FORWARD, ALWAYS PROGRESSING

SV660P Series Servo Drive

Commissioning Guide

Industrial Automation

Intelligent Elevator

New Energy Vehicle

Industrial Robot

Rail Transit

Data code 19011392C00

Preface

Introduction

Thank you for purchasing the SV660P series servo drive developed by Inovance.

The SV660P series high-performance AC servo drive covers a power range from 50 W to 7.5 kW. The servo drive, which covers a power range from 0.05 kW to 7.5 kW, supports Modbus, CANopen and CANlink communication protocols and carries necessary communication interfaces to operate with the host controller for a networked operation of multiple servo drives. The servo drive supports adaptive stiffness level setting, inertia auto-tuning, and vibration suppression for easy use. It allows a quiet and stable operation together with an MS1 series high-response servo motor (with low or high inertia) equipped with a 23-bit single-turn/multi-turn absolute encoder. The SV660P series servo drive serves to achieve quick and accurate position control, speed control, and torque control in automation equipment such as electronic manufacturing devices, manipulators, packing devices, and machine tools.

This manual presents drive commissioning, parameter descriptions, including the operating panel, commissioning software, commissioning procedure and a parameter list.

More documents

Name	Data Code	Description
SV660P Series Servo Drive Selection Guide	19011390	Provides instructions on product selection, including the list of supporting components, technical data on the drive and motor, and the selection guide of cables.
SV660P Series Servo Drive Hardware Guide	19011391	Presents electrical design guidance of the equipment, description of terminals, required certificates and standards and solutions to common EMC problems.
SV660P Series Servo Drive Commissioning Guide	19011392	Presents servo commissioning, parameter descriptions, including the operating panel, commissioning software, commissioning procedure and a parameter list.
SV660P Series Servo Drive Function Guide	19011393	Presents functions and parameters, including function overview, basic servo functions, adjustment and parameter list.
SV660P Series Servo Drive Communication Guide	19012201	Presents functions and parameters of the servo drive, including Modbus communication configuration, parameter descriptions, and communication application cases.

Name	Data Code	Description
SV660P Series Servo Drive Troubleshooting Guide	19011907	Introduces faults and fault levels, the troubleshooting process, warning codes and fault codes.
SV660P Series Servo Drive Safety Guide	19011884	Presents the safety function and related certifications and standards, wiring, commissioning process, troubleshooting, and functions.
SV660P Series Servo Drive Manual Package	PS00005513	Provides information on selection, installation, commissioning, function, troubleshooting and parameters of the equipment.

Revision History

Date	Version	Description
2023-03	C00	• Optimized H0b.33 and H0b.63. • Optimized the detailed description of H02.00 and H05.26. • Added description of Hault/Fault.
2023-01	B02	• Added warranty information in the preface. • Changed the MS1-Z motor to MS1-R motor. • Added hexadecimal parameters in parameter description.
2022-10	B01	Minor corrections.
2022-08	B00	• Deleted section Faults. • Updated the list of parameters and description of parameters.
2021-12	A09	• Added other safety precautions to the safety precautions. • Optimized the 220 V energy data table in section 2.2.4. • Optimized the fault reset timing diagram in section 2.2.5 servo operation. • Optimized the fault reset timing diagram in section 2.2.5 servo operation. • Changed the the default of H0A.30 to 2. • Changed the range of H09.32 to -1000–1000. • Changed the default value of H00.31 to 8388608. • Changed the default value of H09.37 to 300. • Changed the type of the power line breakage fault to No. 2 recoverable.

Date	Version	Description
2021-10	A08	• Optimized section Operation Panel. • Optimized section User Password. • Added sections Adjustment and Commissioning Software. • Optimized section Parameter Setting. • Optimized section Servo Operation. • Optimized section Servo Stop. • Added information on parameter H0E.33. • Optimized the content on H0A.30. • Synchronized with the English manual. • Optimized the list of fault and warning codes. • Minor corrections.
2021-05	A07	• Optimized the content on H02.06, H02.08, H03.65 and H03.66. • Added Appendix A CANlink Enhanced Axis Control Parameters.
2020-11	A02	Minor corrections.
2020-09	A01	Updated the printing style.
2020-08	A00	First release

Access to the Guide

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

- Do keyword search at *http://www.inovance.com*.
- Scan the QR code on the equipment to acquire more.

Warranty

Inovance provides warranty service within the warranty period (as specified in your order) for any fault or damage that is not caused by improper operation of the user. You will be charged for any repair work after the warranty period expires.

Within the warranty period,maintenance fee will be charged for the following damage:

- Damage caused by operations not following the instructions in the user guide
- Damage caused by fire, flood, or abnormal voltage
- Damage caused by unintended use of the product
- Damage caused by use beyond the specified scope of application of the product
- Damage or secondary damage caused by force majeure (natural disaster, earthquake, and lightning strike)

The maintenance fee is charged according to the latest Price List of Inovance. If otherwise agreed upon, the terms and conditions in the agreement shall prevail.

For details, see the Product Warranty Card.

Table of Contents

General Safety Instructions

Safety Precautions

- This section explains the safety precautions that need to be observed to use this product correctly. Before using this product, please read the instruction manual and correctly understand the relevant information of safety precautions. Failure to comply with the safety precautions may result in death, serious injury, or equipment damage.
- "CAUTION", "WARNING", and "DANGER" items in the guide only indicate some of the precautions that need to be followed; they just supplement the safety precautions.
- Use this equipment according to the designated environment requirements. Damage caused by improper use is not covered by warranty.
- Inovance shall take no responsibility for any personal injuries or property damage caused by improper use.

Safety Levels and Definitions

DANGER	Indicates that failure to comply with the notice will result in death or severe personal injuries.
WARNING	Indicates that failure to comply with the notice may result in death or severe personal injuries.
CAUTION	Indicates that failure to comply with the notice may result in minor or moderate personal injuries or equipment damage.

General Safety Instructions

- Drawings in the selection guide are sometimes shown without covers or protective guards. Remember to install the covers or protective guards as specified first, and then perform operations in accordance with the instructions. Install the covers or protective guards as specified, and use the equipment in accordance with the instructions described in the user guide.
- The drawings in the guide are shown for illustration only and may be different from the product you purchased.

Unpacking
WARNING • Do not install the equipment if you find damage, rust, or signs of use on the equipment or accessories upon unpacking. • Do not install the equipment if you find water seepage or missing or damaged components upon unpacking. • Do not install the equipment if you find the packing list does not conform to the equipment you received.
CAUTION • Check whether the packing is intact and whether there is damage, water seepage, dampness, and deformation before unpacking. • Unpack the package by following the unpacking sequence. Do not strike the package violently. • Check whether there is damage, rust, or injuries on the surface of the equipment and equipment accessories before unpacking. • Check whether the package contents are consistent with the packing list before unpacking.
Storage and Transportation
WARNING • Large-scale or heavy equipment must be transported by qualified professionals using specialized hoisting equipment. Failure to comply may result in personal injuries or equipment damage. • Before hoisting the equipment, ensure the equipment components such as the front cover and terminal blocks are secured firmly with screws. Loosely-connected components may fall off and result in personal injuries or equipment damage. • Never stand or stay below the equipment when the equipment is being hoisted by the hoisting equipment. • When hoisting the equipment with a steel rope, ensure the equipment is hoisted at a constant speed without suffering from vibration or shock. Do not turn the equipment over or let the equipment stay hanging in the air. Failure to comply may result in personal injuries or equipment damage.

CAUTION

- Handle the equipment with care during transportation and mind your steps to prevent personal injuries or equipment damage.
- When carrying the equipment with bare hands, hold the equipment casing firmly with care to prevent parts from falling. Failure to comply may result in personal injuries.
- Store and transport the equipment based on the storage and transportation requirements. Failure to comply will result in equipment damage.
- Avoid storing or transporting the equipment in environments with water splash, rain, direct sunlight, strong electric field, strong magnetic field, and strong vibration.
- Avoid storing the equipment for more than three months. Long-term storage requires stricter protection and necessary inspections.
- Pack the equipment strictly before transportation. Use a sealed box for long-distance transportation.
- Never transport the equipment with other equipment or materials that may harm or have negative impacts on this equipment.

Installation

DANGER

- The equipment can be operated by well-trained and qualified professionals only. Non-professionals are not allowed.

WARNING

- Read through the guide and safety instructions before installation.
- Do not install this equipment in places with strong electric or magnetic fields.
- Before installation, check that the mechanical strength of the installation site can bear the weight of the equipment. Failure to comply will result in mechanical hazards.
- Do not wear loose clothes or accessories during installation. Failure to comply may result in an electric shock.
- When installing the equipment in a closed environment (such as a cabinet or casing), use a cooling device (such as a fan or air conditioner) to cool the environment down to the required temperature. Failure to comply may result in equipment over-temperature or a fire.
- Do not retrofit the equipment.
- Do not fiddle with the bolts used to fix equipment components or the bolts marked in red.
- When the equipment is installed in a cabinet or final assembly, a fireproof enclosure providing both electrical and mechanical protections must be provided. The IP rating must meet IEC standards and local laws and regulations.
- Before installing devices with strong electromagnetic interference, such as a transformer, install a shielding device for the equipment to prevent malfunction.
- Install the equipment onto an incombustible object such as a metal. Keep the equipment away from combustible objects. Failure to comply will result in a fire.

CAUTION

- Cover the top of the equipment with a piece of cloth or paper during installation. This is to prevent unwanted objects such as metal chippings, oil, and water from falling into the equipment and causing faults. After installation, remove the cloth or paper on the top of the equipment to prevent over-temperature caused by poor ventilation due to blocked ventilation holes.
- Resonance may occur when the equipment operating at a constant speed executes variable speed operations. In this case, install the vibration-proof rubber under the motor frame or use the vibration suppression function to reduce resonance.

Wiring

DANGER

- Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed only by professionals.
- Before wiring, cut off power connections with all equipment. Residual voltage exists after power cut-off. Therefore, wait at least the time designated on the equipment warning label before further operations. Measure the DC voltage of the main circuit and make sure it is below the safe voltage, otherwise there will be the danger of electric shock.
- Do not perform wiring, remove the equipment cover, or touch the circuit board with power ON. Failure to comply will result in an electric shock.
- Check that the equipment is grounded properly. Failure to comply will result in an electric shock.

WARNING

- Do not connect the input power supply to the output end of the equipment. Failure to comply will result in equipment damage or even a fire.
- When connecting a drive to the motor, check that the phase sequences of the drive and motor terminals are consistent to prevent reverse motor rotation.
- Cables used for wiring must meet cross sectional area and shielding requirements. The shield of the cable must be reliably grounded at one end.
- Fix the terminal screws with the tightening torque specified in the user guide. Improper tightening torque may overheat or damage the connecting part, resulting in a fire.
- After wiring is done, check that all cables are connected properly and no screws, washers or exposed cables are left inside the equipment. Failure to comply may result in an electric shock or equipment damage.

