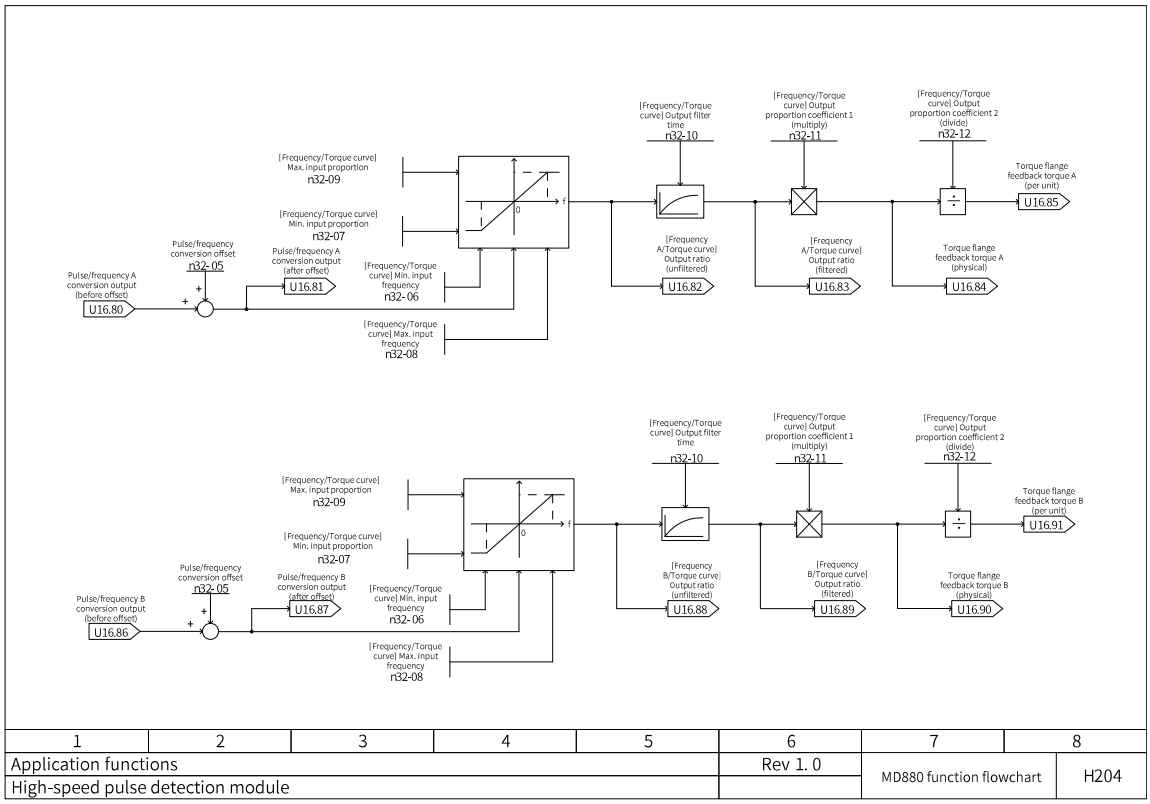
9.3.22 H202 - Load monitoring module



1	2	3	4	5	6	7	8
Application functions					Rev 1. 0	MD880 function flowchart	H202
Load monitoring module							

Figure 9-37 H202 - Load monitoring module

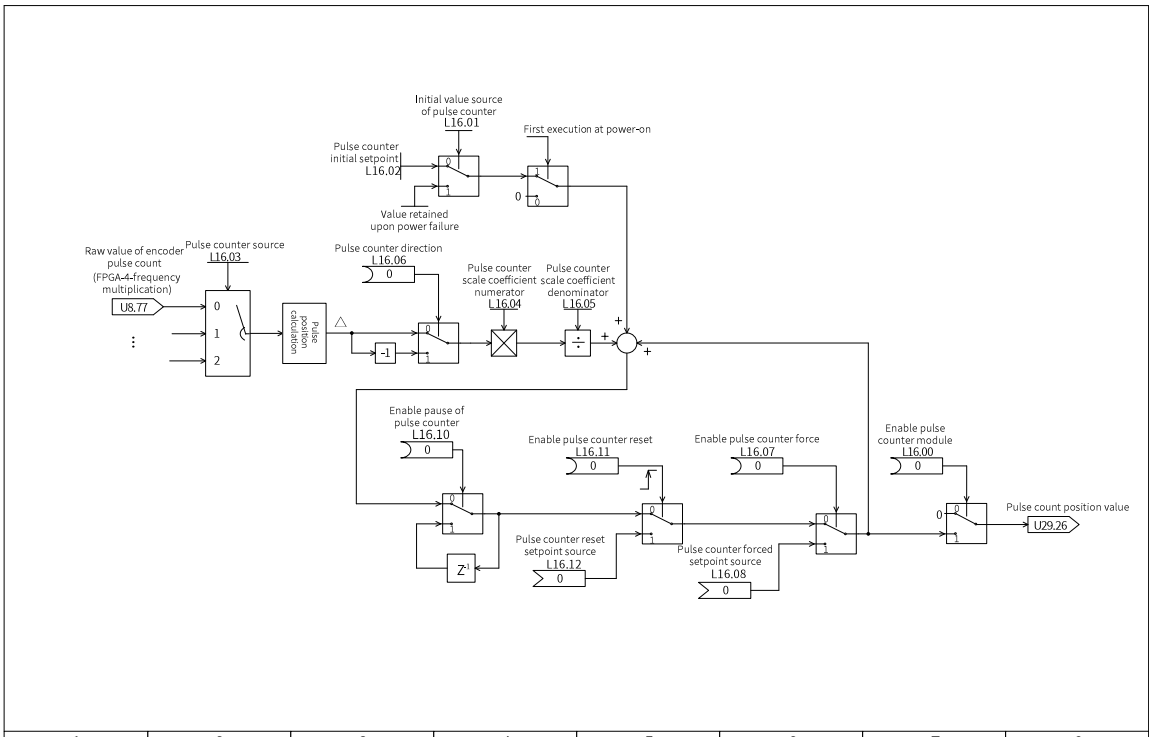
9.3.23 H204 - High-speed pulse detection module



1	2	3	4	5	6	7	8
Application functions					Rev 1. 0	MD880 function flowchart	H204
High-speed pulse detection module							

Figure 9-38 H204 - High-speed pulse detection module

9.3.24 H205 - Pulse counting module

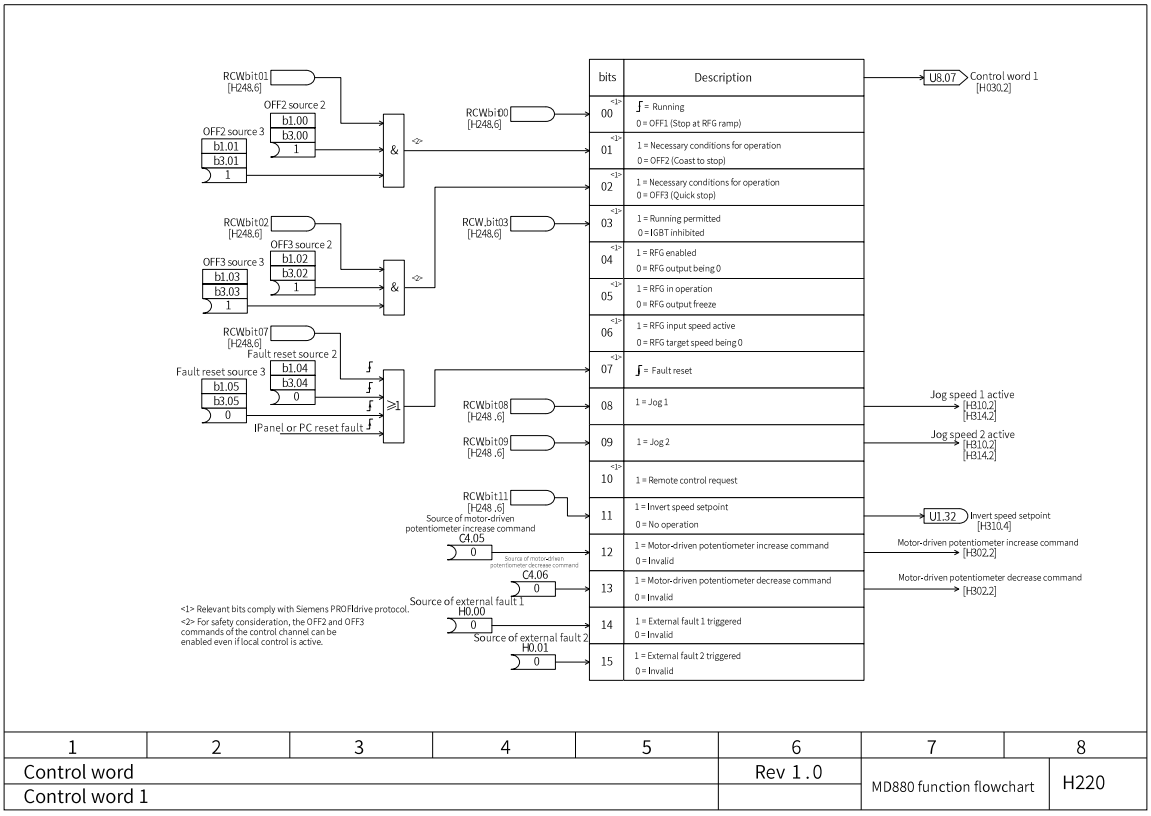


1	2	3	4	5	6	7	8
Application functions					Rev 1. 0	MD880 function flowchart	H205
Pulse calculation module							

Figure 9-39 H205 - Pulse counting module

9.4 Command and Setting

9.4.1 H220 - Control word 1



1	2	3	4	5	6	7	8
Control word					Rev 1.0	MD880 function flowchart	H220
Control word 1							

Figure 9-40 H220 - Control word 1

9.4.2 H230 - Status word 1

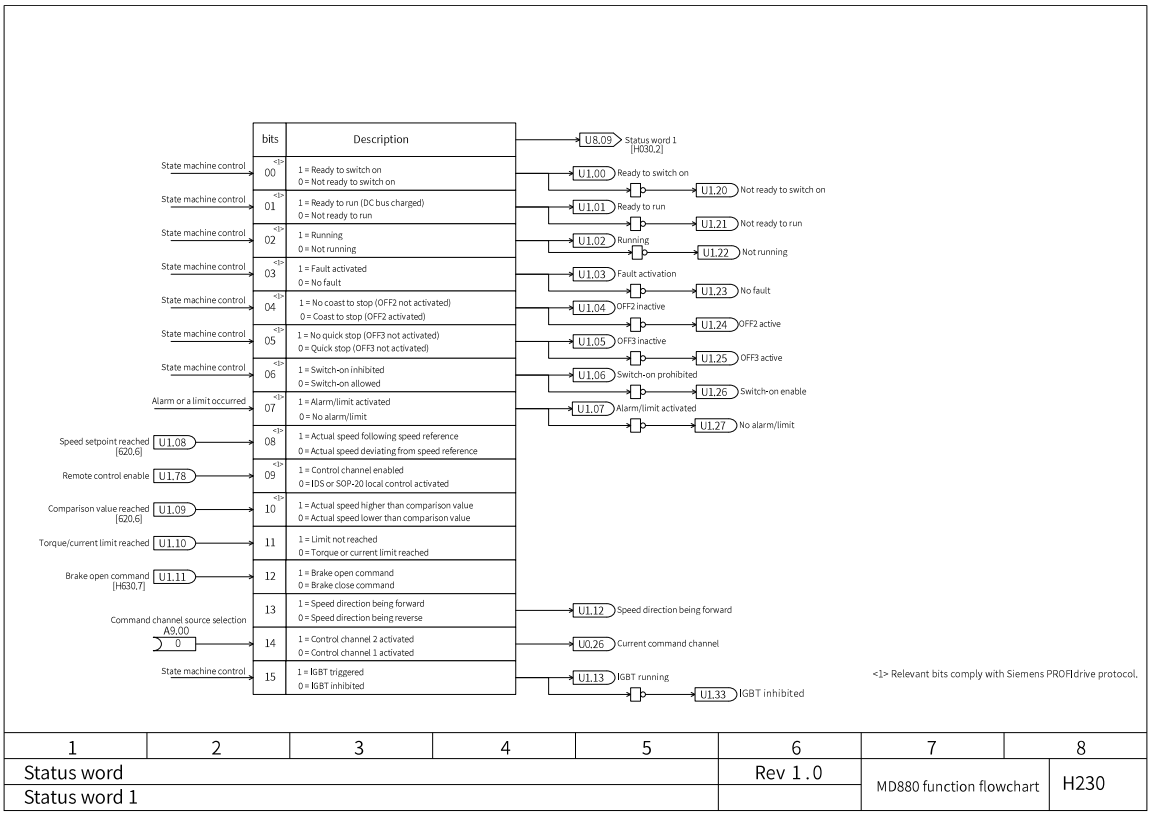
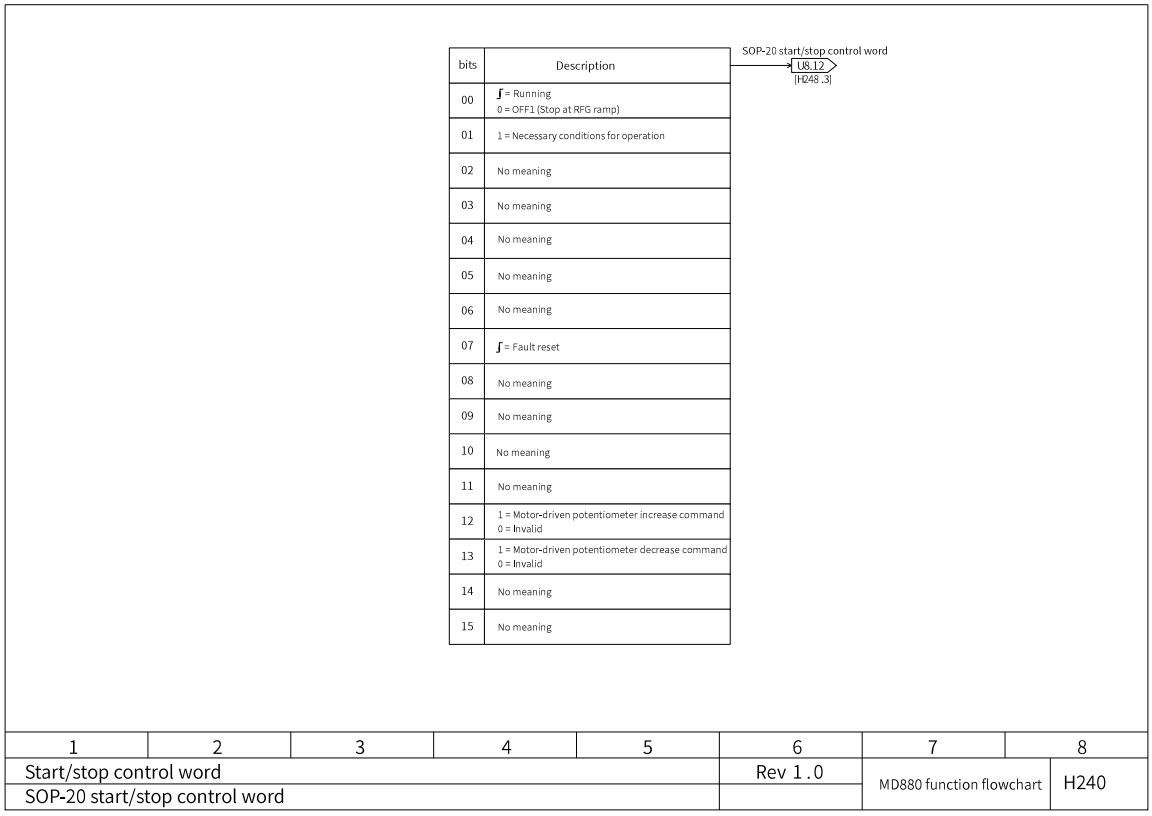


Figure 9-41 H230 - Status word 1

9.4.3 H240 - SOP-20 start/stop control word

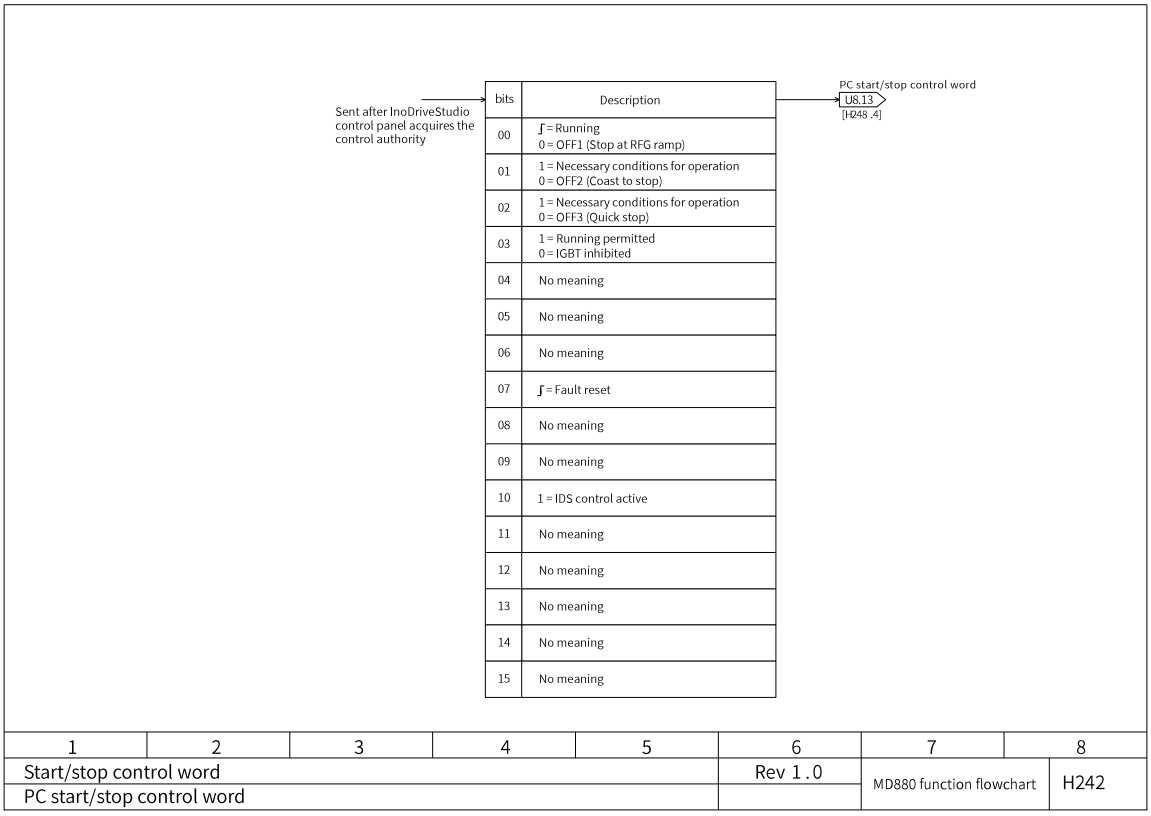


bits	Description
00	∫ = Running 0 = OFF1 (Stop at RFG ramp)
01	1 = Necessary conditions for operation
02	No meaning
03	No meaning
04	No meaning
05	No meaning
06	No meaning
07	∫ = Fault reset
08	No meaning
09	No meaning
10	No meaning
11	No meaning
12	1 = Motor-driven potentiometer increase command 0 = Invalid
13	1 = Motor-driven potentiometer decrease command 0 = Invalid
14	No meaning
15	No meaning

1	2	3	4	5	6	7	8
Start/stop control word					Rev 1.0	MD880 function flowchart	H240
SOP-20 start/stop control word							

Figure 9-42 H240 - SOP-20 start/stop control word

9.4.4 H242 - PC start/stop control word

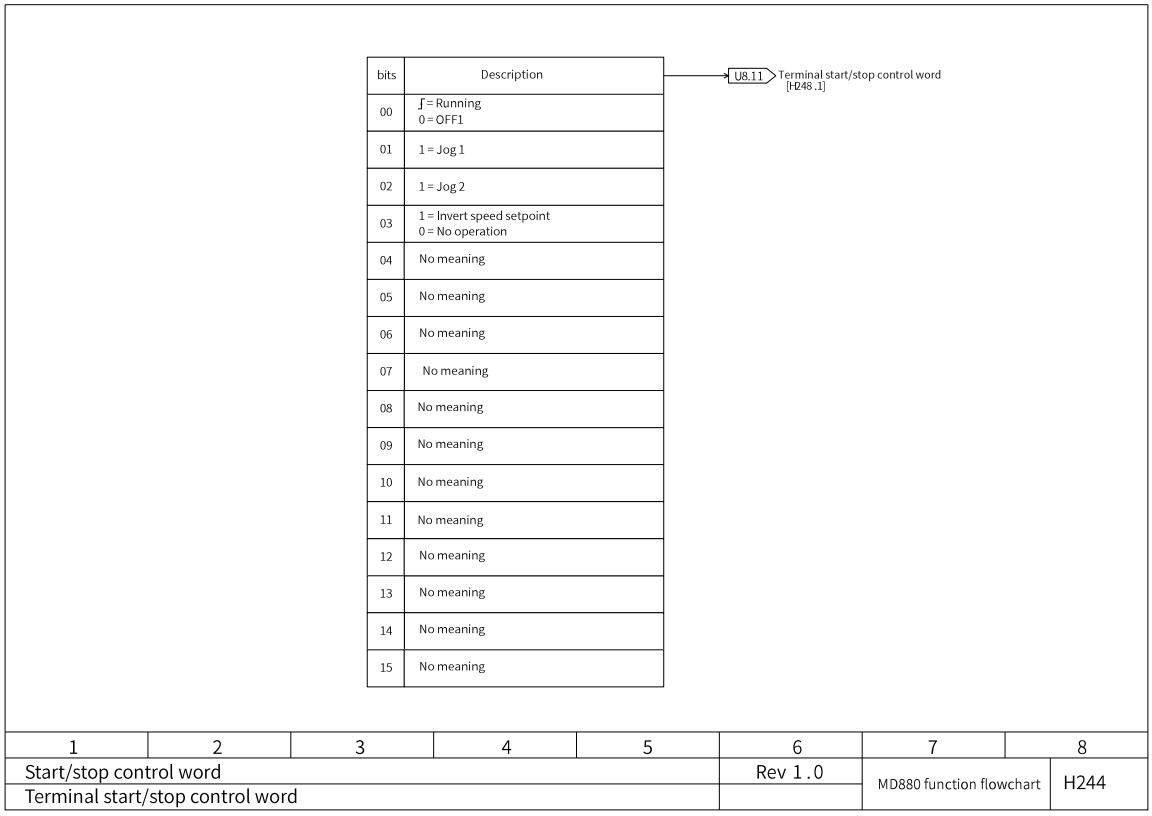


bits	Description
00	∫ = Running 0 = OFF1 (Stop at RFG ramp)
01	1 = Necessary conditions for operation 0 = OFF2 (Coast to stop)
02	1 = Necessary conditions for operation 0 = OFF3 (Quick stop)
03	1 = Running permitted 0 = IGBT inhibited
04	No meaning
05	No meaning
06	No meaning
07	∫ = Fault reset
08	No meaning
09	No meaning
10	1 = IDS control active
11	No meaning
12	No meaning
13	No meaning
14	No meaning
15	No meaning

1	2	3	4	5	6	7	8
Start/stop control word					Rev 1.0	MD880 function flowchart	H242
PC start/stop control word							

Figure 9-43 H242 - PC start/stop control word

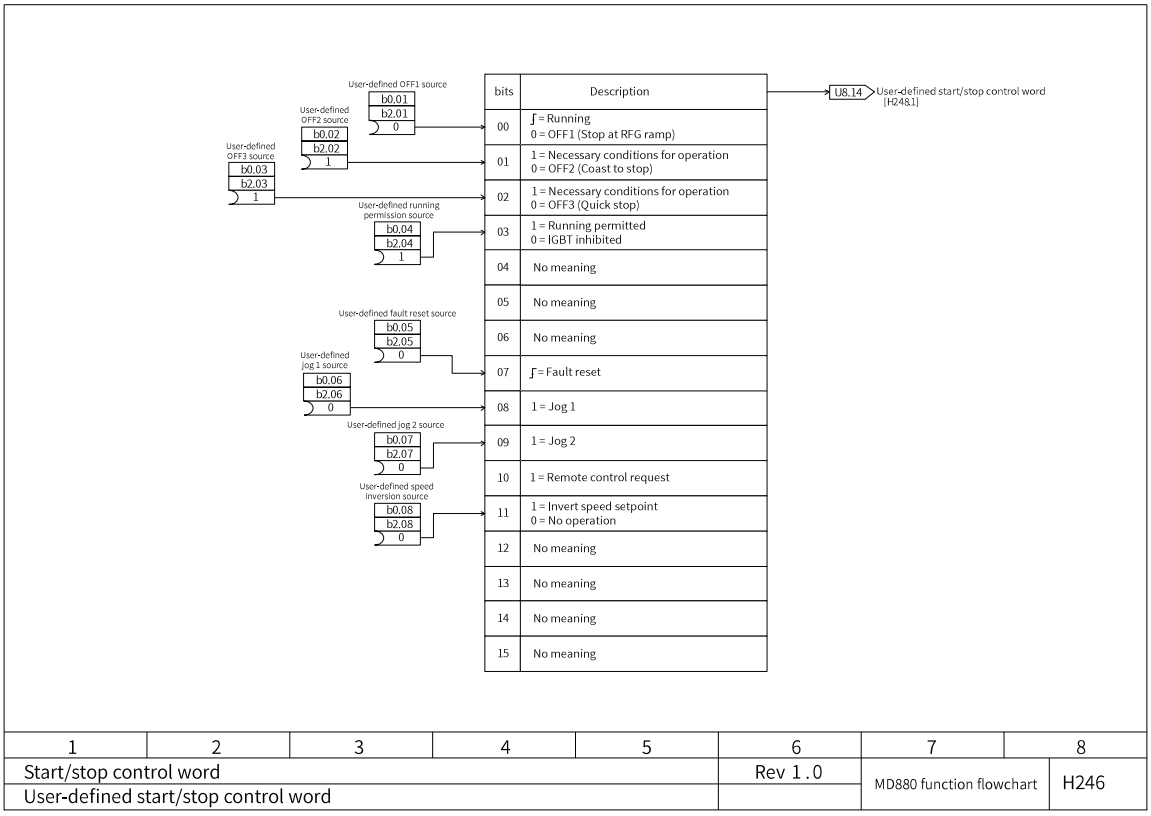
9.4.5 H244 - Terminal start/stop control word



1	2	3	4	5	6	7	8
Start/stop control word					Rev 1 . 0	MD880 function flowchart	H244
Terminal start/stop control word							

Figure 9-44 H244 - Terminal start/stop control word

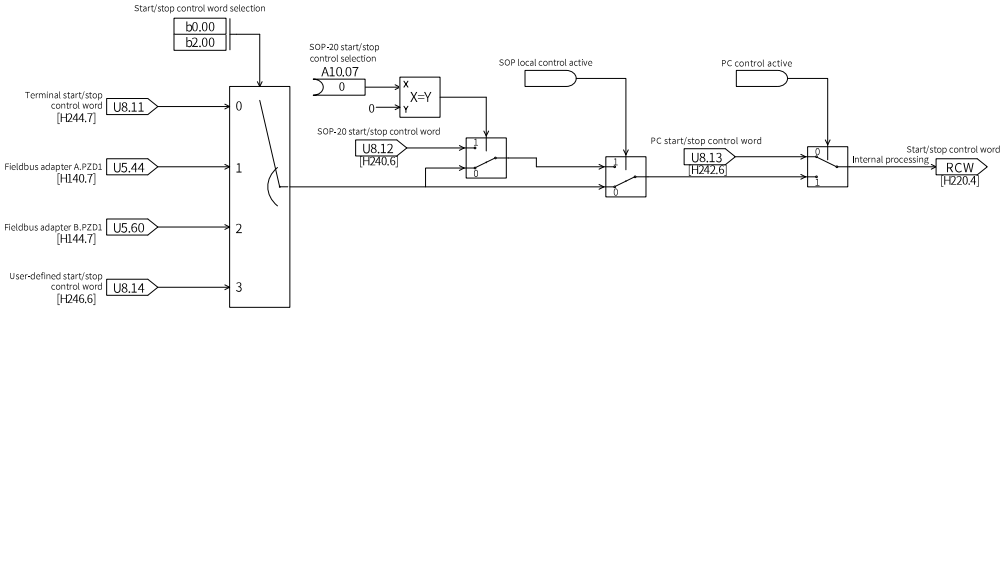
9.4.6 H246 - User-defined start/stop control word



1	2	3	4	5	6	7	8
Start/stop control word					Rev 1.0	MD880 function flowchart	H246
User-defined start/stop control word							

Figure 9-45 H246 - User-defined start/stop control word

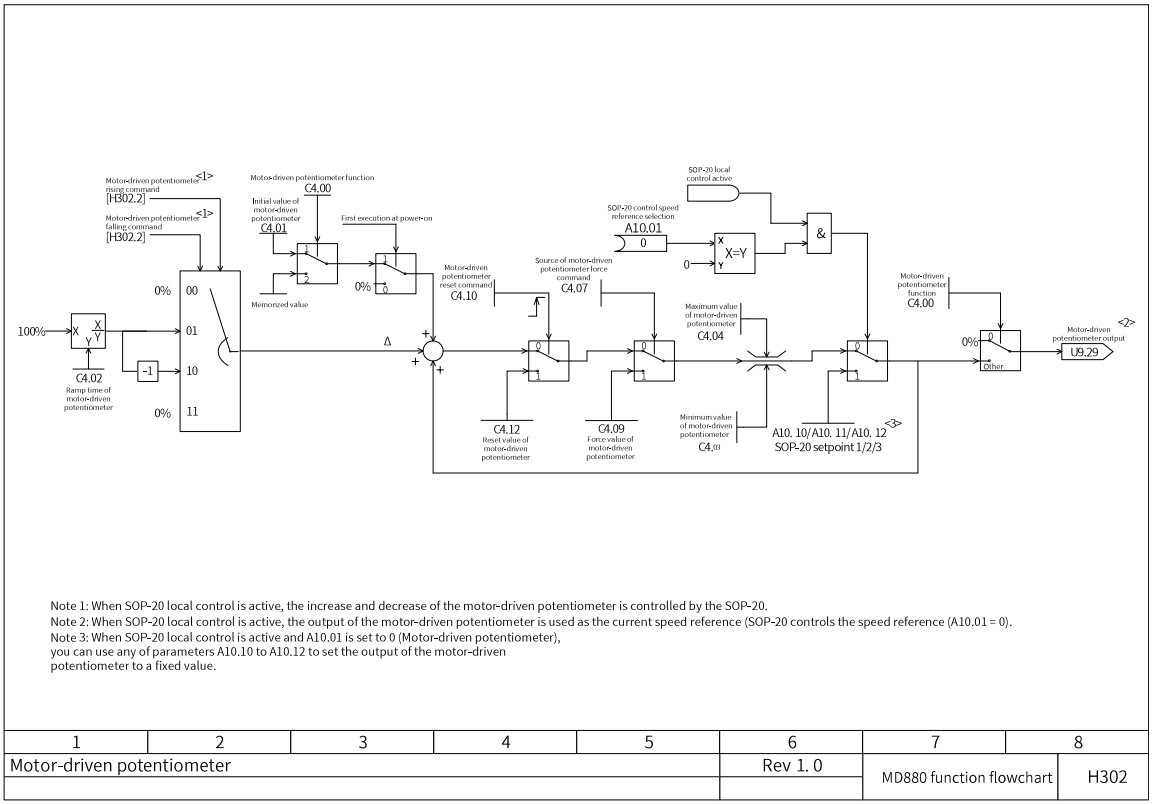
9.4.7 H248 - Start/stop control word selection



1	2	3	4	5	6	7	8
Start/stop control word					Rev 1. 0	MD880 function flowchart	H248
Start/stop control word selection							

Figure 9-46 H248 - Start/stop control word selection

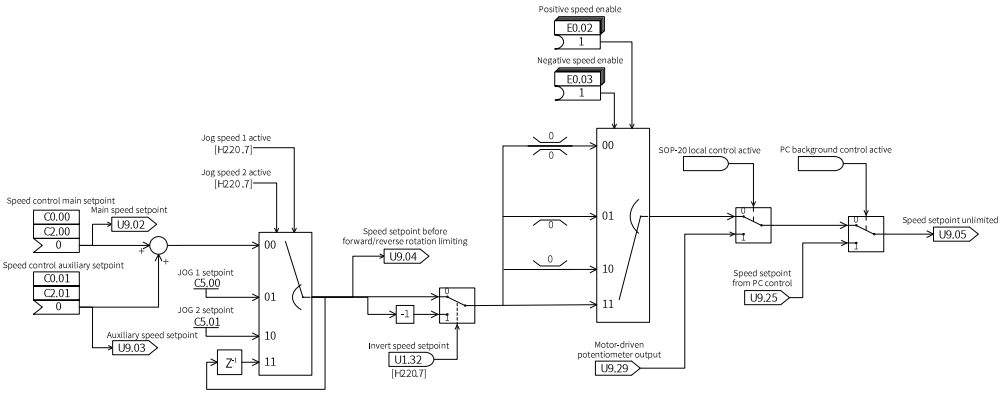
9.4.8 H302 - Motor-driven potentiometer



1	2	3	4	5	6	7	8
Motor-driven potentiometer					Rev 1. 0	MD880 function flowchart	H302

Figure 9-47 H302 - Motor-driven potentiometer

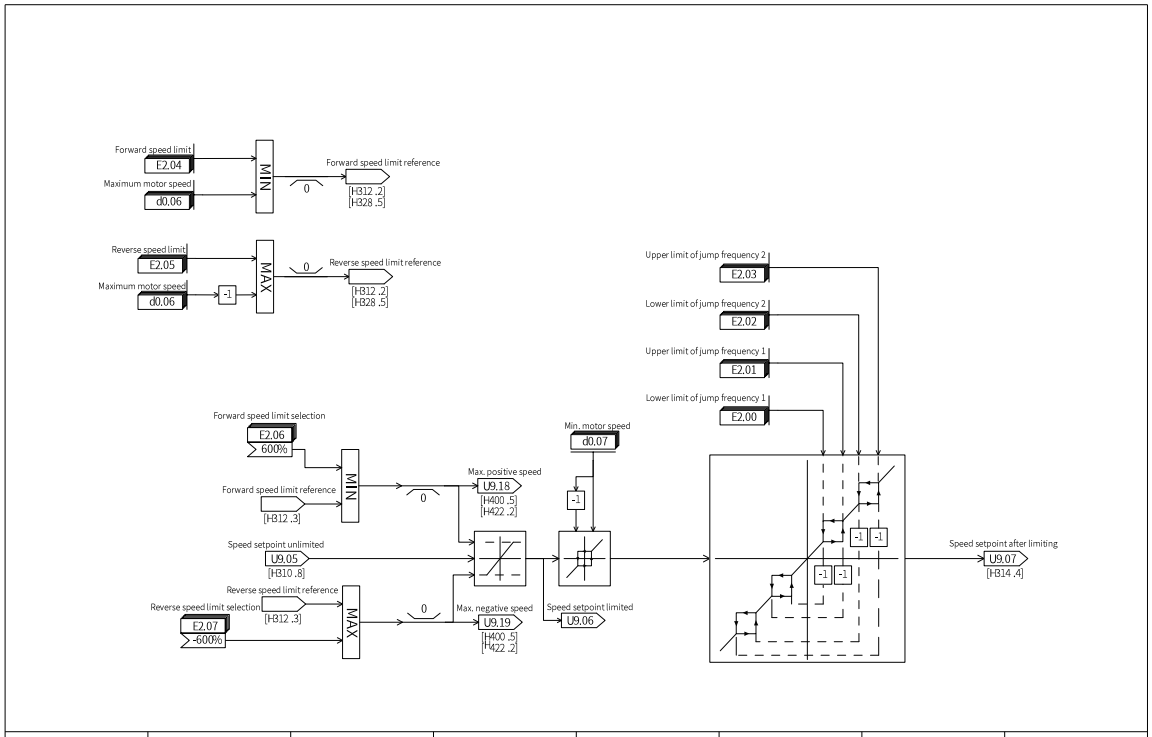
9.4.9 H310 - Regular speed reference source



1	2	3	4	5	6	7	8
Speed reference					Rev 1.0	MD880 function flowchart	H310
Regular speed reference source							

Figure 9-48 H310 - Regular speed reference source

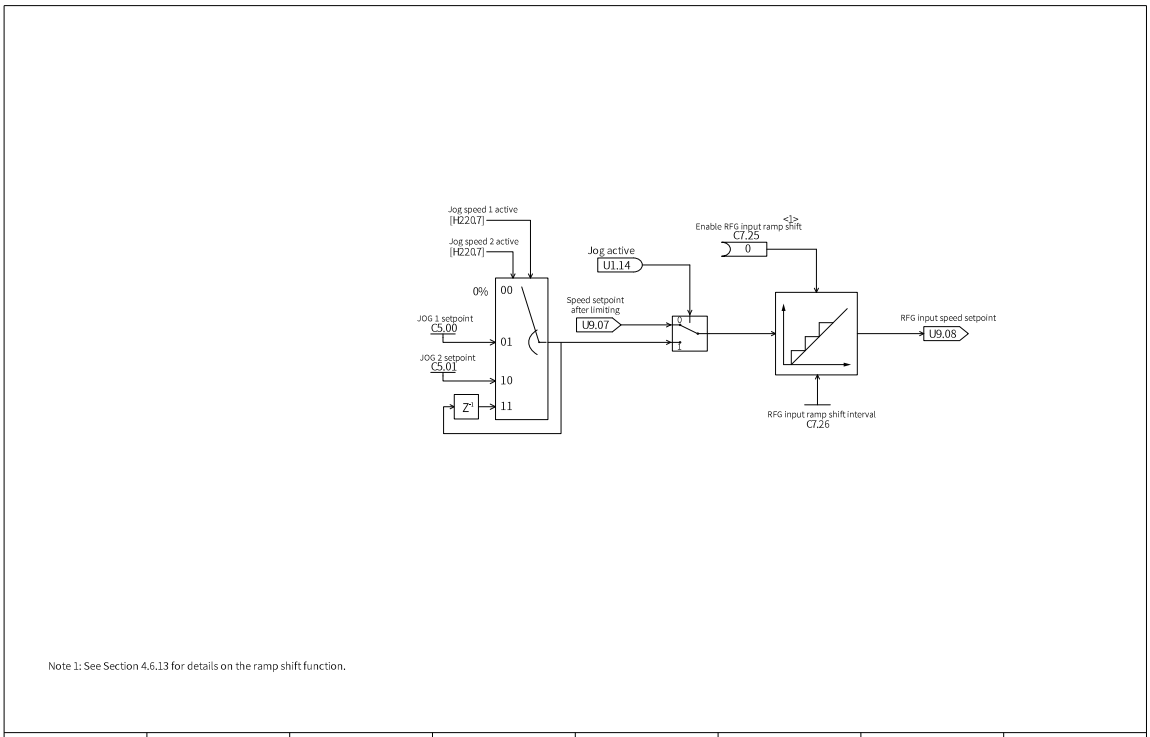
9.4.10 H312 - Speed limit



1	2	3	4	5	6	7	8
Speed reference Speed limit					Rev 1.0	MD880 function flowchart	H312

Figure 9-49 H312 - Speed limit

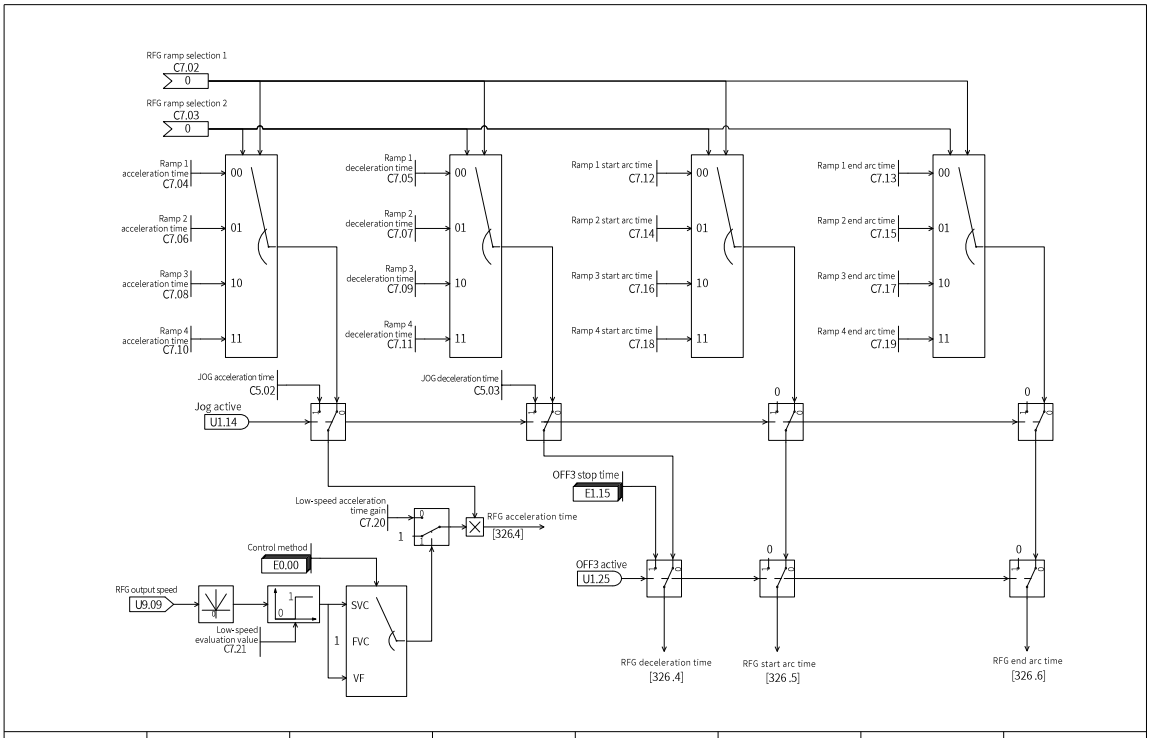
9.4.11 H314 - Jog speed setting



1	2	3	4	5	6	7	8
Speed reference					Rev 1.0	MD880 function flowchart	H314
Jog speed setting							

Figure 9-50 H314 - Jog speed setting

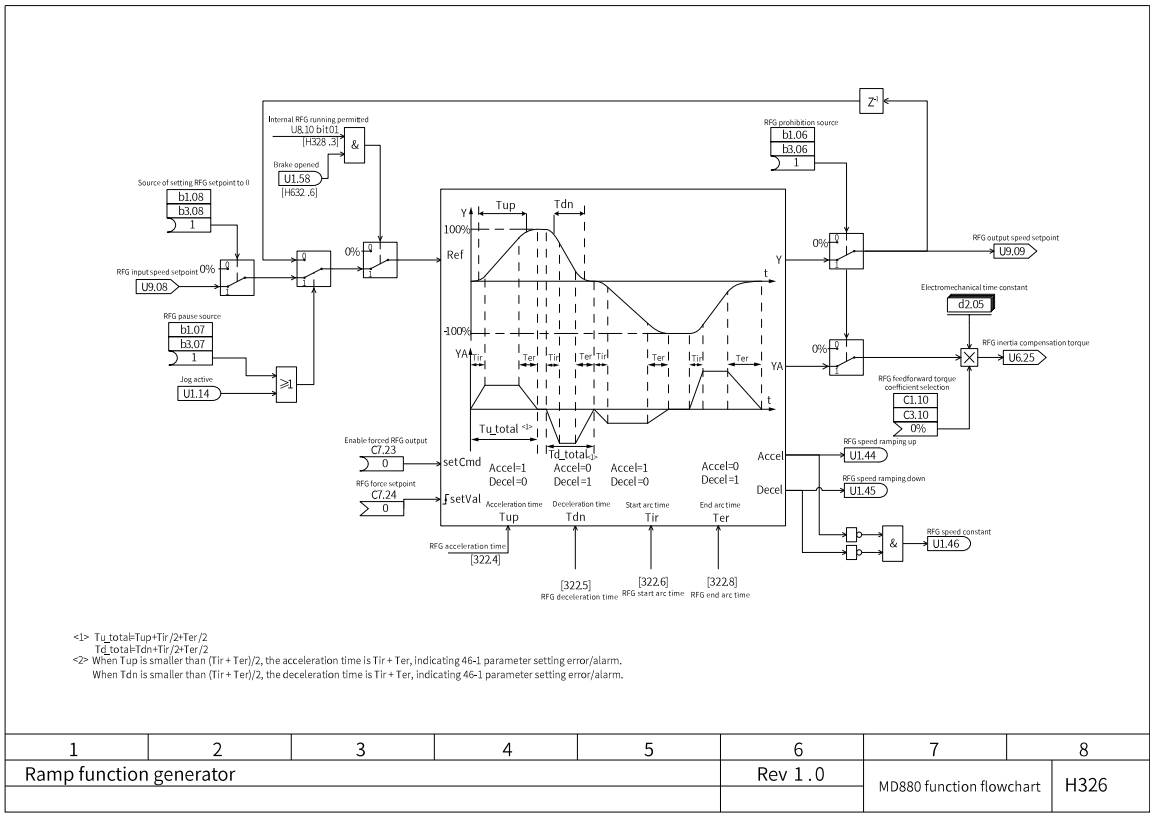
9.4.12 H322 - Acceleration/Deceleration time selection



1	2	3	4	5	6	7	8
Ramp function generator					Rev 1.0	MD880 function flowchart	H322
Acceleration/Deceleration time selection							

Figure 9-51 H322 - Acceleration/Deceleration time selection

9.4.13 H326 - Ramp function generator

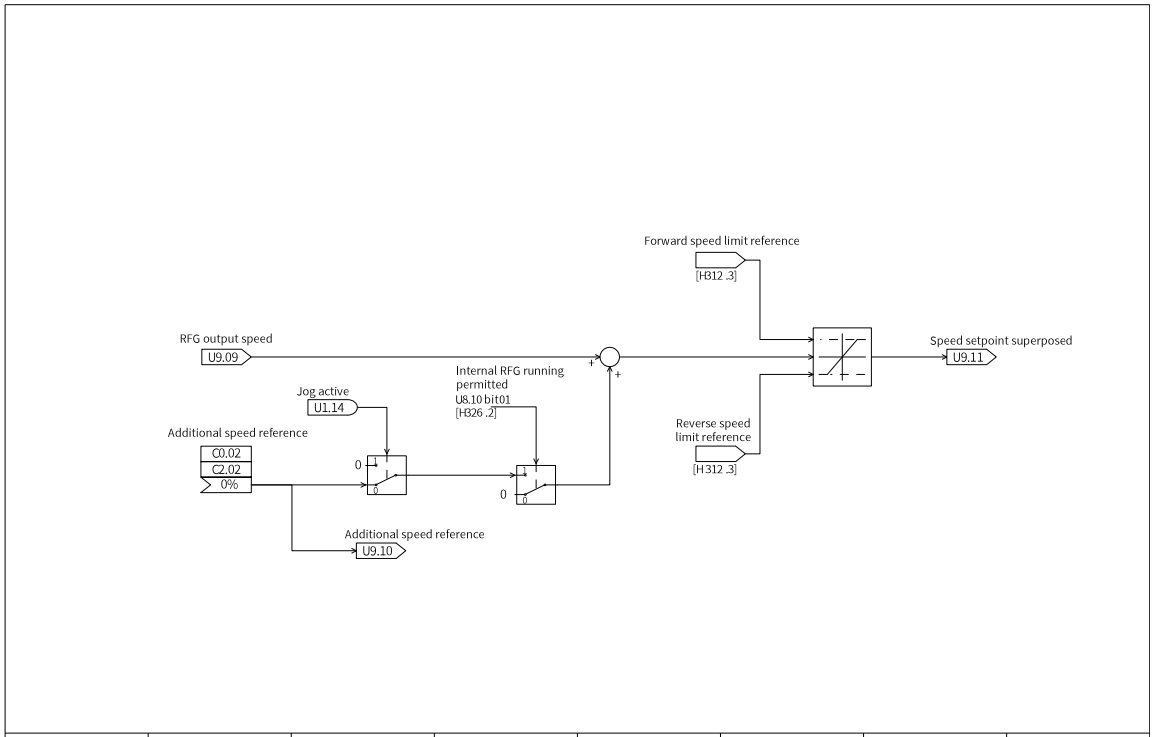


<1> Tu_total=Tup+Tir/2+Ter/2
Td_total=Tdn+Tir/2+Ter/2
<2> When Tup is smaller than (Tir + Ter)/2, the acceleration time is Tir + Ter, indicating 46-1 parameter setting error/alarm.
When Tdn is smaller than (Tir + Ter)/2, the deceleration time is Tir + Ter, indicating 46-1 parameter setting error/alarm.

1	2	3	4	5	6	7	8
Ramp function generator					Rev 1.0	MD880 function flowchart	H326

Figure 9-52 H326 - Ramp function generator

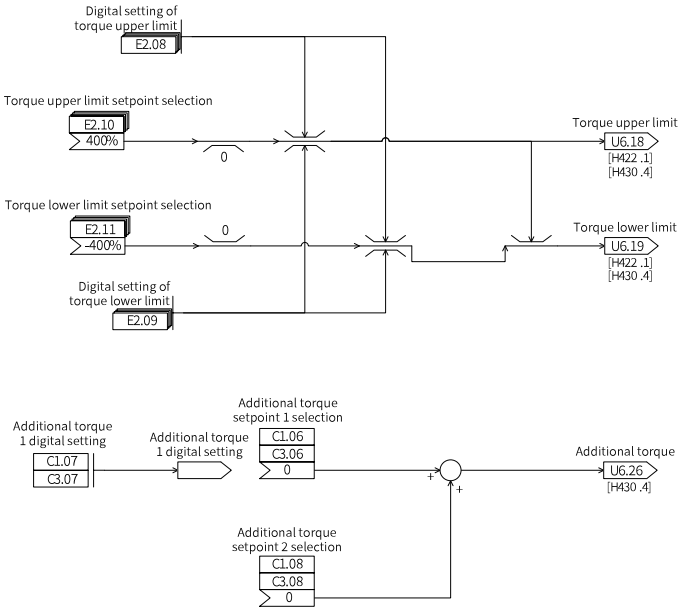
9.4.14 H328 - Additional speed and limit



1	2	3	4	5	6	7	8
Additional speed and limit					Rev 1.0	MD880 function flowchart	H328

Figure 9-53 H328 - Additional speed and limit

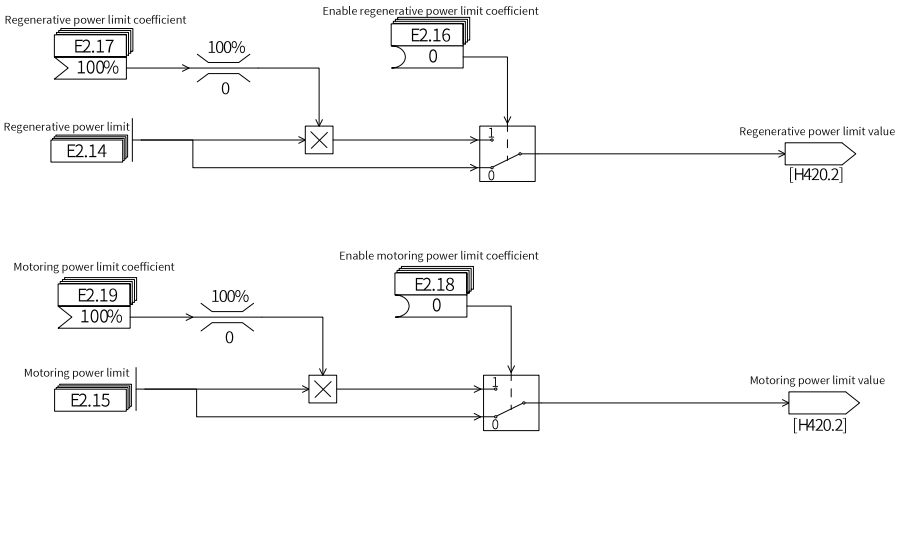
9.4.15 H330 - Additional torque and torque limit setting



1	2	3	4	5	6	7	8
Additional torque and torque limit setting					Rev 1 . 0	MD880 function flowchart	H330

Figure 9-54 H330 - Additional torque and torque limit setting

9.4.16 H332 - Power limit setting

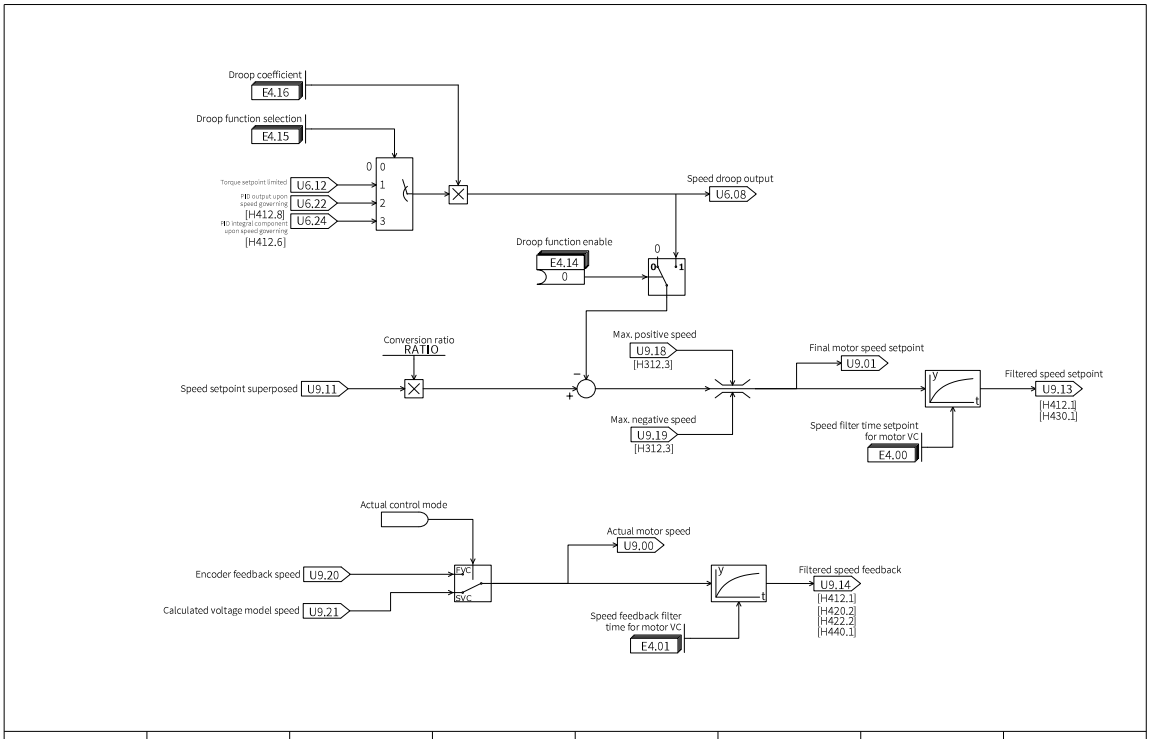


1	2	3	4	5	6	7	8
Power limit setting					Rev 1 . 0	MD880 function flowchart	H332

Figure 9-55 H332 - Power limit setting

9.5 Vector Control

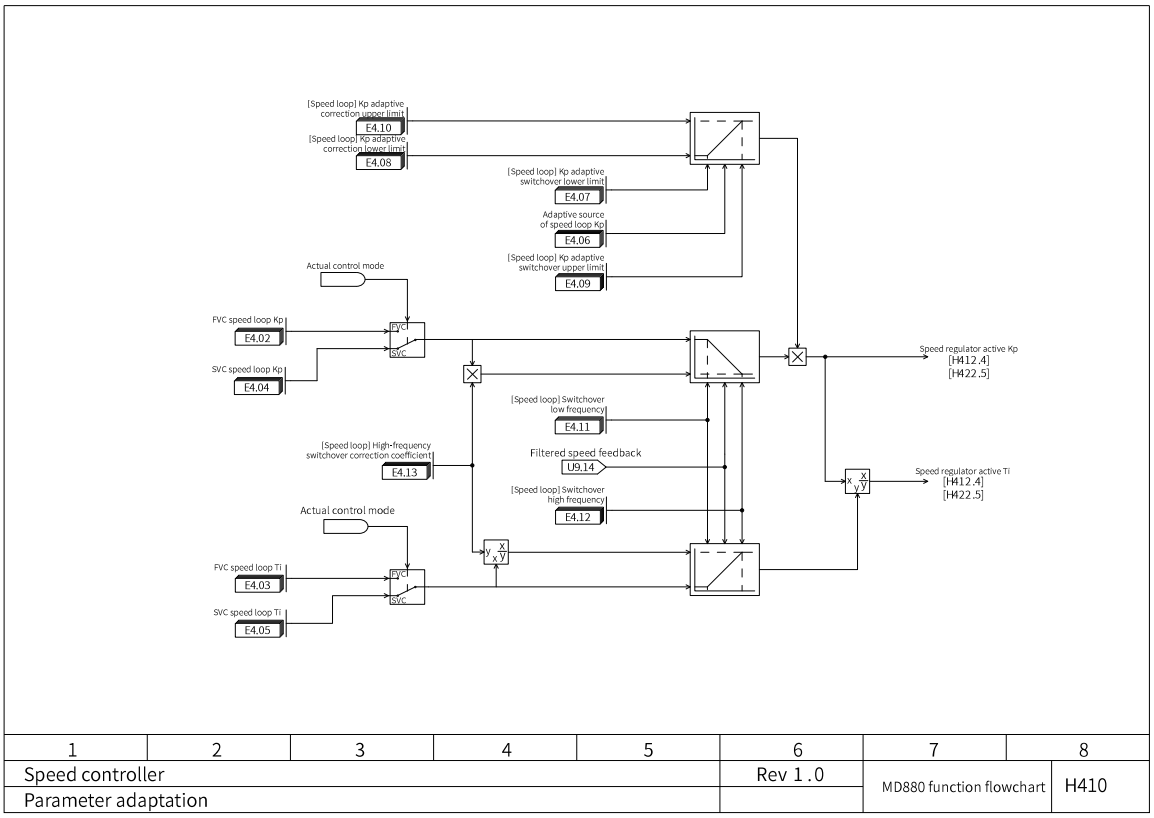
9.5.1 H400 - Speed setting



1	2	3	4	5	6	7	8
Speed setting					Rev 1 .0	MD880 function flowchart	H400

Figure 9-56 H400 - Speed setting

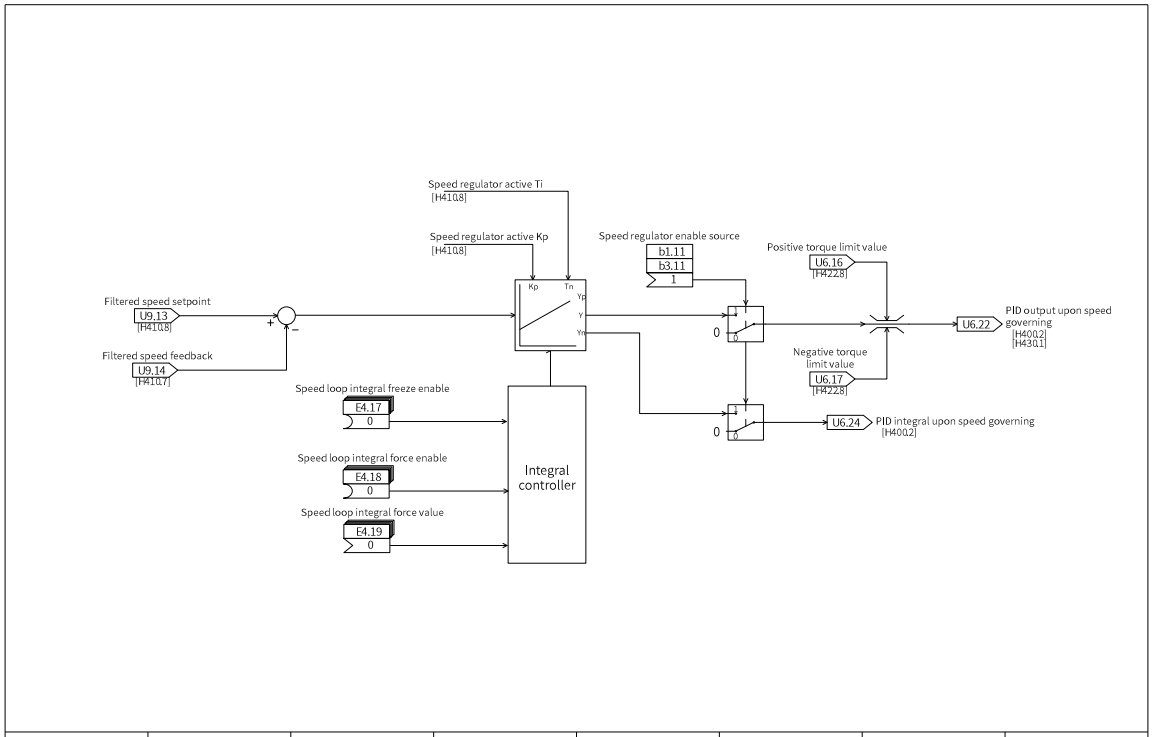
9.5.2 H410 - Parameter configuration



1	2	3	4	5	6	7	8
Speed controller					Rev 1 .0	MD880 function flowchart	H410
Parameter adaptation							

Figure 9-57 H410 - Parameter configuration

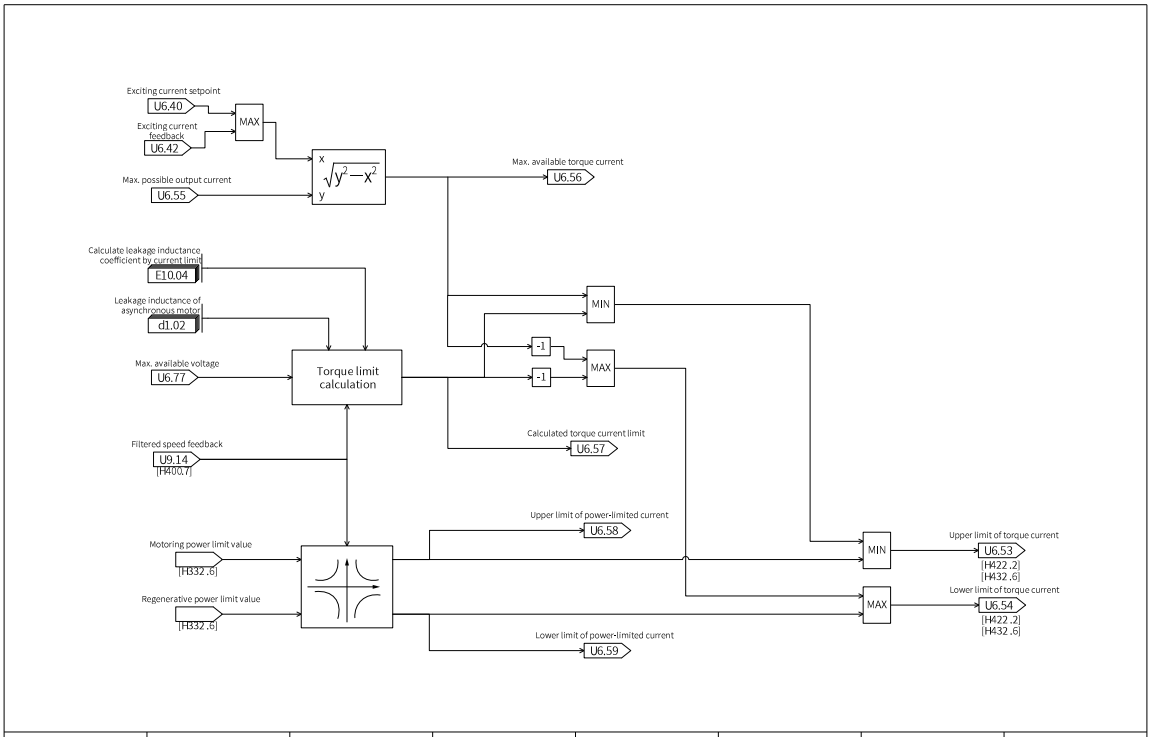
9.5.3 H412 - Speed controller



1	2	3	4	5	6	7	8
Speed controller					Rev 1.0	MD880 function flowchart	H412
Speed controller							

Figure 9-58 H412 - Speed controller

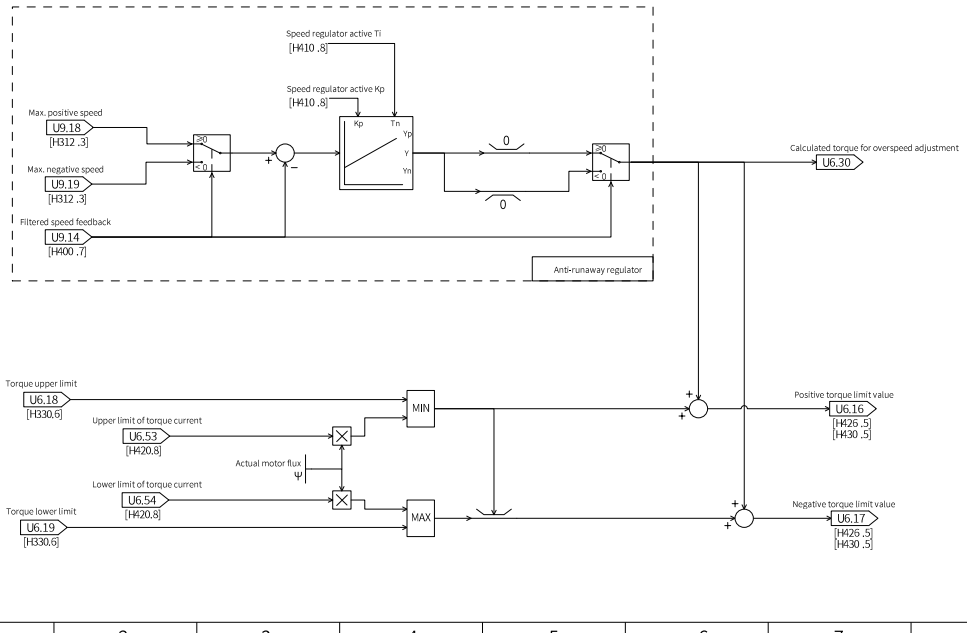
9.5.4 H420 - Torque current limit value calculation



1	2	3	4	5	6	7	8
Torque limit					Rev 1.0	MD880 function flowchart	H420
Torque current limit value calculation							

Figure 9-59 H420 - Torque current limit value calculation

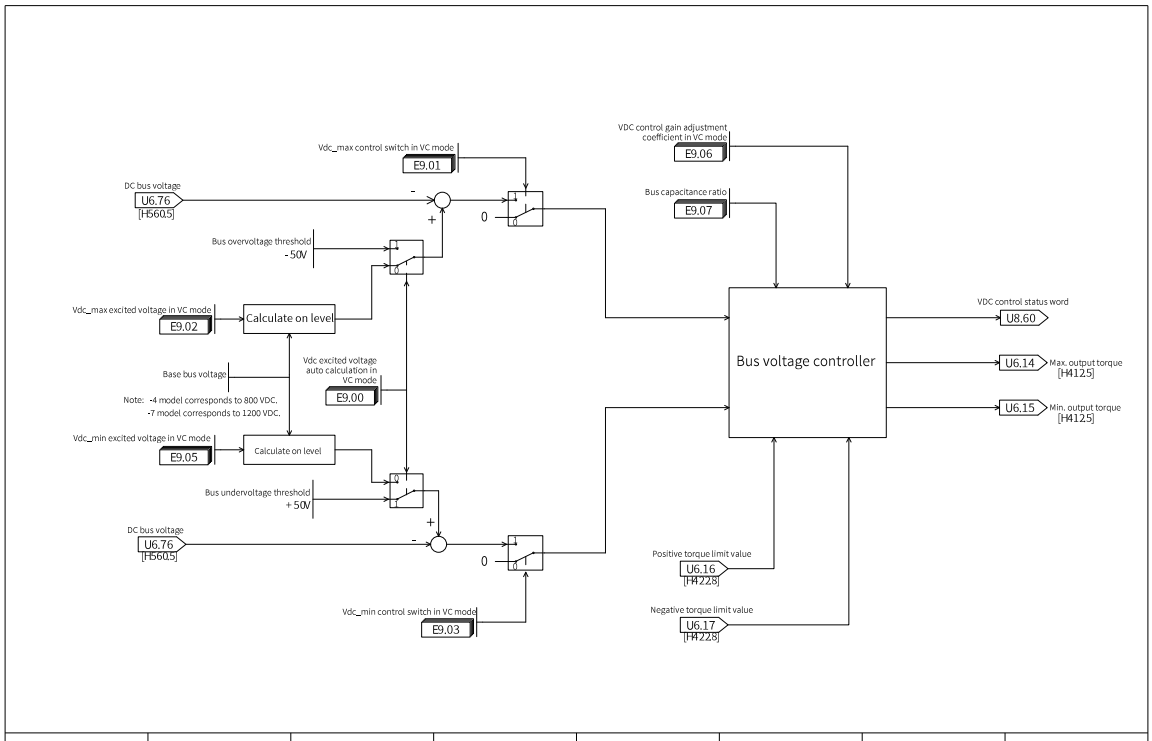
9.5.5 H422 - Torque limit value and runaway protection



1	2	3	4	5	6	7	8
Torque limit					Rev 1.0	MD880 function flowchart	H422
Torque limit value and runaway protection							

Figure 9-60 H422 - Torque limit value and runaway protection

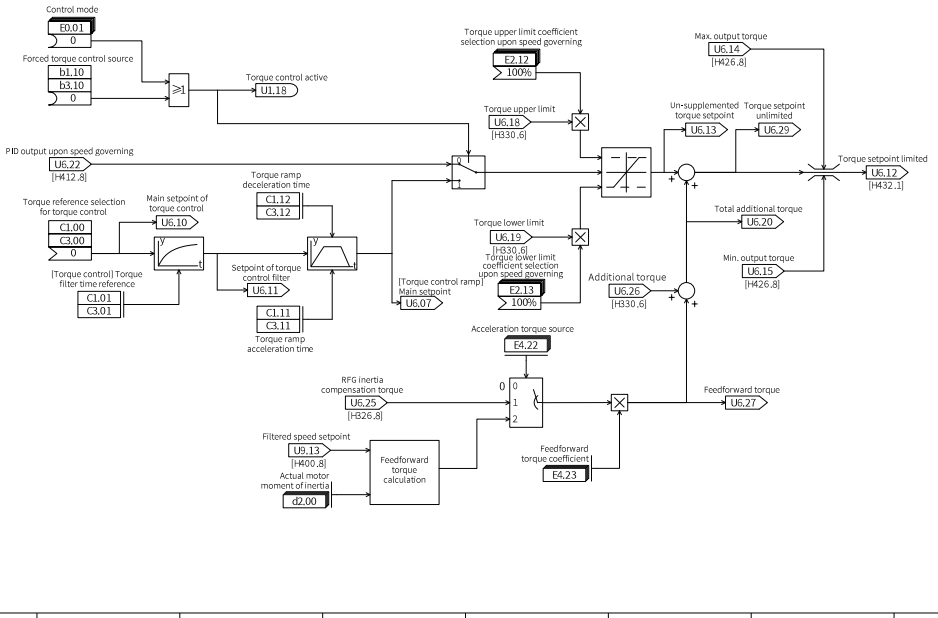
9.5.6 H426 - Bus voltage control



1	2	3	4	5	6	7	8
Torque limit Bus voltage control					Rev 1.0	MD880 function flowchart	H426

Figure 9-61 H426 - Bus voltage control

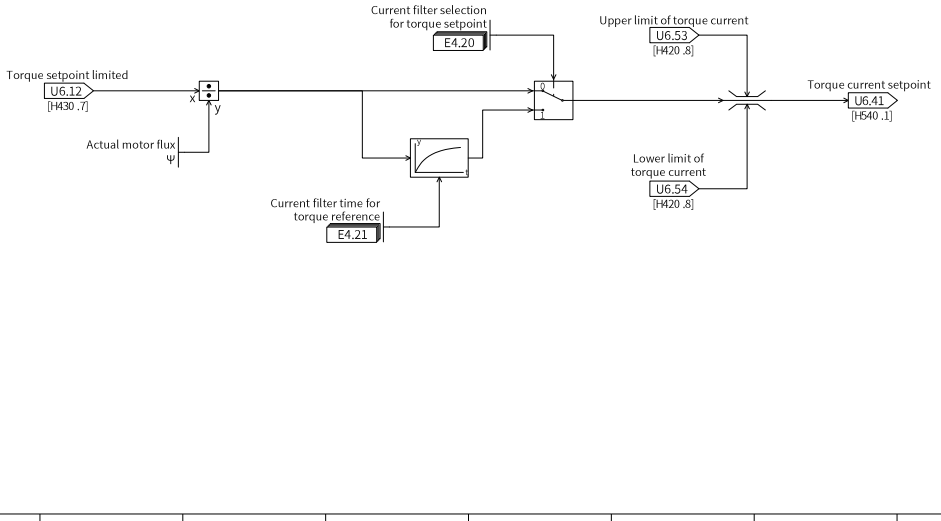
9.5.7 H430 - Additional torque



1	2	3	4	5	6	7	8
Torque current setpoint					Rev 1.0	MD880 function flowchart	H430
Additional torque							

Figure 9-62 H430 - Additional torque

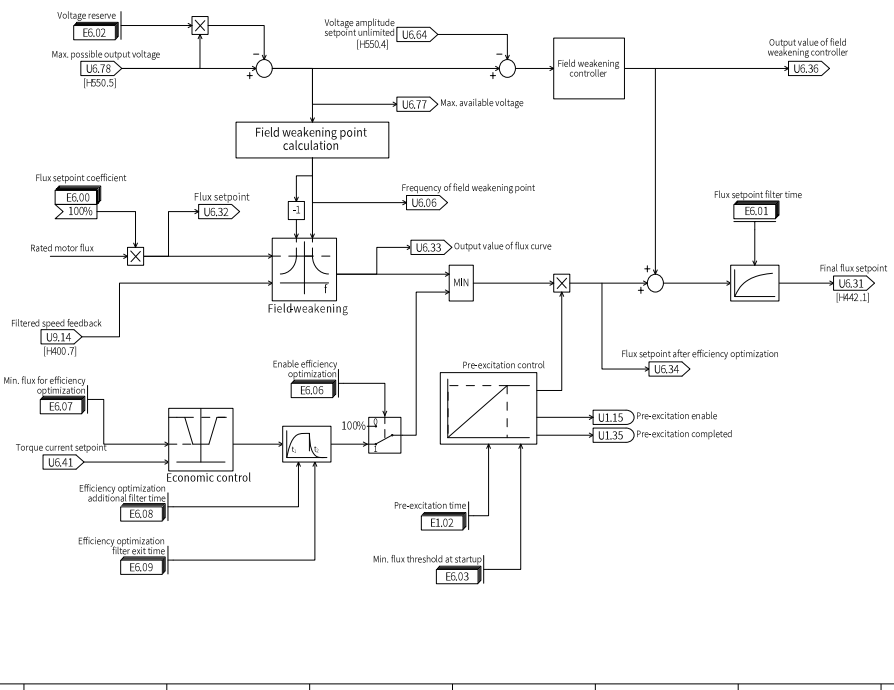
9.5.8 H432 - Torque current conversion



1	2	3	4	5	6	7	8
Torque current setpoint					Rev 1.0	MD880 function flowchart	H432
Torque current conversion							

Figure 9-63 H432 - Torque current conversion

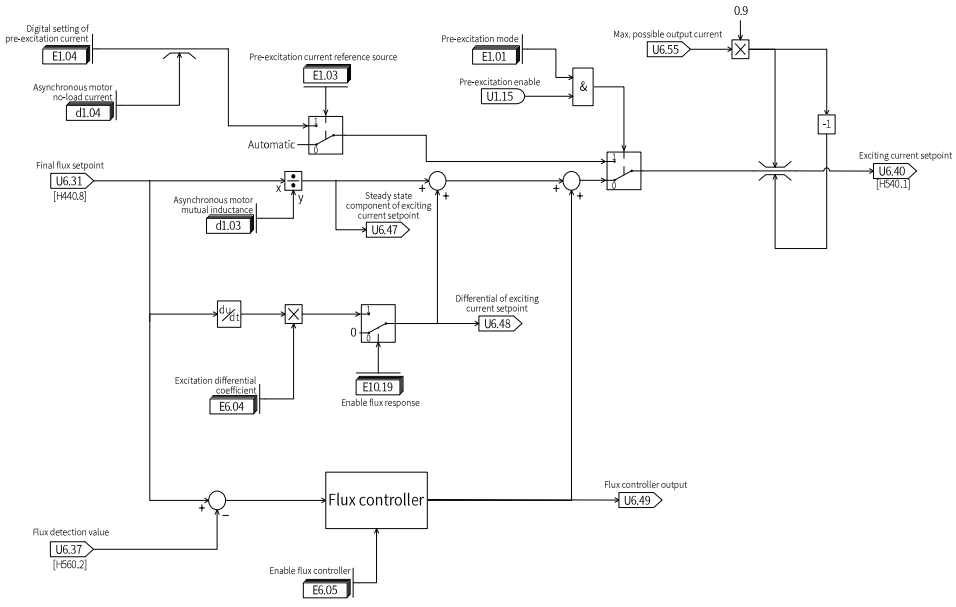
9.5.9 H440 - Flux setting and field weakening control



1	2	3	4	5	6	7	8
Flux setting					Rev 1.0	MD880 function flowchart	H440
Flux setting and field weakening control							

Figure 9-64 H440 - Flux setting and field weakening control

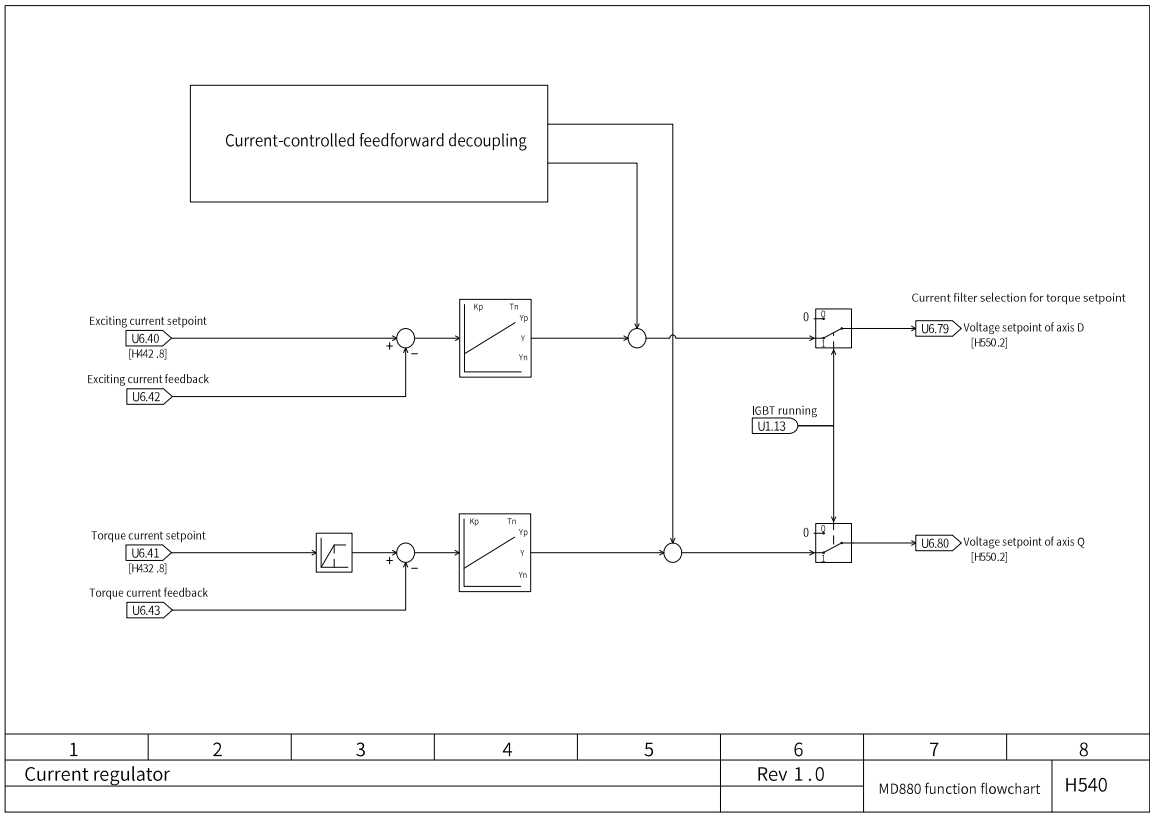
9.5.10 H442 - Exciting current setting



1	2	3	4	5	6	7	8
Exciting current setpoint					Rev 1.0	MD880 function flowchart	H442
Exciting current setpoint							

Figure 9-65 H442 - Exciting current setting

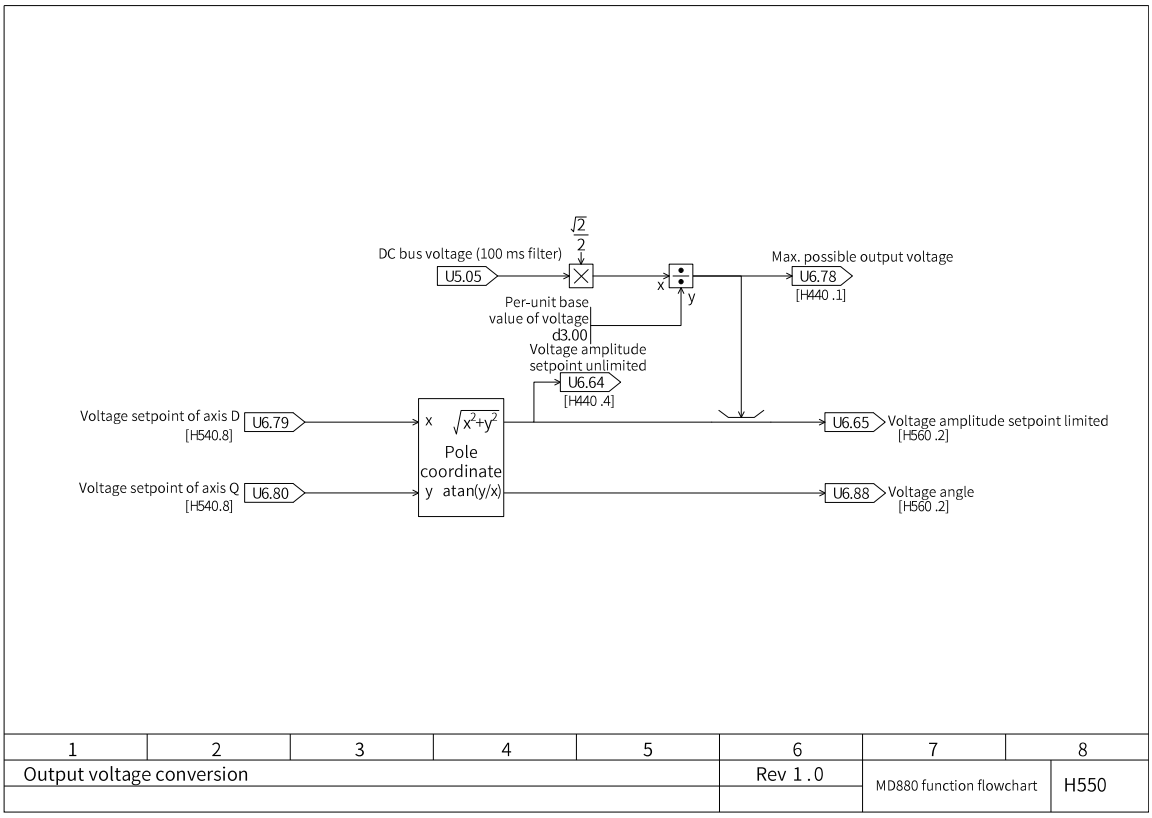
9.5.11 H540 - Current regulator



1	2	3	4	5	6	7	8
Current regulator					Rev 1.0	MD880 function flowchart	H540

Figure 9-66 H540 - Current regulator

9.5.12 H550 - Output voltage conversion



1	2	3	4	5	6	7	8
Output voltage conversion					Rev 1 . 0	MD880 function flowchart	H550

Figure 9-67 H550 - Output voltage conversion

9.5.13 H560 - Power unit interface

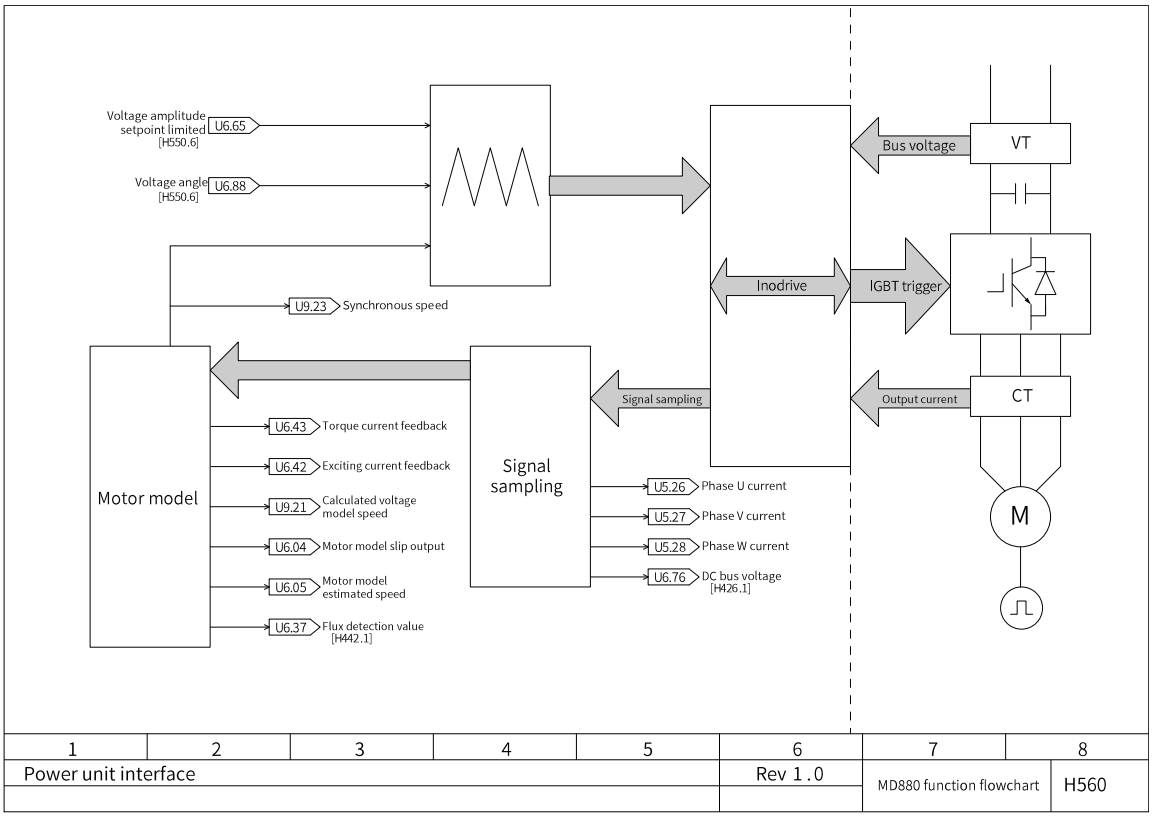
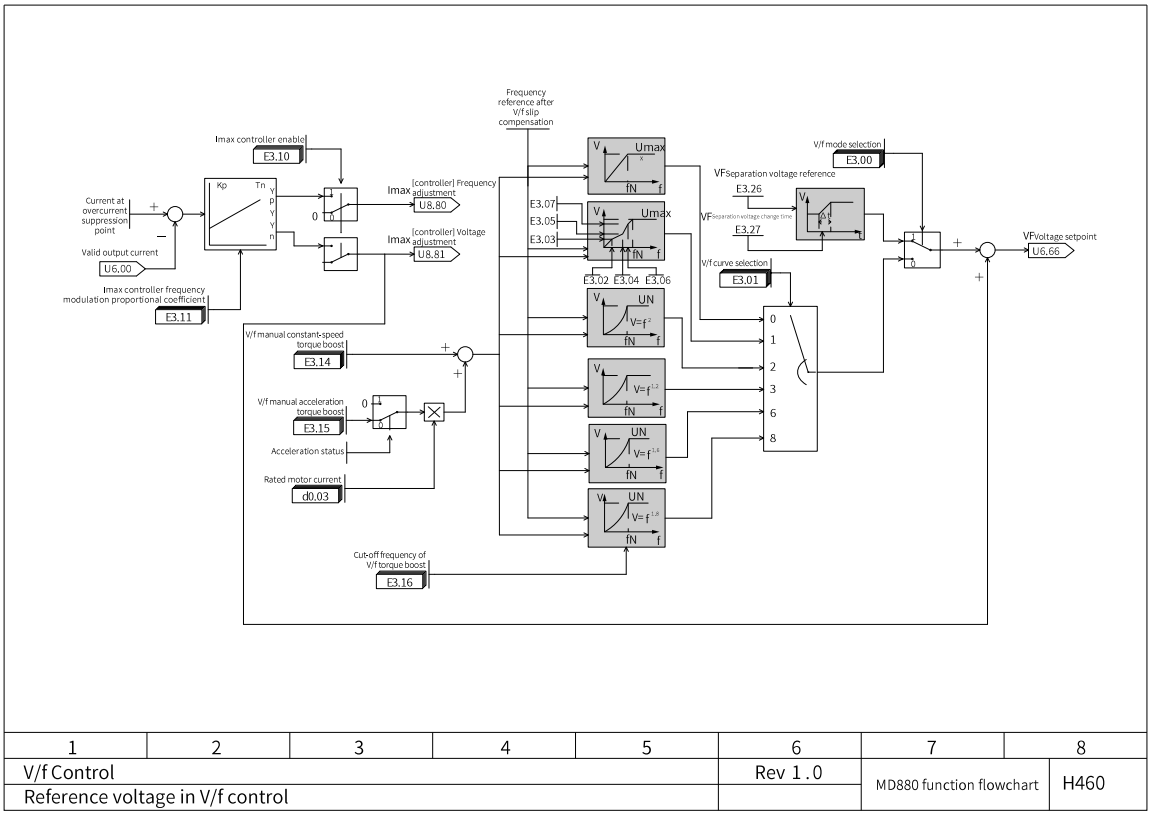


Figure 9-68 H560 - Power unit interface

9.6 V/f Control

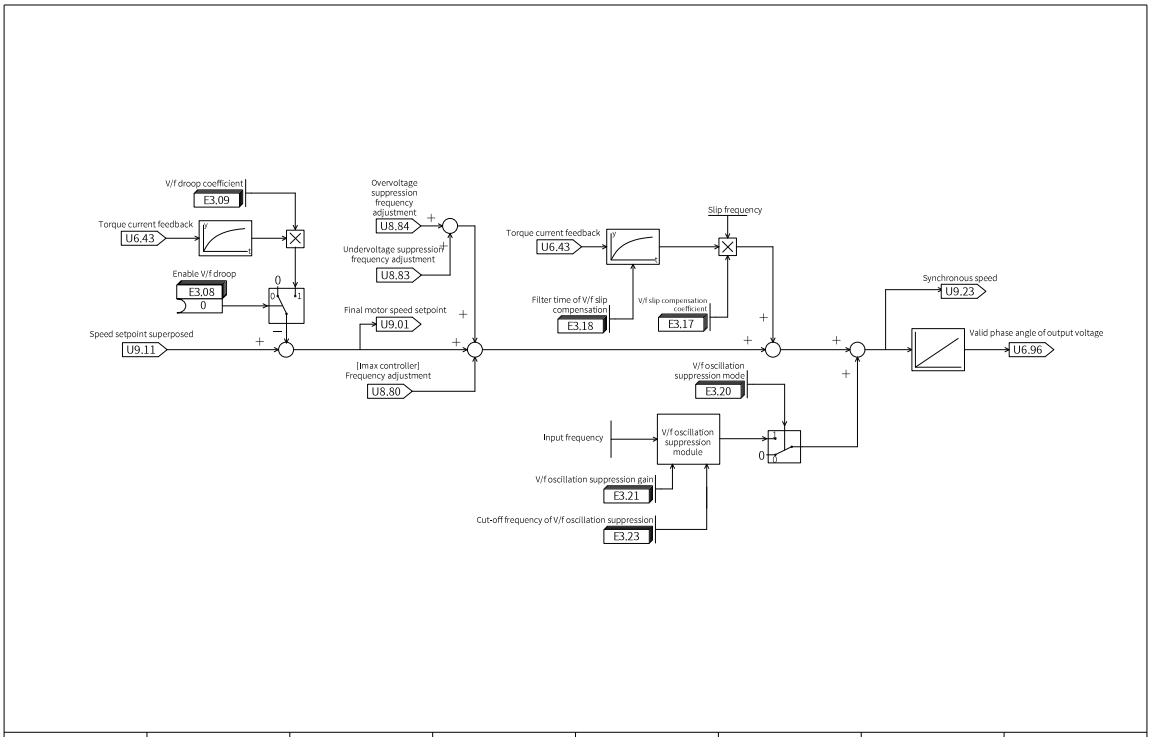
9.6.1 H460 - Reference voltage in V/f control



1	2	3	4	5	6	7	8
V/f Control					Rev 1.0	MD880 function flowchart	H460
Reference voltage in V/f control							

Figure 9-69 H460 - Reference voltage in V/f control

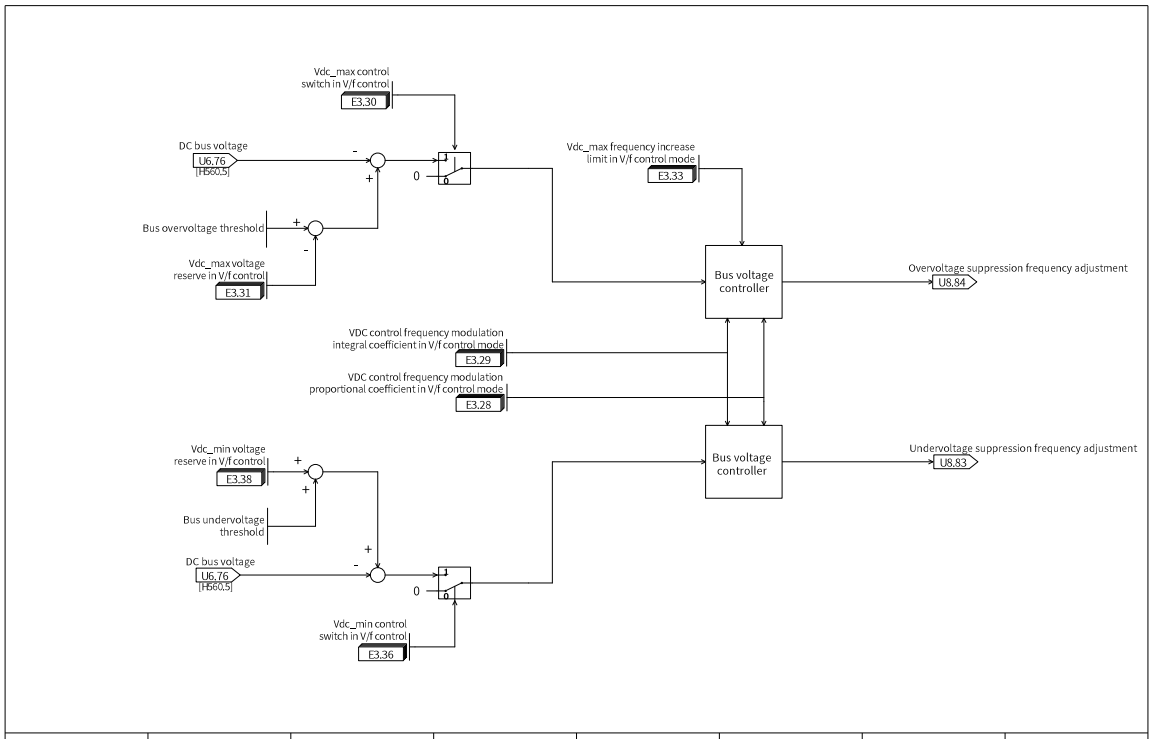
9.6.2 H461 - Reference frequency in V/f control



1	2	3	4	5	6	7	8
V/f Control					Rev 1.0	MD880 function flowchart	H461
Reference frequency in V/f control							

Figure 9-70 H461 - Reference frequency in V/f control

9.6.3 H462 - Vdc control in V/f mode



1	2	3	4	5	6	7	8
V/f Control					Rev 1.0	MD880 function flowchart	H462
VDC control in V/f control							

Figure 9-71 H462 - Vdc control in V/f mode

9.7 Auxiliary Functions

9.7.1 H620 - Speed determination

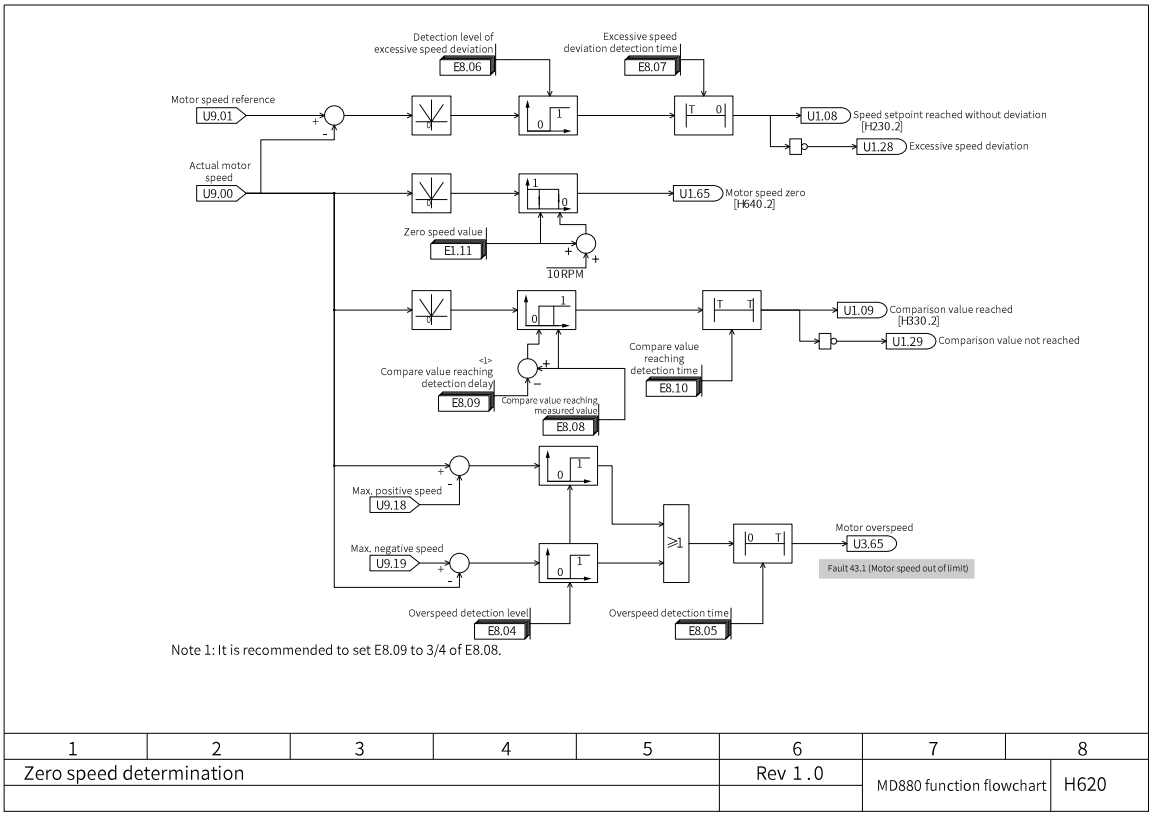
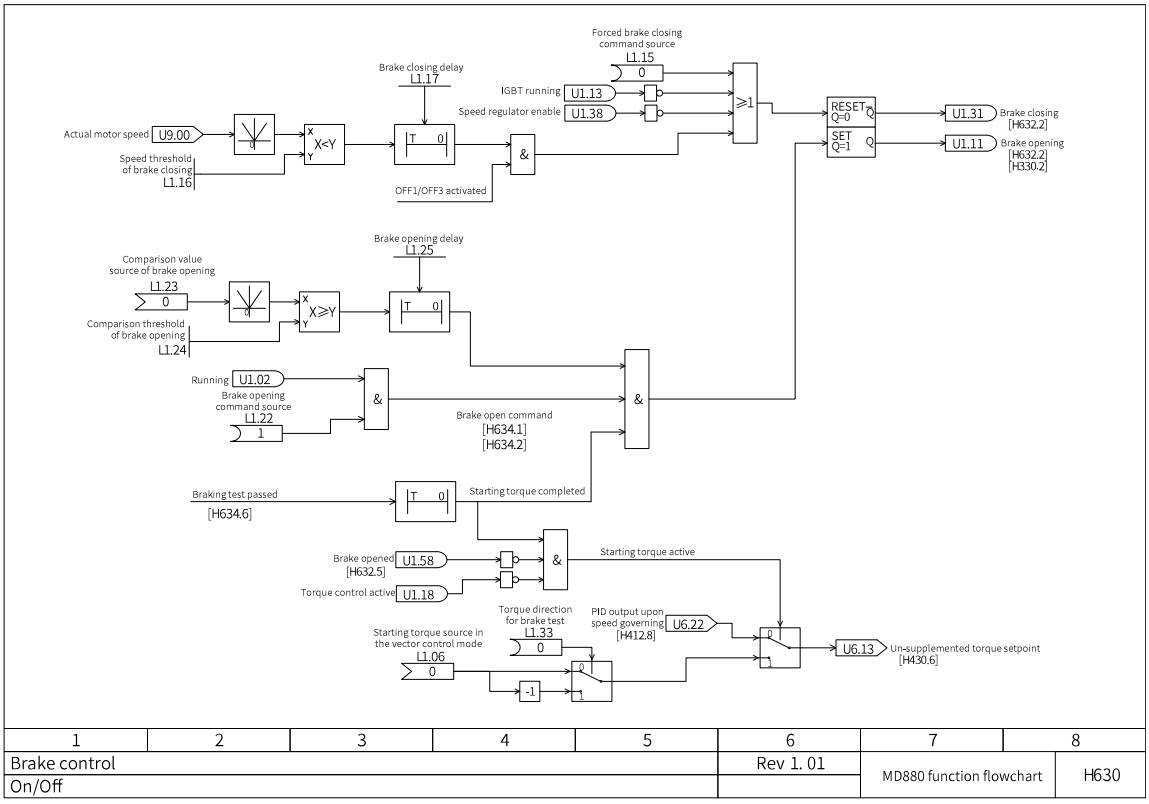


Figure 9-72 H620 - Speed determination

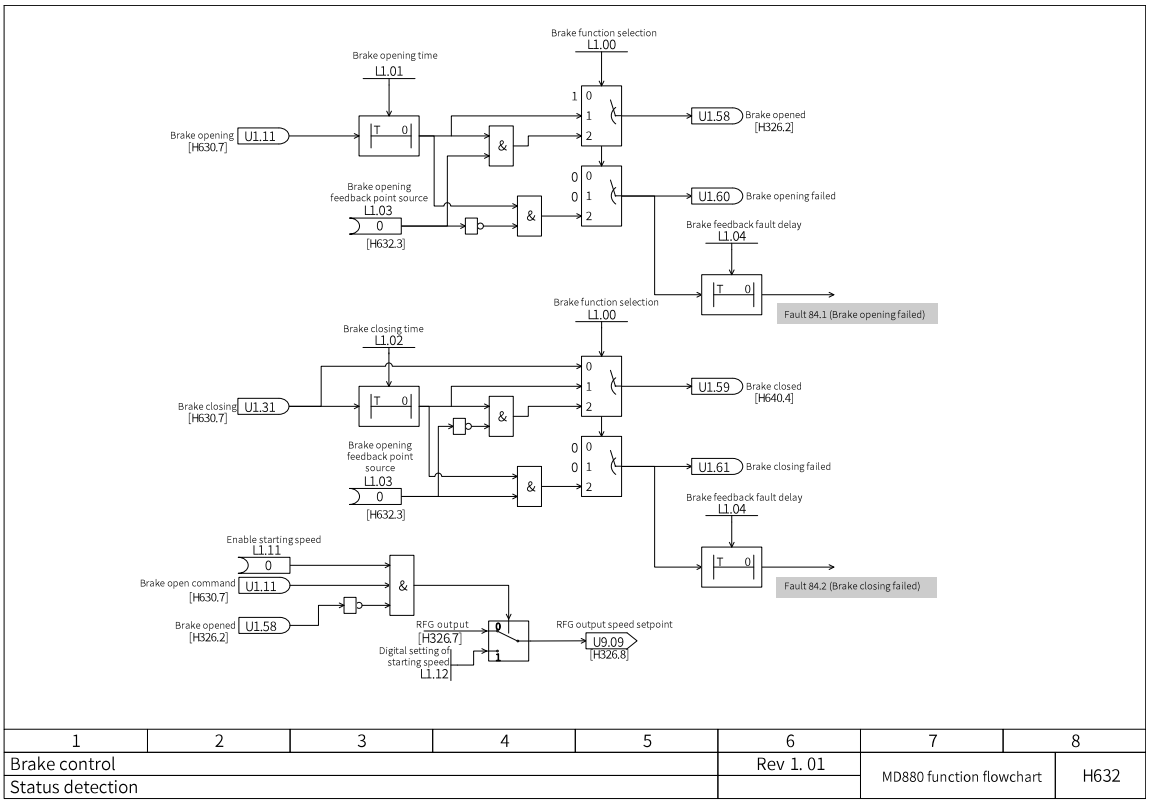
9.7.2 H630 - Brake opening and closing



1	2	3	4	5	6	7	8
Brake control					Rev 1. 01	MD880 function flowchart	H630
On/Off							

Figure 9-73 H630 - Brake opening and closing

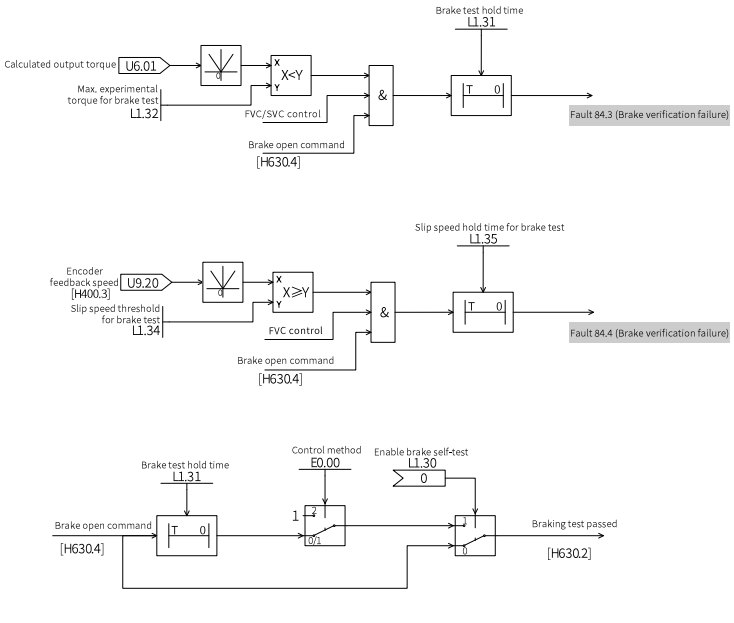
9.7.3 H632 - Brake status detection



1	2	3	4	5	6	7	8
Brake control					Rev 1. 01	MD880 function flowchart	H632
Status detection							

Figure 9-74 H632 - Brake status detection

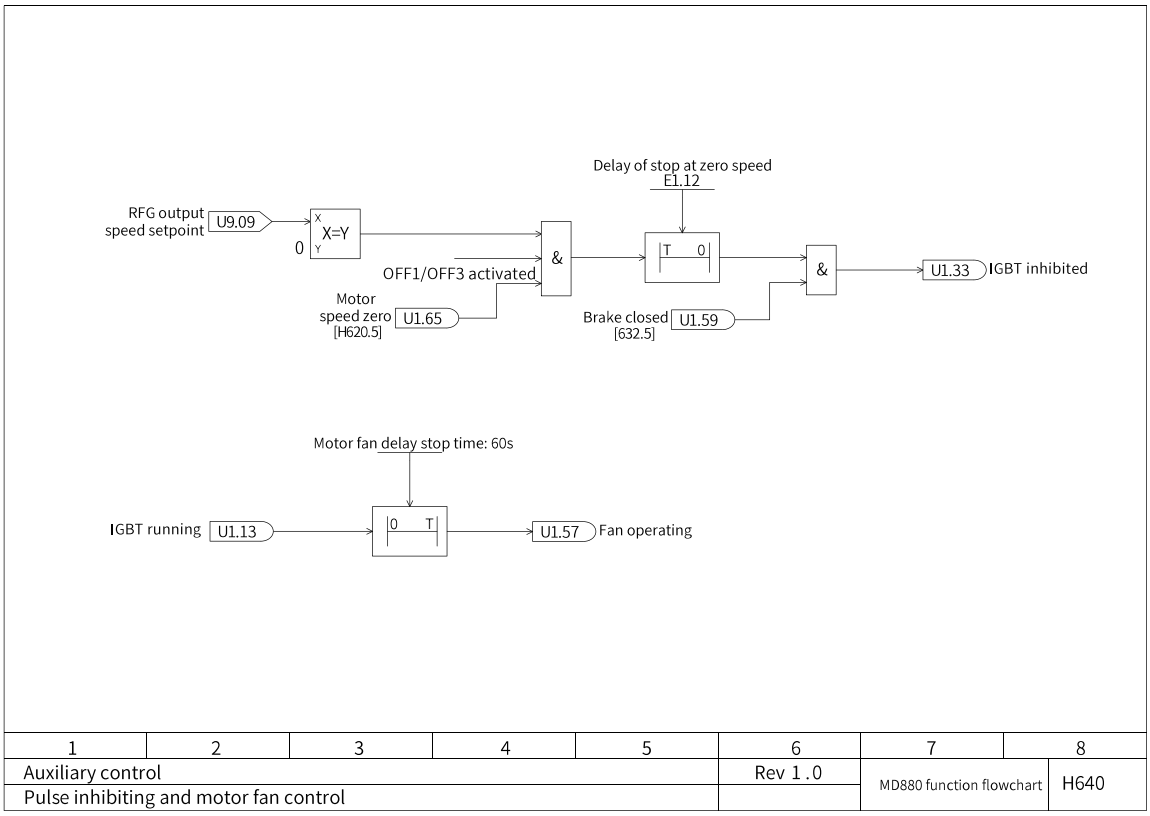
9.7.4 H634 - Brake verification



1	2	3	4	5	6	7	8
Brake control					Rev 1. 03	MD880 function flowchart	H634
Brake verification							

Figure 9-75 H634 - Brake verification

9.7.5 H640 - Pulse inhibiting and motor fan control



1	2	3	4	5	6	7	8
Auxiliary control					Rev 1.0	MD880 function flowchart	H640
Pulse inhibiting and motor fan control							

Figure 9-76 H640 - Pulse inhibiting and motor fan control

10 Fault

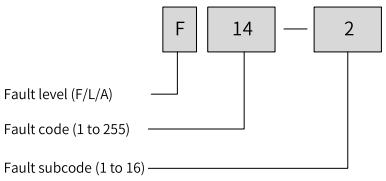
10.1 Viewing Faults

10.1.1 Fault Levels

Faults can be divided into the following three categories based on severity:

- Fault: The system incurs major faults or errors and immediately stops running, waiting for troubleshooting.
- Limit: The system incurs faults but still can run after derating. However, a deviation occurs between the running result and control reference. In this case, the following modes are supported: run at limited current, run at limited speed, and run at limited torque.
- Alarm: A minor error which does not affect operation has occurred, and the user decides the subsequent handling.