CAUTION

- During wiring, follow the proper electrostatic discharge (ESD) procedure, and wear an antistatic wrist strap. Failure to comply will damage the equipment or the internal circuits of the equipment.
- Use shielded twisted pairs for the control circuit. Connect the shield to the grounding terminal of the equipment for grounding purpose. Failure to comply will result in equipment malfunction.

Power-on

DANGER

- Before power-on, check that the equipment is installed properly with reliable wiring and the motor can be restarted.
- Check that the power supply meets equipment requirements before power-on to prevent equipment damage or a fire.
- After power-on, do not open the cabinet door or protective cover of the equipment, touch any terminal, or disassemble any unit or component of the equipment. Failure to comply will result in an electric shock.

WARNING

- Perform a trial run after wiring and parameter setting to ensure the equipment operates safely. Failure to comply may result in personal injuries or equipment damage.
- Before power-on, make sure that the rated voltage of the equipment is consistent with that of the power supply. Failure to comply may resulting in a fire. Failure to comply may result in a fire.
- Before power-on, check that no one is near the equipment, motor, or machine. Failure to comply may result in death or personal injuries.

Operation

DANGER

- The equipment must be operated only by professionals. Failure to comply will result in death or personal injuries.
- Do not touch any connecting terminals or disassemble any unit or component of the equipment during operation. Failure to comply will result in an electric shock.

WARNING

- Do not touch the equipment casing, fan, or resistor with bare hands to feel the temperature. Failure to comply may result in personal injuries.
- Prevent metal or other objects from falling into the equipment during operation. Failure to comply may result in a fire or equipment damage.

Maintenance

DANGER

- Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed only by professionals.
- Do not maintain the equipment with power ON. Failure to comply will result in an electric shock.
- Before maintenance, cut off all the power supplies of the equipment and wait for at least the time designated on the equipment warning label.
- In case of a permanent magnet motor, do not touch the motor terminals immediately after power-off because the motor terminals will generate induced voltage during rotation even after the equipment power supply is off. Failure to comply will result in an electric shock.

WARNING • Perform routine and periodic inspection and maintenance on the equipment according to maintenance requirements and keep a maintenance record.
Repair
DANGER • Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed only by professionals. • Do not repair the equipment with power ON. Failure to comply will result in an electric shock. • Before inspection and repair, cut off all the power supplies of the equipment and wait for at least the time designated on the equipment warning label.
WARNING • Submit the repair request according to the warranty agreement. • When the fuse is blown or the circuit breaker or earth leakage current breaker (ELCB) trips, wait for at least the time designated on the equipment warning label before power-on or further operations. Failure to comply may result in death, personal injuries or equipment damage. • When the equipment is faulty or damaged, the troubleshooting and repair work must be performed by professionals that follow the repair instructions, with repair records kept properly. • Replace quick-wear parts of the equipment according to the replacement instructions. • Do not use damaged equipment. Failure to comply may result in death, personal injuries, or severe equipment damage. • After the equipment is replaced, check the wiring and set parameters again.
Disposal
WARNING • Dispose of retired equipment in accordance with local regulations and standards. Failure to comply may result in property damage, personal injuries, or even death. • Recycle retired equipment by observing industry waste disposal standards to avoid environmental pollution.

Additional Precautions

Cautions for the dynamic brake

- Dynamic braking can only be used for emergency stop in case of failure and sudden power failure. Do not trigger failure or power failure frequently.
- Ensure that the dynamic braking function has an operation interval of more than 5 minutes at high speed, otherwise the internal dynamic braking circuit may be damaged.

- Dynamic braking is common in rotating mechanical structures. For example, when a motor has stopped running, it keeps rotating due to the inertia of its load. In this case, this motor is in the regenerative state and short-circuit current passes through the dynamic brake. If this situation continues, the drive, and even the motor, may be burned.

Safety Label

For safe equipment operation and maintenance, comply with the safety labels on the equipment. Do not damage or remove the safety labels. See the following table for descriptions of the safety labels.

Safety Label	Description
	• Never fail to connect Protective Earth (PE) terminal. Read the manual and follow the safety instructions before use. • Do not touch terminals within 15 minutes after disconnecting the power supply to prevent the risk of electric shock. • Do not touch the heatsink with power ON to prevent the risk of burn.

1 Commissioning Tools

1.1 Operating Panel

1.1.1 Display Panel Components

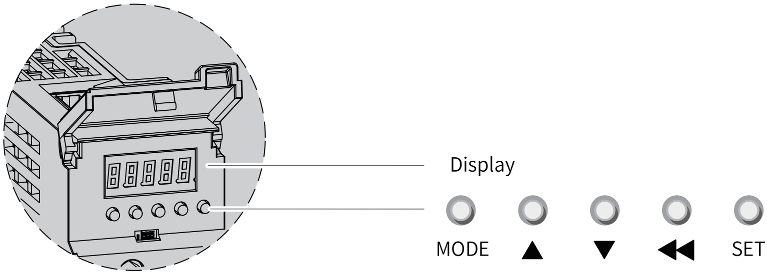


Figure 1-1 Magnified view of the keypad

The operation panel of the SV660 Series servo drive consists of an LED (5-digit, 8-segment) and five buttons. The keypad is used for value display, parameter setting, user password setting and general function execution. The following table takes parameter setting as an example to describe the general functions of the keys.

Table 1–1 Descriptions of keys

Name	Symbol	Description
MODE	MODE	Switches among different modes. Returns to the previous menu.
UP	▲	Increases the value of the blinking digit for the LED.
DOWN	▼	Decreases the value of the blinking digit for the LED.
SHIFT	◀◀	Shifts the blinking digit for the LED. You can view the high digits of the number consisting of more than 5 digits.
SET	SET	Switches to the lower-level menu. Executes commands such as storing parameter setting value.

1.1.2 Display Panel Indicators

The keypad can be used to display the servo drive status, parameters, faults, and monitored values.

- Status display: Displays current servo drive status, such as servo ready or servo running.
- Parameter display: Displays parameters and their setpoints
- Fault display: Displays faults and warnings that occurred on the servo drive.
- Monitored value display: Displays values of monitoring parameters.

Display mode switchover

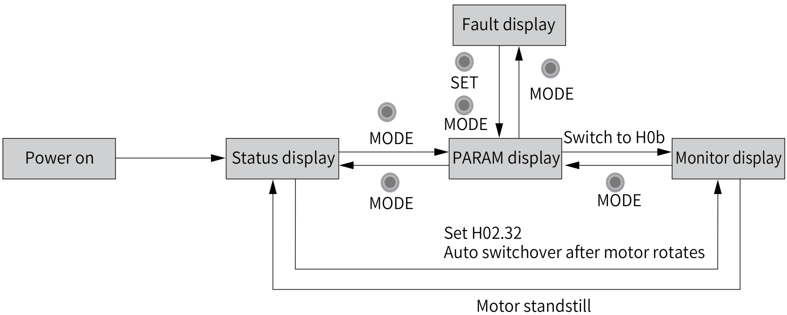
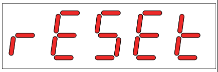
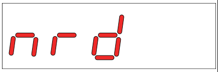
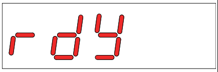
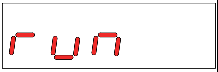
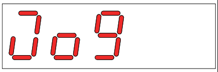


Figure 1-2 Switchover among different display modes

- The keypad enters status display immediately upon power-on.
- Press MODE to switch among different display modes based on the conditions shown in *"Figure 1–2 " on page 15* .
- In status display, set H02.32 to select the parameter to be monitored. When the motor rotates, the keypad automatically switches to monitored value display. After the motor stops, the keypad automatically returns to status display.
- In the parameter display mode, after you select the parameter to be monitored in group H0B, the keypad switches to monitored value display.
- Once a fault occurs, the keypad switches to fault display immediately, with all the five LEDs blinking. Press SET to stop the LEDs from blinking, and then press MODE to switch to parameter display.

Status display

Display	Name	Applicable Occasion	Meaning
	Reset Servo initializing	At the moment upon power on	The servo drive is in the initialization or reset status. After initialization or reset is done, the servo drive automatically switches to other status.
	Nrd Servo not ready	Initialization done, but servo drive not ready	The servo drive is not ready to run because the main circuit is not powered on. For details, see the troubleshooting Guide.
	Rdy Ready	Servo drive ready	The servo drive is ready to run and waits for the S-ON signal.
	Run Running	Servo ON (S-ON) signal activated (S-ON signal switched on)	The servo drive is running.
	Jog Jog	Servo drive in jog status	See section Jog in the commissioning guide for details.

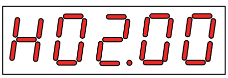
Parameter Display

Parameters are divided into 19 groups based on their functions. A parameter can be located quickly based on the parameter group it belongs to. For details on parameters, see Chapter "Parameter List".

- Display of parameter groups

Display	Name	Description
HXX.YY	Parameter group	XX: parameter group No. (decimal) YY: offset within the parameter group (hexadecimal)

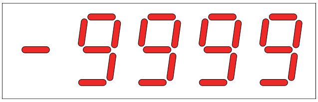
For example, "H02.00" is displayed as follows.

Display	Name	Description
	H02.00	02: Parameter group No. 00: Offset within the parameter group

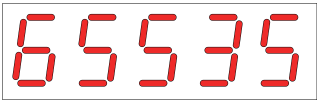
- Display of negative numbers and numbers with different lengths
  - Signed number with 4 digits and below or unsigned number with 5 digits and below

Such numbers are displayed in a single page (five digits). For signed numbers, the highest bit "-" represents the negative symbol.

For example, "-9999" is displayed as follows.



For example, "65535" is displayed as follows.



- Signed number with more than 4 digits or unsigned number with more than 5 digits
  Such numbers are displayed from low to high bits in several pages (5 digits per page): current page + values on current page, as shown in the following figure. Hold down SHIFT for more than 2s to switch to the next page.

  For example, "-1073741824" is displayed as follows.

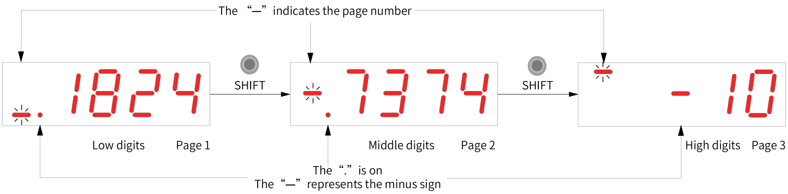


Figure 1-3 Display of "-1073741824"

Example: "1073741824" is displayed as follows:

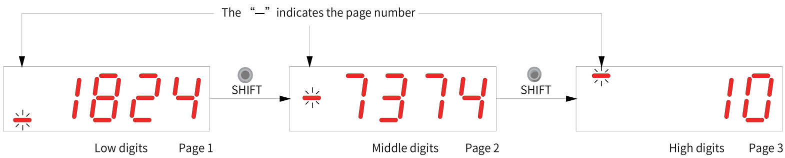
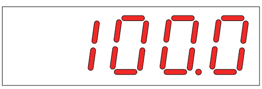
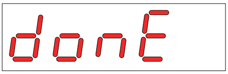
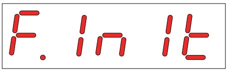
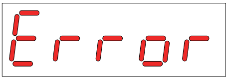


Figure 1-4 Display of "1073741824"

- Display of the decimal point
  The segment "." of the ones indicates the decimal point, which does not blink.