A fault code consists of three parts. In terms of fault levels, F indicates fault, L indicates limit, and A indicates alarm, as shown in the following figure.



10.1.2 Viewing Fault Information

Faults are represented by fault codes and subcodes. Fault codes indicate the fault classification and subcodes indicate specific faults. Take fault ERR14-2 as an example. Fault code 14 indicates drive over-temperature; fault subcode 2 indicates that an over-temperature fault occurred in the V-phase module.

Current fault

HCU can record up to 6 simultaneous faults. Any fault occurs after them is not recorded. You can view currently activated faults in group A1.

Current Fault		Active Limit		Current Alarm	
Fault code	Fault subcode	Fault code	Fault subcode	Fault code	Fault subcode
A1-00	A1-01	A1-12	A1-13	A1-24	A1-25
A1-02	A1-03	A1-14	A1-15	A1-26	A1-27
A1-04	A1-05	A1-16	A1-17	A1-28	A1-29
A1-06	A1-07	A1-18	A1-19	A1-30	A1-31
A1-08	A1-09	A1-20	A1-21	A1-32	A1-33
A1-10	A1-11	A1-22	A1-23	A1-34	A1-35

Historical fault

HCU supports recording the information of 5 latest faults, 1 latest limit, and 1 latest alarm.

Latest Fault		Second Latest Fault		Third Latest Fault		Fourth Latest Fault	
Fault code	Fault subcode	Fault code	Fault subcode	Fault code	Fault subcode	Fault code	Fault subcode
H2-00	H2-01	H3-00	H3-01	H4-00	H4-01	H5-00	H5-01
H2-02	H2-03	H3-02	H3-03	H4-02	H4-03	H5-02	H5-03
H2-04	H2-05	H3-04	H3-05	H4-04	H4-05	H5-04	H5-05
H2-06	H2-07	H3-06	H3-07	H4-06	H4-07	H5-06	H5-07
H2-08	H2-09	H3-08	H3-09	H4-08	H4-09	H5-08	H5-09
H2-10	H2-11	H3-10	H3-11	H4-10	H4-11	H5-10	H5-11

Fifth Latest Fault		Latest Limit		Latest Alarm	
Fault code	Fault subcode	Fault code	Fault subcode	Fault code	Fault subcode
H6-00	H6-01	H7-00	H7-01	H8-00	H8-01
H6-02	H6-03	H7-02	H7-03	H8-02	H8-03
H6-04	H6-05	H7-04	H7-05	H8-04	H8-05
H6-06	H6-07	H7-06	H7-07	H8-06	H8-07
H6-08	H6-09	H7-08	H7-09	H8-08	H8-09
H6-10	H6-11	H7-10	H7-11	H8-10	H8-11

Fault data records

HCU will record the data of the time when the fault occurs while recording the fault itself.

Recorded Item	Data of Latest Fault	Data of Second Latest Fault	Data of Third Latest Fault	Data of Fourth Latest Fault	Data of Fifth Latest Fault
Speed upon fault occurrence	H2-12	H3-12	H4-12	H5-12	H6-12
Current upon fault occurrence	H2-13	H3-13	H4-13	H5-13	H6-13
Bus voltage upon fault occurrence	H2-14	H3-14	H4-14	H5-14	H6-14
Output torque upon fault occurrence	H2-15	H3-15	H4-15	H5-15	H6-15
Control word 1 upon fault occurrence	H2-16	H3-16	H4-16	H5-16	H6-16
Control word 2 upon fault occurrence	H2-17	H3-17	H4-17	H5-17	H6-17
Fault status word	H2-18	H3-18	H4-18	H5-18	H6-18
State machine upon latest fault	H2-19	H3-19	H4-19	H5-19	H6-19
Latest fault occurrence time	H2-20	H3-20	H4-20	H5-20	H6-20
Latest fault occurrence date	H2-21	H3-21	H4-21	H5-21	H6-21

Viewing faults through SOP-20-880

SOP-20-880 allows you to directly view fault information using the above-mentioned parameters or view fault information in the fault menu.

Function	Key	Description
View the current fault	Key operation	Choose "Menu" > "Fault Status" > "Active Fault".
View the active limit	Key operation	Choose "Menu" > "Fault Status" > "Active Limit".
View the current alarm	Key operation	Choose "Menu" → "Fault Status" → "Active Alarm".
View fault-related help information		Select a fault and press this key. The help information related to the fault will be displayed.
View historical faults	Key operation	Choose "Menu" > "Fault Status" > "Previous Fault".

It is recommended to use the fault menu to view fault information. The fault menu presents all the recorded faults with fault description and help information in text.

10.1.3 Fault Reset Modes

HCU supports the following five modes for reset upon fault: SOP-20-880 reset, InoDriveStudio reset, control channel reset, auto reset by parameter setting, and reset by re-power-on.

Mode	Description
SOP-20-880	After successful connection, press STOP on any page to reset upon fault.
InoDriveStudio	After successful connection, click the Reset button on the control panel to reset upon fault.
Control channel	Reset upon fault by parameter settings. For details, see the following table.
Setting parameters	Fault auto-reset is achieved by setting H0-07 to 1 and setting the fault reset time properly.
Re-power-on	Power on the HCU again to reset the fault.

Reset commands have multiple sources. The reset command corresponding to the selected command source is active, while others are inactive. The following table lists the relationship between the reset command sources and the control channels (In the table, SOP indicates the reset by key pressing on SOP-20-880, and IDS indicates the reset command sent by InoDriveStudio).

Active Control Channel	Command Word Source	Reset Command Source									
		b0-05	b1-04	b1-05	b2-05	b3-04	b3-05	U2-07	U2-23	SOP	IDS
A9-00 = 0	b0-00 = 0	X	0→1	0→1	X	X	X	X	X	0→1	0→1
	b0-00 = 1	X	0→1	0→1	X	X	X	0→1	X	0→1	0→1
	b0-00 = 2	X	0→1	0→1	X	X	X	X	0→1	0→1	0→1
	b0-00 = 3	0→1	0→1	0→1	X	X	X	X	X	0→1	0→1
	SOP control	X	0→1	0→1	X	X	X	X	X	0→1	0→1
	IDS control	X	0→1	0→1	X	X	X	X	X	0→1	0→1
A9-00 = 1	b0-00 = 0	X	X	X	X	0→1	0→1	X	X	0→1	0→1
	b0-00 = 1	X	X	X	X	0→1	0→1	0→1	X	0→1	0→1
	b0-00 = 2	X	X	X	X	0→1	0→1	X	0→1	0→1	0→1
	b0-00 = 3	X	X	X	0→1	0→1	0→1	X	X	0→1	0→1
	SOP control	X	X	X	X	0→1	0→1	X	X	0→1	0→1
	IDS control	X	X	X	X	0→1	0→1	X	X	0→1	0→1

Note

- "X" in the table indicates that the corresponding command source is disabled. The reset command takes effect only at the rising edge. Do not always keep a high level.
- U2-07 and U2-23 can take effect with the parameters b1-04/b1-05/b3-04/b3-05 after being configured by them. This table only indicates whether they are active by default when they are not selected by these four parameters.
- U2-07 and U2-23 can take effect with the parameters b0-05/b2-05 after being configured by them only when b0-00 is set to 3. This table only indicates whether they are active by default when they are not selected by these two parameters.
- The reset command from SOP-20-880 or InoDriveStudio is always active once connected, regardless of control sources.

10.1.4 Fault Level Change and Auto Reset

Fault level change

The system can prompt faults, limits, and alarms, which are divided into 7 levels. Users can set fault prompts to different levels based on actual conditions. The following table lists the 10 user-definable fault levels.

Para.	Value
Level change error codes 1 to 10 (such as H1-00)	Fault display code
Levels of error codes 1 to 10 (such as H1-02)	0: Coast to stop 1: Emergency stop 2: Stop at the defined stop mode 3: Run at limited current 4: Run at limited speed 5: Run at limited torque 6: Display alarm only 7: No handling

Fault Level	Meaning	Remarks
0: Coast to stop	The system directly inhibits output.	Fault
1: Emergency stop	The system stops at the maximum capability and cannot run again.	
2: Stop as specified	The system stops according to the set mode, and then cannot run again.	
3: Run at limited current	The system runs normally within the restricted range.	Limit
4: Run at limited speed		
5: Run at limited torque		
6: Display alarm only	The system only generates alarms, and its running is not affected.	Alarm
7: No handling	The system does not generate prompts.	Normal

Note

- Fault display code: It is the fault code prompted upon a system fault, for example, ERR15 external fault 1.
- Fault level change is not applicable to every fault. The system automatically determines the allowed maximum value according to different fault levels.

List of faults with changeable levels

Fault Code Name	Default Level	Max.	Min.
11: Motor overload	0: Coast to stop	0: Coast to stop	6: Display alarm only
13: Output phase loss	0: Coast to stop	0: Coast to stop	6: Display alarm only
15: External fault	0: Coast to stop	0: Coast to stop	6: Display alarm only
31: PID feedback loss	0: Coast to stop	0: Coast to stop	6: Display alarm only
32: Inverter fan fault 2	6: Display alarm only	0: Coast to stop	7: No handling
44: Expansion module offline	0: Coast to stop	0: Coast to stop	6: Display alarm only
45: Expansion module slot address conflict	0: Coast to stop	0: Coast to stop	6: Display alarm only
46: Parameter setting alarm	6: Display alarm only	6: Display alarm only	7: No handling
48: Motor temperature error	0: Coast to stop	0: Coast to stop	6: Display alarm only
50: SD card error	6: Display alarm only	6: Display alarm only	7: No handling
51: RTC error	6: Display alarm only	6: Display alarm only	7: No handling
59: Low module temperature	0: Coast to stop	0: Coast to stop	6: Display alarm only
66: Leakage current	0: Coast to stop	0: Coast to stop	6: Display alarm only
67: Fieldbus adapter A communication card error	0: Coast to stop	0: Coast to stop	6: Display alarm only

Fault Code Name	Default Level	Max.	Min.
68: Fieldbus adapter B communication card error	0: Coast to stop	0: Coast to stop	6: Display alarm only
70: Inverter fan fault	0: Coast to stop	0: Coast to stop	6: Display alarm only
74: Rectifier braking unit fault	0: Coast to stop	0: Coast to stop	6: Display alarm only
77: Reactor temperature error	0: Coast to stop	0: Coast to stop	6: Display alarm only
83: Master-slave communication error	0: Coast to stop	0: Coast to stop	6: Display alarm only
84: Brake control error	0: Coast to stop	0: Coast to stop	6: Display alarm only
91: Parallel mode error	0: Coast to stop	0: Coast to stop	6: Display alarm only
93: Motor control error	0: Coast to stop	0: Coast to stop	6: Display alarm only
114: Input phase loss	0: Coast to stop	0: Coast to stop	6: Display alarm only
148: Motor temperature error	0: Coast to stop	0: Coast to stop	7: No handling
170: I/O expansion module wiring error	6: Display alarm only	0: Coast to stop	6: Display alarm only
173: Sync voltage detection module error	0: Coast to stop	0: Coast to stop	6: Display alarm only

Auto reset

In specific application scenarios, the system can be set to allow a limited number of attempts in auto resetting upon a fault to ensure continuous working. The system allows setting of the fault reset interval (Tr), number of reset attempts (ResetNum), time (Ts) for clearing reset attempts, and 3 non-auto resettable error codes.

Tr: Upon a system fault, reset commands (ResetCmd) are generated at an interval of Tr.

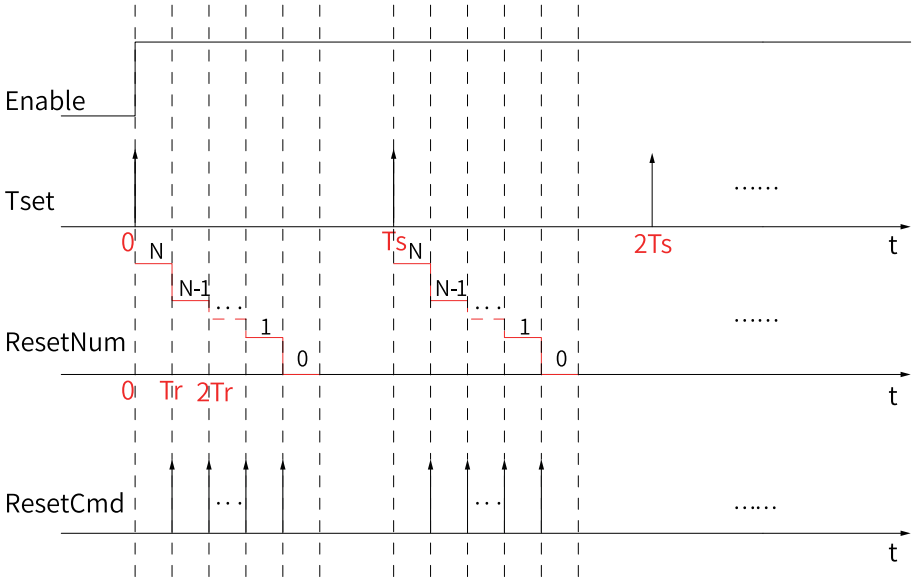
ResetNum: indicates the number of auto reset attempts. Upon generation of each reset command (ResetCmd), the remaining number of auto reset attempts becomes ResetNum – 1. When the remaining number of auto reset attempts reaches 0, the auto fault reset function of the system is disabled.

Ts: indicates the time for resetting the number of reset attempts. After Ts elapses, the remaining number of reset attempts is restored to the original value of ResetNum.

Non-auto resettable error code: When the system fault list contains non-auto resettable error codes, the system will not generate auto reset commands. In this case, users must manually reset the faults. The following table lists the details.

Para.	Name	Value	Remarks
H0-07	Auto fault reset	0: Disable 1: Enable	Enable
H0-08	Time for clearing reset attempts	0.0s to 3600.0s	Tset
H0-09	Interval of reset attempts	0.0s to 600.0s	Tr
H0-10	Fault reset attempts	0 to 5	ResetNum
H0-11	Code of non-resettable error 1	Fault display code	-

Para.	Name	Value	Remarks
H0-12	Code of non-resettable error 2	Fault display code	-
H0-13	Code of non-resettable error 3	Fault display code	-



Note

- The Enable signal is active when the auto fault reset function is enabled and ResetNum is set to a value other than 0.
- If the fault reset interval is greater than the time for clearing reset attempts, this function is inactive.

10.2 User-Defined External Faults and Alarms

External fault

H0-00 and H0-01 provide two ways to trigger user-defined external faults and inhibit AC drive output upon faults. You can select a bit connector from U0-00 to U4-99 as the user-defined fault trigger source. When the status bit is 0, the system is working normally. When the status bit is 1, the external fault ERR15-1 or ERR15-2 is triggered.

External alarm

H0-02 and H0-03 provide two ways to trigger user-defined external alarms. When an alarm is triggered, the AC drive continues running. You can select a bit connector from U0-00 to U4-99 as the trigger source of the user-defined alarm. When the status bit is 0, the system is working normally. When the status bit is 1, the external alarm ERR63-1 or ERR63-2 is triggered.

10.3 User-Defined Error Word

Group H10 contains two sets of user-defined error words, including fault word 1 from H10-02 to H10-33 and fault word 2 from H10-34 to H10-65. Group H10 can be set by the user with a fault code and a fault subcode. When the fault occurred on the AC drive is consistent with the fault code and subcode set by the user, the error word bit corresponding to H10-00 to H10-01 is set to high. When the fault subcodes are set to 0 (all fault subcodes), if the codes of the faults that occur are the same as the fault codes set by users, the corresponding error word bits are high.

For example, if H10-02 is set to 15 and H10-03 is set to 1, bit00 of H10-00 indicates the fault state of ERR15-1 external fault 1. Set H0-00 to 1 to manually activate external fault 1 ERR15-1. Then, H10-00 is displayed as 0x0001. Set H0-00 to 0 to cancel the source of triggering external fault 1 ERR15-1. Then, H10-00 is still displayed as 0x0001. H10-00 can be displayed as 0x0000 only after reset upon fault. The faults that have occurred still can be indicated before reset when the fault trigger signal is inactive.

Para.	Name	Description	Setpoint
H10-00	User-defined error word 1	Error code corresponding to fault word 1	-
H10-01	User-defined error word 2	Error code corresponding to fault word 2	-
H10-02	Fault word 1 - Bit00 error code	Fault code that can be set by users	0 to 65535
H10-03	Fault word 1 - Bit00 error subcode	Error subcode that can be set by users, which corresponds to the code in H10-02	0: All error subcodes 1: Error subcode 1 2: Error subcode 2 3: Error subcode 3 4: Error subcode 4 5: Error subcode 5 6: Error subcode 6 7: Error subcode 7 8: Error subcode 8 9: Error subcode 9 10: Error subcode 10 11: Error subcode 11 12: Error subcode 12 13: Error subcode 13 14: Error subcode 14 15: Error subcode 15 16: Error subcode 16
…	…	…	…
H10-32	Fault word 1 - Bit15 error code	Fault code that can be set by users	0 to 65535
H10-33	Fault word 1 - Bit15 error subcode	Error subcode that can be set by users, which corresponds to the code in H10-32	Same as H10-03
H10-34	Fault word 2 - Bit00 error code	Fault code that can be set by users	0 to 65535
H10-35	Fault word 2 - Bit00 error subcode	Error subcode that can be set by users, which corresponds to the code in H10-34	Same as H10-03

Para.	Name	Description	Setpoint
…	…	…	…
H10-64	Fault word 2 - Bit15 error code	Fault code that can be set by users	0 to 65535
H10-65	Fault word 2 - Bit15 error subcode	Error subcode that can be set by users, which corresponds to the code in H10-64	Same as H10-03
U8-20	User-defined error word 1	Corresponding to H10-00	-
U8-21	User-defined error word 2	Corresponding to H10-01	-

10.4 Troubleshooting for Common Problems

10.4.1 Switch-on Inhibited and Ready-to-Run

- Switch-on inhibited and ready-to-run are two state machines for the system, which are respectively indicated by S4 and S7.
- When the system is in the switch-on inhibited or ready-to-run state for a long time, it is generally because signal states such as OFF1, OFF2, OFF3, or running permission are abnormal. For example, OFF2 and OFF3 signal activation causes the switch-on-inhibited state of the system.
- Troubleshooting: Check A0-16 and A0-17 to quickly find the fault causes. See the following table for details.

Para.	Value	Description	Remarks
A0-16 error prompt type	0	None	Normal
	1	The OFF1\JOG\ start-stop command is not reset, resulting in switch-on inhibited.	Switch-on inhibited: The corresponding command of the active control channel is activated.
	2	OFF2 is activated, causing switch-on inhibited.	
	3	OFF3 is activated, causing switch-on inhibited.	
	4	Operation is not allowed to be activated, resulting in operation preparation.	Operation preparation: The corresponding command of the active control channel is activated.
	9	STO activation	-
	10	DP bus data privilege is released but PZD1.10 is not set to 1.	The source of the start/stop control is the fieldbus adapter, but BIT10 of PZD1 of the data received by the adapter is not 1.
	11	User-defined function block enable switchover causes switch-on inhibited.	-
	12	Three-phase brake A5-01 activates OFF2, resulting in switch-on inhibited.	
A0-17 error	0	None	Normal
	1	It is set to normally active. Check group b parameters.	The corresponding channel command of group b is set to a constant value of 1.
	2	DI1	The terminal signal is active.
	3	DI2	
	4	DI3	
	5	DI4	
	6	DI5	
	7	DI6	
	8	DIL	
	9	HDI1	
	10	HDI2	

Para.	Value	Description	Remarks
A0-17 error	11	Fieldbus adapter A.PZD0.0	Start/stop control source is adapter A and corresponding bit is active.
	12	Fieldbus adapter A.PZD0.1	
	13	Fieldbus adapter A.PZD0.2	
	14	Fieldbus adapter A.PZD0.3	
	15	Fieldbus adapter A.PZD0.8	
	16	Fieldbus adapter A.PZD0.9	
	17	Fieldbus adapter B.PZD0.0	Start/stop control source is adapter B and corresponding bit is active.
	18	Fieldbus adapter B.PZD0.1	
	19	Fieldbus adapter B.PZD0.2	
	20	Fieldbus adapter B.PZD0.3	
	21	Fieldbus adapter B.PZD0.8	
	22	Fieldbus adapter B.PZD0.9	
	23	PC background control bit active	The software has acquired control rights and the corresponding bit is active.
	24	Fieldbus adapter A.PZD1 check bit	Start-stop control source is adapter A and received PZD1.bit10 is not 1.
	25	Fieldbus adapter B.PZD1 parity bit	Start-stop control source is adapter B and received PZD1.bit10 is not 1.
	26	User-defined function block enable is changed, but HCU is not powered on again.	-
	27	Three-phase braking setting A5-00 is set to 0.	-
	28	HINT is not ready due to e.g. model parameter error.	-
	29	STO action signal active	-
	Other	B connector	The corresponding command of the active control channel is selected as the B connector which is active.

Note

The system may encounter exceptions of various categories or from different sources at the same time. Locate and resolve the exceptions one by one as prompted.

10.4.2 System Initialization Fault

Symptom:

After the HCU-50S/51S control power is powered on, the state machine (A0-00) is always "0 System initializing".

Solution:

- Check whether the voltage of the 24 VDC power supply of HCU-50S/51S is too low.
- Check whether the detection circuits of the 24 VDC and 15 VDC power supplies of HCU-50S/51S are abnormal.
- Check whether the EEPROM of HCU-50S/51S is abnormal.

- Ask for technical support.

10.4.3 Locked-Rotor Fault

The ERR93-1 fault indicating locked-rotor on motors is a protective measure to judge motor control faults. It can prevent motors from being pulled down when the motor output torque cannot overcome the load torque.

The motor locked-rotor detection enable signal comes from U1-28 by default [excessive speed deviation]. When U1-28 is enabled, the locked-rotor detection enable is activated. In some application scenarios, motors are required to work in the locked-rotor mode. For example, some applications need motors to run in the speed mode but need to adjust the motor torque limit for torque control. In such applications, set E8-25 to 0 to manually disable locked-rotor detection.

For example, take-up machines on cold rolling lines typically need to work in the torque mode. In this case, output torque can be controlled by setting speed control and torque limit. However, typically, the actual motor speed is not equal to the speed reference. The actual motor speed may even be 0 during tension setup. In this case, disable locked-rotor detection or set E8-26 (locked-rotor speed reference) to a sufficient value.

10.4.4 Parameter Setting Errors

If there is a conflict between the parameters set by the user, HCU-50S/51S will internally limit the setpoints to ensure that the system can work normally. In addition, alarm 46-1 is reported to prompt users of parameter input errors. The system working status may be different from the expected status.

U8-44 indicates the causes of parameter setting errors. When no error occurs, [U8-44] is 0. If the set maximum speed of the motor is less than the minimum speed of the motor, then [U8-44] is 11, and the motor speed will be forced to the minimum speed at the maximum speed. The following table lists details of U8-44.

Parameter Value	Description
0	Parameter settings are correct.
1	The pulse-by-pulse current limit counts conflict.
2	The minimum and maximum values of the motor-driven potentiometer conflict.
3	RFG arc time 1 and acceleration time 1 conflict.
4	RFG arc time 1 and deceleration time 1 conflict.
5	RFG arc time 2 and acceleration time 2 conflict.
6	RFG arc time 2 and deceleration time 2 conflict.
7	RFG arc time 3 and acceleration time 3 conflict.
8	RFG arc time 3 and deceleration time 3 conflict.
9	RFG arc time 4 and acceleration time 4 conflict.
10	RFG arc time 4 and deceleration time 4 conflict.
11	The maximum and minimum motor speeds conflict.
12	The lower and upper limits of jump frequency 1 conflict.
13	The lower and upper limits of jump frequency 2 conflict.
14	The lower and upper limits of torque limit digital setting conflict.
15	The lower and upper limits of speed loop Kp adaptive switchover conflict.
16	The lower frequency and upper frequency of speed loop switchover conflict.

Parameter Value	Description
17	The lower and upper limits of current loop proportion adaptive switchover conflict.
18	The lower frequency and upper frequency of model switchover conflict.
19	The lower frequency and upper frequency of FVC-to-SVC switchover conflict.
20	The minimum and maximum input values of AI1 curve conflict.
21	The minimum and maximum input values of AI2 curve conflict.
22	The minimum and maximum output proportions of AO1 curve conflict.
23	The minimum and maximum output proportions of AO2 curve conflict.
24	The minimum and maximum input frequencies of HDI1 curve conflict.
25	The minimum and maximum input frequencies of HDI2 curve conflict.
26	The minimum and maximum output proportions of HDO1 curve conflict.
27	The minimum and maximum output proportions of HDO2 curve conflict.
28	The slot number of the communication card selected for fieldbus adapter A is not set.
29	The slot number of the communication card selected for fieldbus adapter B is not set.
30	The AC drive calibrated rated current is 6 times greater than the rated motor current.
31	The fault reset interval is greater than the time for clearing reset attempts.
32	The encoder module slot settings conflict.
33	The I/O expansion module slot settings conflict.
34	The fault error processing level settings conflict.
35	Linear V/f curve frequency point settings conflict.
36	The X point of multi-point curve module A is not incremental.
37	The X point of multi-point curve module B is not incremental.
38	Reserved
39	The number of channels of the trigger oscilloscope (A12-20) is more than 8 during ADC cycle operation.
40	The AO1 reference signal source and motor temperature detection conflict.
41	The AO2 reference signal source and motor temperature detection conflict.
42	The user-defined function block execution sequences conflict. For details, see the parameters P9-00 to P9-03.
43	The X point of user-defined multi-point curve module is not incremental.
44	Reserved
45	The start/stop control word is fieldbus adapter. However, the DP data check bit (N16.10) is not bit10.
46	The parallel function (A15-00) is enabled but the number of enabled unit modules is 0.
47	Parameter settings of the I/O expansion module 1 (min. input of AI curve > max. input of AI curve, or min. output proportion of AO curve > max. output proportion of AO curve) conflict.
48	Parameter settings of the I/O expansion module 2 (min. input of AI curve > max. input of AI curve, or min. output proportion of AO curve > max. output proportion of AO curve) conflict.
49	Parameter settings of the I/O expansion module 3 (min. input of AI curve > max. input of AI curve, or min. output proportion of AO curve > max. output proportion of AO curve) conflict.
76	The number of parallel motors is set incorrectly: The number of PMSM can only be 1.
77	The card type of the user-defined communication card is incorrect.
78	The back EMF corresponding to the maximum speed of synchronous motor is too high. High-speed wave may damage the AC drive.
81	The minimum input frequency of the frequency/torque curve in group n32 conflicts with the maximum input frequency.
82	d0-00 is set to synchronous motor and the control mode in E0-00 is set to V/f, but the synchronous motor actually runs in the SVC control mode.

Parameter Value	Description
95	The speed of each point in the load monitoring curve in group L15 is not incremental.
96	The underload threshold of the load monitoring curve in group L15 is greater than or equal to the overload threshold.
97	InoLink data interaction is too large.
98	The upper limit of limit module A conflicts with the lower limit.
99	The upper limit of limit module B conflicts with the lower limit.
100	The upper limit of limit module C conflicts with the lower limit.
101	The upper limit of limit module D conflicts with the lower limit.
501	The pole pairs of the motor are set incorrectly.
502	Parameter setting on motor nameplate is incorrect. Please check whether the rated voltage, current, and power are set correctly.
503	No-load current of asynchronous motor is too large. Please check the motor parameters and auto-tune all motor parameters.
504	Rated flux is incorrect. Check whether the mutual inductance or no-load current is correct.
505	The rotor resistance of asynchronous motor is abnormal or the rated speed setting is incorrect (d0-05 or d0-04 is set incorrectly).
506	The field weakening curve of asynchronous motor is abnormal.
507	The number of pole pairs of resolver does not match the number of motor pole pairs. The number of motor pole pairs must be an integer multiple of the number of pole pairs of resolver.

10.4.5 Pre-Charge Fault

During the startup of the inverter, when the state machine enters the S6 pre-charge state and detects that the bus voltage value is too low for a period of time, the pre-charge fault ERR64-1 will be reported.

If rectifier control is disabled in A6-00, the pre-charge duration is 6s and cannot be changed. If the function is enabled in A6-00, the pre-charge duration depends on the rectifier control starting time specified by A6-01.

Therefore, ensure that the bus voltage reaches the normal value range within the pre-charge duration.

10.5 Faults and Maintenance

10.5.1 Motor Control Error

10.5.1.1 Motor Locked-Rotor

Para.	Name	Setpoint
E8-25	Enable motor locked-rotor detection	0: Disable 1: Enable Other: B connector
E8-26	Motor locked-rotor speed setpoint	0.0% to 100.0%
E8-27	Motor locked-rotor detection time	0.00s to 65.00s

When [E8-25] is set to 1, if the torque reaches the torque limit and the feedback speed remains lower than the threshold specified in E8-26 for a period of time longer than the time specified by E8-27, the motor locked-rotor fault (93-1) is triggered.

For possible causes and troubleshooting, see the following table.

Possible Cause	Solution
The torque limit is active and the running speed is very low in the case of process cooperation.	Disable the motor locked-rotor fault detection function.
The torque limit is inappropriate.	Check whether E2-08 to E2-13 are set correctly, especially when communication setting is enabled.
The load is too heavy.	Check the motor load.
Motor parameters are set incorrectly.	Check whether the motor parameters are set correctly.
An encoder error occurs.	1. Check whether the encoder is connected properly. 2. Check whether the encoder is damaged. 3. Check whether the encoder parameters are set correctly.
Motor auto-tuning is not performed.	Set motor parameters correctly and perform motor parameter auto-tuning.
Output phase loss or output disconnection occurs.	1. Check whether the motor connection is reliable. 2. Check whether the contactor on the motor side is disconnected.
The motor is directly started when it is still rotating or an incorrect speed is detected upon flying start.	Set the start mode to flying start and adjust the flying start parameters.
Other causes	Ask for technical support.

10.5.1.2 Motor Stall

Para.	Name	Setpoint
E8-28	Enable motor stall detection	0: Disable 1: Enable
E8-29	Motor stall detection threshold	10.0% to 80.0%
E8-30	Motor stall detection time	0.00s to 10.00s

In FVC control mode, when [E8-28] is set to 1 and the speed deviation exceeds the motor stall detection threshold set by E8-29 and the duration exceeds the time set by E8-30, the motor stall fault 93-2 will be triggered.

For possible causes and troubleshooting, see the following table.

Possible Cause	Solution
The high speed load is too large.	Check the motor load.
The motor starts while rotating, which brings the motor to regenerative mode and causes bus overvoltage.	E1-00 (start mode) is set as flying start (flying start requires auto-tuning) or starting after motor stops.
Motor parameters are set incorrectly.	Check whether the motor parameters are set correctly.
An encoder error occurs.	1. Check whether the encoder is connected properly. 2. Check whether the encoder is damaged. 3. Check whether the encoder parameters are set correctly.
The motor parameter deviation is too large.	Set motor parameters correctly and perform motor parameter auto-tuning.

Possible Cause	Solution
Output phase loss or output disconnection occurs.	1. Check whether the motor connection is reliable. 2. Check whether the contactor on the motor side is disconnected.
Other causes	Ask for technical support.

10.5.1.3 Current Control Error

Para.	Name	Setpoint
E8-31	Enable current control error detection	0: Disable 1: Enable
E8-32	Current control error detection threshold	10.0% to 80.0%
E8-33	Current control error detection time	0 ms to 500 ms

When E8-31 is set to 1, if the deviation between the feedback and reference of torque current or exciting current exceeds the current error detection threshold (E8-32) for a period of time longer than the time specified by E8-33, the current control error (93-3) is triggered.

For possible causes and troubleshooting, see the following table.

Possible Cause	Solution
The motor is disconnected.	1. Check whether a phase of the motor is disconnected. 2. Check whether the contactor on the motor side is connected properly.
The encoder is disconnected or the encoder signal interference is serious.	Check the wiring of the encoder and eliminate the encoder interference.
The motor parameter setting is incorrect.	Set the motor parameters correctly and perform auto-tuning on all motor parameters.
Other causes	Ask for technical support.

10.5.1.4 SVC Speed Open Loop Locked-Rotor

Para.	Name	Setpoint
E8-38	SVC speed open-loop locked-rotor detection time	0.000s to 65.000s

When the SVC running speed open loop is enabled, a locked-rotor can trigger the SVC speed open loop locked-rotor fault 93-5.

For possible causes and troubleshooting, see the following table.

Possible Cause	Solution
The load is too heavy.	Check the motor load.
Motor parameters are set incorrectly.	Check whether the motor parameters are set correctly.
Motor auto-tuning is not performed.	Set motor parameters correctly and perform motor parameter auto-tuning.
Output phase loss or output disconnection occurs.	1. Check whether the motor connection is reliable. 2. Check whether the contactor on the motor side is disconnected.
Other causes	Ask for technical support.

10.5.2 Motor Overload Protection

Para.	Name	Setpoint
E8-00	Enable motor overload software protection	0: Disable 1: Enable
E8-01	Gain of motor overload software protection	20% to 1000%
E8-02	Motor overload pre-warning coefficient	50% to 100%

E8-00 = 0: The motor has no overload protection function. Therefore, the motor may be damaged due to over-temperature. It is recommended that a thermal relay be installed to connect the drive and the motor.

E8-00 = 1: The AC drive determines whether the motor is overloaded according to the inverse time lag curve. The following figure shows the default inverse time lag curve of the motor.

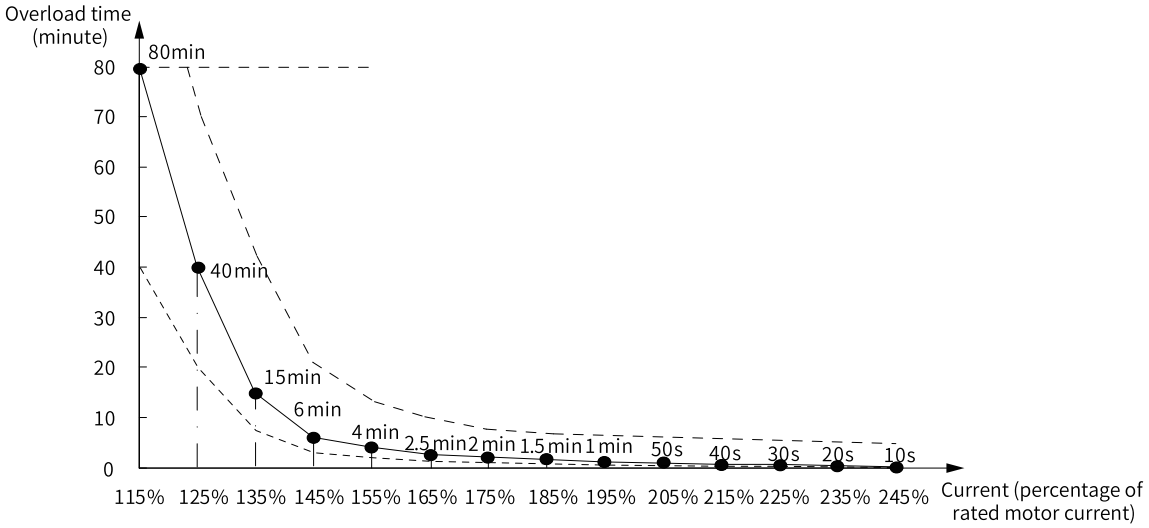


Figure 10-1 Inverse time lag curve of motor overload protection

The upper time limit for motor overload protection is 80 minutes, and the lower limit is 10 seconds. However, the default motor overload curve may not match the actual motor overload characteristics. Set E8-01 (Motor overload software protection gain) to adjust the overload curve. As shown in the preceding figure, at the same current, the actual overload protection time is the time on the default curve multiplied by the motor overload software protection gain.

For example, to ensure that the motor reports overload after running 22 minutes at 130% current, the calculation method is as follows:

According to the motor overload curve, the overload time for motor current 125% and 135% is 40 minutes and 15 minutes respectively. Therefore, by default, 27.5 minutes for the overload of 130% rated motor current is calculated as follows:

$$40 + (40 – 15)/(125\% – 135\%) \times (130\% – 125\%) = 27.5 \text{ min}$$

Therefore, the motor needs to report overload after running 22 minutes at 130% current. The motor overload software protection gain is calculated as follows:

$$E8\text{-}01 = 22/27.5 = 80\%$$

Note

Properly set E8-01 based on the actual overload capacity of motors. An excessively large value of the parameter may prevent the drive from reporting ERR11-1 in time, causing damage to motors due to over-temperature.

The motor overload pre-warning coefficient is used by the drive to provide the alarm signal in advance before the motor overload fault occurs. A smaller coefficient means earlier provision of the alarm signal. If the coefficient is 100%, the pre-load alarm is provided at the same time as the overload fault occurs.

For example, if the motor is required to report overload under the condition of 130% current for 22 minutes, it can be known from the above calculation that E8-01 is 80%. If E8-02 is set to 80% under this condition, when the motor runs continuously for 17.6 min (80% x 22 min) under 130% current, the pre-overload state U1-62 of the motor is set to 1.

10.6 Fault List

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Hardware fault	1	1	Current detection circuit error	Coast to stop	Coast to stop	Coast to stop	Power-off and restart	"10.7.1.1 Current Detection Circuit Error (1-1)" on page 827
		2	15 V power supply error					"10.7.1.2 15 V Power Supply Error (1-2)" on page 827
		3	EEPROM error					"10.7.1.3 EEPROM Error (1-3)" on page 828
		4	Failed to download the model several times					"10.7.1.4 Failed to Download the Model Several Times (1-4)" on page 828
		5	HCU-FPGA software upgrade failure					"10.7.1.5 HCU-FPGA Software Upgrade Failure (1-5)" on page 828
		6	HINT-FPGA software upgrade failure					"10.7.1.6 HINT-FPGA Software Upgrade Failure (1-6)" on page 828
		8	EEPROM parameter reading timeout					"10.7.1.7 EEPROM Parameter Reading Timeout (1-8)" on page 829
		9	EEPROM parameter storage timeout					"10.7.1.8 EEPROM Parameter Storage Timeout (1-9)" on page 829

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Overcurrent	2	1	Hardware overcurrent	Coast to stop	Coast to stop	Coast to stop	Manual reset	*"10.7.2.1 Hardware Overcurrent (2-1)" on page 829*
		2	Software overcurrent					*"10.7.2.2 Software Overcurrent (2-2)" on page 830*
		6	U phase hardware overcurrent					*"10.7.2.3 U Phase Hardware Overcurrent (2-6)" on page 831*
		7	V phase hardware overcurrent					*"10.7.2.4 V Phase Hardware Overcurrent (2-7)" on page 832*
		8	W phase hardware overcurrent					*"10.7.2.5 W Phase Hardware Overcurrent (2-8)" on page 833*
DC overvoltage	5	1	DC overvoltage	Coast to stop	Coast to stop	Coast to stop	Manual reset	*"10.7.3.1 DC Overvoltage (5-1)" on page 834*
		3	High bus voltage during simulation operation					*"10.7.3.2 High Bus Voltage During Simulation Operation (5-3)" on page 835*
DC undervoltage	9	1	DC undervoltage	Coast to stop	Coast to stop	Coast to stop	Manual reset	*"10.7.4.1 DC Undervoltage (9-1)" on page 835*
		2	Low voltage fault					*"10.7.4.2 Low Voltage (9-2)" on page 836*
Drive overload	10	1	Drive overload	Coast to stop	Coast to stop	Coast to stop	Manual reset	*"10.7.5.1 Drive Overload (10-1)" on page 837*
		2	Fast current limit fault					*"10.7.5.2 Fast Current Limit Fault (10-2)" on page 837*

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Motor overload	11	1	Motor overload	Coast to stop	Alarm	Coast to stop	Manual reset	"10.7.6.1 Motor Overload (11-1)" on page 838
		2	Instantaneous overcurrent of synchronous motor					"10.7.6.2 Instantaneous Overcurrent of Synchronous Motor (11-2)" on page 838
Output phase loss	13	1	U phase loss	Coast to stop	Alarm	Coast to stop	Manual reset	"10.7.7.1 U Phase Loss (13-1)" on page 839
		2	V phase loss					"10.7.7.2 V Phase Loss (13-2)" on page 839
		3	W phase loss					"10.7.7.3 W Phase Loss (13-3)" on page 840
		4	Two-phase or three-phase loss					"10.7.7.4 Two-Phase or Three-Phase Loss (13-4)" on page 840
Drive over-temperature	14	1	U phase module over-temperature	Coast to stop	Coast to stop	Coast to stop	Manual reset	"10.7.63.1 Input Phase Loss (114-1)" on page 944
		2	V phase module over-temperature					"10.7.8.2 V Phase Module Over-Temperature (14-2)" on page 841

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Drive over-temperature	14	3	W phase module over-temperature	Coast to stop	Coast to stop	Coast to stop	Manual reset	"10.7.8.3 W Phase Module Over-Temperature (14-3)" on page 842
		4	Temperature switch error					"10.7.8.4 Temperature Switch Error (14-4)" on page 842
		5	Rectifier module over-temperature					"10.7.8.5 Rectifier Module Over-Temperature (14-5)" on page 843
		7	Control cavity over-temperature					"10.7.8.6 Control Cavity Over-Temperature (14-7)" on page 843
External fault	15	1	External fault 1	Coast to stop	Alarm	Coast to stop	Manual reset	"10.7.9.1 External Fault 1 (15-1)" on page 844
		2	External fault 2					"10.7.9.2 External Fault 2 (15-2)" on page 844
		3	Motor over-temperature					"10.7.9.3 Motor Over-Temperature (15-3)" on page 844

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Motor auto-tuning fault	19	1	Static auto-tuning failure of UV/UW sampling gain scaling	Coast to stop	Coast to stop	Coast to stop	Manual reset	"10.7.10.1 Static Auto-Tuning Failure of UV/UW Sampling Gain scaling (19-1)" on page 845
		2	Static auto-tuning failure of stator resistance and IGBT voltage drop					"10.7.10.2 Static Auto-Tuning Failure of Stator Resistance and IGBT Voltage Drop (19-2)" on page 845
		3	Static auto-tuning failure of rotor resistance and leakage inductance					"10.7.10.3 Static Auto-Tuning Failure of Rotor Resistance and Leakage Inductance (19-3)" on page 846
		4	No-load auto-tuning failure of no-load current and mutual inductance					"10.7.10.4 No-Load Auto-Tuning Failure of No-Load Current and Mutual Inductance (19-4)" on page 846
		5	With-load auto-tuning failure of asynchronous motor no-load current and mutual inductance					"10.7.10.5 With-Load Auto-Tuning Failure of Asynchronous Motor No-Load Current and Mutual Inductance (19-5)" on page 847

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Motor auto-tuning fault	19	6	Failure of motor auto-tuning and load inertia auto-tuning	Coast to stop	Coast to stop	Coast to stop	Manual reset	"10.7.10.6 Failure of Motor Auto-Tuning and Load Inertia Auto-Tuning (19-6)" on page 847
		7	Dead zone auto-tuning failure					"10.7.10.7 Dead Zone Auto-Tuning Failure (19-7)" on page 847
		8	Auto-tuned rotor resistance out of range					"10.7.10.8 Auto-Tuned Rotor Resistance Out of Range (19-8)" on page 848
		9	Asynchronous motor with-load auto-tuning failure					"10.7.10.9 Asynchronous Motor With-Load Auto-Tuning Failure (19-9)" on page 848
		10	Synchronous motor magnetic pole auto-tuning failure					"10.7.10.10 Synchronous Motor Magnetic Pole Auto-Tuning Failure (19-10)" on page 848

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Continued	Continued	11	Search failure of synchronous motor magnetic pole auto-tuning current	Continued	Continued	Continued	Continued	"10.7.10.11 Search Failure of Synchronous Motor Magnetic Pole Auto-Tuning Current (19-11)" on page 849
		12	Z signal not obtained during synchronous motor auto-tuning					"10.7.10.12 Z Signal Not Obtained During Synchronous Motor Auto-Tuning (19-12)" on page 849
		13	Synchronous motor with-load auto-tuning failure					"10.7.10.13 Synchronous Motor With-Load Auto-Tuning Failure (19-13)" on page 849
		15	Auto-tuning failure					"10.7.10.14 Auto-Tuning Failure (19-15)" on page 850
		16	Auto-tuning interrupted					"10.7.10.15 Auto-Tuning Interrupted (19-16)" on page 850

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Encoder error	20	1	Encoder disconnection (hardware detection)	Coast to stop	Coast to stop	Coast to stop	Manual reset	"10.7.11.1 20-1 Encoder Disconnection (Hardware Detection)" on page 850
		2	Encoder parameter error					"10.7.11.2 Encoder Parameter Error (20-2)" on page 851
		4	Motor running with no encoder in the FVC mode					"10.7.11.3 Motor Running with no Encoder in FVC Mode (20-4)" on page 851
		5	Encoder speed test fluctuation exceeding the allowable range					"10.7.11.4 Encoder Speed Test Fluctuation Exceeding the Allowable Range (20-5)" on page 852
		6	Operation mode switchover from FVC to SVC enabled					"10.7.11.5 Operation Mode Switchover from FVC to SVC Enabled (20-6)" on page 852
		8	Z signal suffering interference					"10.7.11.6 Z Signal Suffering Interference (20-8)" on page 853
		9	Z signal loss					"10.7.11.7 Z Signal Loss (20-9)" on page 853
		10	Software version of the encoder signal detection module too early					"10.7.11.8 Software Version of Encoder Signal Detection Module Too Early (20-10)" on page 854

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Abnormal motor auto-tuning results	22	1	Encoder not connected	Coast to stop	Coast to stop	Coast to stop	Manual reset	"10.7.12.1 Encoder Not Connected (22-1)" on page 854
		2	Incorrect encoder pulses per revolution					"10.7.12.2 Incorrect Encoder Pulses Per Revolution (22-2)" on page 855
		3	Position detection error					"10.7.12.3 Position Detection Error (22-3)" on page 855
Abnormal motor auto-tuning results	22	4	Abnormal basic motor parameters	Coast to stop	Coast to stop	Coast to stop	Manual reset	"10.7.12.4 Abnormal Basic Motor Parameters (22-4)" on page 855
		5	Abnormal motor expansion parameters					"10.7.12.5 Abnormal Motor Expansion Parameters (22-5)" on page 856
		15	Encoder signal suffering interference					"10.7.12.6 Encoder Signal Suffering Interference (22-15)" on page 856
		16	Auto-tuning not performed on the asynchronous motor magnetic field saturation coefficient					"10.7.12.7 Auto-Tuning Not Performed on the Asynchronous Motor Magnetic Field Saturation Coefficient (22-16)" on page 856
PID feedback loss	31	1	PID feedback loss	Coast to stop	Alarm	Coast to stop	Manual reset	"10.7.13.1 PID Feedback Loss (31-1)" on page 856

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Fan status error 2	32	1	Fan status error	Alarm	Do not process	Coast to stop	Auto reset	"10.7.14.1 Fan Status Error (32-1)" on page 857
		2	MD880 inverter fan status error					"10.7.14.2 MD880 Inverter Fan Status Error (32-2)" on page 857
Excessive speed deviation of motor	42	1	Excessive speed deviation of motor	Alarm	Alarm	Alarm	Auto reset	"10.7.15.1 Excessive Motor Speed Deviation (42-1)" on page 858
Motor speed overlimit	43	1	Motor speed overlimit	Coast to stop	Coast to stop	Coast to stop	Manual reset	"10.7.16.1 Motor Speed Overlimit (43-1)" on page 859
Expansion module offline	44	1	Encoder detection module 1 activated but offline	Coast to stop	Alarm	Coast to stop	Manual reset	"10.7.17.1 Encoder Detection Module 1 Activated But Offline (44-1)" on page 859
		2	Encoder detection module 2 activated but offline					"10.7.17.2 Encoder Detection Module 2 Activated But Offline (44-2)" on page 860
		3	Encoder detection module 3 activated but offline					"10.7.17.3 Encoder Detection Module 3 Activated But Offline (44-3)" on page 860

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Expansion module offline	44	4	I/O module 1 activated but offline	Coast to stop	Alarm	Coast to stop	Manual reset	"10.7.17.4 I/O Module 1 Activated But Offline (44-4)" on page 860
		5	I/O module 2 activated but offline					"10.7.17.5 I/O Module 2 Activated But Offline (44-5)" on page 861
		6	I/O module 3 activated but offline					"10.7.17.6 I/O Module 3 Activated But Offline (44-6)" on page 861
		7	Fieldbus adapter A activated but offline, configured communication card offline					"10.7.17.7 Fieldbus Adapter A Activated but Offline, Configured Communication Card Offline (44-7)" on page 862
		8	Fieldbus adapter B activated but offline, configured communication card offline					"10.7.17.8 Fieldbus Adapter B Activated but Offline, Configured Communication Card Offline (44-8)" on page 862

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Continued	Continued	9	Redundant adapter activated but offline, configured communication card offline	Continued	Continued	Continued	Continued	*"10.7.17.9 Redundant Adapter Activated but Offline, Configured Communication Card Offline (44-9)" on page 863*
		10	Sync voltage detection module activated but offline					*"10.7.17.10 Sync Voltage Detection Module Activated But Offline (44-10)" on page 863*
		11	Dual-port RAM card activated but offline					*"10.7.17.11 Dual-Port RAM Card Activated But Offline (44-11)" on page 863*
		15	High-speed pulse detection module activated but offline					*"10.7.17.12 High-Speed Pulse Detection Module Activated But Offline (44-15)" on page 864*

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Expansion module slot address conflict	45	1	Slot address conflict between encoder detection module 1 and encoder detection module 2	Coast to stop	Alarm	Coast to stop	Manual reset	"10.7.18.1 Slot Address Conflict Between Encoder Detection Module 1 and Encoder Detection Module 2 (45-1)" on page 864
		2	Slot address conflict between encoder detection module 1 and encoder detection module 3					"10.7.18.2 Slot Address Conflict Between Encoder Detection Module 1 and Encoder Detection Module 3 (45-2)" on page 864
		3	Slot address conflict between encoder detection module 2 and encoder detection module 3					"10.7.18.3 Slot Address Conflict Between Encoder Detection Module 2 and Encoder Detection Module 3 (45-3)" on page 865
		4	Slot address conflict between I/O module 1 and I/O module 2					"10.7.18.4 Slot Address Conflict Between I/O Module 1 and I/O Module 2 (45-4)" on page 865
		5	Slot address conflict between I/O module 1 and I/O module 3					"10.7.18.5 Slot Address Conflict Between I/O Module 1 and I/O Module 3 (45-5)" on page 865

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Continued	Continued	6	Slot address conflict between I/O module 2 and I/O module 3	Continued	Continued	Continued	Continued	"10.7.18.6 Slot Address Conflict Between I/O Module 2 and I/O Module 3 (45-6)" on page 866
		7	Conflict between slot address ranges of fieldbus adapters A and B					"10.7.18.7 Conflict Between Slot Address Ranges of Fieldbus Adapters A and B (45-7)" on page 866
		8	Conflict between slot address ranges of fieldbus adapter A and redundant adapter					"10.7.18.8 Conflict Between Slot Address Ranges of Fieldbus Adapter A and Redundant Adapter (45-8)" on page 866
		9	Conflict between slot address ranges of fieldbus adapter B and redundant adapter					"10.7.18.9 Conflict Between Slot Address Ranges of Fieldbus Adapter B and Redundant Adapter (45-9)" on page 867
Parameter setting alarm	46	1	Incorrect parameter setting	Alarm	Do not process	Alarm	Auto reset	"10.7.19.1 Incorrect Parameter Setting (46-1)" on page 867
		3	Simulation operation mode activated					"10.7.19.2 Simulation Operation Mode Activated (46-3)" on page 877

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
STO activation fault	47	1	STO1 input activation	Coast to stop	Coast to stop	Coast to stop	Manual reset	"10.7.20.1 STO1 Input Activation (47-1)" on page 878
		2	STO2 input activation					"10.7.20.2 STO2 Input Activation (47-2)" on page 878
		4	STO power supply fault					"10.7.20.3 STO Power Supply Fault (47-4)" on page 878
		5	STO1 pulse self-test error					"10.7.20.4 STO1 Pulse Self-Test Error (47-5)" on page 879
		6	STO2 pulse self-test error					"10.7.20.5 STO2 Pulse Self-Test Error (47-6)" on page 879
		7	STO1 buffer error					"10.7.20.6 STO1 Buffer Error (47-7)" on page 879
		8	STO2 buffer error					"10.7.20.7 STO2 Buffer Error (47-8)" on page 879
		9	STO input activation					"10.7.20.8 STO Input Activation (47-9)" on page 879
Motor temperature error	48	1	Motor over-temperature	Coast to stop	Alarm	Coast to stop	Manual reset	"10.7.21.1 Motor Over-Temperature (48-1)" on page 880
SD card error	50	1	SD card not detected	Alarm	Do not process	Alarm	Auto reset	"10.7.22.1 SD Card Not Detected (50-1)" on page 880
		2	SD card error					"10.7.22.2 SD Card Error (50-2)" on page 881

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
RTC error	51	1	Insufficient power supply for the HCU-RTC unit	Alarm	Do not process	Alarm	Auto reset	"10.7.23.1 Insufficient Power Supply for the HCU-RTC Unit (51-1)" on page 881
		2	HCU-RTC read/write timeout				Power-off and restart	"10.7.23.2 HCU-RTC Read/Write Timeout (51-2)" on page 881
Local control error	52	1	IDS communication fault	Coast to stop	Coast to stop	Coast to stop	Manual reset	"10.7.24.1 IDS Communication Fault (52-1)" on page 882
		2	SOP-20 communication fault					"10.7.24.2 SOP-20 Communication Fault (52-2)" on page 882

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Drive communication error	53	1	HINT Rx CRC error	Coast to stop	Coast to stop	Coast to stop	Manual reset	"10.7.25.1 CRC Error in Data Received by HINT (53-1)" on page 883
		2	HINT authentication error					"10.7.25.2 HINT Authentication Error (53-2)" on page 883
		3	HCU Rx disconnection					"10.7.25.3 Data Receiving Failure (53-3)" on page 883
		4	HCU Rx CRC error					"10.7.25.4 CRC Error in Data Received by HCU (53-4)" on page 884
		5	HINT synchronization fault					"10.7.25.5 HINT Synchronization Fault (53-5)" on page 884
		6	PWM data write timeout					"10.7.25.6 PWM Data Write Timeout (53-6)" on page 885
		7	HINT Rx disconnection					"10.7.25.7 Data Receiving Failure of HINT (53-7)" on page 885
		8	CRC error in data received by HPCU from HCU					"10.7.25.8 CRC Error in Data Received by HPCU from HCU (53-8)" on page 886

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Drive communication error	53	9	HPCU Rx disconnection from HCU	Coast to stop	Coast to stop	Coast to stop	Manual reset	*"10.7.25.9 Data Reception Failure of HPCU from HCU (53-9)" on page 886*
		10	CRC error in data received by HPCU from HINT					*"10.7.25.10 CRC Error in Data Received by HPCU from HINT (53-10)" on page 886*
		11	HPCU Rx disconnection from HINT					*"10.7.25.11 Data Reception Failure of HPCU from HINT (53-11)" on page 887*
		12	HPCU synchronization fault					*"10.7.25.12 HPCU Synchronization Fault (53-12)" on page 887*
		13	HINT not ready					*"10.7.25.13 HINT Not Ready (53-13)" on page 887*

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
IGBT drive error	57	1	IGBT drive error	Coast to stop	Coast to stop	Coast to stop	Manual reset	"10.7.26.1 IGBT Drive Error (57-1)" on page 888
		2	U phase lower bridge fault					"10.7.26.2 U Phase Lower Bridge Fault (57-2)" on page 888
		3	V phase upper bridge fault					"10.7.26.3 V Phase Upper Bridge Fault (57-3)" on page 889
		4	V phase lower bridge fault					"10.7.26.4 V Phase Lower Bridge Fault (57-4)" on page 889
		5	W phase upper bridge fault					"10.7.26.5 W Phase Upper Bridge Fault (57-5)" on page 890
		6	W phase lower bridge fault					"10.7.26.6 W Phase Lower Bridge Fault (57-6)" on page 890
		7	IGBT module fault					"10.7.26.7 IGBT Module Fault (57-7)" on page 891
Self-test fault	58	1	Self-test fault	Coast to stop	Coast to stop	Coast to stop	Manual reset	"10.7.27.1 Self-Test Fault (58-1)" on page 891

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Self-test fault	58	2	AC drive output side short-circuited	Coast to stop	Coast to stop	Coast to stop	Manual reset	"10.7.27.2 AC Drive Output Side Short-Circuited (58-2)" on page 891
		3	AC drive output phase loss					"10.7.27.3 AC Drive Output Phase Loss (58-3)" on page 892
		4	Sensor detection error					"10.7.27.4 Sensor Detection Error (58-4)" on page 892
		5	Sensor inversely installed					"10.7.27.5 Sensor Inversely Installed (58-5)" on page 892
		6	Short circuit to ground					"10.7.27.6 Short Circuit to Ground (58-6)" on page 893
		7	Three-phase current unbalance					"10.7.27.7 Three-Phase Current Unbalance (58-7)" on page 893
		8	Two-phase current unbalance					"10.7.27.8 Two-Phase Current Unbalance (58-8)" on page 893
		16	Self-test process interrupted					"10.7.27.9 Self-Test Process Interrupted (58-16)" on page 893

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Low module temperature	59	1	U phase module low temperature	Coast to stop	Alarm	Coast to stop	Manual reset	"10.7.28.1 U Phase Module Low Temperature (59-1)" on page 894
		2	V phase module low temperature					"10.7.28.2 V Phase Module Low Temperature (59-2)" on page 894
		3	W phase module low temperature					"10.7.28.3 W Phase Module Low Temperature (59-3)" on page 895
		4	Rectifier module low temperature					"10.7.28.4 Rectifier Module Low Temperature (59-4)" on page 895
Ambient temperature error	60	1	High ambient temperature	Alarm	Alarm	Alarm	Auto reset	"10.7.29.1 High Ambient Temperature (60-1)" on page 895
Speed search failure	61	1	Excessive flying start current	Coast to stop	Coast to stop	Coast to stop	Manual reset	"10.7.30.1 Excessive Flying Start Current (61-1)" on page 896
Speed search failure	61	2	Flying start time too long	Coast to stop	Coast to stop	Coast to stop	Manual reset	"10.7.30.2 Flying Start Time Too Long (61-2)" on page 896
		5	HSVM card not connected or enabled					"10.7.30.3 HSVM Card Not Connected or Enabled (61-5)" on page 896

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
External alarm	63	1	External alarm 1	Alarm	Alarm	Alarm	Auto reset	"10.7.31.1 External Alarm 1 (63-1)" on page 897
		2	External alarm 2					"10.7.31.2 External Alarm 2 (63-2)" on page 897
		3	Motor over-temperature alarm					"10.7.31.3 Motor Over-Temperature Alarm (63-3)" on page 897
		4	OFF2/OFF3 stop					"10.7.31.4 OFF2 or OFF3 Stop (63-4)" on page 898
Pre-charge failure	64	1	Pre-charge failure	Coast to stop	Coast to stop	Coast to stop	Manual reset	"10.7.32.1 Pre-Charge Failure (64-1)" on page 898
		2	Pre-charge failure					"10.7.32.2 Pre-Charge Failure (64-2)" on page 899
Parameter processing error	65	1	Factory defaults restoration interrupted	Coast to stop	Coast to stop	Coast to stop	Manual reset	"10.7.33.1 Factory Defaults Restoration Interrupted (65-1)" on page 899
		2	Parameter downloading interrupted (restoring from the SD card)					"10.7.33.2 Parameter Downloading Interrupted (Restoring from the SD Card) (65-2)" on page 900
		3	Parameter cache capacity exceeded					"10.7.33.3 Parameter Cache Capacity Exceeded (65-3)" on page 900
		4	Parameter storage timeout during parameter download					"10.7.33.4 Parameter Storage Timeout During Parameter Download (65-4)" on page 900

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Leakage current fault	66	2	Excessive leakage current (software detection)	Coast to stop	Alarm	Coast to stop	Manual reset	*"10.7.34.1 Excessive Leakage Current (Software Detection) (66-2)" on page 901*
Communication card error of fieldbus adapter A	67	1	External bus timeout of adapter A	Coast to stop	Alarm	Coast to stop	Manual reset	*"10.7.35.1 External Bus Timeout of Adapter A (67-1)" on page 901*
		2	Incorrect communication parameter setting (address or baud rate) for adapter A					*"10.7.35.2 Incorrect Communication Parameter Setting (Address or Baud Rate) for Adapter A (67-2)" on page 902*
		3	Bus address conflict of adapter A					*"10.7.35.3 Bus Address Conflict of Adapter A (67-3)" on page 902*
		7	EtherCAT EEPROM load error of adapter A					*"10.7.35.4 EtherCAT EEPROM Load Error of Adapter A (67-7)" on page 902*
		8	Communication card initialization error of adapter A					*"10.7.35.5 Communication Card Initialization Error of Adapter A (67-8)" on page 902*

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Continued	Continued	9	EtherCAT master station switchover error of adapter A	Continued	Continued	Continued	Continued	*"10.7.35.6 EtherCAT Master Station Switchover Error of Adapter A (67-9)" on page 903*
		10	Synchronization signal error of adapter A					*"10.7.35.7 Synchronization Signal Error of Adapter A (67-10)" on page 903*
		11	PDI synchronization signal error of adapter A					*"10.7.35.8 PDI Synchronization Signal Error of Adapter A (67-11)" on page 903*
		15	Check error in data received by communication card of adapter A					*"10.7.35.9 Check Error in Data Received by Communication Card of Adapter A (67-15)" on page 903*
		16	Check error in data sent by communication card of adapter A					*"10.7.35.10 Check Error in Data Sent by Communication Card of Adapter A (67-16)" on page 904*

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Communication card error of fieldbus adapter B	68	1	External bus timeout of adapter B	Coast to stop	Alarm	Coast to stop	Manual reset	"10.7.36.1 External Bus Timeout of Adapter B (68-1)" on page 904
		2	Incorrect communication parameter setting (address or baud rate) for adapter B					"10.7.36.2 Incorrect Communication Parameter Setting (Address or Baud Rate) for Adapter B (68-2)" on page 905
		3	Bus address conflict of adapter B					"10.7.36.3 Bus Address Conflict of Adapter B (68-3)" on page 905
		7	EtherCAT EEPROM load error of adapter B					"10.7.36.4 EtherCAT EEPROM Load Error of Adapter B (68-7)" on page 906
		8	Communication card initialization error of adapter B					"10.7.36.6 EtherCAT Master Station Switchover Error of Adapter B (68-9)" on page 906

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Continued	Continued	9	EtherCAT master station switchover error of adapter B	Continued	Continued	Continued	Continued	*"10.7.36.6 EtherCAT Master Station Switchover Error of Adapter B (68-9)" on page 906*
		10	Synchronization signal error of adapter B					*"10.7.36.7 Synchronization Signal Error of Adapter B (68-10)" on page 906*
		11	PDI synchronization signal error of adapter B					*"10.7.36.8 PDI Synchronization Signal Error of Adapter B (68-11)" on page 906*
		15	Check error in data received by communication card of adapter B					*"10.7.36.9 Check Error in Data Received by Communication Card of Adapter B (68-15)" on page 907*
		16	Check error in data sent by communication card of adapter B					*"10.7.36.10 Check Error in Data Sent by Communication Card of Adapter B (68-16)" on page 907*

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Communication card error of redundant adapter	69	1	External bus timeout	Coast to stop	Alarm	Coast to stop	Manual reset	"10.7.37.1 69-1 External Bus Timeout" on page 908
		2	Incorrect communication parameter setting (address or baud rate)					"10.7.37.2 Incorrect Communication Parameter Setting (Address or Baud Rate) (69-2)" on page 908
		3	Bus address conflict					"10.7.37.3 Bus Address Conflict (69-3)" on page 909
		7	EtherCAT EEPROM load error					"10.7.37.4 EtherCAT EEPROM Load Error (69-7)" on page 909
Continued	Continued	8	Communication card initialization error	Continued	Continued	Continued	Continued	"10.7.37.5 Communication Card Initialization Error (69-8)" on page 909
		9	EtherCAT master station switchover error					"10.7.37.6 EtherCAT Master Station Switchover Error (69-9)" on page 909
		15	Check error in data received by communication card					"10.7.37.7 Check Error in Data Received by Communication Card (69-15)" on page 909
		16	Check error in data sent by communication card					"10.7.37.8 Check Error in Data Sent by Communication Card (69-16)" on page 910

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Inverter fan error	70	1	HE inverter fan phase sequence error	Coast to stop	Alarm	Coast to stop	Manual reset	"10.7.38.1 HE Inverter Fan Phase Sequence Error (70-1)" on page 910
		2	HE inverter fan over-temperature					"10.7.38.2 HE Inverter Fan Over-Temperature (70-2)" on page 910
Rectifier self-test fault	71	1	Rectifier braking self-test fault	Coast to stop	Alarm	Coast to stop	Manual reset	"10.7.39.1 Rectifier Braking Self-Test Fault (71-1)" on page 911
Pre-charge error	72	1	Pre-charge timeout	Coast to stop	Coast to stop	Coast to stop	Manual reset	"10.7.40.1 Pre-Charge Timeout (72-1)" on page 911
Pre-charge error	72	2	Basic rectifier pre-charge timeout	Coast to stop	Coast to stop	Coast to stop	Manual reset	"10.7.40.2 Basic Rectifier Pre-Charge Timeout (72-2)" on page 911
		4	Rectifier not started					"10.7.40.3 Rectifier Unit Not Started (72-4)" on page 912

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Pre-charge hardware error	73	1	Main circuit breaker feedback error	Coast to stop	Coast to stop	Coast to stop	Manual reset	*"10.7.41.1 Main Circuit Breaker Feedback Error (73-1)" on page 912*
		2	Power board undervoltage (HE200-D2)					*"10.7.41.2 Power Board Under-voltage (HE200-D2) (73-2)" on page 912*
		3	Pre-charge contactor feedback error (single drive)					*"10.7.41.3 Pre-Charge Contactor Feedback Error (Single Drive) (73-3)" on page 912*
		4	Rectifier bridge error (single-drive)					*"10.7.41.4 Rectifier Bridge Error (Single-Drive) (73-4)" on page 913*

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Rectifier braking unit error	74	1	Braking transistor overcurrent	Coast to stop	Alarm	Coast to stop	Manual reset	"10.7.42.1 Braking Transistor Over-current (74-1)" on page 913
		2	High braking transistor temperature					"10.7.42.2 High Braking Transis-tor Tempera-ture (74-2)" on page 913
		3	Braking IGBT-VCE fault					"10.7.42.3 Braking IGBT-Vce Fault (74-3)" on page 914
		4	Braking IGBT short circuit					"10.7.42.4 Braking IGBT Short Cir-cuit (74-4)" on page 914
		5	Braking transistor temperature too low or not connected to the NTC					"10.7.42.5 Braking Transistor Tem-perature Too Low or Not Con-nected to the NTC (74-5)" on page 914
Rectifier fan error	75	1	Rectifier fan fault	Alarm	Alarm	Alarm	Auto reset	"10.7.43.1 Rectifier Fan Fault (75-1)" on page 915
Rectifier module tempera ture error	76	1	Module 1 over-temperature	Coast to stop	Coast to stop	Coast to stop	Manual reset	"10.7.44.1 Module 1 Over-Temper-ature (76-1)" on page 915

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Rectifier module temperature error	76	2	Module 2 over-temperature	Coast to stop	Coast to stop	Coast to stop	Manual reset	"10.7.44.2 Module 2 Over-Temperature (76-2)" on page 916
		3	Module 3 over-temperature					"10.7.44.3 Module 3 Over-Temperature (76-3)" on page 916
		4	Module 1 temperature too low or not connected to the NTC					"10.7.44.4 Module 1 Temperature Too Low or Not Connected to the NTC (76-4)" on page 917
		5	Module 2 temperature too low or not connected to the NTC					"10.7.44.5 Module 2 Temperature Too Low or Not Connected to the NTC (76-5)" on page 917
		6	Module 3 temperature too low or not connected to the NTC					"10.7.44.6 Module 3 Temperature Too Low or Not Connected to the NTC (76-6)" on page 918
Reactor temperature error	77	1	Reactor over-temperature	Coast to stop	Alarm	Coast to stop	Manual reset	"10.7.45.1 Reactor Over-temperature (77-1)" on page 918
		4	Reactor over-temperature in the AC drive cabinet					"10.7.45.2 Reactor Over-Temperature in the AC Drive Cabinet (77-4)" on page 918

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Temperature error in the rectifier cabinet	78	1	High temperature	Alarm	Alarm	Alarm	Auto reset	"10.7.46.1 High Temperature (78-1)" on page 919
		2	Low temperature or NTC not connected					"10.7.46.2 Low Temperature or NTC Not Connected (78-2)" on page 919
DC voltage error	79	2	High voltage	Coast to stop	Coast to stop	Coast to stop	Manual reset	"10.7.47.1 High Voltage (79-2)" on page 920
		3	Low voltage					"10.7.47.2 Low Voltage (79-3)" on page 920
Rectifier error	80	1	HE200-1# rectifier disconnection	Coast to stop	Coast to stop	Coast to stop	Manual reset	"10.7.48.1 HE200-1# Rectifier Unit Disconnected (80-1)" on page 921
		2	HE200-2# rectifier disconnection					"10.7.48.2 HE200-2# Rectifier Unit Disconnected (80-2)" on page 921
Rectifier error	80	3	Conflict of expansion card settings of the HE200 rectifier	Coast to stop	Coast to stop	Coast to stop	Manual reset	"10.7.48.3 Conflict of Expansion Card Settings of the HE200 Rectifier (80-3)" on page 922

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Grid error	81	1	High grid voltage	Coast to stop	Coast to stop	Coast to stop	Manual reset	"10.7.49.1 High Grid Voltage (81-1)" on page 922
		2	Low grid voltage					"10.7.49.2 Low Grid Voltage (81-2)" on page 922
		7	R phase loss					"10.7.49.3 R Phase Loss (81-7)" on page 923
		8	S phase loss					"10.7.49.4 S Phase Loss (81-8)" on page 923
		9	T phase loss					"10.7.49.5 T Phase Loss (81-9)" on page 923
DC pre-charge error	82	1	DC pre-charge error	Coast to stop	Coast to stop	Coast to stop	Manual reset	"10.7.50.1 DC Pre-Charge Error (82-1)" on page 924
Master-slave communication fault	83	1	InoLink: address conflict	Coast to stop	Alarm	Coast to stop	Manual reset	"10.7.51.1 InoLink: Address Conflict (83-1)" on page 924
		2	InoLink: communication offline					"10.7.51.2 InoLink: Communication Offline (83-2)" on page 924
		3	InoLink: receiver offline					"10.7.51.3 InoLink: Receiver Offline (83-3)" on page 925
		5	Optical fiber synchronization expansion module: node address conflict					"10.7.51.4 Optical Fiber Synchro-nization Expan-sion Module: Node Address Conflict (83-5)" on page 925

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Master-slave communication fault	83	6	Optical fiber synchronization expansion module: data interrupt for node A that receives the data	Coast to stop	Alarm	Coast to stop	Manual reset	"10.7.51.5 Optical Fiber Synchronization Expansion Module: Data Interrupt for Node A That Receives the Data (83-6)" on page 925
		7	Optical fiber synchronization expansion module: data interrupt for node B that receives the data					"10.7.51.6 Optical Fiber Synchronization Expansion Module: Data Interrupt for Node B That Receives the Data (83-7)" on page 926
		8	Optical fiber synchronization expansion module: data interrupt for node C that receives the data					"10.7.51.7 Optical Fiber Synchronization Expansion Module: Data Interrupt for Node C That Receives the Data (83-8)" on page 926
		9	Optical fiber synchronization expansion module: module offline					"10.7.51.8 Optical Fiber Synchronization Expansion Module: Module Offline (83-9)" on page 926
		10	Optical fiber synchronization expansion module: data receiving error					"10.7.51.9 Optical Fiber Synchronization Expansion Module: Data Receiving Error (83-10)" on page 927

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Brake control error	84	1	Brake opening failed	Coast to stop	Alarm	Coast to stop	Manual reset	"10.7.52.1 Brake Opening Failed (84-1)" on page 927
		2	Brake closing failed					"10.7.52.2 Brake Closing Failed (84-2)" on page 927
		3	Brake verification failure					"10.7.52.3 Brake Verification Failure (84-3)" on page 928
		4	Brake verification failure					"10.7.52.4 Brake Verification Failure (84-4)" on page 928
Internal fault	85	1	Internal data exchange error	Coast to stop	Coast to stop	Coast to stop	Manual reset	"10.7.53.1 Internal Data Exchange Error (85-1)" on page 928
		3	State machine out of range					"10.7.53.2 State Machine Out of Range (85-3)" on page 929
		4	Abnormal interrupt generated					"10.7.53.3 Abnormal Interrupt Generated (85-4)" on page 929
		5	HCU internal data synchronization error					"10.7.53.4 HCU Internal Data Synchronization Error (85-5)" on page 929

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Model parameter error	88	1	Model code not existing	Coast to stop	Coast to stop	Coast to stop	Manual reset	"10.7.54.1 Model Code Not Existing (88-1)" on page 929
		2	Model parameter/Software undervoltage threshold changed					"10.7.54.2 Model Parameter/Software Undervoltage Threshold Changed (88-2)" on page 930
		3	Model parameter mismatch					"10.7.54.3 Model Parameter/Software Undervoltage Threshold Mismatch (88-3)" on page 930
		4	Model code mismatch					"10.7.54.4 Model Code Mismatch (88-4)" on page 930
		6	Mismatch between the model and software					"10.7.54.5 Mismatch Between the Model and Software (88-6)" on page 931

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Continued	Continued	7	Model code not recognized/Software undervoltage threshold overlimit	Continued	Continued	Continued	Continued	*"10.7.54.6 Model Code Not Recognized/Software Undervoltage Threshold Overlimit (88-7)" on page 931*
		8	Set model code not recognized					*"10.7.54.7 Set Model Code Not Recognized (88-8)" on page 931*
		9	Correction coefficient out-of-range					*"10.7.54.8 Correction Coefficient Out-of-Range (88-9)" on page 932*
		11	Different software undervoltage thresholds					*"10.7.54.9 Different Software Undervoltage Thresholds (88-11)" on page 932*
		16	Mismatch between the model setting and the parameter					*"10.7.54.10 Mismatch Between Model Setting and Function Parameter (88-16)" on page 933*
HCU 24 V power supply error	89	1	Low 24 V power supply	Alarm/Fault	Alarm/Fault	Alarm/Fault	Auto reset/ Manual result	*"10.7.55.1 Low 24 V Power Supply Voltage (89-1)" on page 933*
Parallel mode error	91	1	Mode setting conflict	Coast to stop	Alarm	Coast to stop	Manual reset	*"10.7.56.1 Mode Setting Conflict (91-1)" on page 934*
Parallel mode error	91	2	Mismatch between enabled modules and online modules	Coast to stop	Alarm	Coast to stop	Manual reset	*"10.7.56.2 Mismatch Between Enabled Modules and Online Modules (91-2)" on page 934*
		4	HPCU offline					*"10.7.56.3 HPCU Offline (91-4)" on page 934*

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Parallel module fault	92	2	Parallel module U phase loss	Coast to stop	Coast to stop	Coast to stop	Manual reset	"10.7.57.1 Parallel Module U Phase Loss (92-2)" on page 935
		3	Parallel module V phase loss					"10.7.57.2 Parallel Module V Phase Loss (92-3)" on page 935
		4	Parallel module W phase loss					"10.7.57.3 Parallel Module W Phase Loss (92-4)" on page 936
		5	Parallel module bus voltage detection error					"10.7.57.4 Parallel Module Bus Voltage Detection Error (92-5)" on page 936
Motor control fault	93	1	Motor locked-rotor	Coast to stop	Alarm	Coast to stop	Manual reset	"10.7.58.1 Motor Locked-Rotor (93-1)" on page 937
		2	Motor stall					"10.7.58.2 Motor Stall (93-2)" on page 937
		3	Current control error					"10.7.58.3 Current Control Error (93-3)" on page 938
		4	Two-phase or three-phase loss					"10.7.58.4 Two-Phase or Three-Phase Loss (93-4)" on page 938
		5	SVC speed open loop locked-rotor					"10.7.58.5 SVC Speed Open Loop Locked-Rotor (93-5)" on page 939
		6	SVC control error					"10.7.58.6 SVC Control Error (93-6)" on page 939

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Parallel module current unbalance alarm	99	1	Parallel module U phase current unbalance	Alarm	Alarm	Alarm	Auto reset	*"10.7.59.1 Parallel Module U Phase Current Unbalance (99-1)" on page 940*
		2	Parallel module V phase current unbalance					*"10.7.59.2 Parallel Module V Phase Current Unbalance (99-2)" on page 940*
		3	Parallel module W phase current unbalance					*"10.7.59.3 Parallel Module W Phase Current Unbalance (99-3)" on page 941*
Fault information	100	1	Fault information causing errors	Coast to stop	Coast to stop	Coast to stop	Manual reset	*"10.7.60.1 Generation of Abnormal Fault Information (100-1)" on page 941*
		2	Subcode error					*"10.7.60.2 Subcode Error (100-2)" on page 941*
		3	Code error					*"10.7.60.3 Code Error (100-3)" on page 941*
		4	Interactive data error					*"10.7.60.4 Exchange Data Error (100-4)" on page 942*

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
HINT error	101	1	Mismatch between HINT type and the HCU	Coast to stop	Coast to stop	Coast to stop	Manual reset	"10.7.61.1 Mismatch Between HINT Type and the HCU (101-1)" on page 942
		2	Mismatch of HINT software versions					"10.7.61.2 Mismatch of HINT Software Versions (101-2)" on page 942
		3	STO function mismatch					"10.7.61.3 STO Function Mismatch (101-3)" on page 943
		4	Mismatch between the HINT (where the synchronous motor magnetic pole auto-tuning is unavailable) and the setting					"10.7.61.4 Mismatch Between the HINT (Where the Synchronous Motor Magnetic Pole Auto-Tuning is Unavailable) and the Setting (101-4)" on page 943
HINT alarm	102	1	HINT model parameter check not completed	Alarm	Alarm	Alarm	Auto reset	"10.7.62.1 HINT Model Parameter Check Not Completed (102-1)" on page 943
		2	Mismatch between HINT current sampling and the setting					"10.7.62.2 Mismatch Between HINT Current Sampling and the Setting (102-2)" on page 944
Input phase loss	114	1	Input phase loss	Coast to stop	Alarm	Coast to stop	Manual reset	"10.7.63.1 Input Phase Loss (114-1)" on page 944

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
AC drive pre-overload	117	1	AC drive pre-overload	Alarm	Alarm	Alarm	Auto reset	*"10.7.64.1 AC Drive Pre-Overload (117-1)" on page 945*
STO activation alarm	147	3	STO1 and STO2 input activated	Alarm	Alarm	Alarm	Auto reset/ Manual reset	*"10.7.65.1 STO1 and STO2 Input Activated (147-3)" on page 945*
Motor tempera ture error	148	1	Motor over-temperature warning	Coast to stop	Do not process	Coast to stop	Manual reset	*"10.7.66.1 Motor Over-Tempera-ture Alarm (148-2)" on page 946*

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Bus adapter communication error	156	1	Communication error between fieldbus adapter A and the host controller	Alarm	Alarm	Alarm	Auto reset	"10.7.67.1 Communication Error Between Fieldbus Adapter A and the Host Controller (156-1)" on page 946
		2	Communication error between fieldbus adapter B and the host controller					"10.7.67.2 Communication Error Between Fieldbus Adapter B and the Host Controller (156-2)" on page 947
		3	Communication error between the redundant fieldbus adapter and the host controller					"10.7.67.3 Communication Error Between the Redundant Fieldbus Adapter and the Host Controller (156-3)" on page 948
		4	Fieldbus adapter A data check error					"10.7.67.4 Fieldbus Adapter A Data Check Error (156-4)" on page 948
		5	Fieldbus adapter B data check error					"10.7.67.5 Fieldbus Adapter B Data Check Error (156-5)" on page 948
		6	Redundant fieldbus adapter B data check error					"10.7.67.6 Redundant Fieldbus Adapter Data Check Error (156-6)" on page 949

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Self-test fault	158	1	VI self-test: IGBT U phase lower bridge short circuited	Coast to stop	Coast to stop	Coast to stop	Manual reset	"10.7.68.1 VI Self-Test: IGBT U Phase Lower Bridge Short Circuited (158-1)" on page 949
		2	VI self-test: IGBT U phase upper bridge short circuited					"10.7.68.2 VI Self-Test: IGBT U Phase Upper Bridge Short Circuited (158-2)" on page 949
		3	VI self-test: IGBT V phase lower bridge short circuited					"10.7.68.3 VI Self-Test: IGBT V Phase Upper Bridge Short Circuited (158-3)" on page 950
		4	VI self-test: IGBT V phase upper bridge short circuited					"10.7.68.4 VI Self-Test: IGBT V Phase Upper Bridge Short Circuited (158-4)" on page 950
		5	VI self-test: IGBT W phase lower bridge short circuited					"10.7.68.5 VI Self-Test: IGBT W Phase Lower Bridge Short Circuited (158-5)" on page 950
		6	VI self-test: IGBT W phase upper bridge short circuited					"10.7.68.6 VI Self-Test: IGBT W Phase Upper Bridge Short Circuited (158-6)" on page 951
		7	Output short circuited to ground					"10.7.68.7 Output Short Circuited to Ground (158-7)" on page 951

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Continued	Continued	8	Bridge arm self-test: IGBT U+V-W- short circuited during pulse output	Continued	Continued	Continued	Continued	*"10.7.68.8 Bridge Arm Self-Test: IGBT U+V-W- Short Circuited During Pulse Output (158-8)" on page 951*
		9	Bridge arm self-test: IGBT U-V+W+ short circuited during pulse output					*"10.7.68.9 Bridge Arm Self-Test: IGBT U-V+W+ Short Circuited During Pulse Output (158-9)" on page 952*
		10	Bridge arm self-test: IGBT V+U-W- short circuited during pulse output					*"10.7.68.10 Bridge Arm Self-Test: IGBT V+U-W- Short Circuited During Pulse Output (158-10)" on page 952*

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Continued	Continued	11	Bridge arm self-test: IGBT V-U+W+ short circuited during pulse output	Continued	Continued	Continued	Continued	*"10.7.68.11 Bridge Arm Self-Test: IGBT V-U+W+ Short Circuited During Pulse Output (158-11)" on page 952*
		12	Bridge arm self-test: IGBT W+U-V- short circuited during pulse output					*"10.7.68.12 Bridge Arm Self-Test: IGBT W+U-V- Short Circuited During Pulse Output (158-12)" on page 952*
		13	Bridge arm self-test: IGBT W-U+V+ short circuited during pulse output					*"10.7.68.13 Bridge Arm Self-Test: IGBT W-U+V+ Short Circuited During Pulse Output (158-13)" on page 953*
Self-test fault	158	14	System output phase U loss	Coast to stop	Coast to stop	Coast to stop	Manual reset	*"10.7.68.14 System Output U Phase Loss (158-14)" on page 953*
		15	System output phase V loss					*"10.7.68.15 System Output V Phase Loss (158-15)" on page 953*
		16	System output phase W loss					*"10.7.68.16 System Output W Phase Loss (158-16)" on page 954*

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Self-test fault	159	1	Abnormal measured value of the module U phase current sensor	Coast to stop	Coast to stop	Coast to stop	Manual reset	"10.7.69.1 Abnormal Measured Value of the Module U Phase Current Sensor (159-1)" on page 954
		2	Abnormal measured value of the module V phase current sensor					"10.7.69.2 Abnormal Measured Value of the Module V Phase Current Sensor (159-2)" on page 954
		3	Abnormal measured value of the module W phase current sensor					"10.7.69.3 Abnormal Measured Value of the Module W Phase Current Sensor (159-3)" on page 955
		4	Module U phase current sensor inversely installed					"10.7.69.4 Module U Phase Current Sensor Inversely Installed (159-4)" on page 955

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Continued	Continued	5	Module V phase current sensor inversely installed	Continued	Continued	Continued	Continued	"10.7.69.5 Module V Phase Current Sensor Inversely Installed (159-5)" on page 955
		6	Module W phase current sensor inversely installed					"10.7.69.6 Module W Phase Current Sensor Inversely Installed (159-6)" on page 956
		7	Module U phase output phase loss or lower bridge IGBT open circuit					"10.7.69.7 Module U Phase Output Phase Loss or Lower Bridge IGBT Open-Circuited (159-7)" on page 956

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Self-test fault	159	8	Module V phase output phase loss or lower bridge IGBT open circuit	Coast to stop	Coast to stop	Coast to stop	Manual reset	"10.7.69.8 Module V Phase Output Phase Loss or Lower Bridge IGBT Open-Circuited (159-8)" on page 956
		9	Module W phase output phase loss or lower bridge IGBT open circuit					"10.7.69.9 Module W Phase Output Phase Loss or Lower Bridge IGBT Open-Circuited (159-9)" on page 956
		10	Module UV phase sensor incorrectly inserted					"10.7.69.10 Module UV Phase Sensor Incorrectly Inserted (159-10)" on page 957
		11	Module UW phase sensor incorrectly inserted					"10.7.69.11 Module UW Phase Sensor Incorrectly Inserted (159-11)" on page 957
		12	Module VW phase sensor incorrectly inserted					"10.7.69.12 Module VW Phase Sensor Incorrectly Inserted (159-12)" on page 957

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Continued	Continued	13	Module U phase output phase loss or upper bridge IGBT open circuit	Continued	Continued	Continued	Continued	"10.7.69.13 Module U Phase Output Phase Loss or Upper Bridge IGBT Open-Circuited (159-13)" on page 957
		14	Module V phase output phase loss or upper bridge IGBT open circuit					"10.7.69.14 Module V Phase Output Phase Loss or Upper Bridge IGBT Open-Circuited (159-14)" on page 958
		15	Module W phase output phase loss or upper bridge IGBT open circuit					"10.7.69.15 Module W Phase Output Phase Loss or Upper Bridge IGBT Open-Circuited (159-15)" on page 958
		16	Self-test process interrupted					"10.7.69.16 Self-Test Process Interrupted (159-16)" on page 958

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Self-test fault	160	1	Three-phase current unbalance	Coast to stop	Coast to stop	Coast to stop	Manual reset	"10.7.70.1 Three-Phase Current Unbalance (160-1)" on page 959
		2	VW two-phase sampling deviation too large					"10.7.70.2 VW Two-Phase Sampling Deviation Too Large (160-2)" on page 959
		3	UW two-phase sampling deviation too large					"10.7.70.3 UW Two-Phase Sampling Deviation Too Large (160-3)" on page 959
		4	UV two-phase sampling deviation too large					"10.7.70.4 UW Two-Phase Sampling Deviation Too Large (160-3)" on page 960
		5	Module U phase current unbalance					"10.7.70.5 Module U Phase Current Unbalance (160-5)" on page 960
		6	Module V phase current unbalance					"10.7.70.6 Module V Phase Current Unbalance (160-6)" on page 960

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Continued	Continued	7	Module W phase current unbalance	Continued	Continued	Continued	Continued	*"10.7.70.7 Module W Phase Current Unbalance (160-7)" on page 961*
		8	U phase upper bridge or V phase lower bridge IGBT energization failure					*"10.7.70.8 U Phase Upper Bridge or V Phase Lower Bridge IGBT Energization Failure (160-8)" on page 961*
		9	U phase lower bridge or V phase upper bridge IGBT energization failure					*"10.7.70.9 U Phase Lower Bridge or V Phase Upper Bridge IGBT Energization Failure (160-9)" on page 961*
		10	V phase upper bridge or W phase lower bridge IGBT energization failure					*"10.7.70.10 V Phase Upper Bridge or W Phase Lower Bridge IGBT Energization Failure (160-10)" on page 962*
		11	V phase lower bridge or W phase upper bridge IGBT energization failure					*"10.7.70.11 V Phase Lower Bridge or W Phase Upper Bridge IGBT Energization Failure (160-11)" on page 962*
		12	W phase upper bridge or U phase lower bridge IGBT energization failure					*"10.7.70.12 W Phase Upper Bridge or U Phase Lower Bridge IGBT Energization Failure (160-12)" on page 962*

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Continued	Continued	13	W phase lower bridge or U phase lower bridge IGBT energization failure	Continued	Continued	Continued	Continued	*"10.7.70.13 W Phase Lower Bridge or U Phase Upper Bridge IGBT Energization Failure (160-13)" on page 962*
		14	Self-test overcurrent					*"10.7.70.14 Self-Test Overcurrent (160-14)" on page 962*
I/O expansion module wiring error	170	1	<I/O expansion module 1> DIO output cable short circuited	Alarm	Alarm	Coast to stop	Auto reset	*"10.7.71.1 (I/O Expansion Module 1) DIO Output Cable Short-Circuited (170-1)" on page 963*
		2	<I/O expansion module 2> DIO output cable short circuited					*"10.7.71.2 (I/O Expansion Module 2) DIO Output Cable Short-Circuited (170-2)" on page 963*
		3	<I/O expansion module 3> DIO output cable short circuited					*"10.7.71.3 (I/O Expansion Module 3) DIO Output Cable Short-Circuited (170-3)" on page 963*
		4	<I/O expansion module 1> AI input disconnected					*"10.7.71.4 (I/O Expansion Module 1) AI Input Disconnected (170-4)" on page 964*
		5	<I/O expansion module 2> AI input disconnected					*"10.7.71.5 (I/O Expansion Module 2) AI Input Disconnected (170-5)" on page 964*

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
I/O expansion module wiring error	170	6	<I/O expansion module 3> AI input disconnected	Alarm	Alarm	Coast to stop	Auto reset	*"10.7.71.6 (I/O Expansion Module 3) AI Input Disconnected (170-6)" on page 965*
		7	<I/O expansion module 1> EEPROM operation error					*"10.7.71.7 (I/O Expansion Module 1) EEPROM Operation Error (170-7)" on page 965*
		8	<I/O expansion module 2> EEPROM operation error					*"10.7.71.8 (I/O Expansion Module 2) EEPROM Operation Error (170-8)" on page 966*
I/O expansion module wiring error	170	9	<I/O expansion module 3> EEPROM operation error	Alarm	Alarm	Coast to stop	Auto reset	*"10.7.71.9 (I/O Expansion Module 3) EEPROM Operation Error (170-9)" on page 966*
		10	<I/O expansion module 1> Correction coefficient error					*"10.7.71.10 (I/O Expansion Module 1) Correction Coefficient Error (170-10)" on page 966*
		11	<I/O expansion module 2> Correction coefficient error					*"10.7.71.11 (I/O Expansion Module 1) Correction Coefficient Error (170-10)" on page 967*
		12	<I/O expansion module 3> Correction coefficient error					*"10.7.71.12 (I/O Expansion Module 3) Correction Coefficient Error (170-12)" on page 967*

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Module pre-overtemperature	172	1	U phase module pre-overtemperature	Alarm	Alarm	Alarm	Auto reset	"10.7.72.1 172-1 U Phase Module Pre-Overtemperature" on page 967
		2	V phase module pre-overtemperature					"10.7.72.2 172-2 V Phase Module Pre-Overtemperature" on page 968
		3	W phase module pre-overtemperature					"10.7.72.3 172-3 W Phase Module Pre-Overtemperature" on page 968
		7	Control cavity temperature error					"10.7.72.4 172-7 Control Cavity Temperature Error" on page 969
Sync voltage detection module error	173	7	HSVM version incompatible	Coast to stop	Alarm	Coast to stop	Manual reset	"10.7.73.1 173-7 HSVM Version Incompatible" on page 969
Sampling detection error	174	13	HSVM phase sequence error	Coast to stop	Coast to stop	Coast to stop	Manual reset	"10.7.74.1 174-13 HSVM Phase Sequence Error" on page 969
		14	HSVM sampling module disconnected or not connected					"10.7.74.2 174-14 HSVM Sampling Module Disconnected or Not Connected" on page 970

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Master-slave communication error alarm	183	4	InoLink communication: data receiving node address being the local address	Alarm	Alarm	Alarm	Auto reset	*"10.7.75.1 InoLink Communication: Data Receiving Node Address Being the Local Address (183-4)" on page 970*
		5	Optical fiber synchronization communication module: node address conflict					*"10.7.75.2 Optical Fiber Synchronization Communication Module: Node Address Conflict (183-5)" on page 970*
		6	Optical fiber synchronization communication module: node A that receives the data not enabled					*"10.7.75.3 Optical Fiber Synchronization Communication Module: Node A That Receives the Data Not Enabled (183-6)" on page 971*
		7	Optical fiber synchronization communication module: node B that receives the data not enabled					*"10.7.75.4 Optical Fiber Synchronization Communication Module: Node B That Receives the Data Not Enabled (183-7)" on page 971*
		8	Optical fiber synchronization communication module: node C that receives the data not enabled					*"10.7.75.5 Optical Fiber Synchronization Communication Module: Node C That Receives the Data Not Enabled (183-8)" on page 971*

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Master-slave communication error alarm	183	9	Optical fiber synchronization communication module: local node address not set	Alarm	Alarm	Alarm	Auto reset	"10.7.75.6 Optical Fiber Synchronization Communication Module: Local Node Address Not Set (183-9)" on page 972
		10	Optical fiber synchronization communication module: data receiving node address being the local address					"10.7.75.7 Optical Fiber Synchronization Communication Module: Data Receiving Node Address Being the Local Address (183-10)" on page 972
		11	Optical fiber synchronization communication module not activated					"10.7.75.8 Optical Fiber Synchronization Communication Module Not Activated (183-11)" on page 972
		12	Optical fiber synchronization communication module: node A that receives the data not on the network					"10.7.75.10 Optical Fiber Synchronization Communication Module: Node B That Receives the Data Not on the Network (183-13)" on page 973

Fault Name	Fault Code	Sub code	Subcode Name	Default Fault Level	Lowest Fault Level	Highest Fault Level	Reset Method	Page
Master-slave communication error alarm	183	13	Optical fiber synchronization communication module: node B that receives the data not on the network	Alarm	Alarm	Alarm	Auto reset	"10.7.75.10 Optical Fiber Synchronization Communication Module: Node B That Receives the Data Not on the Network (183-13)" on page 973
		14	Optical fiber synchronization communication module: node C that receives the data not on the network					"10.7.75.11 Optical Fiber Synchronization Communication Module: Node C That Receives the Data Not on the Network (183-14)" on page 973
Load monitoring error	190	1	Load monitoring overload	Coast to stop	Coast to stop	Coast to stop	Manual reset	"10.7.76.1 Load Monitoring Overload (190-1)" on page 974
		2	Load monitoring underload					"10.7.76.2 Load Monitoring Underload (190-2)" on page 974
Load monitoring error alarm	191	1	Load monitoring overload	Alarm	Alarm	Alarm	Auto reset	"10.7.77.1 Load Monitoring Overload (191-1)" on page 974
		2	Load monitoring underload					"10.7.77.2 Load Monitoring Underload (191-2)" on page 975

10.7 Description of Faults

10.7.1 Hardware Faults (1)

10.7.1.1 Current Detection Circuit Error (1-1)

Default fault level: Coast to stop	Reset method: Power-off and restart
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

After the main power supply is turned on, the detected current zero drift is too large.

Fault diagnosis:

Possible Cause	Solution
The zero drift of three-phase output current is too large. Check whether the three-phase output current [U6-85]/[U6-86]/[U6-87] is not zero.	1. Check whether the three-phase output Hall sensor is normal. 2. Replace the power module.
The Hall sensor is disconnected. Check whether the three-phase output current [U6-85]/[U6-86]/[U6-87] is further greater than 0 upon stop.	1. Check the wiring of the three-phase output Hall sensor. 2. Replace the power module.
In parallel mode, the zero drift of one or more modules is too large.	Enable only one unit in A15-02 and A15-03 at a time to locate which specific unit module is faulty.
Other causes	Ask for technical support.

10.7.1.2 15 V Power Supply Error (1-2)

Default fault level: Coast to stop	Reset method: Power-off and restart
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

The 1-2 fault is reported when the voltage of the 15 V power supply detected by the HCU control system is below 10 V.

Remarks:

When the 24 V output power supply is short-circuited, the fault indicator flashes. Check whether the 24 V (J11 on HCU) output power supply is short-circuited.

Fault diagnosis:

Possible Cause	Solution
The 24 V power supply of the HCU control power is abnormal.	Check whether the HCU control power is within 24 V ±10%.
The 24 V output power supply is short-circuited.	Check whether the 24 V (J11 on HCU) output power supply is short-circuited.
The 15 V output power supply of SOP-20 is short-circuited.	Replace the cable or SOP-20
Other causes	Ask for technical support.

10.7.1.3 EEPROM Error (1-3)

Default fault level: Coast to stop
Reset method: Power-off and restart
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The EEPROM chip is damaged.	1. Replace the control board. 2. Ask for technical support.
Periphery circuits of EEPROM are abnormal.	1. Replace the control board. 2. Ask for technical support.

10.7.1.4 Failed to Download the Model Several Times (1-4)

Default fault level: Coast to stop
Reset method: Power-off and restart
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
An HINT error occurs.	Replace the HINT board.
The interference is too much.	Eliminate the interference source.
Other causes	Ask for technical support.

10.7.1.5 HCU-FPGA Software Upgrade Failure (1-5)

Default fault level: Coast to stop
Reset method: Power-off and restart
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
FPGA on HCU has no software.	1. Check the FPGA software version on HCU through the parameter A2-06.
Other	1. Replace the control board. 2. Ask for technical support.