Display	Name	Description
	Decimal point	100.0

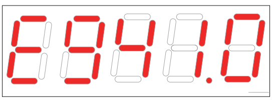
- Display of parameter setting status

Display	Name	Applicable Occasion	Meaning
	Done (parameter setting done)	The parameter is set successfully.	The parameter is set and saved to the servo drive (Done). The servo drive can execute other operations.
	F.InIt (restored to default)	Parameter initialization is in progress (H02.31 = 1).	The servo drive is in the process of parameter initialization. Switch on the control circuit again after initialization is done.
	Error (wrong password)	The user password (H02.30) is activated and the password entered is wrong.	A wrong password is entered. You need to enter the password again.

Fault Display

- The panel displays the active or history faults and warning codes. For troubleshooting, see the troubleshooting guide.
- When a fault or warning occurs, the keypad displays the corresponding fault or warning code immediately. When multiple faults or warnings occur, the keypad displays the fault code of the highest fault level.
- You can select the previous fault/warning to be viewed through H0b.33 and view the code of the selected fault/warning in H0b.34.
- You can clear the latest 10 faults or warnings saved in the servo drive by setting H02.31 to 2.

For example, "E941.0" is displayed as following:

Display	Name	Description
	E941.0 Warning code	E: A fault or warning occurs on the servo drive. 941.0: Warning code

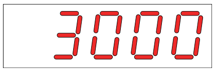
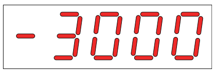
Note

- If the panel displays Hault/Fault, a system fault has occurred.
- The possible causes include bugs of the program, external interference like static electricity or electromagnetic interference, extreme operating temperature or radiation.
- In this case, record the values of H16.00–H16.27, and consult with our R&D engineers.

Monitored value display

- Group H0B: Displays parameters used to monitor the operating state of the servo drive.
- Set H02.32 (Default keypad display) properly. After the motor operates normally, the keypad switches from status display to parameter display. The parameter group number is H0b and the offset within the group is the setpoint of H02.32.
- For example, if H02.32 is set to 00 and the motor speed is not 0 rpm, the keypad displays the value of H0b.00.

The following table describes the monitoring parameters in H0b.00.

Parameter	Name	Unit	Meaning	Example of Display
H0b.00	Motor speed actual value	rpm	Displays the actual value of the motor speed after round-off, which can be accurate to 1 rpm.	Display of 3000 rpm:  -3000 rpm: 

1.1.3 Parameter Settings

Example of parameter settings

You can set parameters through the keypad. For details on parameters, see Chapter "List of Parameters". The following figure shows how to switch from position control mode to speed control mode using the keypad after power-on.

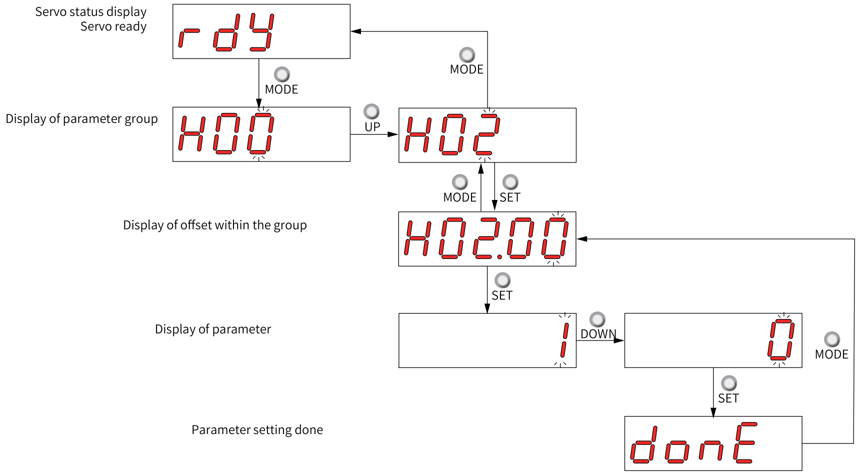


Figure 1-5 Example of parameter setting

- MODE: Used to switch the keypad display mode and return to the previous interface.
- UP/DOWN: Used to increase or decrease the value of the blinking digit.
- SHIFT: Used to shift the blinking digit.
- SET: Used to save the present setpoint or switch to the next interface.

After parameter setting is done, that is, "donE" is displayed on the keypad, press MODE to return to the parameter group interface (interface of "H02.00").

Forced DI/DO signals

You can assign different functions to DI/DOs by setting parameters in groups H03 and H04 through the keypad (or host controller), so that the host controller can control the servo functions through DI signals or use the DO signals outputted by the servo drive.

The servo drive also provides forced DI/DO functions. The forced DIs can be used to test the DI functions of the servo drive, and the forced DOs can be used to check the DO signal connection between the host controller and the servo drive.

When the forced DI/DO function is used, the logics of both physical DI and virtual DI are determined by the forced DI.

Forced DI signal input

After this function is enabled, all DI signal levels are controlled by the forced DI setting (H0d.18), independent of external DI signal status.

1. Operating process

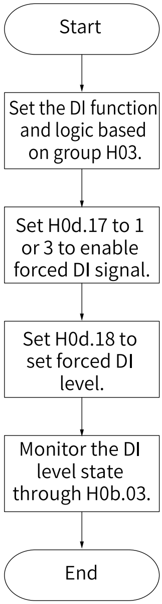


Figure 1-6 Procedure for setting forced DI function

H0d.18 is used to set the forced DI input. The keypad displays the value in hexadecimal. After the hexadecimal value is converted to a binary value, the value "1" indicates high level and "0" indicates low level.

Note

- The DI logic is defined by parameters in group H03.
- H0b.03 is used to monitor the DI level status. The keypad displays the level, and the value of H0b.03 (Monitored DI signal) read in the software tool is a decimal.

2. Example:

To activate the DI function assigned to DI1 and deactivate DI functions assigned to DI2...DI9 (DI to DI9 are active low), set as follows:

As the value "1" indicates high level and the value "0" indicates low level, the corresponding binary value and hexadecimal value are "110011110" and "19E" respectively. Therefore, set H0d.18 to "19E" through the keypad.

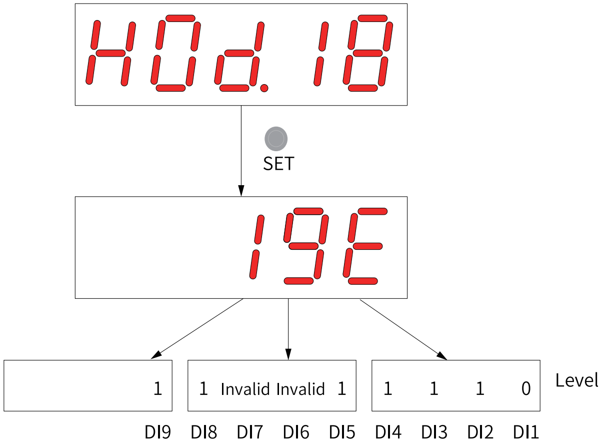


Figure 1-7 Meaning of the H0d.18 setpoint

Monitoring the DI level status through H0b.03:

If the DI function is normal, the display value of H0b.03 is always the same as that of H0d.18.

In this case, the DI1 is active low, DI2 to DI9 are active high and the value of H0b.03 read by the software tool is 414 (in decimal). See the following figure.

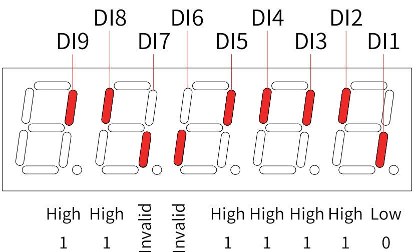


Figure 1-8 DI level status corresponding to H0b.03

Note

Upper LED segments ON: high level (indicated by "1") Lower LED segments ON: low level (indicated by "0")

3. Exit

   The forced DI signal function is not retentive upon power-off. Normal DIs apply after restart, or you can set H0d.17 to 0 (No operation) to return to the normal DI mode.

Forced DO function

After this function is enabled, all DO signal levels are controlled by H0d.19 (Forced DO value), regardless of the internal DO status of the servo drive.

Caution

In applications where the servo motor is used for vertical movement, if the brake output signal (FunOUT.9: BK, brake output) is active, the brake will be released and the load may fall. Take protective measures on the machine to prevent the risk of falling.

1. Operating process

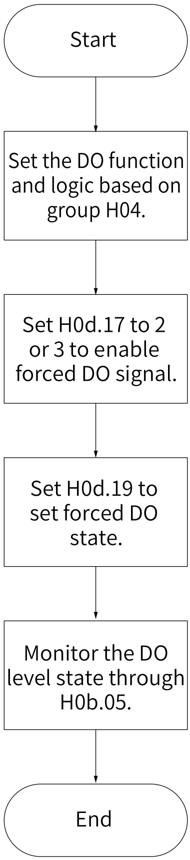


Figure 1-9 Procedure for setting forced DO function

H0d.19 (Forced DO value) is used to set whether the DO function is active. The keypad displays the value in hexadecimal. After the hexadecimal value is converted to a binary value, the value "1" indicates the DO function is active and "0" indicates the DO function is inactive.

The DO logic is defined by parameters in group H04. H0b.05 is used to monitor the DO level status. The keypad displays the level, and the value of H0b.05 (monitored DO signal) read in the software tool is decimal.

2. Example:
   To activate the DO function assigned to DO1 and deactivate DO functions assigned to DO2 and DO5, set as follows:

   As the value "1" indicates the DO function is active and "0" indicates the DO function is inactive, the binary value is "11110", which corresponds to the hexadecimal value "1E". Therefore, set H0d.19 (Forced DO value) to 1E through the keypad.

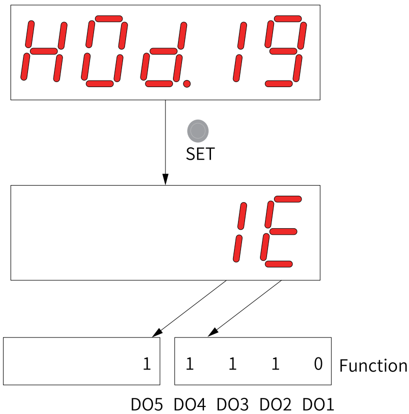


Figure 1-10 Meaning of the H0d.19 setpoint

Monitoring the DO level status through H0b.05:

If the logic of all the three DO terminals are "active at low level", the DO1 terminal is high level and DO2 to DO5 terminals are low level, and the corresponding binary number is "00001". In this case, the value of H0b.05 (Monitored DO signal) read by the software tool is 1 (decimal). See the following figure.

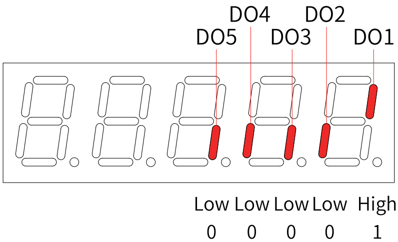


Figure 1-11 Display H0b.05 when all DO are "active low"

If the logic of all the 5 DO terminals are "active high", the DO1 terminal is low level and DO2 to DO5 terminals are high level, and the corresponding binary number is "11110". In this case, the value of H0b.05 (Monitored DO signal) read by the software tool is 30 (decimal). See the following figure.

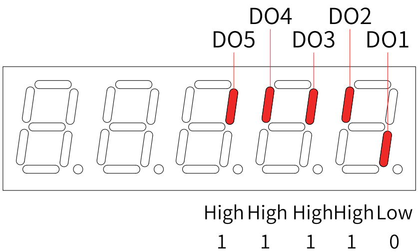


Figure 1-12 Display H0b.05 when all DO are "active high"

3. Exit

   The forced DO signal is not retentive upon power-off. Normal DO functions are restored after restart, or you can set H0d.17 to 0 to return to the normal DO mode.

User password

After the user password (H02.30) is activated, only authorized operators can set parameters.

- Setting the user password

  The following figure shows how to set the user password to "00001".

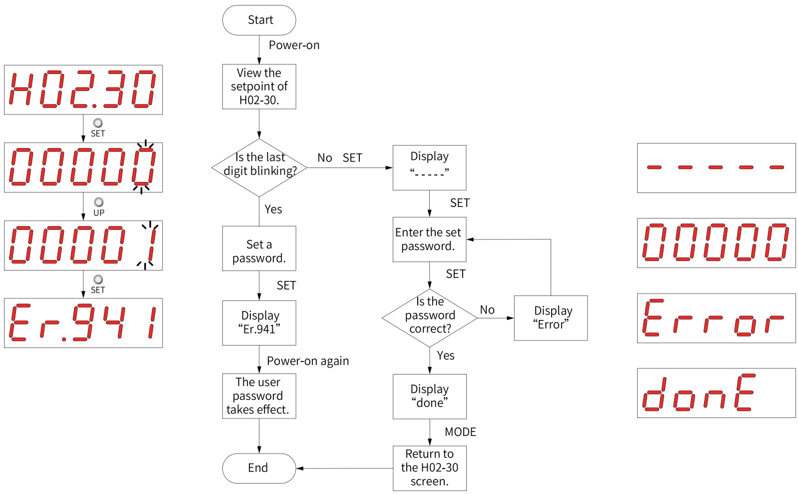


Figure 1-13 Procedure for setting the user password

To change the user password, input current password first to authorize the access to parameter setting. Next, enter H02.30 again to set a new password based on the procedure shown in the preceding figure.

Note

If the last bit does not blink, the access to parameters is password protected. If the last bit blinks, password is not needed or the password entered is correct.

- Canceling user password
  Enter the set user password, and set H02.30 to "00000" to cancel the user password.

1.2 Commissioning Software

1.2.1 Overview

The software tool InoDriverShop can be downloaded from http://www.inovance.com.

Use an S6-L-T00-3.0 communication cable for communication between the drive and the PC.

InoDriverShop supports 32-bit/64-bit Windows 7 and 64-bit Windows 10 operating systems. For details on how to use InoDriverShop, see the help document of InoDriverShop.

1.2.2 Installation

1. Software

   a. Visit the official website of Inovance as shown below.
   http://www.inovance.com

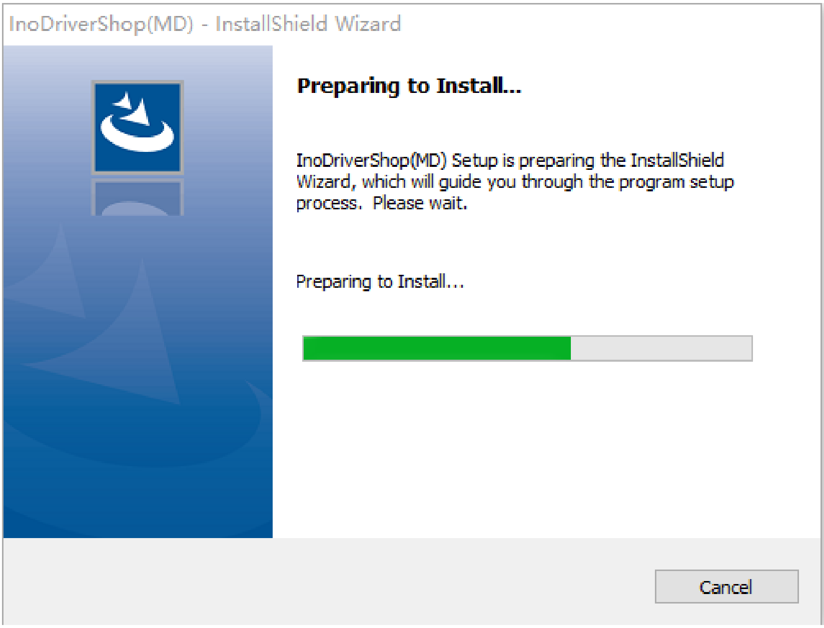
   b. Choose Support → Download, and then type in the keyword InoDriverShop and click Search.

   c. Click Download.

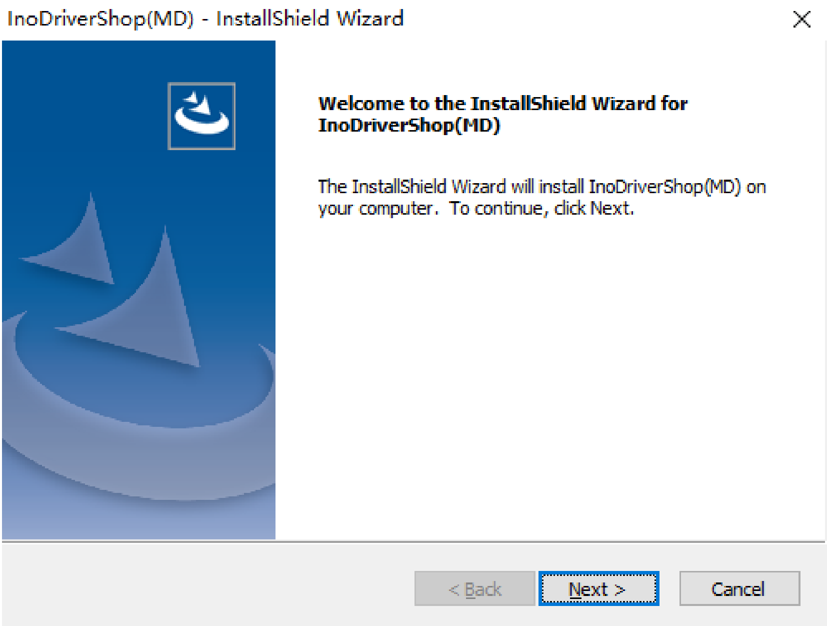
2. Unzip the package downloaded.

3. Click 

to start installing InoDriverShop.

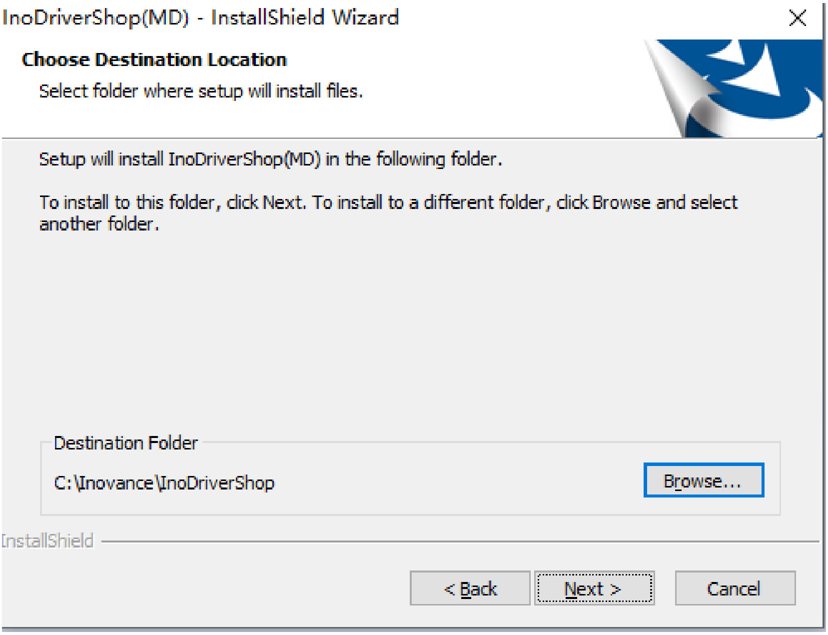


4. Click Next.

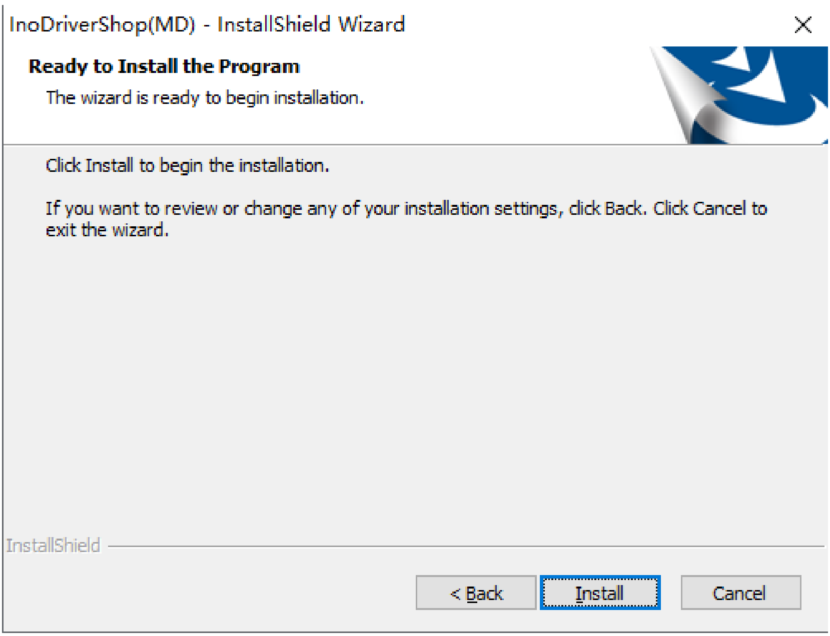


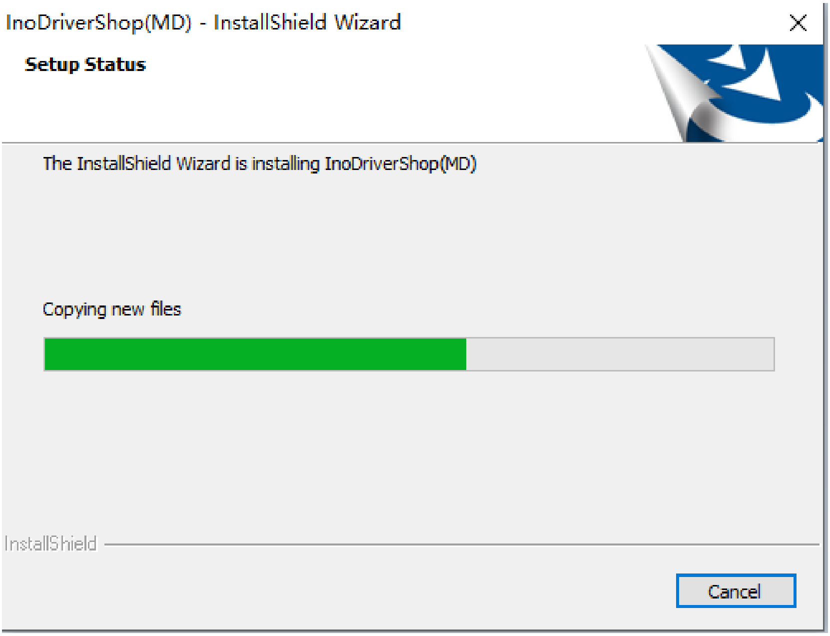
5. You can select the directory for installation as needed through the Browse button. The default directory for installation is "C:\Program Files\Inovance\InoDriverShop". In online upgrade, InoDriverShop will be upgraded directly in the original directory.