10.7.1.6 HINT-FPGA Software Upgrade Failure (1-6)

Default fault level: Coast to stop
Reset method: Power-off and restart
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
FPGA on HINT has no software.	1. Check the FPGA software version on HINT through the parameter A2-07.
Other	1. Replace the HINT board. 2. Ask for technical support.

10.7.1.7 EEPROM Parameter Reading Timeout (1-8)

Default fault level: Coast to stop
Reset method: Power-off and restart
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The EEPROM chip is damaged.	1. Replace the control board. 2. Ask for technical support.
Periphery circuits of EEPROM are abnormal.	1. Replace the control board. 2. Ask for technical support.

10.7.1.8 EEPROM Parameter Storage Timeout (1-9)

Default fault level: Coast to stop
Reset method: Power-off and restart
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The EEPROM chip is damaged.	1. Replace the control board. 2. Ask for technical support.
Periphery circuits of EEPROM are abnormal.	1. Replace the control board. 2. Ask for technical support.

10.7.2 Overcurrent (2)

10.7.2.1 Hardware Overcurrent (2-1)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

An overcurrent signal triggered by the hardware is detected. The transient current of a phase exceeds the hardware overcurrent threshold.

Fault diagnosis:

Possible Cause	Solution
The acceleration/deceleration time is set to a too small value.	Set appropriate acceleration/deceleration time.
The drive power rating is insufficient.	Select a drive with appropriate power rating.
The drive output circuit is grounded or short-circuited.	1. Check whether the output cable and motor are grounded 2. Check the motor cable for inter-phase short circuit. 3. If the motor cable is not in good contact, tighten the wiring screws.

Possible Cause	Solution
The control mode is SVC or FVC, and the motor is started without parameter auto-tuning.	Set motor parameters correctly according to the motor nameplate, and run the motor after auto-tuning of motor parameters is completed.
Under the condition of rapid acceleration or deceleration, the acceleration and deceleration time is too short.	Set appropriate acceleration/deceleration time.
The customized torque boost is not appropriate. The V/f curve is not appropriate.	1. Set appropriate torque boost parameters. 2. Set an appropriate V/f curve.
The motor is started when it is rotating.	E1-00 (start mode) is set as flying start (flying start requires auto-tuning) or starting after motor stops.
The encoder feedback signal is abnormal in FVC mode.	Check whether the encoder feedback signal is normal.
The motor cable is too long.	Add an output reactor.
The DC bus voltage is low.	Adjust the DC bus voltage to the normal range.
Motor parameters are set incorrectly.	Set the motor parameters correctly.
The Hall circuit is abnormal.	1. Check the Hall wiring. 2. Check the Hall power supply. 3. Check the Hall sensor.
The periphery circuits are abnormal.	Check the fault history. If the current value upon the fault is below the overcurrent threshold, check for interference sources.
The current sampling DIP is incorrect after the power board is replaced.	1. See the DIP before the power board is replaced. 2. Ask for technical support.
Other causes: 1. The output is connected to capacitive load. 2. The output is connected to an AC drive or a filter.	Ask for technical support.

10.7.2.2 Software Overcurrent (2-2)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

The maximum of the U\V\W phase currents exceeds the overcurrent threshold set in A4-20.

Fault diagnosis:

Possible Cause	Solution
A4-20 (software overcurrent threshold) is set to a too small value.	Set A4-20 properly. It is recommended to set this parameter to 100% to disable software overcurrent detection.
The drive output circuit is grounded or short-circuited.	Eliminate peripheral faults and check the motor or output contactor for short circuit.
The control mode is SVC or FVC, and the motor is started without parameter auto-tuning.	Set motor parameters correctly according to the motor nameplate, and run the motor after auto-tuning of motor parameters is completed.
Under the condition of rapid acceleration or deceleration, the acceleration and deceleration time is too short.	Set appropriate acceleration/deceleration time.

Possible Cause	Solution
The customized torque boost is not appropriate. The V/f curve is not appropriate.	1. Set appropriate torque boost parameters. 2. Set an appropriate V/f curve.
The motor is started when it is rotating.	Select flying start or start the motor after it stops.
The encoder feedback signal is abnormal in FVC mode.	Check whether the encoder feedback signal is normal.
The drive power rating is insufficient.	Select a drive with appropriate power rating.
The DC bus voltage is low.	Adjust the DC bus voltage to the normal range.
Motor parameters are set incorrectly.	Set the motor parameters correctly.
The periphery circuits are abnormal.	1. Check the fault history. If the current value upon the fault is below the overcurrent threshold, check for interference sources. 2. If no other interference sources exist, check for driver board or Hall device problems.
Other causes	Ask for technical support.

10.7.2.3 U Phase Hardware Overcurrent (2-6)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

An overcurrent signal triggered by the hardware is detected by the U phase. The transient current of this phase exceeds the hardware overcurrent threshold.

Fault diagnosis:

Possible Cause	Solution
The drive power rating is insufficient.	Select a drive with appropriate power rating.
The drive output circuit is grounded or short-circuited.	1. Check whether the output cable and motor are grounded 2. Check the motor cable for inter-phase short circuit. 3. If the motor cable is not in good contact, tighten the wiring screws.
The control mode is SVC or FVC, and the motor is started without parameter auto-tuning.	Set motor parameters correctly according to the motor nameplate, and run the motor after auto-tuning of motor parameters is completed.
Under the condition of rapid acceleration or deceleration, the acceleration and deceleration time is too short.	Set appropriate acceleration/deceleration time.
The customized torque boost is not appropriate. The V/f curve is not appropriate.	1. Set appropriate torque boost parameters. 2. Set an appropriate V/f curve.
The motor is started when it is rotating.	E1-00 (start mode) is set as flying start (flying start requires auto-tuning) or starting after motor stops.
The encoder feedback signal is abnormal in FVC mode.	Check whether the encoder feedback signal is normal.
The motor cable is too long.	Add an output reactor.
The DC bus voltage is low.	Adjust the DC bus voltage to the normal range.
Motor parameters are set incorrectly.	Set the motor parameters correctly.

Possible Cause	Solution
The Hall circuit is abnormal.	1. Check the Hall wiring. 2. Check the Hall power supply. 3. Check the Hall sensor.
The periphery circuits are abnormal.	Check the fault history. If the current value upon the fault is below the overcurrent threshold, check for interference sources.
The current sampling DIP is incorrect after the power board is replaced.	1. See the DIP before the power board is replaced. 2. Ask for technical support.
Other causes: 1. The output is connected to capacitive load. 2. The output is connected to an AC drive or a filter.	Ask for technical support.

10.7.2.4 V Phase Hardware Overcurrent (2-7)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

An overcurrent signal triggered by the hardware is detected by the V phase. The transient current of this phase exceeds the hardware overcurrent threshold.

Fault diagnosis:

Possible Cause	Solution
The drive power rating is insufficient.	Select a drive with appropriate power rating.
The drive output circuit is grounded or short-circuited.	1. Check whether the output cable and motor are grounded 2. Check the motor cable for inter-phase short circuit. 3. If the motor cable is not in good contact, tighten the wiring screws.
The control mode is SVC or FVC, and the motor is started without parameter auto-tuning.	Set motor parameters correctly according to the motor nameplate, and run the motor after auto-tuning of motor parameters is completed.
Under the condition of rapid acceleration or deceleration, the acceleration and deceleration time is too short.	Set appropriate acceleration/deceleration time.
The customized torque boost is not appropriate. The V/f curve is not appropriate.	1. Set appropriate torque boost parameters. 2. Set an appropriate V/f curve.
The motor is started when it is rotating.	E1-00 (start mode) is set as flying start (flying start requires auto-tuning) or starting after motor stops.
The encoder feedback signal is abnormal in FVC mode.	Check whether the encoder feedback signal is normal.
The motor cable is too long.	Add an output reactor.
The DC bus voltage is low.	Adjust the DC bus voltage to the normal range.
Motor parameters are set incorrectly.	Set the motor parameters correctly.
The Hall circuit is abnormal.	1. Check the Hall wiring. 2. Check the Hall power supply. 3. Check the Hall sensor.

Possible Cause	Solution
The periphery circuits are abnormal.	Check the fault history. If the current value upon the fault is below the overcurrent threshold, check for interference sources.
The current sampling DIP is incorrect after the power board is replaced.	1. See the DIP before the power board is replaced. 2. Ask for technical support.
Other causes: 1. The output is connected to capacitive load. 2. The output is connected to an AC drive or a filter.	Ask for technical support.

10.7.2.5 W Phase Hardware Overcurrent (2-8)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

An overcurrent signal triggered by the hardware is detected by the W phase. The transient current of this phase exceeds the hardware overcurrent threshold.

Fault diagnosis:

Possible Cause	Solution
The drive power rating is insufficient.	Select a drive with appropriate power rating.
The drive output circuit is grounded or short-circuited.	1. Check whether the output cable and motor are grounded 2. Check the motor cable for inter-phase short circuit. 3. If the motor cable is not in good contact, tighten the wiring screws.
The control mode is SVC or FVC, and the motor is started without parameter auto-tuning.	Set motor parameters correctly according to the motor nameplate, and run the motor after auto-tuning of motor parameters is completed.
Under the condition of rapid acceleration or deceleration, the acceleration and deceleration time is too short.	Set appropriate acceleration/deceleration time.
The customized torque boost is not appropriate. The V/f curve is not appropriate.	1. Set appropriate torque boost parameters. 2. Set an appropriate V/f curve.
The motor is started when it is rotating.	E1-00 (start mode) is set as flying start (flying start requires auto-tuning) or starting after motor stops.
The encoder feedback signal is abnormal in FVC mode.	Check whether the encoder feedback signal is normal.
The motor cable is too long.	Add an output reactor.
The DC bus voltage is low.	Adjust the DC bus voltage to the normal range.
Motor parameters are set incorrectly.	Set the motor parameters correctly.
The Hall circuit is abnormal.	1. Check the Hall wiring. 2. Check the Hall power supply. 3. Check the Hall sensor.
The periphery circuits are abnormal.	Check the fault history. If the current value upon the fault is below the overcurrent threshold, check for interference sources.

Possible Cause	Solution
The current sampling DIP is incorrect after the power board is replaced.	1. See the DIP before the power board is replaced. 2. Ask for technical support.
Other causes: 1. The output is connected to capacitive load. 2. The output is connected to an AC drive or a filter.	Ask for technical support.

10.7.3 DC Voltage (5)

10.7.3.1 DC Overvoltage (5-1)

Default fault level: Coast to stop

Reset method: Manual

Lowest fault level: Coast to stop

Highest fault level: Coast to stop

Error mechanism:

The DC bus voltage exceeds the DC overvoltage threshold (which is 800 V for 400 V models, 900 V for 500 V models, and 1200 V for 690 V models).

Fault diagnosis:

Possible Cause	Solution
The DC bus voltage is too high.	1. Adjust the DC bus voltage to the normal range. 2. Enable the Vdc_max overvoltage suppression algorithm. Adjust parameters in group E9 in VC mode and adjust parameters in group E3 in V/f control mode. 3. Optimize the Vdc_max overvoltage suppression parameters. Adjust parameters in group E9 in VC mode and adjust parameters in group E3 in V/f control mode. 4. Increase the deceleration time.
The DC bus overvoltage threshold is inappropriate.	Check whether A4-15 is set properly.
The starting voltage of the braking unit is too high.	Reduce the starting voltage of the braking unit.
The generating working condition occurs, and no braking unit is installed or an improper braking resistor model is selected.	Install a braking unit or select a proper braking resistor.
An improper drive voltage class is selected.	Select an appropriate AC drive model with a matching voltage class.
The drive model is incorrectly set.	Ask for technical support.
The overvoltage suppression parameters are inappropriate.	1. In V/f control mode, check whether the overvoltage suppression (E3-30) is enabled and whether the E3-31 to E3-35 parameters are properly set. 2. In VC mode, check whether the E9-01 parameter is enabled and whether the E9-02 parameter is set to a too large value.
The DC bus voltage correction coefficient is inappropriate.	Check whether the DC voltage sampling gain (A3-06) is set incorrectly.

Possible Cause	Solution
The speed loop parameters are set improperly in VC mode.	Too weak speed loop parameters result in electricity generation during callback after speed overshoot. Too strong speed loop parameters or large encoder feedback speed fluctuation will result in motor high-frequency oscillation and overvoltage. Such problems can be avoided by setting the speed loop properly.
The motor starts while rotating, which brings the motor to regenerative mode and causes bus overvoltage.	E1-00 (start mode) is set as flying start (flying start requires auto-tuning) or starting after motor stops.
Short circuit to ground	If the output end is short-circuited to ground, overvoltage may occur during motor running. Check whether the output end insulation is normal with a tramegger.
Check whether the model parameters A2-01/A2-02/A2-03 are modified.	Modify to the correct model parameters.
Other causes	Ask for technical support.

10.7.3.2 High Bus Voltage During Simulation Operation (5-3)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

The DC bus voltage during simulation operation is above 48 V.

Fault diagnosis:

Possible Cause	Solution
The bus voltage during simulation operation is above 48 V.	Disconnect the bus voltage before entering the simulation operation mode.

10.7.4 DC Undervoltage (9)

10.7.4.1 DC Undervoltage (9-1)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

After the device switch-on (ON) is enabled, the DC bus voltage is lower than the DC undervoltage threshold set in A4-18.

Fault diagnosis:

Possible Cause	Solution
The input voltage is abnormal.	1. Check whether the input voltage is low. 2. Check whether for input phase loss or disconnection. 3. Enable the Vdc_min undervoltage suppression function if allowed by the load and process.
The DC bus undervoltage threshold is inappropriate.	1. Check whether the DC bus undervoltage threshold set in A4-18 is too high. 2. Adjust the bus undervoltage threshold in A4-16 and A4-17.
An improper drive voltage class is selected. Check the rated module voltage in A2-02.	Select an appropriate AC drive model with a matching voltage class.
The undervoltage suppression is enabled but relevant parameter settings are inappropriate.	1. Check whether the vector control detection is enabled in E9-03 and whether E9-04 to E9-06 are inappropriate. 2. Enable the V/f control in E3-36 and adjust the settings of E3-37 to E3-40.
The DC bus voltage is incorrectly displayed.	1. Check the DC voltage sampling gain (A3-06). 2. Check whether the hardware sampling circuit is normal. 3. Ask for technical support.
The pre-charge resistor is not cut off.	Check whether pre-charge resistor is cut off.
Other causes	Ask for technical support.

10.7.4.2 Low Voltage (9-2)

Default fault level: Coast to stop

Reset method: Manual

Lowest fault level: Coast to stop

Highest fault level: Coast to stop

Error mechanism:

The system enters the Vdc_min control when the bus voltage is low. This fault is reported and the system exits the Vdc_min control when the running frequency is below the set frequency threshold.

Fault diagnosis:

Possible Cause	Solution
The input voltage is too low for a long time.	Ensure that the input voltage is normal.
The load inertia is too small to maintain the DC bus voltage.	-
The set frequency threshold is too high.	1. Properly set the frequency threshold in vector control (E9-04). 2. Properly set the frequency threshold in V/f control (E3-37).
Other causes	Ask for technical support.

10.7.5 Drive Overload (10)

10.7.5.1 Drive Overload (10-1)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The load is too heavy.	1. Reduce the load. 2. Select a drive with appropriate power rating.
Parameter auto-tuning is not performed in vector control mode.	Set motor parameters correctly, and run the motor after auto-tuning.
The torque boost parameter setting under V/f control is inappropriate.	1. In manual torque boost mode, set E3-14 and E3-15 to a large value. 2. In auto torque boost mode, run the motor after static auto-tuning is completed.
Motor locked-rotor occurs.	Check the motor and machine.
The device runs with heavy load at a low speed for a long time.	If the AC drive runs at a low frequency for a long time, derate its parameters and increase its power.
Derating occurs due to excessive carrier frequency.	Decrease the carrier frequency through A4-02.
Flying start failed.	The tracked speed is inconsistent with the actual motor speed. AC drive overload occurs due to excessive current after running. For high-speed tracking, increase the flying start filter cut-off frequency in E7-02.
Other causes	Ask for technical support.

10.7.5.2 Fast Current Limit Fault (10-2)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The acceleration/deceleration time is set to a too small value.	Set appropriate acceleration/deceleration time.
The drive power rating is insufficient.	Select a drive with appropriate power rating.
The drive output circuit is grounded or short-circuited.	1. Check whether the output cable and motor are grounded 2. Check the motor cable for inter-phase short circuit. 3. If the motor cable is not in good contact, tighten the wiring screws.
The control mode is SVC or FVC, and the motor is started without parameter auto-tuning.	Set motor parameters correctly according to the motor nameplate, and run the motor after auto-tuning of motor parameters is completed.
Under the condition of rapid acceleration or deceleration, the acceleration and deceleration time is too short.	Set appropriate acceleration/deceleration time.

Possible Cause	Solution
The customized torque boost is not appropriate. The V/f curve is not appropriate.	1. Set appropriate torque boost parameters. 2. Set an appropriate V/f curve.
The motor is started when it is rotating.	E1-00 (start mode) is set as flying start (flying start requires auto-tuning) or starting after motor stops.
The encoder feedback signal is abnormal in FVC mode.	Check whether the encoder feedback signal is normal.
The motor cable is too long.	Add an output reactor.
The DC bus voltage is low.	Adjust the DC bus voltage to the normal range.
Motor parameters are set incorrectly.	Set the motor parameters correctly.
The Hall circuit is abnormal.	1. Check the Hall wiring. 2. Check the Hall power supply. 3. Check the Hall sensor.
The periphery circuits are abnormal.	Check the fault history. If the current value upon the fault is below the overcurrent threshold, check for interference sources.
The current sampling DIP is incorrect after the power board is replaced.	1. See the DIP before the power board is replaced. 2. Ask for technical support.
Other causes: 1. The output is connected to capacitive load. 2. The output is connected to an AC drive or a filter.	Ask for technical support.

10.7.6 Motor Overload (11)

10.7.6.1 Motor Overload (11-1)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The load is too heavy.	1. Reduce the load or replace the motor with one with greater power. 2. Check the motor and machine.
Parameter auto-tuning is not performed in vector control mode.	Set motor parameters correctly, and run the motor after auto-tuning.
The torque boost parameter setting under V/f control is inappropriate.	1. In manual torque boost mode, set E3-14 and E3-15 to a large value. 2. In auto torque boost mode, run the motor after static auto-tuning is completed.
The motor overload protection gain is inappropriate.	Check whether E8-01 is set to a too small value.
The DC bus voltage is too low.	Adjust the DC bus voltage to the normal range.
Other causes	Ask for technical support.

10.7.6.2 Instantaneous Overcurrent of Synchronous Motor (11-2)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The motor is directly started when it is rotating at a high speed.	Flying start is enabled
The synchronous motor is demagnetized.	Ask for technical support.
Parameter auto-tuning is not performed in vector control mode.	Set motor parameters correctly, and run the motor after auto-tuning.
The demagnetization protection threshold is inappropriate.	Check the demagnetization protection threshold.
The load is too heavy.	1. Reduce the load or replace the motor with one with greater power. 2. Check the motor and machine.
Other causes	Ask for technical support.

10.7.7 Output Phase Loss (13)

10.7.7.1 U Phase Loss (13-1)

Default fault level: Coast to stop

Reset method: Manual

Lowest fault level: Alarm

Highest fault level: Coast to stop

Error mechanism:

During operation, the current of the U phase is significantly less than that of the other two phases in multiple current cycles.

Fault diagnosis:

Possible Cause	Solution
The motor U phase cable is disconnected or the connection is unreliable.	Check whether the motor UVW connection is normal.
The output contactor is not closed or is faulty.	Check whether the output contactor is closed properly.
The motor three-phase winding is faulty.	Replace the motor.
The current detected by hardware is abnormal.	1. Check the hardware current detection circuit. 2. Replace the power board or Hall sensor.
The drive is faulty.	1. Check whether the drive circuit cable connection is normal. 2. Replace the power board.
Other causes	Ask for technical support.

10.7.7.2 V Phase Loss (13-2)

Default fault level: Coast to stop

Reset method: Manual

Lowest fault level: Alarm

Highest fault level: Coast to stop

Error mechanism:

During operation, the current of the V phase is significantly less than that of the other two phases in multiple current cycles.

Fault diagnosis:

Possible Cause	Solution
The motor V phase cable is disconnected or the connection is unreliable.	Check whether the motor UVW connection is normal.
The output contactor is not closed or is faulty.	Check whether the output contactor is closed properly.
The motor three-phase winding is faulty.	Replace the motor.
The current detected by hardware is abnormal.	1. Check the hardware current detection circuit. 2. Replace the power board or Hall sensor.
The drive is faulty.	1. Check whether the drive circuit cable connection is normal. 2. Replace the power board.
Other causes	Ask for technical support.

10.7.7.3 W Phase Loss (13-3)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

During operation, the current of the W phase is significantly less than that of the other two phases in multiple current cycles.

Fault diagnosis:

Possible Cause	Solution
The motor W phase cable is disconnected or the connection is unreliable.	Check whether the motor UVW connection is normal.
The output contactor is not closed or is faulty.	Check whether the output contactor is closed properly.
The motor three-phase winding is faulty.	Replace the motor.
The current detected by hardware is abnormal.	1. Check the hardware current detection circuit. 2. Replace the power board or Hall sensor.
The drive is faulty.	1. Check whether the drive circuit cable connection is normal. 2. Replace the power board.
Other causes	Ask for technical support.

10.7.7.4 Two-Phase or Three-Phase Loss (13-4)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

The output current is constantly less than one-fourth of the motor no-load current during operation. This fault is reported only in vector control mode when an asynchronous motor is used.

Fault diagnosis:

Possible Cause	Solution
The motor cable is disconnected or the connection is unreliable.	Check whether the motor UVW connection is normal.
The output contactor is not closed or is faulty.	Check whether the output contactor is closed properly.
The motor three-phase winding is faulty.	Replace the motor.
The driver board is abnormal.	1. Check the driver board circuit connection. 2. Replace the driver board.
Other causes	Ask for technical support.

10.7.8 Drive Over-Temperature (14)

10.7.8.1 U Phase Module Over-Temperature (14-1)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

The detected temperature (U7-09) of the module U phase is above the over-temperature threshold (A4-33, which is dependent on the model).

Fault diagnosis:

Possible Cause	Solution
The ambient temperature is high.	Decrease the ambient temperature. Ensure that the temperature at the air inlet is no more than 40°C.
The load is too heavy.	Reduce the load.
The air filter is blocked.	Clean the air filter.
Fan error: 1. The fan stops rotating or rotates at a speed. 2. The power supply board of the fan is faulty.	1. Replace the fan. 2. Replace the fan power supply board.
The thermistor of the module is faulty.	Ask for technical support.
Other causes	Ask for technical support.

10.7.8.2 V Phase Module Over-Temperature (14-2)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

The detected temperature (U7-10) of the module V phase is above the over-temperature threshold (A4-33, which is dependent on the model).

Fault diagnosis:

Possible Cause	Solution
The ambient temperature is high.	Decrease the ambient temperature. Ensure that the temperature at the air inlet is no more than 40°C.
The load is too heavy.	Reduce the load.
The air filter is blocked.	Clean the air filter.

Possible Cause	Solution
Fan error: 1. The fan stops rotating or rotates at a speed. 2. The power supply board of the fan is faulty.	1. Replace the fan. 2. Replace the fan power supply board.
The thermistor of the module is faulty.	Ask for technical support.
Other causes	Ask for technical support.

10.7.8.3 W Phase Module Over-Temperature (14-3)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

The detected temperature (U7-11) of the module W phase is above the over-temperature threshold (A4-33, which is dependent on the model).

Fault diagnosis:

Possible Cause	Solution
The ambient temperature is high.	Decrease the ambient temperature. Ensure that the temperature at the air inlet is no more than 40°C.
The load is too heavy.	Reduce the load.
The air filter is blocked.	Clean the air filter.
Fan error: 1. The fan stops rotating or rotates at a speed. 2. The power supply board of the fan is faulty.	1. Replace the fan. 2. Replace the fan power supply board.
The thermistor of the module is faulty.	Ask for technical support.
Other causes	Ask for technical support.

10.7.8.4 Temperature Switch Error (14-4)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

In the HE200 or HE300 series inverters, when HINT detects that the temperature switch signal is disconnected, Err14-4 (drive over-temperature) is reported.

Fault diagnosis:

Possible Cause	Solution
The ambient temperature is high.	Decrease the ambient temperature. Ensure that the temperature at the air inlet is no more than 40°C.
The load is too heavy.	Reduce the load.
The air filter is blocked.	Clean the air filter.
Fan error: 1. The fan stops rotating or rotates at a speed. 2. The fan rotates reversely.	1. Replace the fan. 2. Change the phase sequence.

Possible Cause	Solution
The module temperature switch is abnormal.	1. Check whether the temperature switch circuit is disconnected. 2. Check whether the temperature switch is normal.
Other causes	Ask for technical support.

10.7.8.5 Rectifier Module Over-Temperature (14-5)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

The detected rectifier temperature (U5-09) of the HE200 or HE300 series inverter is above the over-temperature threshold (A4-35, which is dependent on the model).

Fault diagnosis:

Possible Cause	Solution
The ambient temperature is high.	Decrease the ambient temperature. Ensure that the temperature at the air inlet is no more than 40°C.
The load is too heavy.	Reduce the load.
The air filter is blocked.	Clean the air filter.
Fan error: 1. The fan stops rotating or rotates at a speed. 2. The power supply board of the fan is faulty.	1. Replace the fan. 2. Replace the fan power supply board.
The temperature detection circuit is abnormal.	Ask for technical support.
Other causes	Ask for technical support.

10.7.8.6 Control Cavity Over-Temperature (14-7)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

The control cavity temperature (U5-08) is above the over-temperature threshold (A4-34, which is dependent on the model).

Remarks:

This fault is reported only in the 690 V single-drive and water cooling multi-drive models.

Fault diagnosis:

Possible Cause	Solution
The ambient temperature is high.	Decrease the ambient temperature. Ensure that the temperature at the air inlet is no more than 40°C.
The load is too heavy.	Reduce the load.
The air filter is blocked.	Clean the air filter.

Possible Cause	Solution
Fan error: 1. The fan stops rotating or rotates at a speed. 2. The power supply board of the fan is faulty.	1. Replace the fan. 2. Replace the fan power supply board.
The temperature detection circuit is abnormal.	Ask for technical support.
Other causes	Ask for technical support.

10.7.9 External Fault (15)

10.7.9.1 External Fault 1 (15-1)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

When [H0-00] is set to 1, the 15-1 external fault 1 is triggered.

Fault diagnosis:

Possible Cause	Solution
The setting source of the H0-00 parameter is active.	Check whether the setting source is active.
H0-00 is set incorrectly.	1. Set H0-00 to 0. 2. Set H0-00 correctly.

10.7.9.2 External Fault 2 (15-2)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

When [H0-01] is set to 1, the 15-2 external fault 2 is triggered.

Fault diagnosis:

Possible Cause	Solution
The setting source of the H0-01 parameter is active.	Check whether the setting source is active.
H0-01 is set incorrectly.	1. Set H0-01 to 0. 2. Set H0-01 correctly.

10.7.9.3 Motor Over-Temperature (15-3)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

The motor temperature exceeds the protection threshold set in E8-23.

Fault diagnosis:

Possible Cause	Solution
The motor cooling fan is blocked or abnormal.	Check whether the motor cooling fan and air outlet are normal.
The motor load is too large.	Check whether the motor is overloaded for a long time.
The temperature detection circuit is abnormal.	Check the temperature detection circuit wiring.
The motor temperature detection mode set in [E8-22] is incorrect.	Correct the motor temperature detection mode. 1. Check whether the signal source is PG card or AI terminal. 2. Check whether the sensor type is correct.
The motor over-temperature protection threshold set in [E8-23] is inappropriate.	Check whether the motor over-temperature protection threshold is too low.
Other causes	Ask for technical support.

10.7.10 Motor Auto-Tuning Fault (19)

10.7.10.1 Static Auto-Tuning Failure of UV/UW Sampling Gain scaling (19-1)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

The auto-tuning times out and the current cannot reach the setpoint.

Fault diagnosis:

Possible Cause	Solution
The motor is not connected.	1. Check whether the motor is connected properly. 2. Check whether the output contactor is connected properly.
Output phase loss occurs.	1. Check whether the motor is connected properly. 2. Check whether the output contactor is connected properly. 3. See the fault description of Err13-1.
Basic motor parameters are set incorrectly.	Set basic parameters of the motor correctly according to the motor nameplate.
The drive power rating is insufficient.	Select a drive with appropriate power rating.
Other causes	1. Set b5-01 to 1 to perform self-test and check whether the module is normal. 2. Ask for technical support.

10.7.10.2 Static Auto-Tuning Failure of Stator Resistance and IGBT Voltage Drop (19-2)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

The auto-tuning times out and the current cannot reach the setpoint.

Fault diagnosis:

Possible Cause	Solution
The auto-tuning process is interrupted.	Ensure that the start/stop control word during the motor auto-tuning is normal.
Faults occur during auto-tuning.	Troubleshoot the problem based on the fault information reported by the controller.
Other causes	Ask for technical support.

10.7.10.3 Static Auto-Tuning Failure of Rotor Resistance and Leakage Inductance (19-3)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

The auto-tuning times out and the current cannot reach the setpoint.

Fault diagnosis:

Possible Cause	Solution
The auto-tuning process is interrupted.	Ensure that the start/stop control word during the motor auto-tuning is normal.
Faults occur during auto-tuning.	Troubleshoot the problem based on the fault information reported by the controller.
Other causes	Ask for technical support.

10.7.10.4 No-Load Auto-Tuning Failure of No-Load Current and Mutual Inductance (19-4)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

The auto-tuning times out and the current cannot reach the setpoint.

Fault diagnosis:

Possible Cause	Solution
The upper limit of the motor speed is less than 75%.	Change the upper limit of the motor speed to a value greater than 75%.
Brake control is enabled in group L1.	Disable the brake function through d0-13 or L1-00. Remove the potential energy torque, manually open the brake in safe conditions, and then perform auto-tuning.
The bus voltage is too low.	The bus voltage is below 105% x A2-02 x b5-19.
The auto-tuning deviation is too large.	1. Check whether the parameters on the motor nameplate are correct. 2. Ask for technical support.
Other causes	Ask for technical support.

10.7.10.5 With-Load Auto-Tuning Failure of Asynchronous Motor No-Load Current and Mutual Inductance (19-5)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

The auto-tuning times out and the current cannot reach the setpoint.

Fault diagnosis:

Possible Cause	Solution
Basic motor parameters are set incorrectly.	Set basic parameters of the motor correctly according to the motor nameplate.
Other causes	Ask for technical support.

10.7.10.6 Failure of Motor Auto-Tuning and Load Inertia Auto-Tuning (19-6)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

The auto-tuning times out and the current cannot reach the setpoint.

Fault diagnosis:

Possible Cause	Solution
The upper limit of the motor speed is less than 75%.	Change the upper limit of the motor speed to a value greater than 75%.
Brake control is enabled in group L1.	Disable the brake function through d0-13 or L1-00. Remove the potential energy torque, manually open the brake in safe conditions, and then perform auto-tuning.
The auto-tuning takes a too long time.	1. Check the torque limit and check whether the speed loop, forward running, and integral freezing are enabled. 2. Check whether other parameters in group E4 are set properly. 3. Ask for technical support.
Other causes	Ask for technical support.

10.7.10.7 Dead Zone Auto-Tuning Failure (19-7)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

The auto-tuning times out and the current cannot reach the setpoint.

Fault diagnosis:

Possible Cause	Solution
Basic motor parameters are set incorrectly.	Set basic parameters of the motor correctly according to the motor nameplate.
The bus voltage fluctuates.	Ask for technical support.
The motor rotates.	Ask for technical support.
Other causes	Ask for technical support.

10.7.10.8 Auto-Tuned Rotor Resistance Out of Range (19-8)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

The auto-tuned rotor resistance is out of range.

Fault diagnosis:

Possible Cause	Solution
The rated speed of asynchronous motor is incorrectly set, and the nameplate parameter settings of the motor are inconsistent with the actual values.	Set the motor nameplate parameters correctly.
The difference between the AC drive module power and the motor power is large.	Select a correct model.
The motor is rotating during static auto-tuning.	Ask for technical support.
Other causes	Ask for technical support.

10.7.10.9 Asynchronous Motor With-Load Auto-Tuning Failure (19-9)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

The auto-tuning times out and the current cannot reach the setpoint.

Fault diagnosis:

Possible Cause	Solution
The torque limit is not applied.	Set the torque limit to an appropriate value.
The speed reference is too low.	Increase the speed reference for with-load auto-tuning.
Basic motor parameters are set incorrectly.	Set basic parameters of the motor correctly according to the motor nameplate.
Static auto-tuning ([b5-00] set to 1) or static complete auto-tuning ([b5-00] set to 3) is not performed.	Perform with-load auto-tuning after static auto-tuning has been performed.
Other causes	Ask for technical support.

10.7.10.10 Synchronous Motor Magnetic Pole Auto-Tuning Failure (19-10)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

Auto-tuning times out.

Fault diagnosis:

Possible Cause	Solution
The motor has no magnetic saturation effect, causing failure to complete auto-tuning.	1. Check whether the motor parameters are set correctly. 2. Check whether the motor model is correct.
Basic motor parameters are set incorrectly.	Set basic parameters of the motor correctly according to the motor nameplate.
Other causes	Ask for technical support.

10.7.10.11 Search Failure of Synchronous Motor Magnetic Pole Auto-Tuning Current (19-11)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

The auto-tuning times out and the current cannot reach the target value.

Fault diagnosis:

Possible Cause	Solution
The motor has phase loss or open circuit.	Check the motor wiring.
Other causes	Ask for technical support.

10.7.10.12 Z Signal Not Obtained During Synchronous Motor Auto-Tuning (19-12)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

The Z signal is not obtained for a long time during auto-tuning.

Fault diagnosis:

Possible Cause	Solution
The Z signal wiring is abnormal.	Check the encoder Z signal wiring.
Other causes	Ask for technical support.

10.7.10.13 Synchronous Motor With-Load Auto-Tuning Failure (19-13)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

Auto-tuning times out.

Fault diagnosis:

Possible Cause	Solution
The encoder phase sequence is inversed.	Check the wiring of the encoder.
Other causes	Ask for technical support.

10.7.10.14 Auto-Tuning Failure (19-15)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

Auto-tuning times out.

Fault diagnosis:

Possible Cause	Solution
Auto-tuning failed.	Ask for technical support.

10.7.10.15 Auto-Tuning Interrupted (19-16)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

The RUN command disappears during auto-tuning.

Fault diagnosis:

Possible Cause	Solution
The auto-tuning process is interrupted.	Ensure that the start/stop control word during the motor auto-tuning is normal.
Faults occur during auto-tuning.	Troubleshoot problems based on fault reports.
Other causes	Ask for technical support.

10.7.11 Encoder Error (20)

10.7.11.1 20-1 Encoder Disconnection (Hardware Detection)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

The encoder signal voltage does not match the encoder type.

Fault diagnosis:

Possible Cause	Solution
The encoder is damaged.	Replace the encoder.
The encoder power supply is faulty.	Check whether the power cable of the encoder is properly connected. Check whether the supply voltages of the encoder and PG card are consistent.
The encoder connection is faulty.	1. Check whether the AB connection of the encoder is correct. 2. Check whether the encoder connection is reliable.
The encoder disconnection detection setting is abnormal.	Check whether n4-10/n5-10/n6-10 is set correctly. For example, for AB single-end signal, the parameter should be set to 4. If the parameter is set to 2 (the default value), this fault will be reported.
The encoder signal interference is serious.	1. Check whether the shield of the encoder is properly grounded. 2. Route the signal cable and power cable of the encoder separately.
Other causes	Ask for technical support.

10.7.11.2 Encoder Parameter Error (20-2)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

The deviation between the motor speed reference and the encoder feedback speed is large.

Fault diagnosis:

Possible Cause	Solution
Parameter setting is incorrect.	1. Set the encoder PPR correctly. 2. Set the motor parameters correctly, including the rated motor speed, frequency, and number of pole pairs.
An encoder error occurs.	1. Check whether the encoder is installed properly. 2. Check whether the encoder wiring is normal. 3. Check whether the encoder feedback signal and power supply are normal. 4. Replace the encoder.
Other causes	Ask for technical support.

10.7.11.3 Motor Running with no Encoder in FVC Mode (20-4)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

The motor runs in FVC mode but the PG card is offline.

Fault diagnosis:

Possible Cause	Solution
The PG card is offline or is not installed.	1. Check whether the PG card is installed. 2. Check whether the status of the PG card is online in n4-01.
The PG card module is not connected properly.	Reinstall or fix the PG card module.
Other causes	Ask for technical support.

10.7.11.4 Encoder Speed Test Fluctuation Exceeding the Allowable Range (20-5)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

The encoder speed test fluctuation exceeds the range specified in n4-22. This fault is used to detect faults such as encoder disconnection, signal interference, and encoder loose.

Fault diagnosis:

Possible Cause	Solution
The encoder is installed incorrectly.	1. Check whether the encoder is firmly installed. 2. Check whether the fixing method is proper.
Encoder signal suffers interference.	1. Ground the shield of the encoder. 2. Route the signal cable and power cable of the encoder separately. 3. If running is required, increase the coefficient in n4-21 or the threshold of encoder signal error count in n4-23, or set n4-20 to 0 to disable software disconnection detection.
The encoder power supply is faulty.	1. Check whether the power cable of the encoder is properly connected. 2. Check whether the supply voltages of the encoder and PG card are consistent.
Encoder disconnection	This fault is reported when the encoder signal cable is suddenly disconnected or the speed is low or the motor suspends at zero speed.
The motor is locked.	Check whether the motor is locked suddenly due to brake closing or other external devices.
Other causes	Ask for technical support.

10.7.11.5 Operation Mode Switchover from FVC to SVC Enabled (20-6)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

When [E8-50] is set to 1 or [E8-51] is set to 1 or 2, the operation mode switches from FVC to SVC due to an encoder feedback error. If the switchover occurs when the motor is running, an alarm is reported. If the switchover occurs when the motor sops, a fault is reported.

Fault diagnosis:

Possible Cause	Solution
The encoder is installed incorrectly.	1. Check whether the encoder is firmly installed. 2. Check whether the fixing method is proper.
Encoder signal suffers interference.	1. Ground the shield of the encoder. 2. Route the signal cable and power cable of the encoder separately. 3. If running is required, increase the coefficient in n4-21 or the threshold of encoder signal error count in n4-23, or set n4-20 to 0 to disable software disconnection detection.
The encoder power supply is faulty.	1. Check whether the power cable of the encoder is properly connected. 2. Check whether the supply voltages of the encoder and PG card are consistent.
Encoder disconnection	This fault is reported when the encoder signal cable is suddenly disconnected or the speed is low or the motor suspends at zero speed.
The motor is locked.	Check whether the motor is locked suddenly due to brake closing or other external devices.
Other causes	Ask for technical support.

10.7.11.6 Z Signal Suffering Interference (20-8)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

When the function is enabled in n4-30/n5-30/n6-30, if the deviation of the encoder zero position angle is large, ERR20-8 will be reported.

Fault diagnosis:

Possible Cause	Solution
The Z signal suffers interference when the synchronous motor is provided with ABZ encoder closed-loop control.	Check whether the encoder zero position angle is correct.
The encoder PPR is set incorrectly.	Set the encoder PPR correctly.
The motor type is set to asynchronous motor.	Set the motor type correctly.
Other causes	Ask for technical support.

10.7.11.7 Z Signal Loss (20-9)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The Z signal is lost when the synchronous motor is provided with ABZ encoder closed-loop control.	Check the encoder Z signal wiring.
The encoder PPR is set incorrectly.	Set the encoder PPR correctly.
Other causes	Ask for technical support.

10.7.11.8 Software Version of Encoder Signal Detection Module Too Early (20-10)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

The software version of the encoder signal detection module is too early and does not support PMSM control.

Fault diagnosis:

Possible Cause	Solution
The software version of the encoder signal detection module does not support PMSM control.	Ask for technical support.
Other causes	Ask for technical support.

10.7.12 Abnormal Motor Auto-Tuning Results (22)

10.7.12.1 Encoder Not Connected (22-1)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

No encoder signal is not detected during dynamic auto-tuning.

Fault diagnosis:

Possible Cause	Solution
The encoder is installed incorrectly.	Check whether the encoder is firmly installed.
Parameter setting is incorrect.	1. Check whether the encoder related parameters are correctly set and match the encoder type (check the settings of group n4/n5/n6 parameters according to the setting of d0.11). 2. If the encoder is not required in SVC or V/f mode, disable the encoder module. (According to the setting of d0.11, set n4.00/n5.00/n6.00 to 0.)
The encoder wiring is incorrect.	Check whether the encoder is correctly connected.
The encoder power supply is faulty.	1. Check whether the power cable of the encoder is properly connected. 2. Check whether the supply voltages of the encoder and PG card are consistent.

Possible Cause	Solution
The motor is locked.	Check whether the motor is locked due to brake closing or other external devices.
Other causes	Ask for technical support.

10.7.12.2 Incorrect Encoder Pulses Per Revolution (22-2)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

The feedback speed detected during dynamic auto-tuning is inconsistent with the speed reference.

Fault diagnosis:

Possible Cause	Solution
Parameter setting is incorrect.	1. Set the encoder PPR correctly. 2. Set the motor parameters correctly, including the rated motor speed, frequency, and number of pole pairs.
An encoder error occurs.	1. Check whether the encoder is installed properly. 2. Check whether the encoder wiring is normal. 3. Check whether the encoder feedback signal and power supply are normal. 4. Replace the encoder.
Other causes	Ask for technical support.

10.7.12.3 Position Detection Error (22-3)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
Other causes	Ask for technical support.

10.7.12.4 Abnormal Basic Motor Parameters (22-4)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
Basic motor parameters are set incorrectly.	Set basic parameters of the motor correctly according to the motor nameplate.
Other causes	Ask for technical support.

10.7.12.5 Abnormal Motor Expansion Parameters (22-5)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

The parameter settings obtained by auto-tuning are out of range.

Fault diagnosis:

Possible Cause	Solution
Basic motor parameters are set incorrectly.	Set basic parameters of the motor correctly according to the motor nameplate and perform auto-tuning again.
Other causes	Ask for technical support.

10.7.12.6 Encoder Signal Suffering Interference (22-15)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
Encoder signal speed measurement fluctuates significantly.	1. Check whether the encoder is firmly installed. 2. Check the encoder for disconnection and pulse loss. Check whether the shield of the signal cable is connected as required, and whether the signal cable is grounded and separated from the power cable.
Other causes	Ask for technical support.

10.7.12.7 Auto-Tuning Not Performed on the Asynchronous Motor Magnetic Field Saturation Coefficient (22-16)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The motor load is too large. As a result, the magnetic field saturation coefficient auto-tuning is canceled.	Reduce the load and perform auto-tuning again.
Other causes	Ask for technical support.

10.7.13 PID Feedback Loss (31)

10.7.13.1 PID Feedback Loss (31-1)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

When process PID is enabled, if the PID feedback value is smaller than the feedback error detection threshold L4-27 and the time exceeds the time set in L4-28, the PID feedback loss fault Err31-1 is triggered.

Remarks:

Any of [L4-27] and [L4-28] is set to 0, PID feedback loss is not detected.

Fault diagnosis:

Possible Cause	Solution
The PID feedback value is abnormal or is set incorrectly.	1. Check whether the PID feedback is normal. 2. Check the PID feedback source setting is normal.
The PID feedback error detection value is inappropriate.	Check whether the feedback error detection threshold (L4-27) is set to a too small value.
The PID feedback fluctuates greatly, and the set PID feedback error detection time is too short.	1. Check whether the PID feedback fluctuates greatly, check the feedback signal source for interference, and troubleshoot feedback signal source errors. 2. Properly increase the PID feedback error detection threshold (L4-28).
Other causes	Ask for technical support.

10.7.14 Inverter Fan Error 2 (32)

10.7.14.1 Fan Status Error (32-1)

Default fault level: Alarm
Reset method: Auto
Lowest fault level: No action
Highest fault level: Coast to stop

Remarks:

The fault 32-1 is reported only for 690 V single-drive models and water cooling multi-drive models. The fan error signal is displayed in bit10 of A15-94, with the value 1 indicating abnormal.

Fault diagnosis:

Possible Cause	Solution
The fan phase sequence is inversed.	Check and adjust the fan phase sequence.
The phase sequence detection circuit is abnormal or has phase loss.	Check whether the input power supply of the phase sequence detector is too low or has phase loss.
The fan phase sequence detector is damaged.	Replace the fan phase sequence detector.
Other causes	Ask for technical support.

10.7.14.2 MD880 Inverter Fan Status Error (32-2)

Default fault level: Alarm
Reset method: Auto
Lowest fault level: No action
Highest fault level: Coast to stop

Error mechanism:

The fault 32-2 is reported only for non-water cooling multi-drive models. The fan error signal is displayed in bit5 of A15-94, with the value 0 indicating abnormal.

Fault diagnosis:

Possible Cause	Solution
The fan phase sequence is inversed.	Check and adjust the fan phase sequence.
The phase sequence detection circuit is abnormal or has phase loss.	Check whether the input power supply of the phase sequence detector is too low or has phase loss.
The fan phase sequence detector is damaged.	Replace the fan phase sequence detector.
Other causes	Ask for technical support.

10.7.15 Excessive Motor Speed Deviation (42)

10.7.15.1 Excessive Motor Speed Deviation (42-1)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

When the motor runs normally or decelerates to stop in speed control mode, and the deviation between the actual motor speed and speed setpoint is greater than the detection threshold set in E8-06 for a time set in E8-07, Err42-1 will be triggered.

Remarks:

When E8-07 (excessive speed deviation detection time) is set to 0, the excessive deviation detection function is disabled.

Fault diagnosis:

Possible Cause	Solution
The acceleration/deceleration time is so short that the motor cannot follow the motor speed reference.	1. Set appropriate acceleration/deceleration time. 2. Give feedforward compensation for the acceleration rate.
The load is too large or motor locked-rotor occurs.	1. Check the load and reduce the load or select an appropriate applicable drive. 2. Check the motor and mechanical drive.
The detection threshold of excessive deviation (E8-06) and the detection time of excessive deviation (E8-07) are set to too small values.	Set E8-06 and E8-07 properly.
The speed loop PI parameter is weak in vector control mode.	Enhance the speed loop PI parameter.
The encoder parameters are set incorrectly.	Set the encoder parameters correctly.

10.7.16 Motor Speed Overlimit (43)

10.7.16.1 Motor Speed Overlimit (43-1)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

Err43-1 (motor overspeed) will be triggered in the following cases:

- The actual motor speed is greater than the forward speed limit (U9-18 + E8-04) and the duration is more than the time specified in E8-05.
- The actual motor speed is lower than the reverse speed limits (U9-19 - E8-04) and the duration is more than the time specified in E8-05.

Remarks:

- The forward speed limit U9-18 is determined by the maximum motor speed D0-06, forward speed limit E2-04, and forward torque limit E2-06.
- The reverse speed limit U9-19 is determined by the maximum motor speed D0-06, reverse speed limit E2-05, and reverse torque limit E2-07.

Fault diagnosis:

Possible Cause	Solution
The motor is driven to run by external force.	Check the actual load of the motor.
For gravity load applications, the torque limit is set improperly and the load is accelerated by the self gravity.	Check whether the torque limit is set properly.
For gravity load applications, the drive power rating is insufficient to drive the load properly.	Select a drive with appropriate power rating.
The motor control is faulty.	Ask for technical support.

10.7.17 Expansion Module Offline (44)

10.7.17.1 Encoder Detection Module 1 Activated But Offline (44-1)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Alarm	Highest fault level: Coast to stop

Error mechanism:

The slot is activated and the encoder type is active, but no data is received in 0.5s.

Fault diagnosis:

Possible Cause	Solution
The slot setting is incorrect.	Set the slot again.
The slot of the expansion module is loose.	Check whether the slot of the expansion module is loose. If yes, tighten the slot fixing screws.

Possible Cause	Solution
The expansion module type is incorrect.	1. Check whether the PG card is inserted to the expansion module slot. 2. Check the encoder type set in n4-02.
Other causes	Ask for technical support.

10.7.17.2 Encoder Detection Module 2 Activated But Offline (44-2)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

The slot is activated and the encoder type is active, but no data is received in 0.5s.

Fault diagnosis:

Possible Cause	Solution
The slot setting is incorrect.	Set the slot again.
The slot of the expansion module is loose.	Check whether the slot of the expansion module is loose. If yes, tighten the slot fixing screws.
The expansion module type is incorrect.	1. Check whether the PG card is inserted to the expansion module slot. 2. Check the encoder type set in n5-02.
Other causes	Ask for technical support.

10.7.17.3 Encoder Detection Module 3 Activated But Offline (44-3)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

The slot is activated and the encoder type is active, but no data is received in 0.5s.

Fault diagnosis:

Possible Cause	Solution
The slot setting is incorrect.	Set the slot again.
The slot of the expansion module is loose.	Check whether the slot of the expansion module is loose. If yes, tighten the slot fixing screws.
The expansion module type is incorrect.	1. Check whether the PG card is inserted to the expansion module slot. 2. Check the encoder type set in n6-02.
Other causes	Ask for technical support.

10.7.17.4 I/O Module 1 Activated But Offline (44-4)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

The slot is activated and the module type is active, but no data is received in 0.5s.

Fault diagnosis:

Possible Cause	Solution
The slot setting is incorrect.	Set the slot again.
The slot of the expansion module is loose.	Check whether the slot of the expansion module is loose. If yes, tighten the slot fixing screws.
The expansion module type is incorrect.	1. Check whether the I/O module is inserted to the expansion module slot. 2. Check the I/O module type set in n7-02.
Other causes	Ask for technical support.

10.7.17.5 I/O Module 2 Activated But Offline (44-5)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Alarm	Highest fault level: Coast to stop

Error mechanism:

The slot is activated and the module type is active, but no data is received in 0.5s.

Fault diagnosis:

Possible Cause	Solution
The slot setting is incorrect.	Set the slot again.
The slot of the expansion module is loose.	Check whether the slot of the expansion module is loose. If yes, tighten the slot fixing screws.
The expansion module type is incorrect.	1. Check whether the I/O module is inserted to the expansion module slot. 2. Check the I/O module type set in n8-02.
Other causes	Ask for technical support.

10.7.17.6 I/O Module 3 Activated But Offline (44-6)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Alarm	Highest fault level: Coast to stop

Error mechanism:

The slot is activated and the module type is active, but no data is received in 0.5s.

Fault diagnosis:

Possible Cause	Solution
The slot setting is incorrect.	Set the slot again.
The slot of the expansion module is loose.	Check whether the slot of the expansion module is loose. If yes, tighten the slot fixing screws.

Possible Cause	Solution
The expansion module type is incorrect.	1. Check whether the I/O module is inserted to the expansion module slot. 2. Check the I/O module type set in n9-02.
Other causes	Ask for technical support.

10.7.17.7 Fieldbus Adapter A Activated but Offline, Configured Communication Card Offline (44-7)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

The bus type is selected in n1-00 and a slot is selected for the module, but no data is received in 1s.

Fault diagnosis:

Possible Cause	Solution
The slot setting is incorrect.	Set the slot again.
The slot of the expansion module is loose.	Check whether the slot of the expansion module is loose. If yes, tighten the slot fixing screws.
The expansion module type is incorrect.	Check whether the slot to which the expansion module inserted is of the bus type for fieldbus adapter set in n1-00.
Other causes	Ask for technical support.

10.7.17.8 Fieldbus Adapter B Activated but Offline, Configured Communication Card Offline (44-8)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

The bus type is selected in n2-00 and a slot is selected for the module, but no data is received in 1s.

Fault diagnosis:

Possible Cause	Solution
The slot setting is incorrect.	Set the slot again.
The slot of the expansion module is loose.	Check whether the slot of the expansion module is loose. If yes, tighten the slot fixing screws.
The expansion module type is incorrect.	Check whether the slot to which the expansion module inserted is of the bus type for fieldbus adapter set in n2-00.
Other causes	Ask for technical support.

10.7.17.9 Redundant Adapter Activated but Offline, Configured Communication Card Offline (44-9)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Alarm	Highest fault level: Coast to stop

Error mechanism:

The bus type is selected in n3-00 and a slot is selected for the module, but no data is received in 1s.

Fault diagnosis:

Possible Cause	Solution
The slot setting is incorrect.	Set the slot again.
The slot of the expansion module is loose.	Check whether the slot of the expansion module is loose. If yes, tighten the slot fixing screws.
The expansion module type is incorrect.	Check whether the slot to which the expansion module inserted is of the bus type for fieldbus adapter set in n3-00.
Other causes	Ask for technical support.

10.7.17.10 Sync Voltage Detection Module Activated But Offline (44-10)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Alarm	Highest fault level: Coast to stop

Error mechanism:

An expansion slot is selected in n19-00 but no data is received.

Fault diagnosis:

Possible Cause	Solution
The slot setting is incorrect.	Set the slot again.
The slot of the expansion module is loose.	Check whether the slot of the expansion module is loose. If yes, tighten the slot fixing screws.
Other causes	Ask for technical support.

10.7.17.11 Dual-Port RAM Card Activated But Offline (44-11)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Alarm	Highest fault level: Coast to stop

Error mechanism:

Carrier frequency synchronization is enabled in A7-01 and an expansion slot is selected in A7-03, but no data is received.

Fault diagnosis:

Possible Cause	Solution
The slot setting is incorrect.	Set the slot again.
The slot of the expansion module is loose.	Check whether the slot of the expansion module is loose. If yes, tighten the slot fixing screws.
Other causes	Ask for technical support.

10.7.17.12 High-Speed Pulse Detection Module Activated But Offline (44-15)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

The slot is activated and the module type is active, but no data is received in 0.5s.

Fault diagnosis:

Possible Cause	Solution
The slot setting is incorrect.	Set the slot again.
The slot of the expansion module is loose.	Check whether the slot of the expansion module is loose. If yes, tighten the slot fixing screws.
The expansion module type is incorrect.	1. Check whether the high-speed pulse detection module is inserted to the expansion module slot. 2. Check the encoder type set in n32-02.
Other causes	Ask for technical support.

10.7.18 Expansion Module Slot Address Conflict (45)

10.7.18.1 Slot Address Conflict Between Encoder Detection Module 1 and Encoder Detection Module 2 (45-1)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

The expansion slot settings in n4-00 and n5-00 are the same.

Fault diagnosis:

Possible Cause	Solution
The slot selected in n4-00 for the encoder detection module 1 is the same as that selected in n5-00 for the encoder detection module 2.	Set n4-00 and n5-00 correctly.

10.7.18.2 Slot Address Conflict Between Encoder Detection Module 1 and Encoder Detection Module 3 (45-2)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

The expansion slot settings in n4-00 and n6-00 are the same.

Fault diagnosis:

Possible Cause	Solution
The slot selected in n4-00 for the encoder detection module 1 is the same as that selected in n6-00 for the encoder detection module 3.	Set n4-00 and n6-00 correctly.

10.7.18.3 Slot Address Conflict Between Encoder Detection Module 2 and Encoder Detection Module 3 (45-3)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

The expansion slot settings in n5-00 and n6-00 are the same.

Fault diagnosis:

Possible Cause	Solution
The slot selected in n5-00 for the encoder detection module 2 is the same as that selected in n6-00 for the encoder detection module 3.	Set n5-00 and n6-00 correctly.

10.7.18.4 Slot Address Conflict Between I/O Module 1 and I/O Module 2 (45-4)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

The expansion slot settings in n7-00 and n8-00 are the same.

Fault diagnosis:

Possible Cause	Solution
The expansion slot selected in n7-00 for the I/O module 1 is the same as that selected in n8-00 for the I/O module 2.	Set n7-00 and n8-00 correctly.

10.7.18.5 Slot Address Conflict Between I/O Module 1 and I/O Module 3 (45-5)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

The expansion slot settings in n7-00 and n9-00 are the same.

Fault diagnosis:

Possible Cause	Solution
The expansion slot selected in n7-00 for the I/O module 1 is the same as that selected in n9-00 for the I/O module 3.	Set n7-00 and n9-00 correctly.

10.7.18.6 Slot Address Conflict Between I/O Module 2 and I/O Module 3 (45-6)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Alarm	Highest fault level: Coast to stop

Error mechanism:

The expansion slot settings in n8-00 and n9-00 are the same.

Fault diagnosis:

Possible Cause	Solution
The expansion slot selected in n8-00 for the I/O module 2 is the same as that selected in n9-00 for the I/O module 3.	Set n8-00 and n9-00 correctly.

10.7.18.7 Conflict Between Slot Address Ranges of Fieldbus Adapters A and B (45-7)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Alarm	Highest fault level: Coast to stop

Error mechanism:

The settings of n1-00 (bus type of fieldbus adapter) and n2-00 (bus type of redundant adapter) conflict.

Remarks:

- There are three address ranges. Expansion slots 1-1, 1-2, and 1-3 are in the same range. Expansion slots 2-1, 2-2, and 2-3 are in the same range. Slot 3-1 is in a separate range.
- When n1-00 and n2-00 are set to different communication modules, the corresponding slot ranges cannot be the same.

Fault diagnosis:

Possible Cause	Solution
The settings of n1-00 (bus type of fieldbus adapter) and n2-00 (bus type of redundant adapter) conflict.	1. Correctly set the slot position of the corresponding communication module. 2. Install the corresponding communication module to the correct slot.

10.7.18.8 Conflict Between Slot Address Ranges of Fieldbus Adapter A and Redundant Adapter (45-8)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Alarm	Highest fault level: Coast to stop

Error mechanism:

The settings of n1-00 (bus type of fieldbus adapter) and n3-00 (bus type of redundant adapter) conflict.

Remarks:

- There are three address ranges. Expansion slots 1-1, 1-2, and 1-3 are in the same range. Expansion slots 2-1, 2-2, and 2-3 are in the same range. Slot 3-1 is in a separate range.
- When n1-00 and n3-00 are set to different communication modules, the corresponding slot ranges cannot be the same.

Fault diagnosis:

Possible Cause	Solution
The settings of n1-00 (bus type of fieldbus adapter) and n3-00 (bus type of redundant adapter) conflict.	1. Correctly set the slot position of the corresponding communication module. 2. Install the corresponding communication module to the correct slot.

10.7.18.9 Conflict Between Slot Address Ranges of Fieldbus Adapter B and Redundant Adapter (45-9)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Alarm	Highest fault level: Coast to stop

Error mechanism:

The settings of n2-00 (bus type of fieldbus adapter) and n3-00 (bus type of redundant adapter) conflict.

Remarks:

- There are three address ranges. Expansion slots 1-1, 1-2, and 1-3 are in the same range. Expansion slots 2-1, 2-2, and 2-3 are in the same range. Slot 3-1 is in a separate range.
- When n2-00 and n3-00 are set to different communication modules, the corresponding slot ranges cannot be the same.

Fault diagnosis:

Possible Cause	Solution
The settings of n2-00 (bus type of fieldbus adapter) and n3-00 (bus type of redundant adapter) conflict.	1. Correctly set the slot position of the corresponding communication module. 2. Install the corresponding communication module to the correct slot.

10.7.19 Parameter Setting Alarm (46)

10.7.19.1 Incorrect Parameter Setting (46-1)

Default fault level: Alarm	Reset method: Auto
Lowest fault level: No action	Highest fault level: Alarm

You can view the fault information to check the fault causes and view the details in U8-44.

Parameter Value	Description
1	The pulse-by-pulse current limit counts conflict.
2	The minimum and maximum values of the motor-driven potentiometer conflict.
3	RFG arc time 1 and acceleration time 1 conflict.

Parameter Value	Description
4	RFG arc time 1 and deceleration time 1 conflict.
5	RFG arc time 2 and acceleration time 2 conflict.
6	RFG arc time 2 and deceleration time 2 conflict.
7	RFG arc time 3 and acceleration time 3 conflict.
8	RFG arc time 3 and deceleration time 3 conflict.
9	RFG arc time 4 and acceleration time 4 conflict.
10	RFG arc time 4 and deceleration time 4 conflict.
11	The maximum and minimum motor speeds conflict.
12	The lower and upper limits of jump frequency 1 conflict.
13	The lower and upper limits of jump frequency 2 conflict.
14	The lower and upper limits of torque limit digital setting conflict.
15	The lower and upper limits of speed loop Kp adaptive switchover conflict.
16	The lower frequency and upper frequency of speed loop switchover conflict.
17	The lower and upper limits of current loop proportion adaptive switchover conflict.
18	The lower frequency and upper frequency of model switchover conflict.
19	The lower frequency and upper frequency of FVC-to-SVC switchover conflict.
20	The minimum and maximum input values of AI1 curve conflict.
21	The minimum and maximum input values of AI2 curve conflict.
22	The minimum and maximum output proportions of AO1 curve conflict.
23	The minimum and maximum output proportions of AO2 curve conflict.
24	The minimum and maximum input frequencies of HDI1 curve conflict.
25	The minimum and maximum input frequencies of HDI2 curve conflict.
26	The minimum and maximum output proportions of HDO1 curve conflict.
27	The minimum and maximum output proportions of HDO2 curve conflict.
28	The slot number of the communication card selected for fieldbus adapter A is not set.
29	The slot number of the communication card selected for fieldbus adapter B is not set.
30	The AC drive calibrated rated current is 6 times greater than the rated motor current.
31	The fault reset interval is greater than the time for clearing reset attempts.
34	The fault error processing level settings conflict.
35	Linear V/f curve frequency point settings conflict.
36	The X point of multi-point curve module A is not incremental.
37	The X point of multi-point curve module B is not incremental.
39	The number of channels of the trigger oscilloscope (A12.20) is more than 8 during ADC cycle operation.
40	The AO1 reference signal source and motor temperature detection conflict.
41	The AO2 reference signal source and motor temperature detection conflict.
42	The user-defined function block execution sequences conflict. For details, see the parameters P9-00 to P9-03.
43	The X point of user-defined multi-point curve module is not incremental.
45	The start/stop control word is fieldbus adapter. However, the DP data check bit (n16.10) is not bit10.
46	The parallel function is enabled (A15.00) but the number of enabled unit modules is 0.

Parameter Value	Description
47	Parameter settings of the I/O expansion module 1 (min. input of AI curve > max. input of AI curve, or min. output proportion of AO curve > max. output proportion of AO curve) conflict.
48	Parameter settings of the I/O expansion module 2 (min. input of AI curve > max. input of AI curve, or min. output proportion of AO curve > max. output proportion of AO curve) conflict.
49	Parameter settings of the I/O expansion module 3 (min. input of AI curve > max. input of AI curve, or min. output proportion of AO curve > max. output proportion of AO curve) conflict.
76	The number of parallel motors is set incorrectly: The number of PMSM can only be 1.
77	The card type of the user-defined communication card is incorrect.
78	The back EMF corresponding to the maximum speed of synchronous motor is too high. High-speed wave may damage the AC drive.
81	The minimum input frequency of the frequency/torque curve in group n32 conflicts with the maximum input frequency.
82	d0-00 is set to synchronous motor and the control mode in E0-00 is set to V/f, but the synchronous motor actually runs in the SVC control mode.
95	The speed of each point in the load monitoring curve in group L15 is not incremental.
96	The underload threshold of the load monitoring curve in group L15 is greater than or equal to the overload threshold.
97	InoLink data interaction is too large.
98	The upper limit of limit module A conflicts with the lower limit.
99	The upper limit of limit module B conflicts with the lower limit.
100	The upper limit of limit module C conflicts with the lower limit.
101	The upper limit of limit module D conflicts with the lower limit.
501	The pole pairs of the motor are set incorrectly.
502	Parameter setting on motor nameplate is incorrect. Please check whether the rated voltage, current, and power are set correctly.
503	No-load current of asynchronous motor is too large. Please check the motor parameters and auto-tune all motor parameters.
504	Rated flux is incorrect. Check whether the mutual inductance or no-load current is correct.
505	The rotor resistance of asynchronous motor is abnormal or the rated speed setting is incorrect (d0-05 or d0-04 is set incorrectly).
506	The field weakening curve of asynchronous motor is abnormal.
507	The number of pole pairs of resolver does not match the number of motor pole pairs. The number of motor pole pairs must be an integer multiple of the number of pole pairs of resolver.

Fault information: 1 The pulse-by-pulse current limit counts conflict.

Possible Cause	Solution
[A3-21] > [A3-22]	Set the parameter properly.

Fault information: 2 The minimum and maximum values of the motor-driven potentiometer conflict.

Possible Cause	Solution
[C4-03] > [C4-04]	Set the parameter properly.

Fault information: 3 RFG arc time 1 and acceleration time 1 conflict.

Possible Cause	Solution
([C7-12] + [C7-13])/2 > [C7-04]	Set the parameter properly.

Fault information: 4 RFG arc time 1 and deceleration time 1 conflict.

Possible Cause	Solution
([C7-12] + [C7-13])/2 > [C7-05]	Set the parameter properly.

Fault information: 5 RFG arc time 2 and acceleration time 2 conflict.

Possible Cause	Solution
([C7-14] + [C7-15])/2 > [C7-06]	Set the parameter properly.

Fault information: 6 RFG arc time 2 and deceleration time 2 conflict.

Possible Cause	Solution
([C7-14] + [C7-15])/2 > [C7-07]	Set the parameter properly.

Fault information: 7 RFG arc time 3 and acceleration time 3 conflict.

Possible Cause	Solution
([C7-16] + [C7-17])/2 > [C7-08]	Set the parameter properly.

Fault information: 8 RFG arc time 3 and deceleration time 3 conflict.

Possible Cause	Solution
([C7-16] + [C7-17])/2 > [C7-09]	Set the parameter properly.

Fault information: 9 RFG arc time 4 and acceleration time 4 conflict.

Possible Cause	Solution
([C7-18] + [C7-19])/2 > [C7-10]	Set the parameter properly.

Fault information: 10 RFG arc time 4 and deceleration time 4 conflict.

Possible Cause	Solution
([C7-18] + [C7-19])/2 > [C7-11]	Set the parameter properly.

Fault information: 11 The maximum and minimum motor speeds conflict.

Possible Cause	Solution
[d0-06] < [d0-07]	Set the parameter properly.

Fault information: 12 The lower and upper limits of jump frequency 1 conflict.

Possible Cause	Solution
[E2-00] > [E2-01]	Set the parameter properly.

Fault information: 13 The lower and upper limits of jump frequency 2 conflict.

Possible Cause	Solution
[E2-02] > [E2-03]	Set the parameter properly.

Fault information: 14 The lower and upper limits of torque limit digital setting conflict.

Possible Cause	Solution
[E2-09] > [E2-08]	Set the parameter properly.

Fault information: 15 The lower and upper limits of speed loop Kp adaptive switchover conflict.

Possible Cause	Solution
[E4-07] >= [E4-09]	Set the parameter properly.

Fault information: 16 The lower frequency and upper frequency of speed loop switchover conflict.

Possible Cause	Solution
[E4-11] > [E4-12]	Set the parameter properly.

Fault information: 17 The lower and upper limits of current loop proportion adaptive switchover conflict.

Possible Cause	Solution
[E5-07] > [E5-08]	Set the parameter properly.

Fault information: 18 The lower frequency and upper frequency of model switchover conflict.

Possible Cause	Solution
[E11-01] > [E11-00]	Set the parameter properly.

Fault information: 19 The lower frequency and upper frequency of FVC-to-SVC switchover conflict.

Possible Cause	Solution
[E11-06] > [E11-05]	Set the parameter properly.

Fault information: 20 The minimum and maximum input values of AI1 curve conflict.

Possible Cause	Solution
[F2-06] >= [F2-08]	Set the parameter properly.

Fault information: 21 The minimum and maximum input values of AI2 curve conflict.

Possible Cause	Solution
[F2-10] >= [F2-12]	Set the parameter properly.

Fault information: 22 The minimum and maximum output proportions of AO1 curve conflict.

Possible Cause	Solution
[F3-08] >= [F3-10]	Set the parameter properly.

Fault information: 23 The minimum and maximum output proportions of AO2 curve conflict.

Possible Cause	Solution
[F3-13] >= [F3-15]	Set the parameter properly.

Fault information: 24 The minimum and maximum input frequencies of HDI1 curve conflict.

Possible Cause	Solution
[F4-05] >= [F4-07]	Set the parameter properly.

Fault information: 25 The minimum and maximum input frequencies of HDI2 curve conflict.

Possible Cause	Solution
[F4-09] >= [F4-11]	Set the parameter properly.

Fault information: 26 The minimum and maximum output proportions of HDO1 curve conflict.

Possible Cause	Solution
[F5-07] >= [F5-09]	Set the parameter properly.

Fault information: 27 The minimum and maximum output proportions of HDO2 curve conflict.

Possible Cause	Solution
[F5-11] >= [F5-13]	Set the parameter properly.

Fault information: 28 The slot number of the communication card selected for fieldbus adapter A is not set.

Possible Cause	Solution
A communication card is set in n1-00, but not slot is configured for this communication card.	Set a slot for the communication card.

Fault information: 29 The slot number of the communication card selected for fieldbus adapter B is not set.

Possible Cause	Solution
A communication card is set in n2-00, but not slot is configured for this communication card.	Set a slot for the communication card.

Fault information: 30 The AC drive calibrated rated current is 6 times greater than the rated motor current.

Possible Cause	Solution
The AC drive calibrated rated current (A2-03) is 6 times greater than the rated motor current (d0-03).	Set the motor parameters properly.

Fault information: 31 The fault reset interval is greater than the time for clearing reset attempts.

Possible Cause	Solution
[H0-09] > [H0-08]	Set the parameter properly.

Fault information: 34 The fault error processing level settings conflict.

Possible Cause	Solution
The level change error codes in group H0 are repeated.	Set the error codes in group H0 again.

Fault information: 35 Linear V/f curve frequency point settings conflict.

Possible Cause	Solution
[E3-02] > [E3-04] or [E3-04] > [E3-06]	Set the parameter properly.

Fault information: 36 The X point of multi-point curve module A is not incremental.

Possible Cause	Solution
The X settings of the multi-point module A in group L8 are not incremental.	Set the parameter properly.

Fault information: 37 The X point of multi-point curve module B is not incremental.

Possible Cause	Solution
The X settings of the multi-point module B in group L8 are not incremental.	Set the parameter properly.

Fault information: 39 The number of channels of the trigger oscilloscope (A12.20) is more than 8 during ADC cycle operation.

Possible Cause	Solution
When A12-02 is set to 0, A12-20 > 8	Set the parameter properly.

Fault information: 40 The AO1 reference signal source and motor temperature detection conflict.

Possible Cause	Solution
The motor temperature detection method set in E8-22 conflicts with that in F3-04.	When AI1 is set to detect the motor temperature, set F3-04 to 0.

Fault information: 41 The AO2 reference signal source and motor temperature detection conflict.

Possible Cause	Solution
The motor temperature detection method set in E8-22 conflicts with that in F3-05.	When AI2 is set to detect the motor temperature, set F3-05 to 0.

Fault information: 42 The user-defined function block execution sequences conflict.

Possible Cause	Solution
The user-defined function block execution sequences conflict.	For details, see the parameters P9-00 to P9-03.

Fault information: 43 The X point of user-defined multi-point curve module is not incremental.

Possible Cause	Solution
The X settings of the user-defined multi-point curve modules 1 to 4 in group P8 are not incremental.	Set the parameter properly.

Fault information: 45 The start/stop control word is fieldbus adapter. However, the DP data check bit (n16.10) is not bit10.

Possible Cause	Solution
b0-00 or b2-00 is set to 1 or 2, but the DP check bit specified in n16-10 is not bit10.	Set the parameter properly.

Fault information: 46 The parallel function is enabled (A15.00) but the number of enabled unit modules is 0.

Possible Cause	Solution
A15-00 is set to 1 but both A15-02 and A15-03 are set to 0.	Set A15-02 and A15-03 properly.

Fault information: 47 The parameter settings of I/O expansion module 1 conflict.

Possible Cause	Solution
In group n25, the minimum input of the AI curve is greater than or equal to the maximum input, or the minimum output proportion of the AO curve is greater than or equal to the maximum output proportion.	Set the parameter properly.

Fault information: 48 The parameter settings of I/O expansion module 2 conflict.

Possible Cause	Solution
In group n28, the minimum input of the AI curve is greater than or equal to the maximum input, or the minimum output proportion of the AO curve is greater than or equal to the maximum output proportion.	Set the parameter properly.

Fault information: 49 The parameter settings of I/O expansion module 3 conflict.

Possible Cause	Solution
In group n31, the minimum input of the AI curve is greater than or equal to the maximum input, or the minimum output proportion of the AO curve is greater than or equal to the maximum output proportion.	Set the parameter properly.

Fault information: 76 The number of parallel motors is set incorrectly: The number of PMSM can only be 1.

Possible Cause	Solution
d0-00 is set to PMSM and d0-10 is set to a number greater than 1.	Set the parameter properly.

Fault information: 77 The card type of the user-defined communication card is incorrect.

Possible Cause	Solution
n18-01 is set to 2.	Set the parameter properly.

Fault information: 78 The back EMF corresponding to the maximum speed of synchronous motor is too high. High-speed wave may damage the AC drive.

Possible Cause	Solution
When the value (1.4 x [d1-26] x [d0-06]) is greater than the overvoltage threshold, the defection function can be disabled in the tens position of H0-41.	Set the parameter properly.

Fault information: 81 The minimum input frequency of the frequency/torque curve in group n32 conflicts with the maximum input frequency.

Possible Cause	Solution
[n32-06] >= [n32-08]	Set the parameter properly.

Fault information: 82 d0-00 is set to synchronous motor and the control mode in E0-00 is set to V/f, but the synchronous motor actually runs in the SVC control mode.

Possible Cause	Solution
d0-00 is set to PMSM and the control mode is set to V/f.	Set the parameter properly.

Fault information: 95 The speed of each point in the load monitoring curve in group L15 is not incremental.

Possible Cause	Solution
In group L15, the speed settings of the load monitoring module are not incremental.	Set the parameter properly.

Fault information: 96 The underload threshold of the load monitoring curve in group L15 is greater than the overload threshold.

Possible Cause	Solution
The underload threshold of the load monitoring curve in group L15 is greater than or equal to the overload threshold at the same speed point.	Set the parameter properly.

Fault information: 97 InoLink data interaction is too large.

Possible Cause	Solution
When n0-06 is set to 1, the data interaction of n0-08 is too large or the interaction period is too short.	Set the parameter properly.

Fault information: 98 The upper limit of limit module A conflicts with the lower limit.

Possible Cause	Solution
[L7-61] < [L7-62]	Set the parameter properly.

Fault information: 99 The upper limit of limit module B conflicts with the lower limit.

Possible Cause	Solution
[L7-64] < [L7-65]	Set the parameter properly.

Fault information: 100 The upper limit of limit module C conflicts with the lower limit.

Possible Cause	Solution
[L7-67] < [L7-68]	Set the parameter properly.

Fault information: 101 The upper limit of limit module D conflicts with the lower limit.

Possible Cause	Solution
[L7-70] < [L7-71]	Set the parameter properly.

Fault information: 501 The pole pairs of the motor are set incorrectly.

Possible Cause	Solution
The set number of pole pairs is inconsistent with the calculated one, or the rated frequency or rated speed is set incorrectly.	Set the parameter properly.
The rated parameters of some asynchronous motors are marked on the nameplate according to the motor working conditions, resulting in that the marked rated speed is slightly greater than the synchronous speed.	Set the rated speed to a value of synchronous speed minus rated slip. For example, when on the nameplate, the rated frequency is 50 Hz, the rated speed is 1540 RPM, the motor has two poles, and the synchronous speed is 1500 RPM, then the rated speed of the AC drive should be modified to 1460 RPM.

Fault information: 502 Parameter setting on motor nameplate is incorrect. Please check whether the rated voltage, current, and power are set correctly.

Possible Cause	Solution
The motor nameplate marks the rated parameters for the △ and Y types. or under different speeds, and thus the rated parameters set by the user are inconsistent with the actual ones.	Set the parameter properly.
Motor parameters are special.	Ask for technical support.

Fault information: 503 No-load current of asynchronous motor is too large. Please check the motor parameters and auto-tune all motor parameters.

Possible Cause	Solution
The motor parameters are not auto-tuned in no-load or with-load mode.	Auto-tune motor parameters in no-load or with-load mode.
Motor parameters are special. The no-load current deviates from the empirical range.	In V/f mode, run the motor at a speed above 10% of the rated speed, and check the output current. If the output current does not jitter and is close to the no-load current set in d0-10, this parameter is normal. You can shield this alarm by setting bit12 of A11-40 to 1.

Fault information: 504 Rated flux is incorrect. Check whether the mutual inductance or no-load current is correct.

Possible Cause	Solution
The motor parameters are not auto-tuned in no-load or with-load mode.	Auto-tune motor parameters in no-load or with-load mode.
Motor parameters are special. The no-load current deviates from the empirical range.	In V/f mode, run the motor at a speed above 10% of the rated speed, and check the output current. If the output current does not jitter and is close to the no-load current set in d0-10, this parameter is normal. You can shield this alarm by setting bit12 of A11-40 to 1.

Fault information: 505 The rotor resistance of asynchronous motor is abnormal or the rated speed setting is incorrect (d0-05 or d0-04 is set incorrectly).

Possible Cause	Solution
The set rated speed of asynchronous motor is close to or equal to the synchronous speed.	Set the parameter properly.
An error occurred during rotor resistance auto-tuning.	Perform auto-tuning again.
Motor parameters are special.	Ask for technical support.

Fault information: 506 The field weakening curve of asynchronous motor is abnormal.

Possible Cause	Solution
The auto-tuned mutual inductance is abnormal.	Perform auto-tuning again or ask for technical support.
Oscillation occurred during motor rotate auto-tuning.	Set the hundreds position of b5-08 to 1 and then perform auto-tuning again.

Fault information: 507 The number of pole pairs of resolver does not match the number of motor pole pairs. The number of motor pole pairs must be an integer multiple of the number of pole pairs of resolver.

Possible Cause	Solution
The number of motor pole pairs is not an integer multiple of the number of pole pairs of resolver.	Set the parameter properly.

10.7.19.2 Simulation Operation Mode Activated (46-3)

Default fault level: Alarm
Reset method: Auto
Lowest fault level: No action
Highest fault level: Alarm

Error mechanism:

When [A8-22] is set to 1, the simulation operation mode is enabled. When [A8-22] is set to 0, this mode is disabled.

10.7.20 STO Activation Fault (47)

10.7.20.1 STO1 Input Activation (47-1)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

The STO1 terminal input is activated.

Fault diagnosis:

Possible Cause	Solution
STO1 is activated.	Check the wiring and power supply of the STO1 input circuit. Check whether the polarities of STO1-24V input are connected inversely.
The module is faulty.	Ask for technical support.

10.7.20.2 STO2 Input Activation (47-2)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

The STO2 terminal input is activated.

Fault diagnosis:

Possible Cause	Solution
STO2 is activated.	Check the wiring and power supply of the STO2 input circuit. Check whether the polarities of STO2-24V input are connected inversely.
The module is faulty.	Ask for technical support.

10.7.20.3 STO Power Supply Fault (47-4)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The STO-5V power supply is abnormal.	Check the STO input circuit and power supply.
The module is faulty.	Ask for technical support.

10.7.20.4 STO1 Pulse Self-Test Error (47-5)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
An STO1 input circuit error is detected.	Check the wiring and power supply of the STO1 input circuit.
The module is faulty.	Ask for technical support.

10.7.20.5 STO2 Pulse Self-Test Error (47-6)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
An STO2 input circuit error is detected.	Check the wiring and power supply of the STO2 input circuit.
The module is faulty.	Ask for technical support.

10.7.20.6 STO1 Buffer Error (47-7)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
An STO1 logic circuit error is detected.	Check the wiring and power supply of the STO1 logic circuit.
The module is faulty.	Ask for technical support.

10.7.20.7 STO2 Buffer Error (47-8)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
An STO2 logic circuit error is detected.	Check the wiring and power supply of the STO2 logic circuit.
The module is faulty.	Ask for technical support.

10.7.20.8 STO Input Activation (47-9)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

The STO terminal input is activated.

Fault diagnosis:

Possible Cause	Solution
STO is activated.	Check the wiring and power supply of the STO input circuit. Check whether the polarities of STO1-24V or STO2-24V input are connected inversely.
The module is faulty.	Ask for technical support.

10.7.21 Motor Temperature Error (48)

10.7.21.1 Motor Over-Temperature (48-1)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

When the motor temperature detection mode set in E8-22 is not PTC, if the detected motor temperature exceeds the setting of E8-23, the ERR48-1 fault is reported. If the resistance exceeds 4 kΩ, the ERR48-1 fault is reported.

Fault diagnosis:

Possible Cause	Solution
The actual temperature of the motor is high and a motor heat dissipation error occurs.	Enhance motor heat dissipation measures.
After the motor temperature detection is enabled, an incorrect type of motor temperature sensor is selected.	Set the correct type of temperature sensor.
After the motor temperature detection is enabled, the temperature sensor connection is unreliable.	Ensure stable cable connection of the temperature sensor.
The motor over-temperature threshold is too low.	Set E8-23 properly.
The temperature detection module is faulty.	Ask for technical support.

10.7.22 SD Card Error (50)

10.7.22.1 SD Card Not Detected (50-1)

Default fault level: Alarm
Reset method: Auto
Lowest fault level: No action
Highest fault level: Alarm

Error mechanism:

This alarm can be shielded by setting the thousands position of H0-40 to 0.

Fault diagnosis:

Possible Cause	Solution
The SD card is not installed or the SD card is loose.	Reinstall the SD card.
The SD card is damaged.	Replace the SD card.
Other causes	Ask for technical support.

10.7.22.2 SD Card Error (50-2)

Default fault level: Alarm
Reset method: Auto
Lowest fault level: No action
Highest fault level: Alarm

Fault diagnosis:

Possible Cause	Solution
The SD card is loose.	Reinstall the SD card.
The SD card is damaged.	Replace the SD card.
Other causes	Ask for technical support.

10.7.23 RTC Error (51)

10.7.23.1 Insufficient Power Supply for the HCU-RTC Unit (51-1)

Default fault level: Alarm
Reset method: Auto
Lowest fault level: No action
Highest fault level: Alarm

Error mechanism:

This alarm can be shielded by setting the tens position of H0-40 to 0.

Fault diagnosis:

Possible Cause	Solution
The RTC battery provides insufficient power (battery voltage lower than 2.2 V).	Replace the RTC battery.
The module is faulty.	Ask for technical support.

10.7.23.2 HCU-RTC Read/Write Timeout (51-2)

Default fault level: Alarm
Reset method: Power-off and restart
Lowest fault level: No action
Highest fault level: Alarm

Fault diagnosis:

Possible Cause	Solution
The RTC clock chip is faulty.	Ask for technical support.
The RTC periphery circuit is faulty.	Ask for technical support.

10.7.24 Local Control Error (52)

10.7.24.1 IDS Communication Fault (52-1)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

After InoDriveStudio takes control and controls the motor to run for a period of time, InoDriveStudio is disconnected from the drive for a period of time. Then, the InoDriveStudio communication fault Err52-1 is triggered.

Fault diagnosis:

Possible Cause	Solution
The connection between SOP-20-880 and the PC is unreliable or interrupted.	Check whether the connection is reliable.
The connection between SOP-20-880 and the drive is unreliable or interrupted.	Check whether the connection is reliable.
Interference exists.	Check whether the circuit is routed properly, and add magnetic rings to prevent interference.

10.7.24.2 SOP-20 Communication Fault (52-2)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

After SOP-20 takes control and controls the motor to run for a period of time, SOP-20 is disconnected from the drive for a period of time. Then, the SOP-20 communication fault Err52-2 is triggered.

Remarks:

You can set to [A10-05] to 1 to disable SOP-20 communication disconnection detection. The value of [A10-05] is not retained upon power failure and will be restored to the default value 0 after next power-on.

Fault diagnosis:

Possible Cause	Solution
SOP-20 is cascaded with multiple devices. When SOP-20 is used to start one device, it may be switched to other devices.	1. After using SOP-20-880 to control the current device, disable switchover to other devices. 2. Set [A10-05] to 1 to disable SOP-20 communication disconnection detection.
The connection between SOP-20-880 and the drive is unreliable or interrupted.	Check whether the connection is reliable.
Interference exists.	Check whether the cable is routed properly, and add magnetic rings to prevent interference.

10.7.25 Drive Communication Error (53)

10.7.25.1 CRC Error in Data Received by HINT (53-1)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

A CRC error occurred in the data received by HINT from HCU or HPCU.

Remarks:

In H8 models, HCU is connected to HINT through optical fiber. In models H1 to H7, HCU is connected to HINT through DB15 terminal and terminal block.

Fault diagnosis:

Possible Cause	Solution
For H8 models: The optical fiber is in poor contact or loose.	Insert the optical fiber again or replace it.
For H8 models: The optical fiber joint has dust or foreign matters.	Clean or replace the optical fiber.
For H1 to H7 models: Check whether the DB15 terminal and terminal block of HCU and HINT are in poor contact or loose.	Check whether the DB15 terminal and terminal block of HCU and HINT are connected properly.
Other causes	Ask for technical support.

10.7.25.2 HINT Authentication Error (53-2)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

HCU detects that the ID of the HINT board does not match.

Fault diagnosis:

Possible Cause	Solution
The software types of the HINT board and HCU do not match.	Check whether the software types of MCU and HINT board are consistent.
Other causes	Ask for technical support.

10.7.25.3 Data Receiving Failure (53-3)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

HCU failed to receive data sent by the HINT board or HPCU parallel board.

Remarks:

In H8 models, HCU is connected to HINT through optical fiber. In models H1 to H7, HCU is connected to HINT through DB15 terminal and terminal block.

Fault diagnosis:

Possible Cause	Solution
The HINT or HPCU board is not connected or is not supplied with control power.	1. Connect the HINT board or parallel board. 2. Check whether the power supply of the HINT or parallel board is normal.
For H8 models: The optical fiber is in poor contact or loose.	Insert the optical fiber again or replace it.
For H8 models: The optical fiber joint has dust or foreign matters.	Clean or replace the optical fiber.
For H1 to H7 models: Check whether the DB15 terminal and terminal block of HCU and HINT are in poor contact or loose.	Check whether the DB15 terminal and terminal block of HCU and HINT are connected properly.
Other causes	Ask for technical support.

10.7.25.4 CRC Error in Data Received by HCU (53-4)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

A CRC error occurred in the data received by HCU from HINT or HPCU.

Remarks:

In H8 models, HCU is connected to HINT through optical fiber. In models H1 to H7, HCU is connected to HINT through DB15 terminal and terminal block.

Fault diagnosis:

Possible Cause	Solution
For H8 models: The optical fiber is in poor contact or loose.	Insert the optical fiber again or replace it.
For H8 models: The optical fiber joint has dust or foreign matters.	Clean or replace the optical fiber.
For H1 to H7 models: Check whether the DB15 terminal and terminal block of HCU and HINT are in poor contact or loose.	Check whether the DB15 terminal and terminal block of HCU and HINT are connected properly.
Other causes	Ask for technical support.

10.7.25.5 HINT Synchronization Fault (53-5)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

A carrier synchronization command is received from HCU or HPCU out of the specified time.

Remarks:

In H8 models, HCU is connected to HINT through optical fiber. In models H1 to H7, HCU is connected to HINT through DB15 terminal and terminal block.

Fault diagnosis:

Possible Cause	Solution
A communication error occurs.	1. For H8 models: Check whether the optical fiber is loose. For H1 to H7 models: Check whether the DB15 terminal and terminal block of HCU and HINT are connected properly. 2. Ask for technical support.
Other causes	Ask for technical support.

10.7.25.6 PWM Data Write Timeout (53-6)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

MCU does not update the PWM data within the specified time.

Fault diagnosis:

Possible Cause	Solution
The MCU execution time is insufficient.	1. Decrease the carrier frequency. 2. Decrease the oversampling channels. 3. Ask for technical support.
Other causes	Ask for technical support.

10.7.25.7 Data Receiving Failure of HINT (53-7)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

HINT failed to receive data from HCU or HPCU.

Remarks:

In H8 models, HCU is connected to HINT through optical fiber. In models H1 to H7, HCU is connected to HINT through DB15 terminal and terminal block.

Fault diagnosis:

Possible Cause	Solution
For H8 models: The optical fiber is in poor contact or loose.	Insert the optical fiber again or replace it.
For H8 models: The optical fiber joint has dust or foreign matters.	Clean or replace the optical fiber.

Possible Cause	Solution
For H1 to H7 models: Check whether the DB15 terminal and terminal block of HCU and HINT are in poor contact or loose.	Check whether the DB15 terminal and terminal block of HCU and HINT are connected properly.
Other causes	Ask for technical support.

10.7.25.8 CRC Error in Data Received by HPCU from HCU (53-8)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

A CRC error occurred in the data received by HPCU from HCU.

Fault diagnosis:

Possible Cause	Solution
The optical fiber is in poor contact or loose.	Insert the optical fiber again or replace it.
The optical fiber joint has dust or foreign matters.	Clean or replace the optical fiber.
Other causes	Ask for technical support.

10.7.25.9 Data Reception Failure of HPCU from HCU (53-9)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

HPCU failed to receive data from HCU.

Fault diagnosis:

Possible Cause	Solution
The optical fiber is in poor contact or loose.	Insert the optical fiber again or replace it.
The optical fiber joint has dust or foreign matters.	Clean or replace the optical fiber.
Other causes	Ask for technical support.

10.7.25.10 CRC Error in Data Received by HPCU from HINT (53-10)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

A CRC error occurred in the data received by HPCU from HINT.

Fault diagnosis:

Possible Cause	Solution
The optical fiber is in poor contact or loose.	Insert the optical fiber again or replace it.
The optical fiber joint has dust or foreign matters.	Clean or replace the optical fiber.
Other causes	Ask for technical support.

10.7.25.11 Data Reception Failure of HPCU from HINT (53-11)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

HPCU failed to receive data from HINT.

Fault diagnosis:

Possible Cause	Solution
HINT is not energized or the optical fiber is disconnected.	1. Check whether the HINT power supply is normal. 2. Check whether the optical fiber loop is normal.
The optical fiber is in poor contact or loose.	Insert the optical fiber again or replace it.
The optical fiber joint has dust or foreign matters.	Clean or replace the optical fiber.
Other causes	Ask for technical support.

10.7.25.12 HPCU Synchronization Fault (53-12)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

A carrier synchronization command is received from HCU out of the specified time.

Fault diagnosis:

Possible Cause	Solution
A communication error occurs.	1. Check whether the optical fiber is loose. 2. Ask for technical support.
Other causes	Ask for technical support.

10.7.25.13 HINT Not Ready (53-13)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

A RUN command is generated when HINT is not powered on yet.

Fault diagnosis:

Possible Cause	Solution
A RUN command is generated when HINT is not powered on yet.	Run the device after HINT is powered on.
The HINT control power is abnormal.	Check whether the HINT control power is normal.
Other causes	Ask for technical support.

10.7.26 IGBT Drive Error (57)

10.7.26.1 IGBT Drive Error (57-1)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

FPGA detects that the IGBT feedback signal of the u phase upper bridge is abnormal.

Fault diagnosis:

Possible Cause	Solution
The drive output circuit is grounded or short-circuited.	1. Check whether the output cable and motor are grounded 2. Check the motor cable for inter-phase short circuit. 3. If the motor cable is not in good contact, tighten the wiring screws.
IGBT is damaged	Ask for technical support.
The power board is damaged.	Replace the power board.
The cable between the interface board and the power board is not reliably connected.	Check whether the cable is reliably connected.
The cable between the power board and the gate driver board is not reliably connected.	Check whether the cable is reliably connected.
Other causes	Ask for technical support.

10.7.26.2 U Phase Lower Bridge Fault (57-2)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

FPGA detects that the IGBT feedback signal of the U phase lower bridge is abnormal.

Fault diagnosis:

Possible Cause	Solution
The drive output circuit is grounded or short-circuited.	1. Check whether the output cable and motor are grounded 2. Check the motor cable for inter-phase short circuit. 3. If the motor cable is not in good contact, tighten the wiring screws.
IGBT is damaged	Ask for technical support.
The power board is damaged.	Replace the power board.
The cable between the interface board and the power board is not reliably connected.	Check whether the cable is reliably connected.
The cable between the power board and the gate driver board is not reliably connected.	Check whether the cable is reliably connected.
Other causes	Ask for technical support.

10.7.26.3 V Phase Upper Bridge Fault (57-3)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

FPGA detects that the IGBT feedback signal of the V phase upper bridge is abnormal.

Fault diagnosis:

Possible Cause	Solution
The drive output circuit is grounded or short-circuited.	1. Check whether the output cable and motor are grounded 2. Check the motor cable for inter-phase short circuit. 3. If the motor cable is not in good contact, tighten the wiring screws.
IGBT is damaged	Ask for technical support.
The power board is damaged.	Replace the power board.
The cable between the interface board and the power board is not reliably connected.	Check whether the cable is reliably connected.
The cable between the power board and the gate driver board is not reliably connected.	Check whether the cable is reliably connected.
Other causes	Ask for technical support.

10.7.26.4 V Phase Lower Bridge Fault (57-4)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

FPGA detects that the IGBT feedback signal of the V phase lower bridge is abnormal.

Fault diagnosis:

Possible Cause	Solution
The drive output circuit is grounded or short-circuited.	1. Check whether the output cable and motor are grounded 2. Check the motor cable for inter-phase short circuit. 3. If the motor cable is not in good contact, tighten the wiring screws.
IGBT is damaged	Ask for technical support.
The power board is damaged.	Replace the power board.
The cable between the interface board and the power board is not reliably connected.	Check whether the cable is reliably connected.
The cable between the power board and the gate driver board is not reliably connected.	Check whether the cable is reliably connected.
Other causes	Ask for technical support.

10.7.26.5 W Phase Upper Bridge Fault (57-5)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

FPGA detects that the IGBT feedback signal of the W phase upper bridge is abnormal.

Fault diagnosis:

Possible Cause	Solution
The drive output circuit is grounded or short-circuited.	1. Check whether the output cable and motor are grounded 2. Check the motor cable for inter-phase short circuit. 3. If the motor cable is not in good contact, tighten the wiring screws.
IGBT is damaged	Ask for technical support.
The power board is damaged.	Replace the power board.
The cable between the interface board and the power board is not reliably connected.	Check whether the cable is reliably connected.
The cable between the power board and the gate driver board is not reliably connected.	Check whether the cable is reliably connected.
Other causes	Ask for technical support.

10.7.26.6 W Phase Lower Bridge Fault (57-6)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

FPGA detects that the IGBT feedback signal of the W phase lower bridge is abnormal.

Fault diagnosis:

Possible Cause	Solution
The drive output circuit is grounded or short-circuited.	1. Check whether the output cable and motor are grounded 2. Check the motor cable for inter-phase short circuit. 3. If the motor cable is not in good contact, tighten the wiring screws.
IGBT is damaged	Ask for technical support.
The power board is damaged.	Replace the power board.
The cable between the interface board and the power board is not reliably connected.	Check whether the cable is reliably connected.
The cable between the power board and the gate driver board is not reliably connected.	Check whether the cable is reliably connected.
Other causes	Ask for technical support.

10.7.26.7 IGBT Module Fault (57-7)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

FPGA detects that the feedback signal of the IGBT module is abnormal in parallel mode.

Fault diagnosis:

Possible Cause	Solution
The drive output circuit is grounded or short-circuited.	1. Check whether the output cable and motor are grounded 2. Check the motor cable for inter-phase short circuit. 3. If the motor cable is not in good contact, tighten the wiring screws.
IGBT is damaged	Ask for technical support.
The power board is damaged.	Replace the power board.
The cable between the interface board and the power board is not reliably connected.	Check whether the cable is reliably connected.
The cable between the power board and the gate driver board is not reliably connected.	Check whether the cable is reliably connected.
Other causes	Ask for technical support.

10.7.27 Self-Test Fault (58)

10.7.27.1 Self-Test Fault (58-1)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

IGBT short circuit is detected.

Fault diagnosis:

Possible Cause	Solution
The IGBT module is short circuited.	Replace IGBT.
Other causes	Ask for technical support.

10.7.27.2 AC Drive Output Side Short-Circuited (58-2)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

The AC drive output side is short-circuited.

Fault diagnosis:

Possible Cause	Solution
Check for inter-phase short circuit at the output side.	Use the tramegger for detection.
Check the output side for short circuit to ground.	Use the tramegger for detection.
Other causes	Ask for technical support.

10.7.27.3 AC Drive Output Phase Loss (58-3)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

During self-test, the output end cannot detect the current.

Fault diagnosis:

Possible Cause	Solution
Output phase loss occurs.	Check the motor wiring.
Other causes	Ask for technical support.

10.7.27.4 Sensor Detection Error (58-4)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

The detected current is infinite.

Fault diagnosis:

Possible Cause	Solution
The Hall power supply is abnormal.	Check the Hall power supply.
The Hall sensor is disconnected.	Check the Hall sensor for poor contact or disconnection.
Other causes	Ask for technical support.

10.7.27.5 Sensor Inversely Installed (58-5)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

The current is reversed because the sensor is installed inversely.

Fault diagnosis:

Possible Cause	Solution
The sensor is installed inversely.	Correct the sensor installation direction.
Other causes	Ask for technical support.

10.7.27.6 Short Circuit to Ground (58-6)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

The current to ground is out of the range.

Fault diagnosis:

Possible Cause	Solution
The output end is short circuited to ground.	Check the insulation to ground of the output end.
Other causes	Ask for technical support.

10.7.27.7 Three-Phase Current Unbalance (58-7)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

The difference between detected currents of three phases is large.

Fault diagnosis:

Possible Cause	Solution
The load at the output end is unbalanced.	Check whether the load is normal.
The detected currents or Hall sensors are inconsistent.	Ask for technical support.
Other causes	Ask for technical support.

10.7.27.8 Two-Phase Current Unbalance (58-8)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

The difference between detected currents of two phases is large.

Fault diagnosis:

Possible Cause	Solution
The load at the output end is unbalanced.	Check whether the load is normal.
The detected currents or Hall sensors are inconsistent.	Ask for technical support.
Other causes	Ask for technical support.

10.7.27.9 Self-Test Process Interrupted (58-16)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

The RUN command disappears during self-test.

Fault diagnosis:

Possible Cause	Solution
The self-test process is interrupted.	Ensure that the start/stop control word is normal in the self-test process.
An error occurred during self-test.	Troubleshoot problems based on fault reports.
The device stops during self-test.	Reset the fault.

10.7.28 Low Module Temperature (59)

10.7.28.1 U Phase Module Low Temperature (59-1)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

The detected temperature of the module U phase (U7-09) is lower than the low temperature fault detection threshold set in A4-22.

Fault diagnosis:

Possible Cause	Solution
The temperature sampling circuit connection is abnormal.	Check whether the temperature sampling circuit connection is normal.
The ambient temperature is too low.	Raise the ambient temperature by turning on the air conditioner or heater.
The thermistor of the module is faulty.	Ask for technical support.
The low temperature fault detection threshold (A4-22) is too high.	Set A4-22 properly.

10.7.28.2 V Phase Module Low Temperature (59-2)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

The detected temperature of the module V phase (U7-10) is lower than the low temperature fault detection threshold set in A4-22.

Fault diagnosis:

Possible Cause	Solution
The temperature sampling circuit connection is abnormal.	Check whether the temperature sampling circuit connection is normal.
The ambient temperature is too low.	Raise the ambient temperature by turning on the air conditioner or heater.
The thermistor of the module is faulty.	Ask for technical support.
The low temperature fault detection threshold (A4-22) is too high.	Set A4-22 properly.

10.7.28.3 W Phase Module Low Temperature (59-3)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Alarm	Highest fault level: Coast to stop

Error mechanism:

The detected temperature of the module W phase (U7-11) is lower than the low temperature fault detection threshold set in A4-22.

Fault diagnosis:

Possible Cause	Solution
The temperature sampling circuit connection is abnormal.	Check whether the temperature sampling circuit connection is normal.
The ambient temperature is too low.	Raise the ambient temperature by turning on the air conditioner or heater.
The thermistor of the module is faulty.	Ask for technical support.
The low temperature fault detection threshold (A4-22) is too high.	Set A4-22 properly.

10.7.28.4 Rectifier Module Low Temperature (59-4)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Alarm	Highest fault level: Coast to stop

Error mechanism:

The detected rectifier temperature (U5-09) of the HE200 or HE300 series inverters is lower than the low temperature fault detection threshold set in A4-22.

Fault diagnosis:

Possible Cause	Solution
The temperature sampling circuit connection is abnormal.	Check whether the temperature sampling circuit connection is normal.
The ambient temperature is too low.	Raise the ambient temperature by turning on the air conditioner or heater.
The thermistor of the module is faulty.	Ask for technical support.
The low temperature fault detection threshold (A4-22) is too high.	Set A4-22 properly.

10.7.29 Ambient Temperature Error (60)

10.7.29.1 High Ambient Temperature (60-1)

Default fault level: Alarm	Reset method: Auto
Lowest fault level: Alarm	Highest fault level: Alarm

Error mechanism:

When the ambient temperature of the HE200/HE300 series inverter cavity is above 65°C, Err60-1 will be reported.

Fault diagnosis:

Possible Cause	Solution
The ambient temperature is high.	Decrease the ambient temperature.
The fan is damaged.	Replace the fan.
The thermistor of the module is faulty.	Ask for technical support.

10.7.30 Speed Search Failure (61)

10.7.30.1 Excessive Flying Start Current (61-1)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

During flying start, the output current is greater than 1.8 times the rated motor current.

Fault diagnosis:

Possible Cause	Solution
Flying start is immediately started upon stop and the motor runs abnormally due to residual magnetism.	Increase the demagnetization time in E1-13.
Motor auto-tuning is not performed.	Perform motor auto-tuning again.
Other causes	Ask for technical support.

10.7.30.2 Flying Start Time Too Long (61-2)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

Flying start is not completed over the time specified in E7-04.

Fault diagnosis:

Possible Cause	Solution
The flying start time is set to a small value.	Increase the flying start time in E7-04.
Motor parameters are set incorrectly.	Set basic parameters of the motor correctly, and carry out auto-tuning for the motor parameters again.
Flying start is faulty.	Ask for technical support.

10.7.30.3 HSVM Card Not Connected or Enabled (61-5)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

HSVM is used for synchronous motor speed flying start in SVC mode. However, the HSVM card is not enabled or the HSVM optical fiber is not connected.

Fault diagnosis:

Possible Cause	Solution
HSVM is used for synchronous motor speed flying start in SVC mode. However, the HSVM card is not enabled or connected.	Check whether the sync voltage sampling card is properly connected.

10.7.31 External Alarm (63)

10.7.31.1 External Alarm 1 (63-1)

Default fault level: Alarm
Reset method: Auto
Lowest fault level: Alarm
Highest fault level: Alarm

Error mechanism:

When [H0-02] is set to 1, the 63-1 external alarm 1 is triggered.

Fault diagnosis:

Possible Cause	Solution
The setting source of the H0-02 parameter is active.	Check whether the setting source is active.
H0-02 is set incorrectly.	1. Set H0-02 to 0. 2. Set H0-02 correctly.

10.7.31.2 External Alarm 2 (63-2)

Default fault level: Alarm
Reset method: Auto
Lowest fault level: Alarm
Highest fault level: Alarm

Error mechanism:

When [H0-03] is set to 1, the 63-2 external alarm 2 is triggered.

Fault diagnosis:

Possible Cause	Solution
The setting source of the H0-03 parameter is active.	Check whether the setting source is active.
H0-03 is set incorrectly.	1. Set H0-03 to 0. 2. Set H0-03 correctly.

10.7.31.3 Motor Over-Temperature Alarm (63-3)

Default fault level: Alarm
Reset method: Auto
Lowest fault level: Alarm
Highest fault level: Alarm

Error mechanism:

The motor temperature exceeds the protection threshold set in E8-24.

Fault diagnosis:

Possible Cause	Solution
The motor cooling fan is blocked or abnormal.	Check whether the motor cooling fan and air outlet are normal.
The motor load is too large.	Check whether the motor is overloaded for a long time.
The temperature detection circuit is abnormal.	Check the temperature detection circuit wiring.
The motor temperature detection mode set in [E8-22] is incorrect.	Correct the motor temperature detection mode. 1. Check whether the signal source is PG card or AI terminal. 2. Check whether the sensor type is correct.
The motor over-temperature alarm threshold set in [E8-24] is inappropriate.	Check whether the motor over-temperature protection threshold is too low.
Other causes	Ask for technical support.

10.7.31.4 OFF2 or OFF3 Stop (63-4)

Default fault level: Alarm
Reset method: Auto
Lowest fault level: Alarm
Highest fault level: Alarm

Error mechanism:

OFF2 or OFF3 is activated and thus the OFF2/OFF3 activated alarm 64-3 is triggered.