   After selecting the directory for installation, click Next.

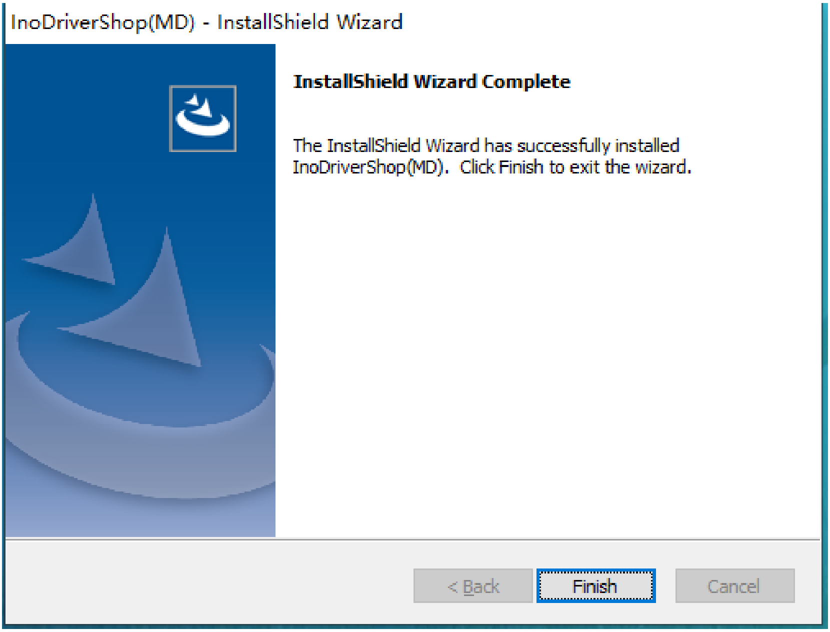


6. Click Install to start installation.





7. After installation is done, click Finish.



8. A shortcut icon for InoDriverShop will be generated automatically on the desktop.

1.2.3 Connecting the Software Tool

1. Start InoDriverShop.

- Double-click  to start the InoDriverShop.
- If there is no shortcut for InoDriverShop on your desktop, click Start and search for InoDriverShop.

2. Create a project.

a. Click ① shown in the following figure to create a project.

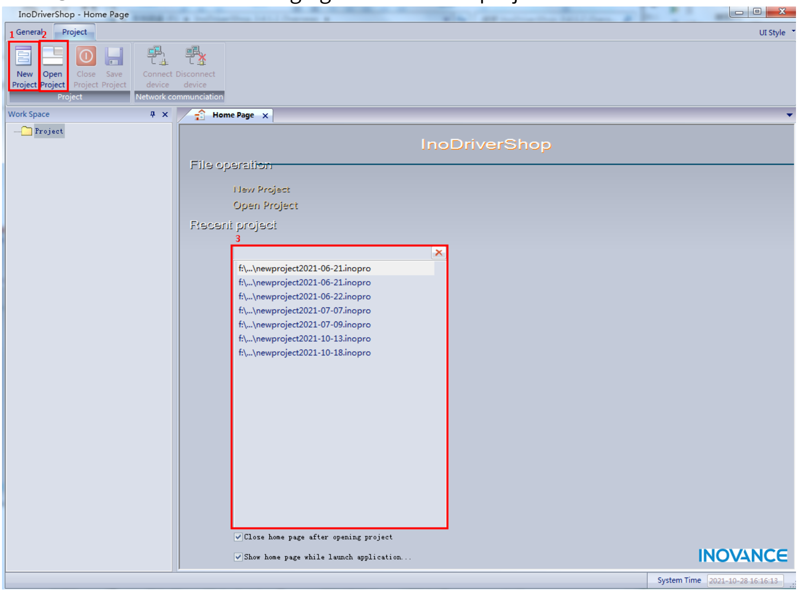


Figure 1-14 Start interface

Note

You can click 2 or 3 shown in the preceding figure to open the project saved before.

b. Open the Project Guide interface.

Click Online or Offline in area ①. Next, click the product series in area ②. Finally, load default communication parameters in area ③ based on the product series selected.

Figure 1-15 Project Guide interface

c. Click Next page to create a project.

- Creating a project for online device brings you to the following interface. The device is scanned automatically. Select the device to be commissioned and click Finish.

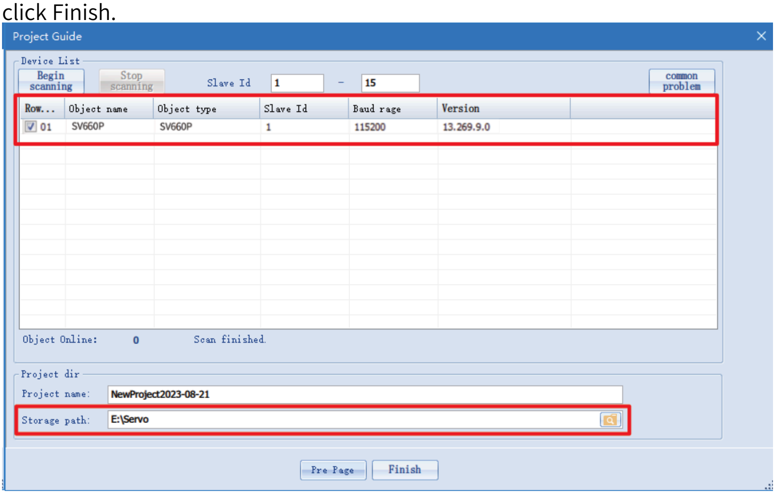


Figure 1-16 Scan interface

- Creating a project for offline device brings you to the following interface. You can select the Slave ID, Object Type, and Software Version as needed and add different standards or customized devices. You can also designate the directory for storage or create multiple offline devices.

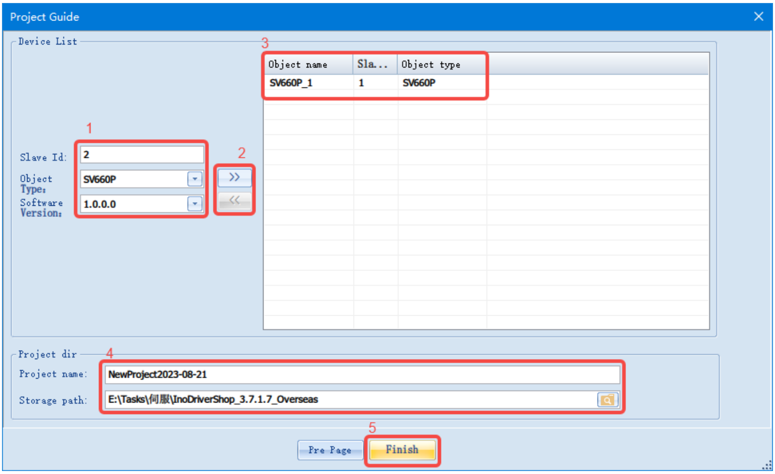


Figure 1-17 Project Guide interface for offline device

Note

① Station No., ④ Project name, and the storage directory can be changed as needed.

---

d. The project has been created.

3. The main interface is shown as follows.

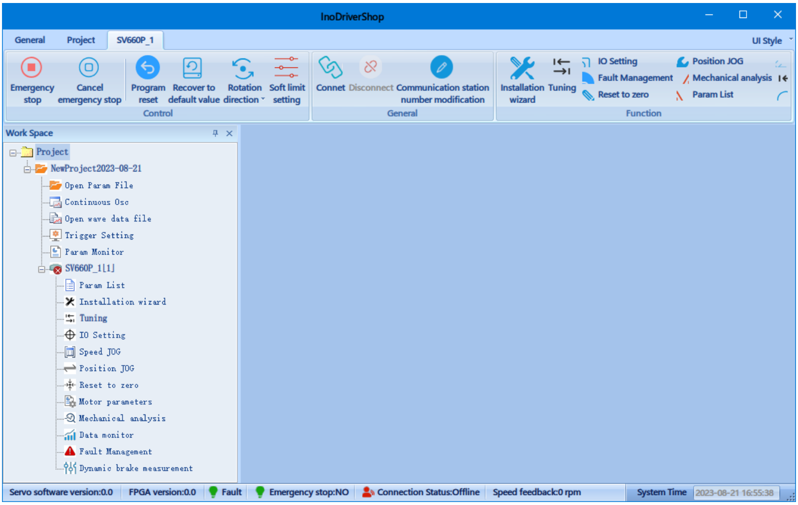
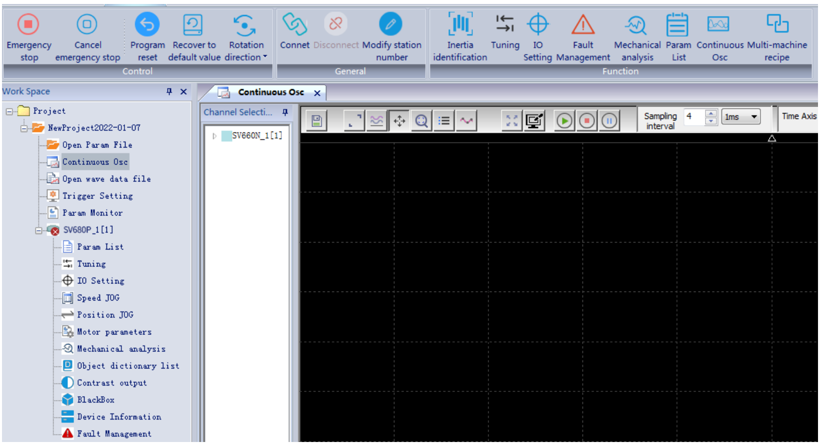


Figure 1-18 Main interface

1.2.4 Introduction to the Software Tool

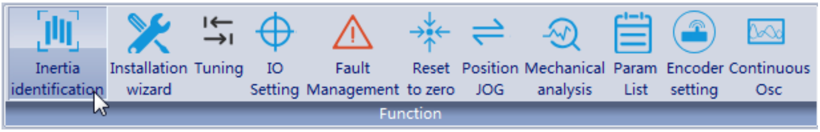
InoDriverShop features the following functions:

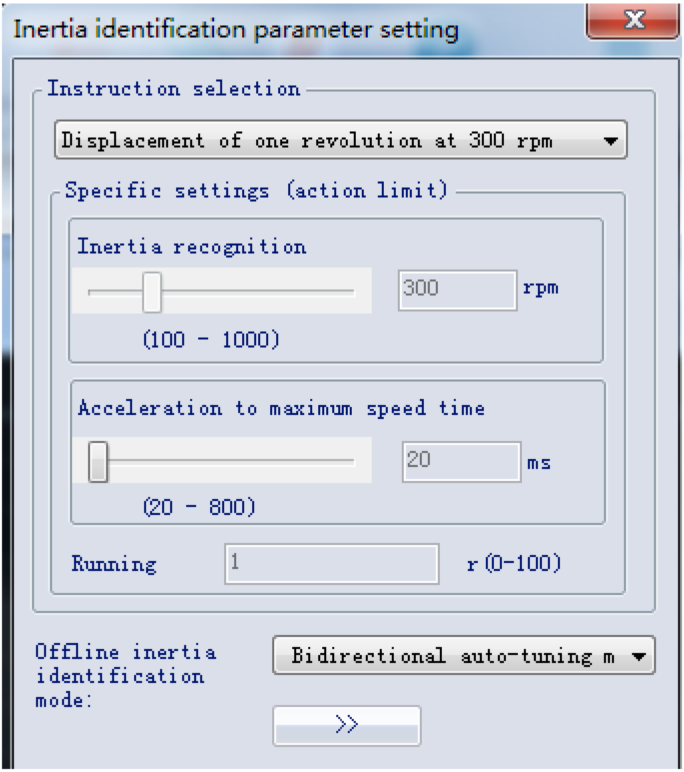
- Oscilloscope: Detects and saves the instantaneous data during operation.



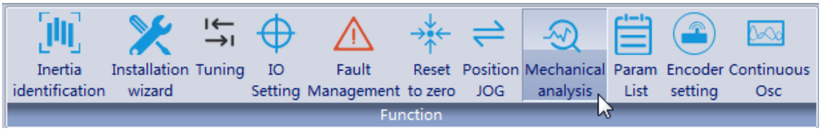
- Parameter management: Reads and downloads parameters in batches.

- Inertia auto-tuning: Generates the load inertia ratio automatically.

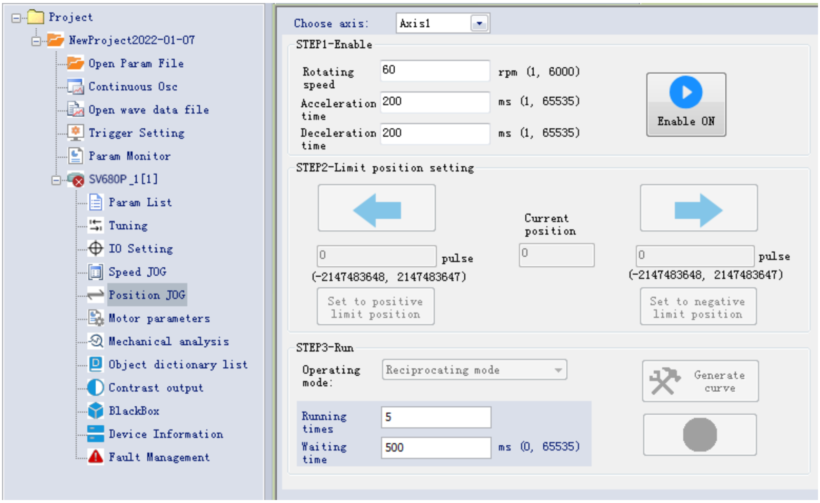




- Mechanical characteristic analysis: Analyzes the resonance frequency of the mechanical system.



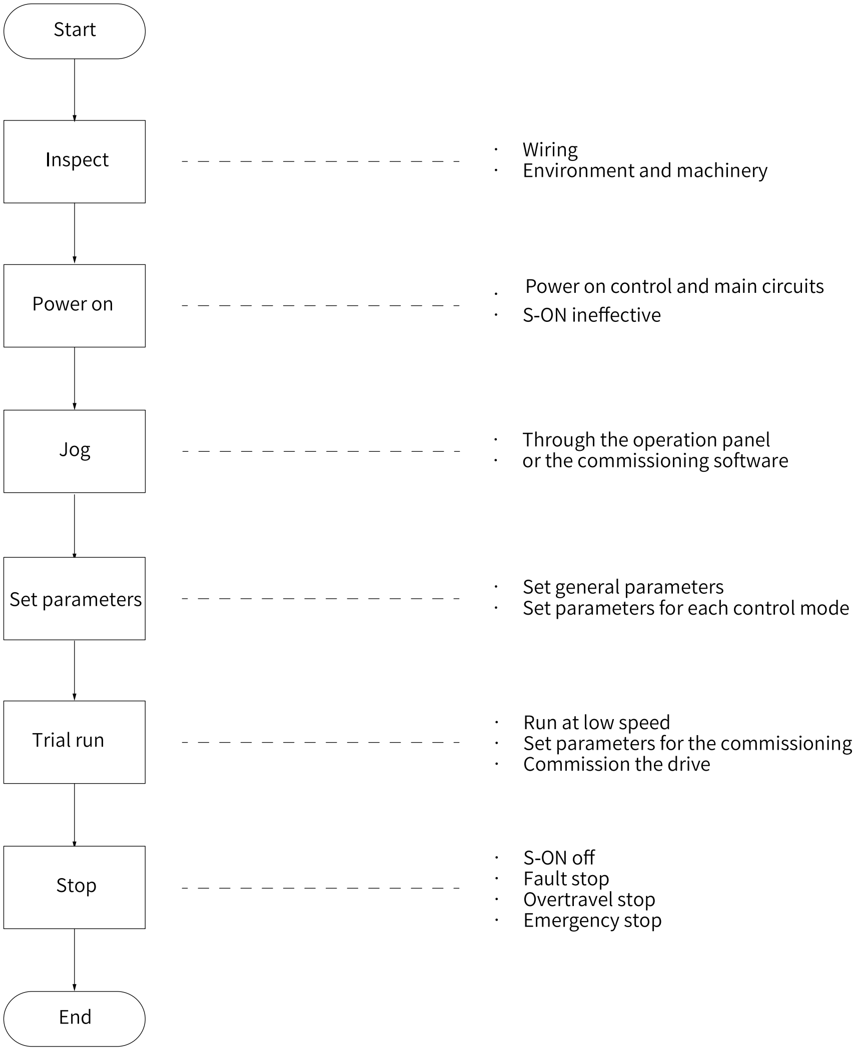
- Motion JOG: Generates position references to make the motor reciprocate.



- Gain tuning: Adjusts the stiffness level and monitors the motion data.

2 Commissioning and Operation

2.1 Commissioning Flowchart



2.2 Inspection Before Commissioning

Check the following items before commissioning the servo drive and the servo motor.

Table 2–1 Checklist

Log	No.	Description
Wiring		
☐	1	The power input terminals (L1, L2/L1, L2, L3/L1C, L2C/R, S, T) of the servo drive are connected properly.
☐	2	The main circuit cables (U, V, W) of the motor are connected to the U/V/W terminals of the drive correctly.
☐	3	No short circuit exists in the power input terminals (L1, L2/L1, L2, L3/R, S, T) or main circuit output terminals (U, V, W) of the servo drive.
☐	4	The signal cables of the servo drive are connected correctly. The external signal cables such as the brake cable and the overtravel protection cable are connected reliably.
☐	5	The servo drive and servo motor are grounded properly.
☐	6	The stress suffered by the cable is within the specified range.
☐	7	All the wiring terminals are insulated properly.
Environment and Mechanical Conditions		
☐	1	There are no unwanted objects (such as cable terminals and metal chippings) that may cause short circuit of the signal cable and power cable inside or outside the servo drive.
☐	2	The servo drive and the external regenerative resistor are placed on incombustible objects.
☐	3	The servo motor is installed properly. The motor shaft is connected to the machine securely.
☐	4	The servo motor and the connected machine are in good condition and ready to run.

2.3 Power-on

- Switching on the input power supply
  - The power input terminals for a single-phase 220 V power supply are L1 and L2.
  - The power input terminals for a three-phase power supply are L1, L2, L3/L1C, L2C (control circuit power input terminals)/R, S, T (main circuit power input terminals).

  After the power supply is switched on, if the bus voltage indicator is in the normal state and the keypad displays "reset” → “nr” → "ry" in sequence, the servo drive is ready to run and waits for the S-ON signal.

Note

- If the operation panel keeps displaying "Nrd", rectify the fault according to the Troubleshooting Guide.
- If the operation panel keeps displaying any other fault, rectify the fault according to the Troubleshooting Guide.

- Turn off the servo ON signal.
  Allocate a certain DI of the servo drive with function 1 (FunIN.1:S-ON, servo ON) and set the active logic of this DI. Then deactivate this DI through communication with the host controller or through an external switch. Then, it can be disabled through the host controller or an external switch.

  ☆ Related parameters:

Code	Parameter Name	Function Name	Function
FunIN.1	S-ON	Servo ON	Inactive: Servo motor de-energized Active: Servo motor energized

2.4 Jog

Caution

To use the jog function, deactivate the S-ON signal first.

The jog function can be used in trial run to check whether the motor rotates properly, without abnormal vibration or noise generated during rotation. You can activate the jogging function through the keypad, two pre-configured external DIs, or the software tool. The motor takes the value saved in H06.04 as the jog speed.

Jogging through the keypad

- Commissioning Steps

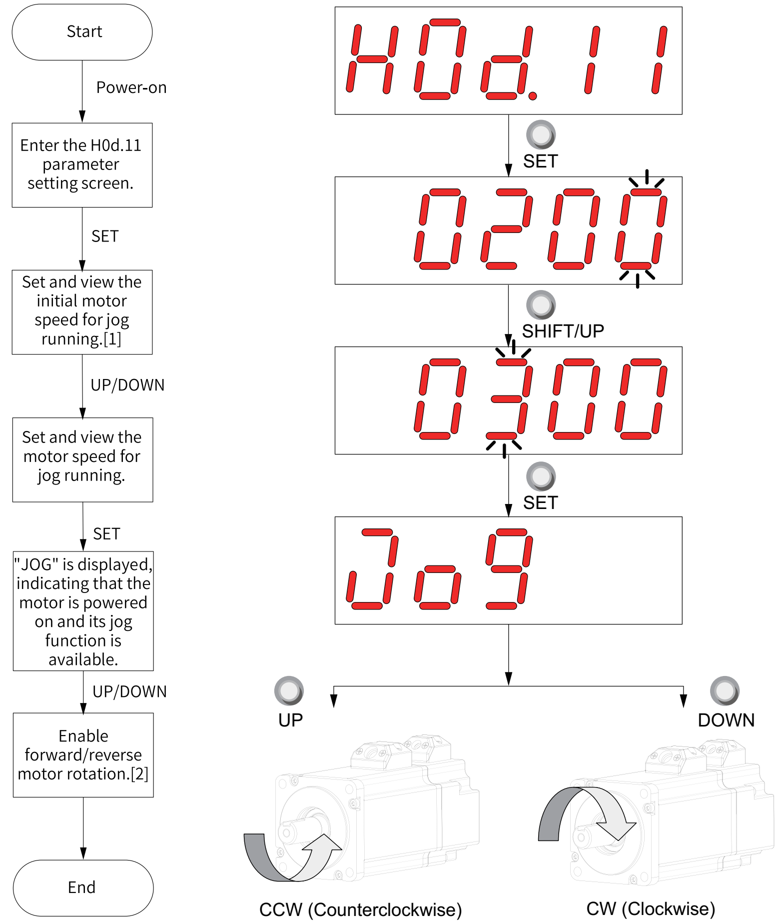


Figure 2-1 Procedure for setting the jog function

Note

- [1] Press the UP or DOWN key to increase or decrease the jog speed. After exiting from the jog mode, the initial speed applies.
- [2] Press the UP or DOWN key to make the motor rotate forwardly or reversely. After you release the key, the motor stops immediately.