Remarks:

This alarm can be shielded by setting the ones position of H0-40 to 0.

Fault diagnosis:

Possible Cause	Solution
OFF2 or OFF3 of the selected control channel is activated upon start/stop in control channel mode.	Check whether OFF2 or OFF3 in the start/stop control word and other control words is activated.
OFF2 source 2, OFF2 source 3, OFF3 source 2, or OFF3 source 3 is activated in other control words of the selected control channel.	Check whether OFF2 source 2, OFF2 source 3, OFF3 source 2, or OFF3 source 3 is activated in other control words of the selected control channel.
OFF2/OFF3 is not selected on the control panel in InoDriveStudio control mode.	Select OFF2/OFF3 on the control panel in InoDriveStudio control mode.

10.7.32 Pre-Charge Failure (64)

10.7.32.1 Pre-Charge Failure (64-1)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

During startup, when the state machine enters S6 (pre-charge), the detected bus voltage is too low.

Fault diagnosis:

Possible Cause	Solution
The DC bus is not energized or the voltage is low.	Adjust the DC bus voltage to the normal range.
An improper drive voltage class is selected.	Select an appropriate AC drive model with a matching voltage class.
The drive model is incorrectly set.	Ask for technical support.
The drive is started before the DC bus voltage pre-charge is completed.	Start the drive when the DC bus voltage is normal.
The DC bus voltage correction coefficient is inappropriate.	Check whether the DC voltage sampling gain (A3-06) is set incorrectly.
The pre-charge resistor, driver board, or control board is abnormal.	Ask for technical support.
The DC bus voltage is incorrectly displayed.	Ask for technical support.

10.7.32.2 Pre-Charge Failure (64-2)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

During startup, when the state machine enters S6 (pre-charge), the detected bus voltage is normal but HINT is not ready.

Fault diagnosis:

Possible Cause	Solution
The interface board is faulty.	Ask for technical support.

10.7.33 Parameter Processing Error (65)

10.7.33.1 Factory Defaults Restoration Interrupted (65-1)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

Parameter restoration or fault record clearing is interrupted due to drive power failure or other reasons. Then, the fault Err65-1 is triggered when the drive is powered on again. You can restore parameters to clear the fault.

Fault diagnosis:

Possible Cause	Solution
The drive is powered off when parameters are being restored or fault records are being cleared.	Restore parameters to clear the fault.
Other causes	Ask for technical support.

10.7.33.2 Parameter Downloading Interrupted (Restoring from the SD Card) (65-2)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

Parameter downloading is interrupted due to HCU power failure or SD card error. Then, the fault 65-2 is triggered when the AC drive is powered on again.

Fault diagnosis:

Possible Cause	Solution
The controller is powered off during parameter downloading.	Locate the cause for power failure and download the parameters after re-power-on.
Other causes	Ask for technical support.

10.7.33.3 Parameter Cache Capacity Exceeded (65-3)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

A large number of EEPROM parameter save operations are required, causing overflow of the parameter saving queue.

Fault diagnosis:

Possible Cause	Solution
A large number of parameter write operations are required.	Prevent repeated parameter write operations.
Other causes	Ask for technical support.

10.7.33.4 Parameter Storage Timeout During Parameter Download (65-4)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

Parameter storage times out during parameter download.

Fault diagnosis:

Possible Cause	Solution
An SD card error occurs.	Replace the SD card.
Other causes	Ask for technical support.

10.7.34 Leakage Current (66)

10.7.34.1 Excessive Leakage Current (Software Detection) (66-2)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Alarm	Highest fault level: Coast to stop

Error mechanism:

The leakage current detected by the software is greater than the leakage current detection threshold set in E8-12.

Fault diagnosis:

Possible Cause	Solution
The leakage current detection threshold set in E8-12 is too small.	Adjust the leakage current detection threshold in E8-12.
The positive and negative buses are not grounded properly.	Check whether the positive and negative buses are properly grounded.
The current detection circuit is abnormal.	Check whether the current detection circuit is normal.
Other causes	Ask for technical support.

10.7.35 Communication Card Error of Fieldbus Adapter A (67)

10.7.35.1 External Bus Timeout of Adapter A (67-1)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Alarm	Highest fault level: Coast to stop

Error mechanism:

External bus communication is interrupted and the process data is not received. A fault is reported for communication interruption and an alarm is reported for disconnection.

Remarks:

1. In PROFIBUS-DP communication, [n16-10] (bit10 of DP data check bit PZD1) is 1 by default; otherwise, all input process data are invalid. You can set the check bit of input PZD1 in [n16-10]. When n16-10 is 1, no check is performed.
2. When the communication disconnection detection time in [n1-01] is set to 0, this fault is shielded.

Fault diagnosis:

Possible Cause	Solution
The external bus is disconnected.	1. Check whether the circuit is disconnected or the connection is unreliable. 2. Check whether the master PLC works normally.
The wiring is abnormal.	1. Check whether the reception and transmission wiring is normal. 2. Check whether the connector connection is reliable. 3. Check whether the circuit positive and negative electrodes are connected correctly.

Possible Cause	Solution
The termination resistor does not match.	1. Check whether the termination resistor is connected. 2. Check whether the resistance of the termination resistor is matching.
The check bit during PROFIBUS-DP communication is abnormal.	DP data check bit [n16-10]
Parameters are set incorrectly.	1. Check whether the communication baud rates are inconsistent. 2. Check whether the communication station number is incorrect or conflicts.
Other causes	Ask for technical support.

10.7.35.2 Incorrect Communication Parameter Setting (Address or Baud Rate) for Adapter A (67-2)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The station number or baud rate is incorrectly set.	Set the baud rate and station number correctly.
Other causes	Ask for technical support.

10.7.35.3 Bus Address Conflict of Adapter A (67-3)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The address settings of slave stations conflict.	Reset the slave station addresses.
Other causes	Ask for technical support.

10.7.35.4 EtherCAT EEPROM Load Error of Adapter A (67-7)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
An EEPROM load error occurred on the EtherCAT card.	Ask for technical support.
Other causes	Ask for technical support.

10.7.35.5 Communication Card Initialization Error of Adapter A (67-8)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The initialization communication parameters of the communication card are abnormal.	Ask for technical support.
Other causes	Ask for technical support.

10.7.35.6 EtherCAT Master Station Switchover Error of Adapter A (67-9)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The master state switchover is incorrect.	Check the master/slave communication configuration.
Other causes	Ask for technical support.

10.7.35.7 Synchronization Signal Error of Adapter A (67-10)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

The expansion slot settings in n4-00 and n5-00 are the same.

Fault diagnosis:

Possible Cause	Solution
The synchronization signal loss count exceeds the limit.	Check the master station real-time performance. Check the communication network and reduce interference.
Other causes	Ask for technical support.

10.7.35.8 PDI Synchronization Signal Error of Adapter A (67-11)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The PDI synchronization signal loss count exceeds the limit.	Check the master station real-time performance. Check the communication network and reduce interference.
Other causes	Ask for technical support.

10.7.35.9 Check Error in Data Received by Communication Card of Adapter A (67-15)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

The number of CRC errors in the data received by the fieldbus adapter reaches the setpoint of n1-03.

Remarks:

The fault is not detected when n1-03 is set to 0.

Fault diagnosis:

Possible Cause	Solution
The circuit has interference.	1. Check whether the wiring and shield meet the requirements. 2. Increase the value of n1-03.
The termination resistor does not match.	1. Check whether the termination resistor is connected. 2. Check whether the resistance of the termination resistor is matching.
Other causes	Ask for technical support.

10.7.35.10 Check Error in Data Sent by Communication Card of Adapter A (67-16)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Alarm	Highest fault level: Coast to stop

Error mechanism:

The number of CRC errors in the data received by the fieldbus adapter reaches the setpoint of n1-03.

Remarks:

The fault is not detected when n1-03 is set to 0.

Fault diagnosis:

Possible Cause	Solution
The circuit has interference.	Check whether the wiring and shield meet the requirements.
n1-03 is set to a too small value.	Set n1-03 again.
Other causes	Ask for technical support.

10.7.36 Communication Card Error of Fieldbus Adapter B (68)

10.7.36.1 External Bus Timeout of Adapter B (68-1)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Alarm	Highest fault level: Coast to stop

Error mechanism:

External bus communication is interrupted and the process data is not received. A fault is reported for communication interruption and an alarm is reported for disconnection.

Remarks:

1. In PROFIBUS-DP communication, [n16-10] (bit10 of DP data check bit PZD1) is 1 by default; otherwise, all input process data are invalid. You can set the check bit of input PZD1 in [n16-10]. When n16-10 is 1, no check is performed.
2. When the communication disconnection detection time in [n2-01] is set to 0, this fault is shielded.

Fault diagnosis:

Possible Cause	Solution
The external bus is disconnected.	1. Check whether the circuit is disconnected or the connection is unreliable. 2. Check whether the master PLC works normally.
The wiring is abnormal.	1. Check whether the reception and transmission wiring is normal. 2. Check whether the connector connection is reliable. 3. Check whether the circuit positive and negative electrodes are connected correctly.
The termination resistor does not match.	1. Check whether the termination resistor is connected. 2. Check whether the resistance of the termination resistor is matching.
The check bit during PROFIBUS-DP communication is abnormal.	DP data check bit [n16-10]
Parameters are set incorrectly.	1. Check whether the communication baud rates are inconsistent. 2. Check whether the communication station number is incorrect or conflicts.
Other causes	Ask for technical support.

10.7.36.2 Incorrect Communication Parameter Setting (Address or Baud Rate) for Adapter B (68-2)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The station number or baud rate is incorrectly set.	Set the baud rate and station number correctly.
Other causes	Ask for technical support.

10.7.36.3 Bus Address Conflict of Adapter B (68-3)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The address settings of slave stations conflict.	Reset the slave station addresses.
Other causes	Ask for technical support.

10.7.36.4 EtherCAT EEPROM Load Error of Adapter B (68-7)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
An EEPROM load error occurred on the EtherCAT card.	Ask for technical support.
Other causes	Ask for technical support.

10.7.36.5 Communication Card Initialization Error of Adapter B (68-8)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The initialization communication parameters of the communication card are abnormal.	Ask for technical support.
Other causes	Ask for technical support.

10.7.36.6 EtherCAT Master Station Switchover Error of Adapter B (68-9)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The master state switchover is incorrect.	Check the master/slave communication configuration.
Other causes	Ask for technical support.

10.7.36.7 Synchronization Signal Error of Adapter B (68-10)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The synchronization signal loss count exceeds the limit.	Check the master station real-time performance. Check the communication network and reduce interference.
Other causes	Ask for technical support.

10.7.36.8 PDI Synchronization Signal Error of Adapter B (68-11)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The PDI synchronization signal loss count exceeds the limit.	Check the master station real-time performance. Check the communication network and reduce interference.
Other causes	Ask for technical support.

10.7.36.9 Check Error in Data Received by Communication Card of Adapter B (68-15)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Alarm	Highest fault level: Coast to stop

Error mechanism:

The number of CRC errors in the data received by the fieldbus adapter reaches the setpoint of n2-03.

Remarks:

The fault is not detected when n2-03 is set to 0.

Fault diagnosis:

Possible Cause	Solution
The circuit has interference.	Check whether the wiring and shield meet the requirements.
n2-03 is set to a too small value.	Set n2-03 again.
Other causes	Ask for technical support.

10.7.36.10 Check Error in Data Sent by Communication Card of Adapter B (68-16)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

The number of CRC errors in the data received by the fieldbus adapter reaches the setpoint of n2-03.

Remarks:

The fault is not detected when n2-03 is set to 0.

Fault diagnosis:

Possible Cause	Solution
The circuit has interference.	Check whether the wiring and shield meet the requirements.
n2-03 is set to a too small value.	Set n2-03 again.
Other causes	Ask for technical support.

10.7.37 Communication Card Error of Redundant Adapter (69)

10.7.37.1 69-1 External Bus Timeout

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Alarm	Highest fault level: Coast to stop

Error mechanism:

External bus communication is interrupted and the process data is not received. A fault is reported for communication interruption and an alarm is reported for disconnection.

Remarks:

1. In PROFIBUS-DP communication, [n16-10] (bit10 of DP data check bit PZD1) is 1 by default; otherwise, all input process data are invalid. You can set the check bit of input PZD1 in [n16-10]. When n16-10 is 1, no check is performed.

Fault diagnosis:

Possible Cause	Solution
The external bus is disconnected.	1. Check whether the circuit is disconnected or the connection is unreliable. 2. Check whether the master PLC works normally.
The wiring is abnormal.	1. Check whether the reception and transmission wiring is normal. 2. Check whether the connector connection is reliable. 3. Check whether the circuit positive and negative electrodes are connected correctly.
The termination resistor does not match.	1. Check whether the termination resistor is connected. 2. Check whether the resistance of the termination resistor is matching.
The check bit during PROFIBUS-DP communication is abnormal.	DP data check bit [n16-10]
Parameters are set incorrectly.	1. Check whether the communication baud rates are inconsistent. 2. Check whether the communication station number is incorrect or conflicts.
Other causes	Ask for technical support.

10.7.37.2 Incorrect Communication Parameter Setting (Address or Baud Rate) (69-2)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Alarm	Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The station number or baud rate is incorrectly set.	Set the baud rate and station number correctly.
Other causes	Ask for technical support.

10.7.37.3 Bus Address Conflict (69-3)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The address settings of slave stations conflict.	Reset the slave station addresses.
Other causes	Ask for technical support.

10.7.37.4 EtherCAT EEPROM Load Error (69-7)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
An EEPROM load error occurred on the EtherCAT card.	Ask for technical support.
Other causes	Ask for technical support.

10.7.37.5 Communication Card Initialization Error (69-8)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The initialization communication parameters of the communication card are abnormal.	Ask for technical support.
Other causes	Ask for technical support.

10.7.37.6 EtherCAT Master Station Switchover Error (69-9)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The master state switchover is incorrect.	Check the master/slave communication configuration.
Other causes	Ask for technical support.

10.7.37.7 Check Error in Data Received by Communication Card (69-15)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The circuit has interference.	Check whether the wiring and shield meet the requirements.
Other causes	Ask for technical support.

10.7.37.8 Check Error in Data Sent by Communication Card (69-16)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The circuit has interference.	Check whether the wiring and shield meet the requirements.
Other causes	Ask for technical support.

10.7.38 Inverter Fan Error (70)

10.7.38.1 HE Inverter Fan Phase Sequence Error (70-1)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

Before running, the HE200 or HE300 series models monitor the fan phase sequence based on the DI signal status fed back by the fan phase sequence.

Remarks:

The fan phase sequence error signal of the HE models is displayed in bit6 of A15-94, with the value 1 indicating abnormal.

Fault diagnosis:

Possible Cause	Solution
The fan phase sequence is inversed.	Check and adjust the fan phase sequence.
The phase sequence detection circuit is abnormal or has phase loss.	Check whether the input power supply of the phase sequence detector is too low or has phase loss.
The fan phase sequence detector is damaged.	Replace the fan phase sequence detector.
Other causes	Ask for technical support.

10.7.38.2 HE Inverter Fan Over-Temperature (70-2)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

The inverter fan status error Err70-2 will be reported when the HE200 or HE300 series models receive the DI feedback signal that the fan running status is abnormal.

Remarks:

The fan status error signal of the HE models is displayed in bit5 of A15-94, with the value 1 indicating abnormal.

Fault diagnosis:

Possible Cause	Solution
The fan is overheated.	1. Check the fan for locked-rotor. 2. Check the fan for phase loss.
The DI feedback circuit is abnormal.	Check whether the fan feedback DI signal is loose or disconnected.
Other causes	Ask for technical support.

10.7.39 Rectifier Self-Test Fault (71)

10.7.39.1 Rectifier Braking Self-Test Fault (71-1)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The braking resistance is too large or too small.	Check whether the braking resistor is appropriate. Check whether the braking resistor is connected properly.
Other causes	Ask for technical support.

10.7.40 Pre-Charge Error (72)

10.7.40.1 Pre-Charge Timeout (72-1)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
Other causes	Ask for technical support.

10.7.40.2 Basic Rectifier Pre-Charge Timeout (72-2)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
5s after pre-charge, the 400 V system bus voltage does not reach 350 V, and the 690 V system bus voltage does not reach 600 V.	Check whether the feedback signal of the main contactor is normal.
Other causes	Ask for technical support.

10.7.40.3 Rectifier Unit Not Started (72-4)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

When the HE models work in the rectifier parallel mode ([A14-36] set to 1), the power-on statuses of the rectifier units 1 and 2 are inconsistent in 1s.

Remarks:

The power-on status of the rectifier units 1 and 2 can be viewed in [A14-20] and [A14-21].

Fault diagnosis:

Possible Cause	Solution
Other causes	Ask for technical support.

10.7.41 Pre-Charge Hardware Error (73)

10.7.41.1 Main Circuit Breaker Feedback Error (73-1)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The main circuit breaker feedback status does not match that of the control signal.	Ask for technical support.

10.7.41.2 Power Board Undervoltage (HE200-D2) (73-2)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
Other causes	Ask for technical support.

10.7.41.3 Pre-Charge Contactor Feedback Error (Single Drive) (73-3)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Remarks:

If bit14 of A15-71 is 1, the single-drive pre-charge contactor feedback is abnormal.

Fault diagnosis:

Possible Cause	Solution
The feedback signal of the single-drive pre-charge contactor is abnormal.	Check whether the feedback signal of the auxiliary contactor is properly connected.
Other causes	Ask for technical support.

10.7.41.4 Rectifier Bridge Error (Single-Drive) (73-4)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Remarks:

ERR73-4 is reported only for the 690 V single-drive model.

Fault diagnosis:

Possible Cause	Solution
Pre-charge resistor overload occurred due to the rectifier bridge fault.	Check whether the rectifier bridge is properly triggered.
Other causes	Ask for technical support.

10.7.42 Rectifier Braking Unit Fault (74)

10.7.42.1 Braking Transistor Overcurrent (74-1)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Remarks:

ERR74-1 is reported only in the HE200 or HE300 series rectifiers.

Fault diagnosis:

Possible Cause	Solution
During braking, the braking current is too large.	Check whether the braking resistance is too small. Check whether the brake is short-circuited.
Other causes	Ask for technical support.

10.7.42.2 High Braking Transistor Temperature (74-2)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

For HE200 or HE300 series inverters with a brake unit, if the braking transistor temperature detected by the system is above 95°C, this fault is reported.

Fault diagnosis:

Possible Cause	Solution
The ambient temperature is high.	Decrease the ambient temperature. Ensure that the temperature at the air inlet is no more than 40°C.
The air filter is blocked.	Clean the air filter.
Fan error: 1. The fan stops rotating or rotates at a speed. 2. The power supply board of the fan is faulty.	1. Replace the fan. 2. Replace the fan power supply board.
The thermistor of the module is faulty.	Ask for technical support.
Braking is applied too frequently.	Ask for technical support.
Other causes	Ask for technical support.

10.7.42.3 Braking IGBT-Vce Fault (74-3)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Alarm	Highest fault level: Coast to stop

Remarks:

ERR74-3 is reported only in the HE200 or HE300 series rectifiers.

Fault diagnosis:

Possible Cause	Solution
The braking IGBT is damaged, or the braking resistor is short-circuited.	1. Check whether the braking resistor circuit is normal. 2. Check the braking IGBT.
Other causes	Ask for technical support.

10.7.42.4 Braking IGBT Short Circuit (74-4)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Alarm	Highest fault level: Coast to stop

Remarks:

ERR74-4 is reported only in the HE200 or HE300 series rectifiers.

Fault diagnosis:

Possible Cause	Solution
The braking IGBT is damaged or short-circuited.	1. Check whether the braking transistor is damaged. 2. Check whether the braking IGBT is short-circuited.
Other causes	Ask for technical support.

10.7.42.5 Braking Transistor Temperature Too Low or Not Connected to the NTC (74-5)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Alarm	Highest fault level: Coast to stop

Error mechanism:

For HE200 or HE300 series inverters with a brake unit, if the braking transistor temperature detected by the system is lower than the setting of A4-22, this fault is reported.

Fault diagnosis:

Possible Cause	Solution
The ambient temperature is too low.	Raise the ambient temperature by turning on the air conditioner or heater.
The temperature sampling circuit connection is abnormal.	Check whether the temperature sampling circuit connection is normal.
The thermistor of the module is faulty.	Ask for technical support.
The low temperature alarm threshold (A4-22) is too high.	Set A4-22 properly.

10.7.43 Rectifier Fan Error (75)

10.7.43.1 Rectifier Fan Fault (75-1)

Default fault level: Alarm
Reset method: Auto
Lowest fault level: Alarm
Highest fault level: Alarm

Remarks:

ERR75-1 is reported only in the HE200 or HE300 series rectifiers.

Fault diagnosis:

Possible Cause	Solution
The fan phase sequence is inversed.	Check the fan phase sequence.
The input power supply of the phase sequence detector is too low or has phase loss.	Check the input power supply of the phase sequence detector.
Other causes	Ask for technical support.

10.7.44 Rectifier Module Temperature Error (76)

10.7.44.1 Module 1 Over-Temperature (76-1)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

The detected R phase temperature of the HE200/HE300 series diode rectifier module is above the over-temperature threshold 95°C.

Fault diagnosis:

Possible Cause	Solution
The ambient temperature is high.	Decrease the ambient temperature. Ensure that the temperature at the air inlet is no more than 40°C.
The load is too heavy.	Reduce the load.

Possible Cause	Solution
The air filter is blocked.	Clean the air filter.
Fan error: 1. The fan stops rotating or rotates at a speed. 2. The power supply board of the fan is faulty.	1. Replace the fan. 2. Replace the fan power supply board.
The thermistor of the module is faulty.	Ask for technical support.
Other causes	Ask for technical support.

10.7.44.2 Module 2 Over-Temperature (76-2)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

The detected S phase temperature of the HE200/HE300 series diode rectifier module is above the over-temperature threshold 95°C.

Fault diagnosis:

Possible Cause	Solution
The ambient temperature is high.	Decrease the ambient temperature. Ensure that the temperature at the air inlet is no more than 40°C.
The load is too heavy.	Reduce the load.
The air filter is blocked.	Clean the air filter.
Fan error: 1. The fan stops rotating or rotates at a speed. 2. The power supply board of the fan is faulty.	1. Replace the fan. 2. Replace the fan power supply board.
The thermistor of the module is faulty.	Ask for technical support.
Other causes	Ask for technical support.

10.7.44.3 Module 3 Over-Temperature (76-3)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

The detected T phase temperature of the HE200/HE300 series diode rectifier module is above the over-temperature threshold 95°C.

Fault diagnosis:

Possible Cause	Solution
The ambient temperature is high.	Decrease the ambient temperature. Ensure that the temperature at the air inlet is no more than 40°C.
The load is too heavy.	Reduce the load.
The air filter is blocked.	Clean the air filter.
Fan error: 1. The fan stops rotating or rotates at a speed. 2. The power supply board of the fan is faulty.	1. Replace the fan. 2. Replace the fan power supply board.

Possible Cause	Solution
The thermistor of the module is faulty.	Ask for technical support.
Other causes	Ask for technical support.

10.7.44.4 Module 1 Temperature Too Low or Not Connected to the NTC (76-4)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

The detected R phase temperature of the HE200/HE300 series diode rectifier module is lower than the setpoint of A4-22.

Fault diagnosis:

Possible Cause	Solution
The ambient temperature is high.	Decrease the ambient temperature. Ensure that the temperature at the air inlet is no more than 40°C.
The load is too heavy.	Reduce the load.
The air filter is blocked.	Clean the air filter.
Fan error: 1. The fan stops rotating or rotates at a speed. 2. The power supply board of the fan is faulty.	1. Replace the fan. 2. Replace the fan power supply board.
The thermistor of the module is faulty.	Ask for technical support.
Other causes	Ask for technical support.

10.7.44.5 Module 2 Temperature Too Low or Not Connected to the NTC (76-5)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

The detected S phase temperature of the HE200/HE300 series diode rectifier module is lower than the setpoint of A4-22.

Fault diagnosis:

Possible Cause	Solution
The ambient temperature is high.	Decrease the ambient temperature. Ensure that the temperature at the air inlet is no more than 40°C.
The load is too heavy.	Reduce the load.
The air filter is blocked.	Clean the air filter.
Fan error: 1. The fan stops rotating or rotates at a speed. 2. The power supply board of the fan is faulty.	1. Replace the fan. 2. Replace the fan power supply board.
The thermistor of the module is faulty.	Ask for technical support.
Other causes	Ask for technical support.

10.7.44.6 Module 3 Temperature Too Low or Not Connected to the NTC (76-6)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

The detected T phase temperature of the HE200/HE300 series diode rectifier module is lower than the setpoint of A4-22.

Fault diagnosis:

Possible Cause	Solution
The ambient temperature is high.	Decrease the ambient temperature. Ensure that the temperature at the air inlet is no more than 40°C.
The load is too heavy.	Reduce the load.
The air filter is blocked.	Clean the air filter.
Fan error: 1. The fan stops rotating or rotates at a speed. 2. The power supply board of the fan is faulty.	1. Replace the fan. 2. Replace the fan power supply board.
The thermistor of the module is faulty.	Ask for technical support.
Other causes	Ask for technical support.

10.7.45 Reactor Temperature Error (77)

10.7.45.1 Reactor Over-temperature (77-1)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Alarm	Highest fault level: Coast to stop

Error mechanism:

In HE200 or HE300 models, if the temperature switch signal feedback from the reactor is disconnected for 1s, Err77-1 (reactor over-temperature) will be reported.

Fault diagnosis:

Possible Cause	Solution
The load is too heavy.	Reduce the load.
The fan is damaged.	Replace the fan.
The temperature detection circuit or the temperature switch is abnormal.	Check the temperature detection circuit or replace the temperature switch.
Other causes	Ask for technical support.

10.7.45.2 Reactor Over-Temperature in the AC Drive Cabinet (77-4)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Alarm	Highest fault level: Coast to stop

Error mechanism:

In a cabinet complying with the manufacturer's standards, when the output reactor is provided with a temperature detection switch (A2-54 set to 1), b6-04 is forcibly set to HDI1 signal and HDI1 is 0.

Fault diagnosis:

Possible Cause	Solution
The temperature detection circuit or the temperature switch is abnormal.	Check the temperature detection circuit or replace the temperature switch.
Other causes	Ask for technical support.

10.7.46 Temperature Error in the Rectifier Cabinet (78)

10.7.46.1 High Temperature (78-1)

Default fault level: Alarm
Reset method: Auto
Lowest fault level: Alarm
Highest fault level: Alarm

Error mechanism:

The temperature of the capacitor box in the HE200 rectifier cabinet exceeds the set over-temperature threshold 65°C.

Fault diagnosis:

Possible Cause	Solution
The load is too heavy.	Reduce the load.
The air filter is blocked.	Clean the air filter.
The fan is damaged.	Replace the fan.
The temperature detection circuit is abnormal.	Check the temperature detection circuit.
Other causes	Ask for technical support.

10.7.46.2 Low Temperature or NTC Not Connected (78-2)

Default fault level: Alarm
Reset method: Auto
Lowest fault level: Alarm
Highest fault level: Alarm

Error mechanism:

The temperature of the capacitor box in the HE200 rectifier cabinet is lower than the value of A4-22.

Fault diagnosis:

Possible Cause	Solution
The ambient temperature is too low.	Raise the ambient temperature.
The temperature detection circuit is abnormal.	Check the temperature detection circuit.
Other causes	Ask for technical support.

10.7.47 DC Voltage Error (79)

10.7.47.1 High Voltage (79-2)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

If the HE series rectifiers judge that the bus voltage is above the overvoltage threshold, the hardware voltage signal is triggered. The overvoltage thresholds of the 400 V model and 690 V model are 800 V and 1200 V, respectively.

Fault diagnosis:

Possible Cause	Solution
Check whether the input voltage is too high.	Decrease the input voltage.
The generating working condition occurs, and no braking unit is installed or an improper braking resistor model is selected.	Install a braking unit or select a proper braking resistor.
An improper drive voltage class is selected.	Select an appropriate AC drive model with a matching voltage class.
The drive model is incorrectly set.	Ask for technical support.
The overvoltage suppression parameters are inappropriate.	1. In V/f control mode, check whether the overvoltage suppression (E3-30) is enabled and whether the E3-31 to E3-35 parameters are properly set. 2. In VC mode, check whether the E9-01 parameter is enabled and whether the E9-02 parameter is set to a too large value.
The DC bus voltage correction coefficient is inappropriate.	Check whether the DC voltage sampling gain (A3-06) is set incorrectly.
The speed loop parameters are set improperly in VC mode.	Use IDS to check whether the overshoot of actual motor speed during acceleration is large and generating overvoltage is caused during speed callback. Set the speed loop parameters properly to reduce the overshoot.
Other causes	Ask for technical support.

10.7.47.2 Low Voltage (79-3)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

The HINT board of the HE series inverters detect that the DC bus voltage is below the undervoltage threshold, which is 350 V for 380 V models and 540 V for 690 V models.

Fault diagnosis:

Possible Cause	Solution
Check whether the input voltage is too low.	Adjust the input voltage to the normal range.
An improper drive voltage class is selected.	Select an appropriate AC drive model with a matching voltage class.
The drive model is incorrectly set.	Ask for technical support.
The undervoltage suppression parameters are inappropriate.	Check whether E9-03 is enabled and whether E9-04 to E9-06 are inappropriate.
The DC bus voltage correction coefficient is inappropriate.	Check whether the DC voltage sampling gain (A3-06) is set incorrectly.
The pre-charge resistor, driver board, or control board is abnormal.	Ask for technical support.
The DC bus voltage is incorrectly displayed.	Ask for technical support.

10.7.48 Rectifier Unit Error (80)

10.7.48.1 HE200-1# Rectifier Unit Disconnected (80-1)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

The rectifier unit 1 of the HE200 series models is enabled in A14-36, but the expansion card connection is abnormal or the expansion slot is set incorrect. Then, the fault Err80-1 is reported.

Fault diagnosis:

Possible Cause	Solution
An incorrect slot is selected.	Check whether the expansion slot selected in A14-37 for the rectifier unit 1 is correct.
The rectifier HINT is not powered on.	Check the power supply circuit of the rectifier HINT.
The optical fiber circuit connection is abnormal.	Check the optical fiber connection circuit.
The optical fiber is damaged.	Replace the optical fiber.
Other causes	Ask for technical support.

10.7.48.2 HE200-2# Rectifier Unit Disconnected (80-2)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

The rectifier unit 2 of the HE200 series models is enabled in A14-36, but the expansion card connection is abnormal or the expansion slot is set incorrect. Then, the fault Err80-2 is reported.

Fault diagnosis:

Possible Cause	Solution
An incorrect slot is selected.	Check whether the expansion slot selected in A14-38 for the rectifier unit 2 is correct.
The rectifier HINT is not powered on.	Check the power supply circuit of the rectifier HINT.
The optical fiber circuit connection is abnormal.	Check the optical fiber connection circuit.

Possible Cause	Solution
The optical fiber is damaged.	Replace the optical fiber.
Other causes	Ask for technical support.

10.7.48.3 Conflict of Expansion Card Settings of the HE200 Rectifier (80-3)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

For the HE200 series models, both rectifier units 1 and 2 are enabled in A14-36, but the expansion card slot settings set in A14-37 and A14-38 conflict. Then, the Err80-3 fault is reported.

Fault diagnosis:

Possible Cause	Solution
The expansion card slot settings set in A14-37 and A14-38 conflict.	Set the expansion card slots again.
Other causes	Ask for technical support.

10.7.49 Grid Error (81)

10.7.49.1 High Grid Voltage (81-1)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

When the grid voltage of the HE series models is greater than the value of ([A14-54] x Voltage base value) for 2s, ERR81-1 is reported.

Remarks:

The voltage base values for the HE 400 V models, 500 V models, and 690 V models are 380 V, 500 V, and 690 V, respectively.

Fault diagnosis:

Possible Cause	Solution
The input grid voltage is too high.	Adjust the input grid voltage to the normal range.
The model voltage class is set incorrectly.	Set the model voltage class correctly.
The high grid voltage judgment threshold is inappropriate.	Check whether A14-54 is set properly.
The grid voltage sampling is abnormal.	Ask for technical support.
Other causes	Ask for technical support.

10.7.49.2 Low Grid Voltage (81-2)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

When the grid voltage of the HE models is lower than the value of ([A14-55] x Voltage base value) for 2s, ERR81-2 is reported.

Remarks:

The voltage base values for the HE 400 V models, 500 V models, and 690 V models are 380 V, 500 V, and 690 V, respectively.

Fault diagnosis:

Possible Cause	Solution
The input grid voltage is too low.	Adjust the input grid voltage to the normal range.
The model voltage class is set incorrectly.	Set the model voltage class correctly.
The low grid voltage judgment threshold is inappropriate.	Check whether A14-55 is set properly.
The grid has phase loss.	Check the input wiring.
The grid voltage sampling is abnormal.	Ask for technical support.
Other causes	Ask for technical support.

10.7.49.3 R Phase Loss (81-7)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The grid has R phase loss.	Check the input wiring.
The grid voltage sampling is abnormal.	Ask for technical support.
Other causes	Ask for technical support.

10.7.49.4 S Phase Loss (81-8)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The grid has S phase loss.	Check the input wiring.
The grid voltage sampling is abnormal.	Ask for technical support.
Other causes	Ask for technical support.

10.7.49.5 T Phase Loss (81-9)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The grid has T phase loss.	Check the input wiring.
The grid voltage sampling is abnormal.	Ask for technical support.
Other causes	Ask for technical support.

10.7.50 DC Pre-Charge Error (82)

10.7.50.1 DC Pre-Charge Error (82-1)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

When the DC bus voltage rises to a value above the undervoltage threshold, no feedback signal is detected from the DC pre-charge unit.

Fault diagnosis:

Possible Cause	Solution
No DC pre-charge unit is configured for the multi-drive system but the detection function is enabled (A4-11 set to 1).	Set A4-11 to 0 to disable the pre-charge resistance detection function.
The feedback signal detection circuit of the DC pre-charge unit is abnormal.	1. Check the feedback signal of the DC pre-charge unit. 2. For H4, H6, or H7 units, check whether an external 24 V power supply is connected.
The pre-charge unit is damaged.	Replace the DC pre-charge unit.
Other causes	Ask for technical support.

10.7.51 Master-Slave Communication Error (83)

10.7.51.1 InoLink: Address Conflict (83-1)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
Duplicate node addresses exist on the InoLink network.	Set InoLink node addresses properly.

10.7.51.2 InoLink: Communication Offline (83-2)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

If no data is received from any node over the specified time after InoLink is enabled, the InoLink communication offline fault is triggered.

Fault diagnosis:

Possible Cause	Solution
The InoLink connection is abnormal or disconnected.	1. Check whether the RS485 connection is normal. 2. Check whether the RS485 is inversely connected.
The termination resistor does not match.	Check whether the termination resistor DIP is correct.
Other causes	Ask for technical support.

10.7.51.3 InoLink: Receiver Offline (83-3)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Alarm	Highest fault level: Coast to stop

Error mechanism:

If the specified data is not received from the specified node over the specified time after InoLink is enabled, the InoLink receiver offline fault 83-3 is triggered.

Fault diagnosis:

Possible Cause	Solution
The specified node is offline.	Check whether the connection is correct.
The address of the specified node does not exist.	Check whether the node address is incorrect.
The termination resistor does not match.	Check whether the termination resistor DIP is correct.
Other causes	Ask for technical support.

10.7.51.4 Optical Fiber Synchronization Expansion Module: Node Address Conflict (83-5)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Alarm	Highest fault level: Coast to stop

Error mechanism:

When n22-00 is set to 1, the address of the local node and that of another node on the network conflict.

Fault diagnosis:

Possible Cause	Solution
Node addresses conflict.	Reset the node address.

10.7.51.5 Optical Fiber Synchronization Expansion Module: Data Interrupt for Node A That Receives the Data (83-6)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Alarm	Highest fault level: Coast to stop

Error mechanism:

Node A is offline after communication is established. You can set [n22-01] to 0 to shield this fault.

Fault diagnosis:

Possible Cause	Solution
The HCU corresponding to node A is disconnected from the network.	1. Check whether the power supply of the HCU corresponding to node A is normal. 2. Check whether the HOFR power supply is normal. 3. Check whether the communication configuration of node A is correct.
The optical fiber circuit is abnormal.	Check the wiring of the address corresponding to node A that receives the data.
Other causes	Ask for technical support.

10.7.51.6 Optical Fiber Synchronization Expansion Module: Data Interrupt for Node B That Receives the Data (83-7)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

Node B is offline after communication is established. You can set [n22-01] to 0 to shield this fault.

Fault diagnosis:

Possible Cause	Solution
The optical fiber circuit is abnormal.	Check the wiring of the address corresponding to node B that receives the data.
Other causes	Ask for technical support.

10.7.51.7 Optical Fiber Synchronization Expansion Module: Data Interrupt for Node C That Receives the Data (83-8)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

Node C is offline after communication is established. You can set [n22-01] to 0 to shield this fault.

Fault diagnosis:

Possible Cause	Solution
The optical fiber circuit is abnormal.	Check the wiring of the address corresponding to node C that receives the data.
Other causes	Ask for technical support.

10.7.51.8 Optical Fiber Synchronization Expansion Module: Module Offline (83-9)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

The communication network has been started. However the local heartbeat feedback value has not been updated for more than 0.3s.

Fault diagnosis:

Possible Cause	Solution
The optical fiber circuit is abnormal.	1. Check whether the cable of the optical fiber expansion module crosses the optical fiber of HCU.
Other causes	Ask for technical support.

10.7.51.9 Optical Fiber Synchronization Expansion Module: Data Receiving Error (83-10)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

The controller of the local address has received data not requested by the local device.

Fault diagnosis:

Possible Cause	Solution
The sending and receiving circuits between modules are incorrectly connected.	Check whether the cable of the optical fiber expansion module crosses the optical fiber of HCU.
Other causes	Ask for technical support.

10.7.52 Brake Control Error (84)

10.7.52.1 Brake Opening Failed (84-1)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

A brake opening command is generated but the brake opened ([L1-03] set to 0) feedback signal is not received.

Fault diagnosis:

Possible Cause	Solution
The brake feedback circuit is faulty or disconnected.	Check whether the brake feedback circuit is normal.
An improper brake function is selected.	Set L1-00 to 1 if no brake feedback signal exists.
The brake opening feedback signal source is inappropriate.	Check whether L1-03 is set correctly.

10.7.52.2 Brake Closing Failed (84-2)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

A brake closing command is generated but the brake closed ([L1-03] set to 1) feedback signal is not received.

Fault diagnosis:

Possible Cause	Solution
The brake feedback circuit is faulty or disconnected.	Check whether the brake feedback circuit is normal.
An improper brake function is selected.	Set L1-00 to 1 if no brake feedback signal exists.
The brake opening feedback signal source is inappropriate.	Check whether L1-03 is set correctly.

10.7.52.3 Brake Verification Failure (84-3)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

Within the brake verification period set in [L1-31], the output torque [U6-01] cannot reach the half of the verification torque [L1-32].

Fault diagnosis:

Possible Cause	Solution
The brake is not closed.	Check whether the brake is closed.
The brake is worn.	Replace the brake.

10.7.52.4 Brake Verification Failure (84-4)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

During brake test, the value of [U9-00] is greater than the speed threshold set in [L1-34] for a time set in [L1-35].

Fault diagnosis:

Possible Cause	Solution
The brake is not closed.	Check whether the brake is closed.
The brake is worn.	Replace the brake.

10.7.53 Internal Fault (85)

10.7.53.1 Internal Data Exchange Error (85-1)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
Other causes	Ask for technical support.

10.7.53.2 State Machine Out of Range (85-3)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
Other causes	Ask for technical support.

10.7.53.3 Abnormal Interrupt Generated (85-4)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
Other causes	Ask for technical support.

10.7.53.4 HCU Internal Data Synchronization Error (85-5)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
Programming of MCU or FPGA software has been performed.	Reset the fault.
Other causes	Ask for technical support.

10.7.54 Model Parameter Error (88)

10.7.54.1 Model Code Not Existing (88-1)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The model set in [A3-00] does not exist.	Check whether the model is correct.
The model stored in HINT does not exist.	Reset the model and download the setting to the HINT board.
An HINT error occurs.	Re-power on or replace the HINT board.
Other causes	Ask for technical support.

10.7.54.2 Model Parameter/Software Undervoltage Threshold Changed (88-2)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

The model parameters are modified but the settings are not downloaded.

Fault diagnosis:

Possible Cause	Solution
The model parameters [A3-00] to [A3-11] or [A4-16] are modified but the settings are not downloaded.	Modify the target model parameters and download the settings.
Other causes	Ask for technical support.

10.7.54.3 Model Parameter/Software Undervoltage Threshold Mismatch (88-3)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

- The model set by HCU is inconsistent with that read from HINT.
- The undervoltage threshold set by HCU is inconsistent with that read from HINT.

Remarks:

This fault may be reported after HCU or HINT is replaced, informing users to check whether the module rated information in group A2 is consistent with the information on the power module nameplate.

Fault diagnosis:

Possible Cause	Solution
HCU is replaced.	Check whether the module rated parameter information in group A2 is consistent with that of the power unit. If yes, reset the fault directly; otherwise, ask for technical support.
The power unit module is replaced.	Check whether the module rated parameter information in group A2 is consistent with that of the power unit. If yes, reset the fault directly; otherwise, ask for technical support.
Only HINT is replaced.	Ask for technical support to reset the model and correction parameters.
Other causes	Ask for technical support.

10.7.54.4 Model Code Mismatch (88-4)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The models of parallel power modules are inconsistent.	1. Check whether the parameters on the nameplate of each module are consistent. 2. Ask for technical support.
Only HINT is replaced.	Ask for technical support to reset the model and correction parameters.
Other causes	Ask for technical support.

10.7.54.5 Mismatch Between the Model and Software (88-6)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

The power model parameter does not match the current HCU.

Fault diagnosis:

Possible Cause	Solution
The model type of the power unit does not match the software type of HCU.	1. Check whether the model matches the software type. 2. The power unit is not of the expected type. Replace with a correct power unit. 3. The HCU controller is not of the expected software type. Replace with a correct HCU controller.
Other causes	Ask for technical support.

10.7.54.6 Model Code Not Recognized/Software Undervoltage Threshold Overlimit (88-7)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

- The model code read by HCU from HINT does not match the software type and thus the model code cannot be recognized. Then, the fault 88-7 is reported.
- The software undervoltage threshold read by HCU from HINT exceeds the setting of [A4-16]. Then, the fault 88-7 is reported and the value of [A4-16] is restored to the factory default.

Fault diagnosis:

Possible Cause	Solution
Power modules and HCUs of different types are connected.	1. Check whether the power module matches the HCU type. 2. Ask for technical support.
Other causes	Ask for technical support.

10.7.54.7 Set Model Code Not Recognized (88-8)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

The HCU cannot recognize the model code set in A3-00.

Fault diagnosis:

Possible Cause	Solution
The model set in A3-00 does not exist.	Set A3-00 correctly.
Other causes	Ask for technical support.

10.7.54.8 Correction Coefficient Out-of-Range (88-9)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

The correction coefficient read from the HINT is out of range.

Fault diagnosis:

Possible Cause	Solution
The HINT correction coefficient is abnormal.	Set the correction coefficient correctly and download the setting.
Other causes	Ask for technical support.

10.7.54.9 Different Software Undervoltage Thresholds (88-11)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

The software undervoltage threshold in HINT is inconsistent with the setting of [A4-16].

Remarks:

In parallel mode, the HINT undervoltage thresholds of all the modules are the same but are inconsistent with the setting of [A4-16]. The value of [A4-16] will be updated to the undervoltage threshold of HINT.

Fault diagnosis:

Possible Cause	Solution
HCU is replaced.	In case of software undervoltage threshold inconsistency, as long as the HINT undervoltage thresholds of all the modules are the same, the value of [A4-16] will be updated to the undervoltage threshold of HINT.
Only HINT is replaced.	1. In parallel mode, select a unit module in [A3-12] and set the read command in [A3-14]. The undervoltage threshold of the module is displayed in [A3-47]. 2. Set the software undervoltage threshold in A4-16 correctly and download the setting to the corresponding HINT module.

Possible Cause	Solution
Power modules and HCUs of different types are connected.	1. Connect power modules and HCUs of the same type. 2. Ask for technical support.
Other causes	Ask for technical support.

10.7.54.10 Mismatch Between Model Setting and Function Parameter (88-16)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

The HE200 model is only used as a rectifier (using the power of HE300). However, the inverter function is not disabled in A14-39.

Fault diagnosis:

Possible Cause	Solution
Parameter setting is incorrect.	Set A14-39 again.
Other causes	Ask for technical support.

10.7.55 HCU 24 V Power Supply Error (89)

10.7.55.1 Low 24 V Power Supply Voltage (89-1)

Default fault level: Alarm/Fault	Reset method: Auto/Manual
Lowest fault level: Alarm/Fault	Highest fault level: Alarm/Fault

Error mechanism:

The voltage of the 24 V control power supply on HCU is too low.

Remarks:

A fault is reported when the power supply voltage is below 18.5 V. When the 24 V input voltage low alarm detection function is enabled in the ones position of H0-41, an alarm is reported when the 24 V input voltage is above 18.5 V but below 21 V. Some functions are not available when the alarm is reported.

Fault diagnosis:

Possible Cause	Solution
The 24 V power supply of the HCU control power is abnormal.	Check whether the HCU control power is within 24 V ±10%.
The 24 V output is short-circuited.	Check whether the 24 V (J11 on HCU) output is short-circuited.
Other causes	Ask for technical support.

10.7.56 Parallel Mode Error (91)

10.7.56.1 Mode Setting Conflict (91-1)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Fault diagnosis:

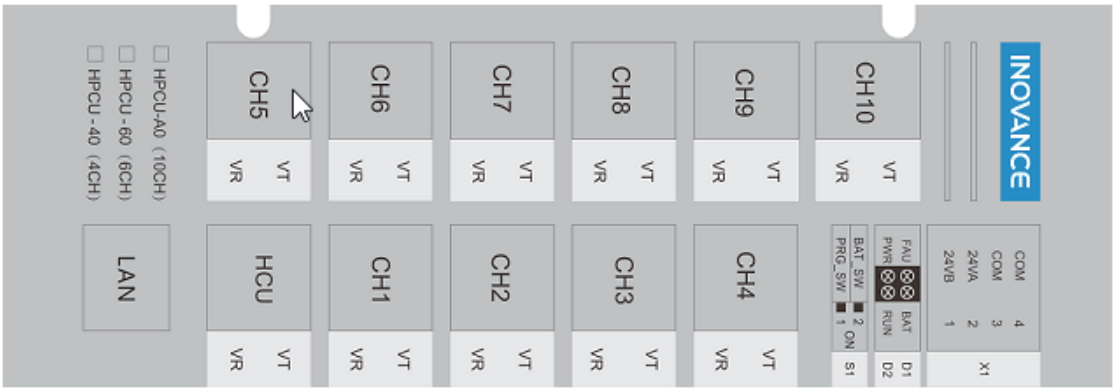
Possible Cause	Solution
A15-00 is set to 0 but HCU is connected to HPCU.	When HCU is connected to HPCU, set A15-00 to 1.
A15-00 is set to 1 but HCU is directly connected to HINT.	When HCU is directly connected to HINT, set A15-00 to 0.
Other causes	Ask for technical support.

10.7.56.2 Mismatch Between Enabled Modules and Online Modules (91-2)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

The number of modules enabled in A15-02 and A15-03 is inconsistent with the number of online module. The enabled parallel modules correspond to online modules one by one. As shown in the following figure, parallel module 1 corresponds to channel CH1, parallel module 2 corresponds to channel CH2, parallel module 10 corresponds to channel CH10, and so on.



Fault diagnosis:

Possible Cause	Solution
A15-02 and A15-03 are set incorrectly.	Set A15-02 and A15-03 based on actually connected modules.
The unit optical fiber circuit is abnormal.	Check the connection circuit of offline modules based on the online modules displayed in A15-05 and A15-06.
Other causes	Ask for technical support.

10.7.56.3 HPCU Offline (91-4)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

The HCU fails to receive data from the HPCU in parallel mode.

Fault diagnosis:

Possible Cause	Solution
The HPCU power supply is abnormal.	Check whether the HPCU power supply is normal.
The optical fiber connection is abnormal.	Check whether the HPCU and HCU are properly connected through optical fiber.
The HPCU module model is incorrect.	Check whether the information on the HPCU nameplate is correct.
Other causes	Ask for technical support.

10.7.57 Parallel Module Fault (92)

10.7.57.1 Parallel Module U Phase Loss (92-2)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

During operation in parallel mode, the current of the U phase of a module is significantly less than that of other modules.

Fault diagnosis:

Possible Cause	Solution
The U phase cable of a parallel module is disconnected or the connection is unreliable.	Check whether the U phase cable of the module is correctly connected.
The detected current of the U phase of a parallel module is abnormal.	1. Check the wiring of the Hall sensor. Select a module in the software and check whether its output current is normal. 2. Replace the corresponding power module.
The IGBT of the U phase of a parallel module is abnormal.	Replace the corresponding power module.
Other causes	Ask for technical support.

10.7.57.2 Parallel Module V Phase Loss (92-3)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

During operation in parallel mode, the current of the V phase of a module is significantly less than that of other modules.

Fault diagnosis:

Possible Cause	Solution
The V phase cable of a parallel module is disconnected or the connection is unreliable.	Check whether the V phase cable of the module is correctly connected.
The detected current of the V phase of a parallel module is abnormal.	1. Check the wiring of the Hall sensor. Select a module in the software and check whether its output current is normal. 2. Replace the corresponding power module.
The IGBT of the V phase of a parallel module is abnormal.	Replace the corresponding power module.
Other causes	Ask for technical support.

10.7.57.3 Parallel Module W Phase Loss (92-4)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

During operation in parallel mode, the current of the W phase of a module is significantly less than that of other modules.

Fault diagnosis:

Possible Cause	Solution
The W phase cable of a parallel module is disconnected or the connection is unreliable.	Check whether the W phase cable of the module is correctly connected.
The detected current of the W phase of a parallel module is abnormal.	1. Check the wiring of the Hall sensor. Select a module in the software and check whether its output current is normal. 2. Replace the corresponding power module.
The IGBT of the W phase of a parallel module is abnormal.	Replace the corresponding power module.
Other causes	Ask for technical support.

10.7.57.4 Parallel Module Bus Voltage Detection Error (92-5)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

When the deviation between the bus voltage of a module and the average bus voltage is greater than 1.5% before running or greater than 5% during running, this fault is reported.

Remarks:

Bus voltage detection enable for parallel module can be disabled by setting [A4-24] to 0.

Fault diagnosis:

Possible Cause	Solution
The DC bus fuse is damaged.	Replace the DC bus fuse.
The DC bus of a module is not connected.	Connect the DC bus.

Possible Cause	Solution
The sampled DC bus voltage is not corrected or a correct error occurs.	1. Use a multimeter to measure the actual DC bus voltage and correct it. 2. If the HINT is replaced, the voltage must be corrected.
The hardware sampling circuit is abnormal.	Check whether the hardware sampling circuit is normal.
Other causes	Ask for technical support.

10.7.58 Motor Control Error (93)

10.7.58.1 Motor Locked-Rotor (93-1)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

When [E8-25] is set to 1, if the torque reaches the torque limit and the feedback speed remains lower than the threshold specified in E8-26 for a period of time longer than the time specified by E8-27, the motor locked-rotor fault (93-1) is triggered.

Fault diagnosis:

Possible Cause	Solution
The torque limit is active and the running speed is very low in the case of process cooperation.	Disable the motor locked-rotor fault detection function.
The torque limit is inappropriate.	Check whether E2-10 to E2-13 are set correctly, especially when communication setting is enabled.
The load is too heavy.	Check the motor load.
Motor parameters are set incorrectly.	Check whether the motor parameters are set correctly.
An encoder error occurs.	1. Check whether the encoder is connected properly. 2. Check whether the encoder is damaged. 3. Check whether the encoder parameters are set correctly.
Motor auto-tuning is not performed.	Set motor parameters correctly and perform motor parameter auto-tuning.
Output phase loss or output disconnection occurs.	1. Check whether the motor connection is reliable. 2. Check whether the contactor on the motor side is disconnected.
The motor is directly started when it is still rotating or an incorrect speed is detected upon flying start.	Set the start mode to flying start and adjust the flying start parameters.
Other causes	Ask for technical support.