- Procedure:

1. Enter the jog mode by setting H0d.11 through the keypad.

   The keypad displays the default jog speed at this moment.

2. Adjust the jog speed through the UP/DOWN key and press the SET key to enter the jog state.

   The keypad displays "JOG".
3. Press the UP/DOWN key to make the motor run forwardly or reversely.
4. Press the MODE key to exit the jog mode and return to the upper-level menu.

   The setpoint of H06.04 returns to the default value.

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H06.04	2006-05h	Jog speed setpoint	0 RPM to 6000 RPM	100	RPM	Real-time	*" H06_en.04" on page 212*

- Exiting the jog running
  Press the MODE key to exit from jog and return to the previous menu.

Jogging through the DI

Note

Note: The jog function can be activated through the DI in any control mode.

Assign two external DIs with FunIN.18 and FunIN.19 respectively. After setting the jog speed through H06.04, switch on the S-ON signal to perform jog through the DI status.

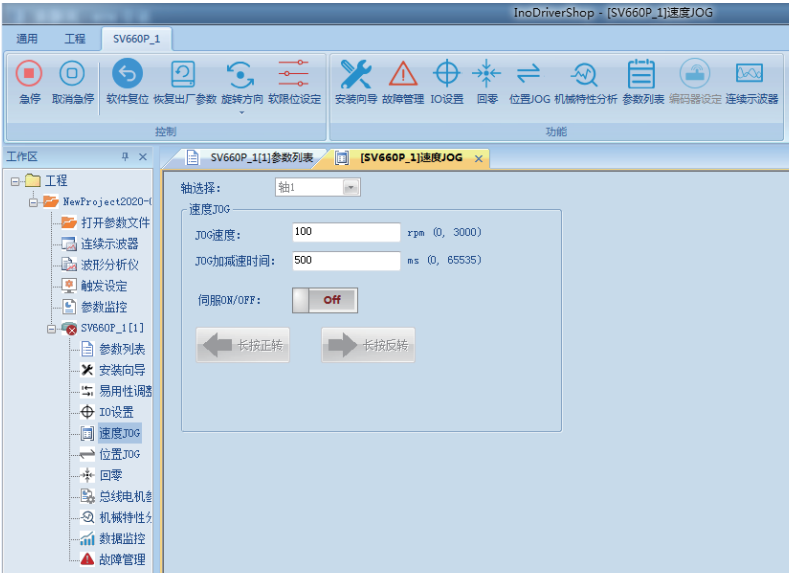
☆ Related parameters:

Code	Parameter Name	Function Name	Description
FunIN.18	JOGCMD+	Forward jog	Active: Input based on command Inactive: Command input stopped
FunIN.19	JOGCMD–	Reverse jog	Active: Input in reverse to the command Inactive: Command input stopped

Jogging through the software tool

Enter the jog interface of the software tool first, and then set the jog speed through H06.04. After clicking the S-ON button in the interface, you can perform forward or reverse jog through the forward/reverse button in the interface.

When you close the jog interface to exit from the jog mode, H06.04 returns to the default value, with previous setpoint abandoned.



2.5 Setting Parameters

Rotation direction selection

Set H02.02 to change the direction of rotation directly.

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H02.02	2002-03h	Forward direction	0: Counterclockwise (CCW) as forward direction 1: Clockwise (CW) as forward direction	0	-	At stop	*" H02_en.02" on page 155*

The change of H02.02 does not affect the pulse output form or the sign (+/-) of monitoring parameter values.

The direction of "forward drive" in overtravel prevention is the same as that defined by H02.02.

Selection of output pulse phase

The output pulse of the servo drive is phase A + phase B quadrature pulse.

The relation between phase A and phase B pulses can be changed directly through H02.03.

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H02.03	2002-04h	Output pulse phase	0: Phase A leads phase B 1: Phase A lags behind phase B	0	-	At stop	" H02_en.03" on page 155

The change of H02.02 does not affect the pulse output form or the sign (+/-) of monitoring parameter values.

The direction of "forward drive" in overtravel prevention is the same as that defined by H02.02.

Brake setting

The brake is used to prevent the motor shaft from moving and lock the position of the motor and the motion part when the drive is in the non-operational status.

Caution

- Use the built-in brake for position-lock purpose only. Do not use this brake for any other purposes (such as braking) other than position-lock in the stop state.
- The brake coil has no polarity.
- Switch off the S-ON signal after the motor stops.
- When the motor with brake runs, the brake may generate a click sound, which does not affect its function.
- When brake coils are energized (the brake is released), flux leakage may occur on the shaft end. Pay special attention when using magnetic sensors around the motor.

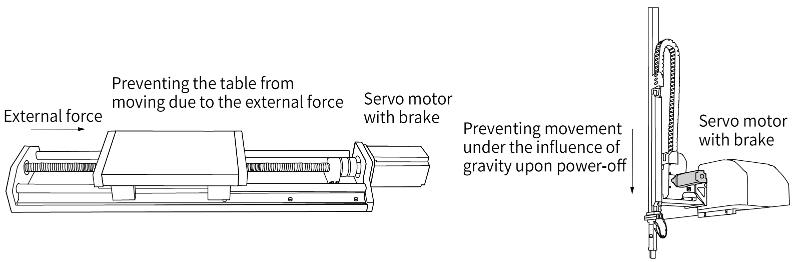


Figure 2-2 Application of the brake

Table 2–2 Brake specifications

Motor Model	Holding Torque (N·m)	Supply Voltage (VDC) ±10%	Rated power (W)	Coil Resistance (Ω)±7%	Exciting Current (A)	Release Time (ms)	Apply Time (ms)	Backlash (°)
MS1H1-05B/10B MS1H4-10B	0.32	24	6.1	94.4	0.25	⩽ 20	⩽ 40	⩽ 1.5
MS1H1-20B/40B MS1H4-20B/40B	1.5		7.6	75.79	0.32	⩽ 20	⩽ 60	⩽ 1.5
MS1H1-75B/10C MS1H4-75B/10C	3.2		10	57.6	0.42	⩽ 40	⩽ 60	⩽ 1
MS1H2-10C/15C/20C/25C	8		17.6	32.73	0.73	⩽ 40	⩽ 100	⩽ 1
MS1H2-30C/40C/50C	16		24	24	1	⩽ 60	⩽ 120	⩽ 1
MS1H3-85B/13C/18C	16		24	24	1	⩽ 60	⩽ 120	⩽ 1
MS1H3-29C/44C/55C/75C	50		31	18.58	1.29	⩽ 100	⩽ 200	⩽ 1

Note

- Do not use a holding brake for braking.
- The release time and operation time of the brake depend on the discharge circuit. Be sure to confirm the operation delay of your equipment before use.
- You need to prepare the 24 VDC power supply yourself.

- Brake software setting

  For the servo motor with brake, assign FunOUT.9 (BK, brake output) to a certain DO, and set the active logic of this DO.

  ☆ Related parameters:

Code	Parameter Name	Function Name	Function
FunOUT.9	BK	Brake output	Inactive: The brake power supply is switched off and the brake applies. In this case, the motor is locked. Active: The brake power supply is switched on and the brake is released. In this case, the motor can rotate.

The operating sequences of the brake are different in the normal state and fault state.

- Brake sequence in normal state
  The brake sequence in the normal state is further divided into the following two types:
  - Standstill: The actual motor speed is lower than 20 RPM.
  - Rotating: The motor speed is equal to or higher than 20 RPM.
- Brake sequence for motor at standstill
  If the servo enabling (S-ON) signal changes from ON to OFF, and the present motor speed is lower than 20 RPM, the servo drive acts according to the brake time sequence in the static state of the motor.

Caution

- After the brake output signal changes from "OFF" to "ON", do not input a position/speed/torque reference within the time defined by H02.09. Otherwise, reference loss or an operation error may occur.
- When the motor is used to drive a vertical axis, the motion part may move slightly under the influence of gravity or external force. If the S-ON signal is switched off, the brake output is set to "OFF" immediately when the motor is at standstill. However, within the time defined by H02.10, the motor is still energized, preventing the load from moving under the influence of gravity or external force.

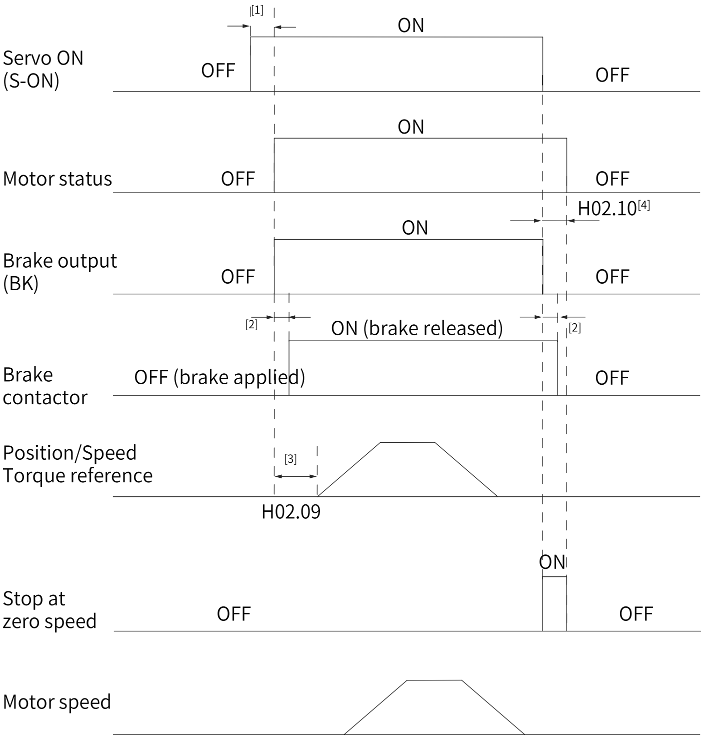


Figure 2-3 Brake sequence for motor at standstill

Note

- [1]: When the S-ON signal is switched on, the brake output is set to "ON" at a delay of about 100 ms, with motor being energized at the same time.
- [2]: For delay of brake contactor actions, see *"Table 2–2 " on page 44*.
- [3]: The interval time, starting from the moment when brake output is set to "ON" to the moment when a command is input, must be higher than the setpoint of H02.09.
- [4]: When the S-ON signal is switched off with motor at standstill (motor speed lower than 20 rpm), the brake output is set to "OFF". You can set in H02.10 the delay of the motor in entering the de-energized state after the brake output is set to "OFF".