10.7.58.2 Motor Stall (93-2)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

In FVC control mode, when [E8-28] is set to 1 and the speed deviation exceeds the motor stall detection threshold set by E8-29 and the duration exceeds the time set by E8-30, the motor stall fault 93-2 will be triggered.

Fault diagnosis:

Possible Cause	Solution
The high speed load is too large.	Check the motor load.
The motor starts while rotating, which brings the motor to regenerative mode and causes bus overvoltage.	E1-00 (start mode) is set as flying start (flying start requires auto-tuning) or starting after motor stops.
Motor parameters are set incorrectly.	Check whether the motor parameters are set correctly.
An encoder error occurs.	1. Check whether the encoder is connected properly. 2. Check whether the encoder is damaged. 3. Check whether the encoder parameters are set correctly.
The motor parameter deviation is too large.	Set motor parameters correctly and perform motor parameter auto-tuning.
Output phase loss or output disconnection occurs.	1. Check whether the motor connection is reliable. 2. Check whether the contactor on the motor side is disconnected.
Other causes	Ask for technical support.

10.7.58.3 Current Control Error (93-3)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Alarm	Highest fault level: Coast to stop

Error mechanism:

In vector control mode, the motor feedback current does not follow the setpoint for a long time.

Fault diagnosis:

Possible Cause	Solution
The motor is disconnected.	1. Check whether a phase of the motor is disconnected. 2. Check whether the contactor on the motor side is connected properly.
The encoder is disconnected or the encoder signal interference is serious.	Check the wiring of the encoder and eliminate the encoder interference.
The motor parameter setting is incorrect.	Set the motor parameters correctly and perform auto-tuning on all motor parameters.
Other causes	Ask for technical support.

10.7.58.4 Two-Phase or Three-Phase Loss (93-4)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Alarm	Highest fault level: Coast to stop

Error mechanism:

The output current is constantly less than one-fourth of the no-load current during operation in vector control mode. This fault is reported only in vector control mode when an asynchronous motor is used.

Fault diagnosis:

Possible Cause	Solution
The motor UVW cable is disconnected or the connection is unreliable.	Check whether the motor UVW connection is normal.
The output contactor is not closed or is faulty.	Check whether the output contactor is closed properly.
The motor three-phase winding is faulty.	Replace the motor.
The motor parameter setting is incorrect.	Set the motor parameters correctly and perform auto-tuning on all motor parameters.
Other causes	Ask for technical support.

10.7.58.5 SVC Speed Open Loop Locked-Rotor (93-5)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
When the SVC running speed open loop function is enabled, motor locked-rotor occurred.	1. Increase SVC control speed loops E4-04 and E4-05. 2. Set [E8-38] to a value smaller than 5s to shield this fault.
The load is too heavy.	Check the motor load.
Basic motor parameters are set incorrectly.	Set basic parameters of the motor correctly according to the motor nameplate.
Output phase loss or output disconnection occurs.	1. Check whether the motor connection is reliable. 2. Check whether the contactor on the motor side is disconnected.
Other causes	Ask for technical support.

10.7.58.6 SVC Control Error (93-6)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
During low-speed operation, the SVC model is abnormal.	1. Increase the minimum running frequency of the motor. 2. Add an encoder and run it in FVC mode if possible. 3. In case of non-gravity load, enable open loop control in E11-08.
The motor parameter setting is incorrect.	Set the motor parameters correctly and perform auto-tuning on all motor parameters.
Other causes	Ask for technical support.

10.7.59 Parallel Module Current Unbalance Alarm (99)

10.7.59.1 Parallel Module U Phase Current Unbalance (99-1)

Default fault level: Alarm	Reset method: Auto
Lowest fault level: Alarm	Highest fault level: Alarm

Error mechanism:

This fault is reported if the RMS current of the U phase exceeds the two times of the average current value when running with a load below 25%, or if the RMS current of the U phase exceeds or below 25% of the average current when running with a load above 25%.

Remarks:

Parallel model current unbalance detection can be disabled by setting A4-25 to 0.

Fault diagnosis:

Possible Cause	Solution
The difference between the output cable lengths is great.	Check whether the cables used by the phases are consistent.
The difference between current sharing inductances output by AC drives is great.	Check whether the output inductances are different.
The detected current of a parallel unit is abnormal.	Check the wiring of the Hall sensor. Select a unit in the software and check whether its output current is normal.
Other causes	Ask for technical support.

10.7.59.2 Parallel Module V Phase Current Unbalance (99-2)

Default fault level: Alarm	Reset method: Auto
Lowest fault level: Alarm	Highest fault level: Alarm

Error mechanism:

This fault is reported if the RMS current of the V phase exceeds the two times of the average current value when running with a load below 25%, or if the RMS current of the V phase exceeds or below 25% of the average current when running with a load above 25%.

Remarks:

Parallel model current unbalance detection can be disabled by setting A4-25 to 0.

Fault diagnosis:

Possible Cause	Solution
The difference between the output cable lengths is great.	Check whether the cables used by the phases are consistent.
The difference between current sharing inductances output by AC drives is great.	Check whether the output inductances are different.
The detected current of a parallel unit is abnormal.	Check the wiring of the Hall sensor. Select a unit in the software and check whether its output current is normal.
Other causes	Ask for technical support.

10.7.59.3 Parallel Module W Phase Current Unbalance (99-3)

Default fault level: Alarm
Reset method: Auto
Lowest fault level: Alarm
Highest fault level: Alarm

Error mechanism:

This fault is reported if the RMS current of the W phase exceeds the two times of the average current value when running with a load below 25%, or if the RMS current of the W phase exceeds or below 25% of the average current when running with a load above 25%.

Remarks:

Parallel model current unbalance detection can be disabled by setting A4-25 to 0.

Fault diagnosis:

Possible Cause	Solution
The difference between the output cable lengths is great.	Check whether the cables used by the phases are consistent.
The difference between current sharing inductances output by AC drives is great.	Check whether the output inductances are different.
The detected current of a parallel unit is abnormal.	Check the wiring of the Hall sensor. Select a unit in the software and check whether its output current is normal.
Other causes	Ask for technical support.

10.7.60 Generation of Abnormal Fault Information (100)

10.7.60.1 Generation of Abnormal Fault Information (100-1)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
Other causes	Ask for technical support.

10.7.60.2 Subcode Error (100-2)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
Other causes	Ask for technical support.

10.7.60.3 Code Error (100-3)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
Other causes	Ask for technical support.

10.7.60.4 Exchange Data Error (100-4)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
Other causes	Ask for technical support.

10.7.61 HINT Error (101)

10.7.61.1 Mismatch Between HINT Type and the HCU (101-1)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

The power module type does not match the current HCU.

Fault diagnosis:

Possible Cause	Solution
The model type of the power unit does not match the software type of HCU.	1. Check whether the model matches the software type. 2. The power unit is not of the expected type. Replace with a correct power unit. 3. The HCU controller is not of the expected software type. Replace with a correct HCU controller.
Other causes	Ask for technical support.

10.7.61.2 Mismatch of HINT Software Versions (101-2)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
In parallel mode, the HINT modules are inconsistent in software version.	1. Check whether the correct HINT board for replacement is correct. 2. Upgrade the HINT software to ensure version consistency.
Other causes	Ask for technical support.

10.7.61.3 STO Function Mismatch (101-3)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

In parallel mode, only some HINT modules support the STO function.

Fault diagnosis:

Possible Cause	Solution
The incorrect HINT board is used for replacement.	1. Check whether the HINT board for replacement supports the STO function or not as the old one. 2. Upgrade the HINT software to ensure version consistency.
Other causes	Ask for technical support.

10.7.61.4 Mismatch Between the HINT (Where the Synchronous Motor Magnetic Pole Auto-Tuning is Unavailable) and the Setting (101-4)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

The synchronous motor magnetic pole auto-tuning is unavailable for the current HINT module. However, the motor type is set to synchronous motor.

Fault diagnosis:

Possible Cause	Solution
The incorrect HINT board is used for replacement.	1. Check whether the HINT board for replacement supports synchronous motors. 2. Upgrade the HINT software to ensure version consistency.
The motor type setting is incorrect.	Check whether the motor type is synchronous motor. Set the motor type correctly.
Other causes	Ask for technical support.

10.7.62 HINT Alarm (102)

10.7.62.1 HINT Model Parameter Check Not Completed (102-1)

Default fault level: Alarm	Reset method: Auto
Lowest fault level: Alarm	Highest fault level: Alarm

Error mechanism:

In the S7 ready-to-run state, reading HINT model parameter times out.

Remarks:

The system cannot run in case of a 102-1 alarm.

Fault diagnosis:

Possible Cause	Solution
Reading model parameter times out.	1. Power on the HCU control power again. 2. Power on the HINT power supply again. 3. Set the model parameters correctly and download the settings.
Other causes	Ask for technical support.

10.7.62.2 Mismatch Between HINT Current Sampling and the Setting (102-2)

Default fault level: Alarm	Reset method: Auto
Lowest fault level: Alarm	Highest fault level: Alarm

Error mechanism:

N-point sampling is enabled by the parameter but is not available in the active HINT.

Fault diagnosis:

Possible Cause	Solution
The incorrect HINT is used for replacement.	1. Replace the HINT with a new version one. 2. Upgrade the HINT software.
A3-23 is set to 4 but the HINT does not support N-point sampling.	Set A3-23 again.
Other causes	Ask for technical support.

10.7.63 Input Phase Loss (114)

10.7.63.1 Input Phase Loss (114-1)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Alarm	Highest fault level: Coast to stop

Error mechanism:

Input phase loss detection is enabled in A4-26. When a phase is abnormal, ERR114-1 is reported.

Fault diagnosis:

Possible Cause	Solution
One phase of the RST input cable of the corresponding device is disconnected or loose.	Check the RST input cable.
The thyristor drive cable is loose (troubleshooting is required only for the 690 V single-drive model).	Check the thyristor drive cable.
Other causes	Ask for technical support.

10.7.64 AC Drive Pre-Overload (117)

10.7.64.1 AC Drive Pre-Overload (117-1)

Default fault level: Alarm
Reset method: Auto
Lowest fault level: Alarm
Highest fault level: Alarm

Fault diagnosis:

Possible Cause	Solution
The load is too heavy.	1. Reduce the load. 2. Select a drive with appropriate power rating.
Parameter auto-tuning is not performed in vector control mode.	Set motor parameters correctly, and run the motor after auto-tuning.
The torque boost parameter setting under V/f control is inappropriate.	1. In manual torque boost mode, set E3-14 and E3-15 to a large value. 2. In auto torque boost mode, run the motor after static auto-tuning is completed.
Motor locked-rotor occurs.	Check the motor and machine.
The device runs with heavy load at a low speed for a long time.	If the AC drive runs at a low frequency for a long time, derate its parameters and increase its power.
Derating occurs due to excessive carrier frequency.	Decrease the carrier frequency through A4-02.
Flying start failed.	The tracked speed is inconsistent with the actual motor speed. AC drive overload occurs due to excessive current after running. For high-speed tracking, increase the flying start filter cut-off frequency in E7-02.
Other causes	Ask for technical support.

10.7.65 STO Activation Alarm (147)

10.7.65.1 STO1 and STO2 Input Activated (147-3)

Default fault level: Alarm
Reset method: Manual/Auto
Lowest fault level: Alarm
Highest fault level: Alarm

Error mechanism:

Input of both STO1 and STO2 terminals are activated.

Remarks:

- The reset mode of the alarm 147-3 is set in [H0-35]. If [H0-35] is set to 0, the alarm must be manually reset. If [H0-35] is set to 1, the alarm is automatically reset.
- If the alarm 147-3 is triggered, the AC drive output will be inhibited until the alarm is cleared.

Fault diagnosis:

Possible Cause	Solution
STO1 and STO2 are activated.	Check the wiring and power supply of the STO1 and STO2 input circuits. Check whether the polarities of 24 VDC input of STO1 and STO2 are connected inversely.
Other causes	Ask for technical support.

10.7.66 Motor Temperature Error (148)

10.7.66.1 Motor Over-Temperature Alarm (148-2)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: No action
Highest fault level: Coast to stop

Error mechanism:

When the motor temperature detection mode set in E8-22 is not PTC, if the detected motor temperature exceeds the setting of E8-24, the ERR148-2 fault is reported. If the resistance exceeds 1.3 kΩ, the ERR148-2 fault is reported.

Fault diagnosis:

Possible Cause	Solution
The actual temperature of the motor is high and a motor heat dissipation error occurs.	Enhance motor heat dissipation measures.
After the motor temperature detection is enabled, an incorrect type of motor temperature sensor is selected.	Set the correct type of temperature sensor.
After the motor temperature detection is enabled, the temperature sensor connection is unreliable.	Ensure stable cable connection of the temperature sensor.
The motor over-temperature threshold is too low.	Set E8-24 properly.
The temperature detection module is faulty.	Ask for technical support.

10.7.67 Fieldbus Adapter Communication Error (156)

10.7.67.1 Communication Error Between Fieldbus Adapter A and the Host Controller (156-1)

Default fault level: Alarm
Reset method: Auto
Lowest fault level: Alarm
Highest fault level: Alarm

Error mechanism:

The fieldbus adapter A receives no valid data in 200 ms.

Fault diagnosis:

Possible Cause	Solution
The external bus is disconnected.	1. Check whether the circuit is disconnected or the connection is unreliable. 2. Check whether the master PLC works normally.
The wiring is abnormal.	1. Check whether the reception and transmission wiring is normal. 2. Check whether the connector connection is reliable. 3. Check whether the circuit positive and negative electrodes are connected correctly.
The termination resistor does not match.	1. Check whether the termination resistor is connected. 2. Check whether the resistance of the termination resistor is matching.
The check bit during PROFIBUS-DP communication is abnormal.	Check the DP data check bit [n16-10].
Parameters are set incorrectly.	1. Check whether the communication baud rates are inconsistent. 2. Check whether the communication station number is incorrect or conflicts.
Other causes	Ask for technical support.

10.7.67.2 Communication Error Between Fieldbus Adapter B and the Host Controller (156-2)

Default fault level: Alarm	Reset method: Auto
Lowest fault level: Alarm	Highest fault level: Alarm

Error mechanism:

The fieldbus adapter B receives no valid data in 200 ms.

Fault diagnosis:

Possible Cause	Solution
The external bus is disconnected.	1. Check whether the circuit is disconnected or the connection is unreliable. 2. Check whether the master PLC works normally.
The wiring is abnormal.	1. Check whether the reception and transmission wiring is normal. 2. Check whether the connector connection is reliable. 3. Check whether the circuit positive and negative electrodes are connected correctly.
The termination resistor does not match.	1. Check whether the termination resistor is connected. 2. Check whether the resistance of the termination resistor is matching.
The check bit during PROFIBUS-DP communication is abnormal.	Check the DP data check bit [n16-10].
Parameters are set incorrectly.	1. Check whether the communication baud rates are inconsistent. 2. Check whether the communication station number is incorrect or conflicts.
Other causes	Ask for technical support.

10.7.67.3 Communication Error Between the Redundant Fieldbus Adapter and the Host Controller (156-3)

Default fault level: Alarm	Reset method: Auto
Lowest fault level: Alarm	Highest fault level: Alarm

Error mechanism:

The redundant fieldbus adapter receives no valid data in 200 ms.

Fault diagnosis:

Possible Cause	Solution
The external bus is disconnected.	1. Check whether the circuit is disconnected or the connection is unreliable. 2. Check whether the master PLC works normally.
The wiring is abnormal.	1. Check whether the reception and transmission wiring is normal. 2. Check whether the connector connection is reliable. 3. Check whether the circuit positive and negative electrodes are connected correctly.
The termination resistor does not match.	1. Check whether the termination resistor is connected. 2. Check whether the resistance of the termination resistor is matching.
The check bit during PROFIBUS-DP communication is abnormal.	Check the DP data check bit [n16-10].
Parameters are set incorrectly.	1. Check whether the communication baud rates are inconsistent. 2. Check whether the communication station number is incorrect or conflicts.
Other causes	Ask for technical support.

10.7.67.4 Fieldbus Adapter A Data Check Error (156-4)

Default fault level: Alarm	Reset method: Auto
Lowest fault level: Alarm	Highest fault level: Alarm

Error mechanism:

The number of consecutive CRC errors in the data received by the fieldbus adapter A reaches 10.

Fault diagnosis:

Possible Cause	Solution
The communication circuit has interference.	1. Check whether the circuit connection is unreliable. 2. Check whether the circuit shield is reliably grounded.
Other causes	Ask for technical support.

10.7.67.5 Fieldbus Adapter B Data Check Error (156-5)

Default fault level: Alarm	Reset method: Auto
Lowest fault level: Alarm	Highest fault level: Alarm

Error mechanism:

The number of consecutive CRC errors in the data received by the fieldbus adapter B reaches 10.

Fault diagnosis:

Possible Cause	Solution
The communication circuit has interference.	1. Check whether the circuit connection is unreliable. 2. Check whether the circuit shield is reliably grounded.
Other causes	Ask for technical support.

10.7.67.6 Redundant Fieldbus Adapter Data Check Error (156-6)

Default fault level: Alarm	Reset method: Auto
Lowest fault level: Alarm	Highest fault level: Alarm

Error mechanism:

The number of consecutive CRC errors in the data received by the redundant fieldbus adapter reaches 10.

Fault diagnosis:

Possible Cause	Solution
The communication circuit has interference.	1. Check whether the circuit connection is unreliable. 2. Check whether the circuit shield is reliably grounded.
Other causes	Ask for technical support.

10.7.68 Self-Test Fault (158)

10.7.68.1 VI Self-Test: IGBT U Phase Lower Bridge Short Circuited (158-1)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

The IGBT U phase lower bridge is short-circuited during VI self-test.

Fault diagnosis:

Possible Cause	Solution
The U phase lower bridge IGBT is short-circuited.	Check whether the U phase lower bridge IGBT is short-circuited.
Other causes	Ask for technical support.

10.7.68.2 VI Self-Test: IGBT U Phase Upper Bridge Short Circuited (158-2)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

The IGBT U phase upper bridge is short-circuited during VI self-test.

Fault diagnosis:

Possible Cause	Solution
The U phase upper bridge IGBT is short-circuited.	Check whether the U phase upper bridge IGBT is short-circuited.
Other causes	Ask for technical support.

10.7.68.3 VI Self-Test: IGBT V Phase Upper Bridge Short Circuited (158-3)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

The IGBT V phase lower bridge is short-circuited during VI self-test.

Fault diagnosis:

Possible Cause	Solution
The V phase lower bridge IGBT is short-circuited.	Check whether the V phase lower bridge IGBT is short-circuited.
Other causes	Ask for technical support.

10.7.68.4 VI Self-Test: IGBT V Phase Upper Bridge Short Circuited (158-4)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

The IGBT V phase upper bridge is short-circuited during VI self-test.

Fault diagnosis:

Possible Cause	Solution
The V phase upper bridge IGBT is short-circuited.	Check whether the V phase upper bridge IGBT is short-circuited.
Other causes	Ask for technical support.

10.7.68.5 VI Self-Test: IGBT W Phase Lower Bridge Short Circuited (158-5)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

The IGBT W phase lower bridge is short-circuited during VI self-test.

Fault diagnosis:

Possible Cause	Solution
The W phase lower bridge IGBT is short-circuited.	Check whether the W phase lower bridge IGBT is short-circuited.
Other causes	Ask for technical support.

10.7.68.6 VI Self-Test: IGBT W Phase Upper Bridge Short Circuited (158-6)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

The IGBT W phase upper bridge is short-circuited during VI self-test.

Fault diagnosis:

Possible Cause	Solution
The W phase upper bridge IGBT is short-circuited.	Check whether the W phase upper bridge IGBT is short-circuited.
Other causes	Ask for technical support.

10.7.68.7 Output Short Circuited to Ground (158-7)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

The expansion slot settings in n4-00 and n5-00 are the same.

Fault diagnosis:

Possible Cause	Solution
The drive output circuit is grounded or short-circuited.	Eliminate peripheral faults and check the motor or output contactor for short circuit.
Other causes	Ask for technical support.

10.7.68.8 Bridge Arm Self-Test: IGBT U+V-W- Short Circuited During Pulse Output (158-8)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The UV or UW two-phase output side is short-circuited.	1. Check the output side of the AC drive for UV or UW short circuit. 2. Ask for technical support.
Other causes	Ask for technical support.

10.7.68.9 Bridge Arm Self-Test: IGBT U-V+W+ Short Circuited During Pulse Output (158-9)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The UV or UW two-phase output side is short-circuited.	1. Check the output side of the AC drive for UV or UW short circuit. 2. Ask for technical support.
Other causes	Ask for technical support.

10.7.68.10 Bridge Arm Self-Test: IGBT V+U-W- Short Circuited During Pulse Output (158-10)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

The expansion slot settings in n4-00 and n5-00 are the same.

Fault diagnosis:

Possible Cause	Solution
The VU or VW two-phase output side is short-circuited.	1. Check the output side of the AC drive for VU or VW short circuit. 2. Ask for technical support.
Other causes	Ask for technical support.

10.7.68.11 Bridge Arm Self-Test: IGBT V-U+W+ Short Circuited During Pulse Output (158-11)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The VU or VW two-phase output side is short-circuited.	1. Check the output side of the AC drive for VU or VW short circuit. 2. Ask for technical support.
Other causes	Ask for technical support.

10.7.68.12 Bridge Arm Self-Test: IGBT W+U-V- Short Circuited During Pulse Output (158-12)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The WU or WV two-phase output side is short-circuited.	1. Check the output side of the AC drive for WU or WV short circuit. 2. Ask for technical support.
Other causes	Ask for technical support.

10.7.68.13 Bridge Arm Self-Test: IGBT W-U+V+ Short Circuited During Pulse Output (158-13)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

The expansion slot settings in n4-00 and n5-00 are the same.

Fault diagnosis:

Possible Cause	Solution
The WU or WV two-phase output side is short-circuited.	1. Check the output side of the AC drive for WU or WV short circuit. 2. Ask for technical support.
Other causes	Ask for technical support.

10.7.68.14 System Output U Phase Loss (158-14)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The U phase output is not connected.	Connect the cable.
The U phase current sensor is abnormal.	1. Check whether the U phase current sensor is damaged. 2. Replace the U phase current sensor.
Self-test is performed when the motor is rotating.	Perform self-test again after the motor stops.
Other causes	1. Check whether the motor winding is disconnected. 2. Ask for technical support.

10.7.68.15 System Output V Phase Loss (158-15)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The V phase output is not connected.	Connect the cable.
The V phase current sensor is abnormal.	1. Check whether the V phase current sensor is damaged. 2. Replace the V phase current sensor.

Possible Cause	Solution
Self-test is performed when the motor is rotating.	Perform self-test again after the motor stops.
Other causes	1. Check whether the motor winding is disconnected. 2. Ask for technical support.

10.7.68.16 System Output W Phase Loss (158-16)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The W phase output is not connected.	Connect the cable.
The W phase current sensor is abnormal.	1. Check whether the W phase current sensor is damaged. 2. Replace the W phase current sensor.
Self-test is performed when the motor is rotating.	Perform self-test again after the motor stops.
Other causes	1. Check whether the motor winding is disconnected. 2. Ask for technical support.

10.7.69 Self-Test Fault (159)

10.7.69.1 Abnormal Measured Value of the Module U Phase Current Sensor (159-1)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

An error occurred in the U phase current sensor of this module, and the measured value is extremely large.

Fault diagnosis:

Possible Cause	Solution
The U phase current sensor is abnormal.	1. Check whether the U phase current sensor is damaged. 2. Check whether the power cable or signal cable of the U phase current sensor is connected incorrectly. 2. Replace the U phase current sensor.
Other causes	Ask for technical support.

10.7.69.2 Abnormal Measured Value of the Module V Phase Current Sensor (159-2)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

An error occurred in the V phase current sensor of this module, and the measured value is extremely large.

Fault diagnosis:

Possible Cause	Solution
The V phase current sensor is abnormal.	1. Check whether the V phase current sensor is damaged. 2. Check whether the power cable or signal cable of the V phase current sensor is connected incorrectly. 2. Replace the V phase current sensor.
Other causes	Ask for technical support.

10.7.69.3 Abnormal Measured Value of the Module W Phase Current Sensor (159-3)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

An error occurred in the W phase current sensor of this module, and the measured value is extremely large.

Fault diagnosis:

Possible Cause	Solution
The W phase current sensor is abnormal.	1. Check whether the W phase current sensor is damaged. 2. Check whether the power cable or signal cable of the W phase current sensor is connected incorrectly. 2. Replace the W phase current sensor.
Other causes	Ask for technical support.

10.7.69.4 Module U Phase Current Sensor Inversely Installed (159-4)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The W phase current sensor is inversely installed.	Correct the direction.
Other causes	Ask for technical support.

10.7.69.5 Module V Phase Current Sensor Inversely Installed (159-5)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The V phase current sensor is inversely installed.	Correct the direction.
Other causes	Ask for technical support.

10.7.69.6 Module W Phase Current Sensor Inversely Installed (159-6)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The W phase current sensor is inversely installed.	Correct the direction.
Other causes	Ask for technical support.

10.7.69.7 Module U Phase Output Phase Loss or Lower Bridge IGBT Open-Circuited (159-7)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
U phase loss occurred at the output side of the module.	Check whether the U phase is connected.
The lower bridge IGBT of the phase is open-circuited.	Check whether the lower bridge IGBT is abnormal.
The motor U phase winding is disconnected.	Check whether the U phase is disconnected.
Other causes	Ask for technical support.

10.7.69.8 Module V Phase Output Phase Loss or Lower Bridge IGBT Open-Circuited (159-8)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
V phase loss occurred at the output side of the module.	Check whether the V phase is connected.
The lower bridge IGBT of the phase is open-circuited.	Check whether the lower bridge IGBT is abnormal.
The motor V phase winding is disconnected.	Check whether the V phase is disconnected.
Other causes	Ask for technical support.

10.7.69.9 Module W Phase Output Phase Loss or Lower Bridge IGBT Open-Circuited (159-9)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
W phase loss occurred at the output side of the module.	Check whether the W phase is connected.
The lower bridge IGBT of the phase is open-circuited.	Check whether the lower bridge IGBT is abnormal.
The motor W phase winding is disconnected.	Check whether the W phase is disconnected.
Other causes	Ask for technical support.

10.7.69.10 Module UV Phase Sensor Incorrectly Inserted (159-10)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The UV two-phase sensor feedback cable of the module is inversely connected.	Check and re-adjust the feedback cable connection.
Other causes	Ask for technical support.

10.7.69.11 Module UW Phase Sensor Incorrectly Inserted (159-11)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The UW two-phase sensor feedback cable of the module is inversely connected.	Check and re-adjust the feedback cable connection.
Other causes	Ask for technical support.

10.7.69.12 Module VW Phase Sensor Incorrectly Inserted (159-12)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The VW two-phase sensor feedback cable of the module is inversely connected.	Check and re-adjust the feedback cable connection.
Other causes	Ask for technical support.

10.7.69.13 Module U Phase Output Phase Loss or Upper Bridge IGBT Open-Circuited (159-13)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
U phase loss occurred at the output side of the module.	Check whether the U phase is connected.
The upper bridge IGBT of the phase is open-circuited.	Check whether the upper bridge IGBT is abnormal.
The motor U phase winding is disconnected.	Check whether the U phase is disconnected.
Other causes	Ask for technical support.

10.7.69.14 Module V Phase Output Phase Loss or Upper Bridge IGBT Open-Circuited (159-14)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
V phase loss occurred at the output side of the module.	Check whether the V phase is connected.
The upper bridge IGBT of the phase is open-circuited.	Check whether the upper bridge IGBT is abnormal.
The motor V phase winding is disconnected.	Check whether the V phase is disconnected.
Other causes	Ask for technical support.

10.7.69.15 Module W Phase Output Phase Loss or Upper Bridge IGBT Open-Circuited (159-15)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
W phase loss occurred at the output side of the module.	Check whether the W phase is connected.
The upper bridge IGBT of the phase is open-circuited.	Check whether the upper bridge IGBT is abnormal.
The motor W phase winding is disconnected.	Check whether the W phase is disconnected.
Other causes	Ask for technical support.

10.7.69.16 Self-Test Process Interrupted (159-16)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
Self-test is interrupted due to a stop or emergency stop command.	Reset the fault and perform self-test again.
Other causes	Ask for technical support.

10.7.70 Self-Test Fault (160)

10.7.70.1 Three-Phase Current Unbalance (160-1)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

The sum of the output current of the three phases is above 20% of the rated motor current during self-test.

Fault diagnosis:

Possible Cause	Solution
The difference between current sharing inductances output by three phases is great.	Check whether the output inductances are different.
The difference between the output cable lengths is great.	Check whether the cables used by the phases are consistent.
The detected current of a phase is abnormal.	Check the Hall wiring.
Other causes	1: The motor is faulty. 2. Ask for technical support.

10.7.70.2 VW Two-Phase Sampling Deviation Too Large (160-2)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

The VW current sampling deviation is above 20% of the rated motor current.

Fault diagnosis:

Possible Cause	Solution
The motor is rotating during self-test.	Perform self-test after the motor stops.
The difference between the output cable lengths is great.	Check whether the cables used by the phases are consistent.
A Hall sampling error occurs.	Check whether the Hall sensor is normal.
Other causes	1: The motor is faulty. 2. Ask for technical support.

10.7.70.3 UW Two-Phase Sampling Deviation Too Large (160-3)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

The UW current sampling deviation is above 20% of the rated motor current.

Fault diagnosis:

Possible Cause	Solution
The motor is rotating during self-test.	Perform self-test after the motor stops.
The difference between the output cable lengths is great.	Check whether the cables used by the phases are consistent.
A Hall sampling error occurs.	Check whether the Hall sensor is normal.
Other causes	1: The motor is faulty. 2. Ask for technical support.

10.7.70.4 UW Two-Phase Sampling Deviation Too Large (160-3)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

The UV current sampling deviation is above 20% of the rated motor current.

Fault diagnosis:

Possible Cause	Solution
The motor is rotating during self-test.	Perform self-test after the motor stops.
The difference between the output cable lengths is great.	Check whether the cables used by the phases are consistent.
A Hall sampling error occurs.	Check whether the Hall sensor is normal.
Other causes	1: The motor is faulty. 2. Ask for technical support.

10.7.70.5 Module U Phase Current Unbalance (160-5)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

In parallel mode, the deviation between the module U phase current and the total current of the parallel U phase is above 10% of the rated heavy-load current.

Fault diagnosis:

Possible Cause	Solution
The cables of parallel modules are different.	Check whether the cables of parallel modules are the same.
A Hall sampling error occurs.	Check whether the Hall sensor is normal.
Other causes	Ask for technical support.

10.7.70.6 Module V Phase Current Unbalance (160-6)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

In parallel mode, the deviation between the module V phase current and the total current of the parallel V phase is above 10% of the rated heavy=load current.

Fault diagnosis:

Possible Cause	Solution
The cables of parallel modules are different.	Check whether the cables of parallel modules are the same.
A Hall sampling error occurs.	Check whether the Hall sensor is normal.
Other causes	Ask for technical support.

10.7.70.7 Module W Phase Current Unbalance (160-7)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Error mechanism:

In parallel mode, the deviation between the module W phase current and the total current of the parallel W phase is above 10% of the rated heavy-load current.

Fault diagnosis:

Possible Cause	Solution
The cables of parallel modules are different.	Check whether the cables of parallel modules are the same.
A Hall sampling error occurs.	Check whether the Hall sensor is normal.
Other causes	Ask for technical support.

10.7.70.8 U Phase Upper Bridge or V Phase Lower Bridge IGBT Energization Failure (160-8)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
IGBT cannot be energized.	Ask for technical support.
Other causes	Ask for technical support.

10.7.70.9 U Phase Lower Bridge or V Phase Upper Bridge IGBT Energization Failure (160-9)

Default fault level: Coast to stop	Reset method: Manual
Lowest fault level: Coast to stop	Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
IGBT cannot be energized.	Ask for technical support.
Other causes	Ask for technical support.

10.7.70.10 V Phase Upper Bridge or W Phase Lower Bridge IGBT Energization Failure (160-10)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
IGBT cannot be energized.	Ask for technical support.
Other causes	Ask for technical support.

10.7.70.11 V Phase Lower Bridge or W Phase Upper Bridge IGBT Energization Failure (160-11)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
IGBT cannot be energized.	Ask for technical support.
Other causes	Ask for technical support.

10.7.70.12 W Phase Upper Bridge or U Phase Lower Bridge IGBT Energization Failure (160-12)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
IGBT cannot be energized.	Ask for technical support.
Other causes	Ask for technical support.

10.7.70.13 W Phase Lower Bridge or U Phase Upper Bridge IGBT Energization Failure (160-13)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
IGBT cannot be energized.	Ask for technical support.
Other causes	Ask for technical support.

10.7.70.14 Self-Test Overcurrent (160-14)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

The output transient current is greater than 1.5 times that of the motor or AC drive.

Fault diagnosis:

Possible Cause	Solution
The output transient current is greater than 1.5 times that of the motor or AC drive.	Ask for technical support.

10.7.71 I/O Expansion Module Wiring Error (170)

10.7.71.1 (I/O Expansion Module 1) DIO Output Cable Short-Circuited (170-1)

Default fault level: Alarm
Reset method: Auto
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

When DIO is used for output, the output cable is short-circuited.

Fault diagnosis:

Possible Cause	Solution
When DIO is used for output, the output cable is short-circuited.	Check each DIO pin used for output for short circuit.
Other causes	Ask for technical support.

10.7.71.2 (I/O Expansion Module 2) DIO Output Cable Short-Circuited (170-2)

Default fault level: Alarm
Reset method: Auto
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

When DIO is used for output, the output cable is short-circuited.

Fault diagnosis:

Possible Cause	Solution
When DIO is used for output, the output cable is short-circuited.	Check each DIO pin used for output for short circuit.
Other causes	Ask for technical support.

10.7.71.3 (I/O Expansion Module 3) DIO Output Cable Short-Circuited (170-3)

Default fault level: Alarm
Reset method: Auto
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

When DIO is used for output, the output cable is short-circuited.

Fault diagnosis:

Possible Cause	Solution
When DIO is used for output, the output cable is short-circuited.	Check each DIO pin used for output for short circuit.
Other causes	Ask for technical support.

10.7.71.4 (I/O Expansion Module 1) AI Input Disconnected (170-4)

Default fault level: Alarm
Reset method: Auto
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

When AI of I/O expansion module 1 is set to current signal of 4 mA to 20 mA, if the input current is lower than the disconnection monitoring threshold for a time exceeding the disconnection monitoring delay, this alarm is reported. The following table lists the correspondence between analog inputs and disconnection monitoring thresholds.

AI	Disconnection Monitoring Threshold	Disconnection Monitoring Delay
AI1	n25-48	n25-49
AI2	n25-58	n25-59
AI3	n25-68	n25-69

Fault diagnosis:

Possible Cause	Solution
The AI type setting is incorrect.	Check whether the AI input voltage/current of the I/O expansion module is correct.
The AI disconnection monitoring threshold or delay is set to a too small value.	1. Adjust the AI disconnection monitoring threshold. 2. Adjust the AI disconnection monitoring delay.
Other causes	Ask for technical support.

10.7.71.5 (I/O Expansion Module 2) AI Input Disconnected (170-5)

Default fault level: Alarm
Reset method: Auto
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

When AI of I/O expansion module 2 is set to current signal of 4 mA to 20 mA, if the input current is lower than the disconnection monitoring threshold for a time exceeding the disconnection monitoring delay, this alarm is reported. The following table lists the correspondence between analog inputs and disconnection monitoring thresholds.

AI	Disconnection Monitoring Threshold	Disconnection Monitoring Delay
AI1	n28-48	n28-49
AI2	n28-58	n28-59
AI3	n28-68	n28-69

Fault diagnosis:

Possible Cause	Solution
The AI type setting is incorrect.	Check whether the AI input voltage/current of the I/O expansion module is correct.
The AI disconnection monitoring threshold or delay is set to a too small value.	1. Adjust the AI disconnection monitoring threshold. 2. Adjust the AI disconnection monitoring delay.
Other causes	Ask for technical support.

10.7.71.6 (I/O Expansion Module 3) AI Input Disconnected (170-6)

Default fault level: Alarm
Reset method: Auto
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

When AI of I/O expansion module 1 is set to current signal of 4 mA to 20 mA, if the input current is lower than the disconnection monitoring threshold for a time exceeding the disconnection monitoring delay, this alarm is reported. The following table lists the correspondence between analog inputs and disconnection monitoring thresholds.

AI	Disconnection Monitoring Threshold	Disconnection Monitoring Delay
AI1	n31-48	n31-49
AI2	n31-58	n31-59
AI3	n31-68	n31-69

Fault diagnosis:

Possible Cause	Solution
The AI type setting is incorrect.	Check whether the AI input voltage/current of the I/O expansion module is correct.
The AI disconnection monitoring threshold or delay is set to a too small value.	1. Adjust the AI disconnection monitoring threshold. 2. Adjust the AI disconnection monitoring delay.
Other causes	Ask for technical support.

10.7.71.7 (I/O Expansion Module 1) EEPROM Operation Error (170-7)

Default fault level: Alarm
Reset method: Auto
Lowest fault level: Alarm
Highest fault level: Coast to stop

Error mechanism:

I/O correction parameters cannot be written and saved to EEPROM.

Fault diagnosis:

Possible Cause	Solution
EEPROM is faulty.	1. Rewrite the correction parameters. 2. Replace the I/O expansion module.
Other causes	Ask for technical support.

10.7.71.8 (I/O Expansion Module 2) EEPROM Operation Error (170-8)

Default fault level: Alarm	Reset method: Auto
Lowest fault level: Alarm	Highest fault level: Coast to stop

Error mechanism:

I/O correction parameters cannot be written and saved to EEPROM.

Fault diagnosis:

Possible Cause	Solution
EEPROM is faulty.	1. Rewrite the correction parameters. 2. Replace the I/O expansion module.
Other causes	Ask for technical support.

10.7.71.9 (I/O Expansion Module 3) EEPROM Operation Error (170-9)

Default fault level: Alarm	Reset method: Auto
Lowest fault level: Alarm	Highest fault level: Coast to stop

Error mechanism:

I/O correction parameters cannot be written and saved to EEPROM.

Fault diagnosis:

Possible Cause	Solution
EEPROM is faulty.	1. Rewrite the correction parameters. 2. Replace the I/O expansion module.
Other causes	Ask for technical support.

10.7.71.10 (I/O Expansion Module 1) Correction Coefficient Error (170-10)

Default fault level: Alarm	Reset method: Auto
Lowest fault level: Alarm	Highest fault level: Coast to stop

Error mechanism:

When the correction coefficient is abnormal, the I/O expansion module corrects parameters to their defaults.

Fault diagnosis:

Possible Cause	Solution
The factory correction parameter of AI or AO is incorrect and n7-39 is set to disabling correction.	Check n7-15 (expansion module feedback status) and correct the corresponding correction coefficient. 1. When bits 3, 7, and 11 of [n7-15] are 1, the correction parameters of channels AI1, AI2, and AI3 are incorrect, respectively. 2. When bits 13, 14, and 15 of [n7-15] are 1, the correction parameters of channels AO1, AO2, and AO3 are incorrect, respectively.
Other causes	Ask for technical support.

10.7.71.11 (I/O Expansion Module 1) Correction Coefficient Error (170-10)

Default fault level: Alarm	Reset method: Auto
Lowest fault level: Alarm	Highest fault level: Coast to stop

Error mechanism:

When the correction coefficient is abnormal, the I/O expansion module corrects parameters to their defaults.

Fault diagnosis:

Possible Cause	Solution
The factory correction parameter of AI or AO is incorrect and n8-39 is set to disabling correction.	Check n7-15 (expansion module feedback status) and correct the corresponding correction coefficient. 1. When bits 3, 7, and 11 of [n7-15] are 1, the correction parameters of channels AI1, AI2, and AI3 are incorrect, respectively. 2. When bits 13, 14, and 15 of [n7-15] are 1, the correction parameters of channels AO1, AO2, and AO3 are incorrect, respectively.
Other causes	Ask for technical support.

10.7.71.12 (I/O Expansion Module 3) Correction Coefficient Error (170-12)

Default fault level: Alarm	Reset method: Auto
Lowest fault level: Alarm	Highest fault level: Coast to stop

Error mechanism:

When the correction coefficient is abnormal, the I/O expansion module corrects parameters to their defaults.

Fault diagnosis:

Possible Cause	Solution
The factory correction parameter of AI or AO is incorrect and n9-39 is set to disabling correction.	Check n7-15 (expansion module feedback status) and correct the corresponding correction coefficient. 1. When bits 3, 7, and 11 of [n7-15] are 1, the correction parameters of channels AI1, AI2, and AI3 are incorrect, respectively. 2. When bits 13, 14, and 15 of [n7-15] are 1, the correction parameters of channels AO1, AO2, and AO3 are incorrect, respectively.
Other causes	Ask for technical support.

10.7.72 Module Pre-Overtemperature (172)

10.7.72.1 172-1 U Phase Module Pre-Overtemperature

Default fault level: Alarm	Reset method: Auto
Lowest fault level: Alarm	Highest fault level: Alarm

Error mechanism:

The detected temperature of the module U phase is greater than ([A4-33] - [A4-27]).

The module pre-overtemperature threshold can be set in A4-27.

Fault diagnosis:

Possible Cause	Solution
The air filter is blocked.	Clean the air filter.
The fan is abnormal.	Check the fan.
The ambient temperature is high.	Decrease the ambient temperature.
The over-temperature alarm threshold advance is too large.	Set A4-27 properly
The module is faulty.	Ask for technical support.

10.7.72.2 172-2 V Phase Module Pre-Overtemperature

Default fault level: Alarm	Reset method: Auto
Lowest fault level: Alarm	Highest fault level: Alarm

Error mechanism:

The detected temperature of the module V phase is greater than ([A4-33] - [A4-27]).

The module pre-overtemperature threshold can be set in A4-27.

Fault diagnosis:

Possible Cause	Solution
The air filter is blocked.	Clean the air filter.
The fan is abnormal.	Check the fan.
The ambient temperature is high.	Decrease the ambient temperature.
The over-temperature alarm threshold advance is too large.	Set A4-27 properly.
The module is faulty.	Ask for technical support.

10.7.72.3 172-3 W Phase Module Pre-Overtemperature

Default fault level: Alarm	Reset method: Auto
Lowest fault level: Alarm	Highest fault level: Alarm

Error mechanism:

The detected temperature of the module W phase is greater than ([A4-33] - [A4-27]).

The module pre-overtemperature threshold can be set in A4-27.

Fault diagnosis:

Possible Cause	Solution
The air filter is blocked.	Clean the air filter.
The fan is abnormal.	Check the fan.
The ambient temperature is high.	Decrease the ambient temperature.

Possible Cause	Solution
The over-temperature alarm threshold advance is too large.	Set A4-27 properly.
The module is faulty.	Ask for technical support.

10.7.72.4 172-7 Control Cavity Temperature Error

Default fault level: Alarm
Reset method: Auto
Lowest fault level: Alarm
Highest fault level: Alarm

Error mechanism:

The detected temperature of the module W phase is greater than ([A4-34] - [A4-27]).

The module pre-overtemperature threshold can be set in A4-27.

Remarks:

This fault is reported only in the 690 V single-drive and water cooling multi-drive models.

Fault diagnosis:

Possible Cause	Solution
The air filter is blocked.	Clean the air filter.
The fan is abnormal.	Check the fan.
The ambient temperature is high.	Decrease the ambient temperature.
The over-temperature alarm threshold advance is too large.	Set A4-27 properly.
The module is faulty.	Ask for technical support.

10.7.73 Sync Voltage Detection Module Error (173)

10.7.73.1 173-7 HSVM Version Incompatible

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Alarm
Highest fault level: Coast to stop

Fault diagnosis:

Possible Cause	Solution
The HSVM software version is incompatible.	Ask for technical support.

10.7.74 Sampling Detection Error (174)

10.7.74.1 174-13 HSVM Phase Sequence Error

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

The UVW phase sequence of the HSVM sampling card is different from that of the module.

Fault diagnosis:

Possible Cause	Solution
The HSVM phase sequence is incorrect.	Check whether the UVW phase sequence of the HSVM sampling card is consistent that of the module.

10.7.74.2 174-14 HSVM Sampling Module Disconnected or Not Connected

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

The cable of the HSVM sampling card is not connected or disconnected.

Fault diagnosis:

Possible Cause	Solution
The HSVM sampling cable is disconnected or not connected.	Check whether the HSVM module wiring is normal.

10.7.75 Master-Slave Communication Error Alarm (183)

10.7.75.1 InoLink Communication: Data Receiving Node Address Being the Local Address (183-4)

Default fault level: Alarm
Reset method: Auto
Lowest fault level: Alarm
Highest fault level: Alarm

Error mechanism:

After InoLink is enabled, the specified receiving node address is the local address, and thus this fault is triggered.

Fault diagnosis:

Possible Cause	Solution
The address of the specified receiving node is inappropriate.	Set the address of the specified receiving node correctly.
The local address is inappropriate.	Set the local address correctly.

10.7.75.2 Optical Fiber Synchronization Communication Module: Node Address Conflict (183-5)

Default fault level: Alarm
Reset method: Auto
Lowest fault level: Alarm
Highest fault level: Alarm

Error mechanism:

When n22-00 is set to 0, the address of the local node and that of another node on the network conflict.

Fault diagnosis:

Possible Cause	Solution
Node addresses conflict.	Reset the node address.

10.7.75.3 Optical Fiber Synchronization Communication Module: Node A That Receives the Data Not Enabled (183-6)

Default fault level: Alarm
Reset method: Auto
Lowest fault level: Alarm
Highest fault level: Alarm

Error mechanism:

When n22-00 is set to 0, the heartbeat has not been updated for a long time for the source address of node A.

Fault diagnosis:

Possible Cause	Solution
The optical fiber circuit is abnormal.	Check the wiring of the address corresponding to node A that receives the data.
The address of node A is not enabled.	Check whether the source address of node A is enabled.
Other causes	Ask for technical support.

10.7.75.4 Optical Fiber Synchronization Communication Module: Node B That Receives the Data Not Enabled (183-7)

Default fault level: Alarm
Reset method: Auto
Lowest fault level: Alarm
Highest fault level: Alarm

Error mechanism:

When n22-00 is set to 0, the heartbeat has not been updated for a long time for the source address of node B.

Fault diagnosis:

Possible Cause	Solution
The optical fiber circuit is abnormal.	Check the wiring of the address corresponding to node B that receives the data.
The address of node B is not enabled.	Check whether the source address of node B is enabled.
Other causes	Ask for technical support.

10.7.75.5 Optical Fiber Synchronization Communication Module: Node C That Receives the Data Not Enabled (183-8)

Default fault level: Alarm
Reset method: Auto
Lowest fault level: Alarm
Highest fault level: Alarm

Error mechanism:

When n22-00 is set to 0, the heartbeat has not been updated for a long time for the source address of node C.

Fault diagnosis:

Possible Cause	Solution
The optical fiber circuit is abnormal.	Check the wiring of the address corresponding to node C that receives the data.
The address of node C is not enabled.	Check whether the source address of node C is enabled.
Other causes	Ask for technical support.

10.7.75.6 Optical Fiber Synchronization Communication Module: Local Node Address Not Set (183-9)

Default fault level: Alarm
Reset method: Auto
Lowest fault level: Alarm
Highest fault level: Alarm

Error mechanism:

When n22-05 is set to the local node address and the local communication network (n22-00 set to 1) is enabled, the 183-9 alarm will be reported.

Fault diagnosis:

Possible Cause	Solution
The local node address is not set.	Set the local address in n22-05.
Other causes	Ask for technical support.

10.7.75.7 Optical Fiber Synchronization Communication Module: Data Receiving Node Address Being the Local Address (183-10)

Default fault level: Alarm
Reset method: Auto
Lowest fault level: Alarm
Highest fault level: Alarm

Error mechanism:

The 183-10 alarm is reported when the data receiving source node set in n22-06, n22-07, or n22-08 is the address of the local node.

Fault diagnosis:

Possible Cause	Solution
The data receiving source node set in n22-06, n22-07, or n22-08 is the address of the local node.	Set the data receiving source node set in n22-06, n22-07, or n22-08 again.
Other causes	Ask for technical support.

10.7.75.8 Optical Fiber Synchronization Communication Module Not Activated (183-11)

Default fault level: Alarm
Reset method: Auto
Lowest fault level: Alarm
Highest fault level: Alarm

Error mechanism:

The communication network has been started. However, no slot is set for the optical fiber synchronization communication module in n22-02.

Fault diagnosis:

Possible Cause	Solution
The communication network has been started. However, no slot is set for the optical fiber synchronization communication module in n22-02.	Set a slot in n22-02.
Other causes	Ask for technical support.

10.7.75.9 Optical Fiber Synchronization Communication Module: Node A That Receives the Data Not on the Network (183-12)

Default fault level: Alarm
Reset method: Auto
Lowest fault level: Alarm
Highest fault level: Alarm

Error mechanism:

The address selected for the node A is not detected.

Fault diagnosis:

Possible Cause	Solution
The address set for node A in n22-06 does not exist.	Reset node A that receives the data in n22-06.
The address loop optical fiber set for node A in n22-06 is abnormal.	Check the loop optical fiber.
Other causes	Ask for technical support.

10.7.75.10 Optical Fiber Synchronization Communication Module: Node B That Receives the Data Not on the Network (183-13)

Default fault level: Alarm
Reset method: Auto
Lowest fault level: Alarm
Highest fault level: Alarm

Error mechanism:

The address selected for the node B is not detected.

Fault diagnosis:

Possible Cause	Solution
The address set for node B in n22-07 does not exist.	Reset node B that receives the data in n22-07.
The address loop optical fiber set for node B in n22-07 is abnormal.	Check the loop optical fiber.
Other causes	Ask for technical support.

10.7.75.11 Optical Fiber Synchronization Communication Module: Node C That Receives the Data Not on the Network (183-14)

Default fault level: Alarm
Reset method: Auto
Lowest fault level: Alarm
Highest fault level: Alarm

Error mechanism:

The address selected for the node C is not detected.

Fault diagnosis:

Possible Cause	Solution
The address set for node C in n22-08 does not exist.	Reset node C that receives the data in n22-08.
The address loop optical fiber set for node C in n22-08 is abnormal.	Check the loop optical fiber.
Other causes	Ask for technical support.

10.7.76 Load Monitoring Error (190)

10.7.76.1 Load Monitoring Overload (190-1)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

[L15-02] is set to 2 or 3, the monitoring signal [L15-00] exceeds the overload curve point for a period of time specified in [L15-19], and thus ERR190-1 is reported.

Fault diagnosis:

Possible Cause	Solution
The set overload curve point is exceeded for the actual load characteristic curve.	Set the overload curve properly.

10.7.76.2 Load Monitoring Underload (190-2)

Default fault level: Coast to stop
Reset method: Manual
Lowest fault level: Coast to stop
Highest fault level: Coast to stop

Error mechanism:

[L15-03] is set to 2 or 3, the monitoring signal [L15-00] exceeds the underload curve point for a period of time specified in [L15-20], and thus ERR190-2 is reported.

Fault diagnosis:

Possible Cause	Solution
The set underload curve point is exceeded for the actual load characteristic curve.	Set the underload curve properly.

10.7.77 Load monitoring Error Alarm (191)

10.7.77.1 Load Monitoring Overload (191-1)

Default fault level: Alarm
Reset method: Auto
Lowest fault level: Alarm
Highest fault level: Alarm

Error mechanism:

[L15-02] is set to 1, the monitoring signal [L15-00] exceeds the overload curve point for a period of time specified in [L15-19], and thus ERR191-1 is reported.

[L15-02] is set to 3, the monitoring signal [L15-00] exceeds the overload curve point for a period of time that is half the time specified in [L15-19], and thus ERR191-1 is reported.

Fault diagnosis:

Possible Cause	Solution
The set overload curve point is exceeded for the actual load characteristic curve.	Set the overload curve properly.

10.7.77.2 Load Monitoring Underload (191-2)

Default fault level: Alarm
Reset method: Auto
Lowest fault level: Alarm
Highest fault level: Alarm

Error mechanism:

[L15-03] is set to 1, the monitoring signal [L15-00] exceeds the underload curve point for a period of time specified in [L15-20], and thus ERR191-2 is reported.

[L15-03] is set to 3, the monitoring signal [L15-00] exceeds the underload curve point for a period of time that is half the time specified in [L15-20], and thus ERR191-2 is reported.

Fault diagnosis:

Possible Cause	Solution
The set underload curve point is exceeded for the actual load characteristic curve.	Set the underload curve properly.

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