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H02.09	2002-0Ah	Delay from brake output ON to command received	0ms to 500ms	250	ms	Real-time	*" H02_en.09" on page 158*
H02.10	2002-0Bh	Delay from brake output OFF to motor de-energized in the standstill state	1ms to 1000ms	150	ms	Real-time	*" H02_en.10" on page 158*

- Brake sequence for motor in the rotation state
  If the S-ON signal changes from ON to OFF, and the present motor speed is equal to or higher than 20 RPM, the servo drive acts according to the brake time sequence in motor rotating state.

Caution

- When the S-ON signal is switched on, do not input a position/speed/torque reference within the time defined by H02.09. Otherwise, reference loss or an operation error may occur.
- If the S-ON signal is switched off when the motor is still rotating, the motor enters the "Stop at zero speed" state, but the brake output can be set to "OFF" only when one of the following conditions is met:
  - The motor has decelerated to the value defined by H02.11, but the time defined by H02.12 is not reached.
  - The time defined by H02.12 has been reached, but the motor speed is still higher than the value defined by H02.11.
- The motor is still energized within 50 ms after the brake output changes from "ON" to "OFF". This is to prevent the motion parts from moving under the influence of gravity or external force.

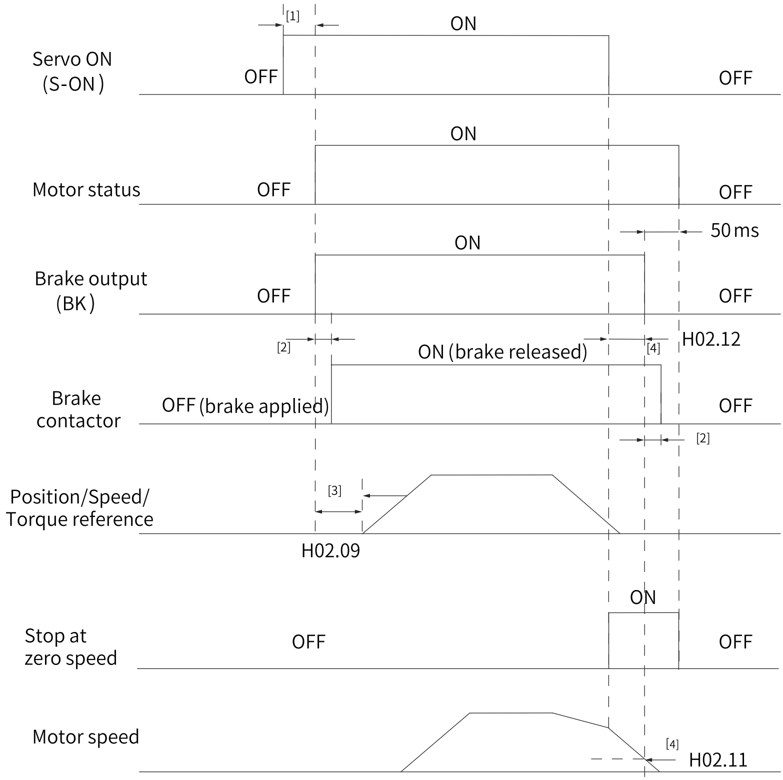


Figure 2-4 Brake sequence for a rotating motor

Note

- [1]: When the S-ON signal is switched on, the brake output is set to "ON" at a delay of about 100 ms, with motor being energized at the same time.
- [2]: For delay of brake contactor actions, see *"Table 2–2 " on page 44*.
- [3]: The interval time, starting from the moment when brake output is set to "ON" to the moment when a command is input, must be higher than the setpoint of H02.09.
- [4]: You can set in H02.11 and H02.12 the delay in setting the brake output to "OFF" when the S-ON signal is switched off in the rotation state. The motor is de-energized at a delay of 50 ms after the brake output is set to "OFF".

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H02.11	2002-0Ch	Motor speed threshold at brake output OFF in rotation state	0 RPM to 3000 RPM	30	RPM	Real-time	" H02_en.11" on page 158
H02.12	2002-0Dh	Delay from S-ON OFF to brake output OFF in rotation state	1ms to 1000ms	500	ms	Real-time	" H02_en.12" on page 159

- Brake sequence in the fault state
  Based on stop mode, servo faults are classified into class 1 (No.1) faults and class 2 (No.2) faults. For details, see SV660P Series Servo Drive Troubleshooting Guide. The brake sequences in the fault state are further divided into the following two types:
  - In case of No. 1 faults:
    The conditions for brake output is the same as the brake time sequence for the motor in rotational state. Which is to say: The brake output can be set to "OFF" only when any one of the following conditions is met:
    - The motor has decelerated to the value defined by H02.11, but the time defined by H02.12 is not reached.
    - The time defined by H02.12 has been reached, but the motor speed is still higher than the value defined by H02.11.
  - In case of No. 2 faults:
    When a No. 2 fault occurs and the brake is enabled, the stop mode is forced to "Stop at zero speed, keeping dynamic braking status".

    In this case, the servo motor stops at zero speed first. When the motor speed actual value is lower than 20 RPM, the brake output changes to "OFF" immediately but the motor is still energized within the time defined by H02.10, which is the same as the brake time sequence for the motor at standstill.

Braking settings

When the motor torque direction is opposite to the direction of rotation, the energy is fed back to the servo drive from the motor side, leading to bus voltage rise. Once the bus voltage rises to the braking threshold, the excessive energy must be consumed by a regenerative resistor. Otherwise, the servo drive will be damaged. The regenerative resistor can be a built-in or an external one. The internal and built-in regenerative resistors must not be used together. Specifications of the regenerative resistor are as follows.

Table 2–3 Specifications of the regenerative resistor

Servo Drive Model	Specifications of Built-in Regenerative Resistor			External regenerative resistor Min. Allowable Resistance (Ω) (H02.21)
	Resistance (Ω)	Power (Pr) (W)	Processing Power (Pa) (W)	
SV660PS1R6I	-	-	-	50
SV660PS2R8I	-	-	-	45
SV660PS5R5I	50	50	25	40
SV660PS7R6I	25	80	40	20
SV660PS012I				15
SV660PT3R5I	100	80	40	80
SV660PT5R4I	100	80	40	60
SV660PT8R4I	50	80	40	45
SV660PT012I				40
SV660PT017I	35	100	50	35
SV660PT021I				25
SV660PT026I				

Note

The built-in regenerative resistor is not available in S2R8 models. For these models, you can install an external regenerative resistor as needed.

- Without external load torque
  The kinetic energy generated upon braking of a reciprocating motor is converted into electric energy that fed back to the bus capacitor. When the bus voltage rises above the braking voltage threshold, the regenerative resistor starts consuming the excessive energy fed back by the motor. The following figure shows the motor speed curve in no-load operation from 3000 rpm to a standstill.

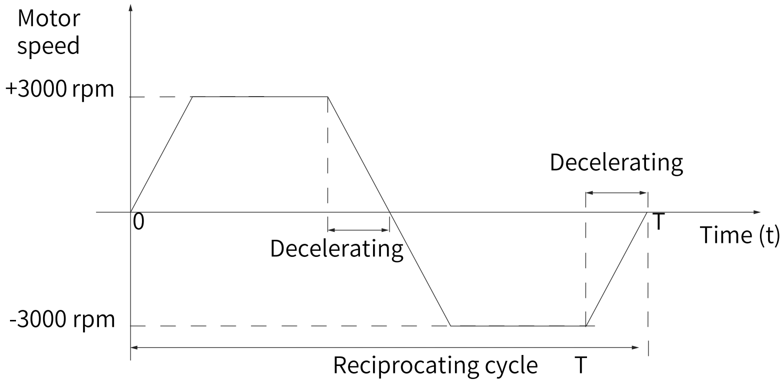


Figure 2-5 Example of motor speed curve (without external load torque)

- Energy calculation
  The built-in braking resistor is not available in SV660PS1R6I and SV660PS2R8I models. The energy that can be absorbed by a capacitor is described in section "Wiring and Setting of the Regenerative Resistor" in SV660P Series Servo Drive Hardware Guide An external regenerative resistor is needed when the rotational energy of the motor and the load exceeds the values listed in the following table.

Drive Model	Regenerative Energy Can Be Absorbed	Remarks
SV660PS1R6I	13.15	The input voltage of the main circuit power supply is 220 VAC.
SV660PS2R8I	26.29	

- The following table shows the energy generated by a 220 V motor in decelerating from the rated speed to a standstill during no-load operation.

Table 2–4 220 V motor energy data

Capacity (kW)	Servo Motor Model MS1H*-*******-*****	Rotor Inertia J (10^{-4} kgm ^{2})	EO Generated During Decelerating from Rated Speed to a Standstill (J)	Max. Braking Energy Absorbed by Capacitor E C (J)
0.05	MS1H1-05B30CB-A330Z MS1H1-05B30CB-A332Z	0.026 (0.028)	0.13 (0.14)	7.86
0.1	MS1H1-10B30CB-A330Z MS1H1-10B30CB-A332Z	0.041 (0.043)	0.20 (0.21)	
0.2	MS1H1-20B30CB-A331R MS1H1-20B30CB-A334R	0.0938 (0.106)	0.46 (0.52)	
0.4	MS1H1-40B30CB-A331R MS1H1-40B30CB-A334R	0.145 (0.157)	0.72 (0.78)	15.72
0.55	MS1H1-55B30CB-A331R	0.55	2.72	22.39
0.75	MS1H1-75B30CB-A331R MS1H1-75B30CB-A334R	0.68 (0.71)	3.36 (3.51)	22.39

Capacity (kW)	Servo Motor Model MS1H*-*******-*****	Rotor Inertia J (10^{-4} kgm ^{2})	EO Generated During Decelerating from Rated Speed to a Standstill (J)	Max. Braking Energy Absorbed by Capacitor E C (J)
1	MS1H1-10C30CB-A331R MS1H1-10C30CB-A334R	0.82 (0.87)	4.05 (4.30)	32.39
1	MS1H2-10C30CB-A331R MS1H2-10C30CB-A334R	1.78 (2.6)	8.80 (12.86)	32.39
1.5	MS1H2-15C30CB-A331R MS1H2-15C30CB-A334R	2.35 (3.17)	11.6 (15.68)	32.39
2.0	MS1H2-20C30CB-A331R MS1H2-20C30CB-A334R	2.92 (3.74)	14.44 (18.49)	32.39
0.85	MS1H3-85B15CB-A331R MS1H3-85B15CB-A334R	13.56 (15.8)	16.45 (17.3)	32.39
1.3	MS1H3-13C15CB-A331R MS1H3-13C15CB-A334R	19.25 (21.5)	22 (22.86)	32.39
0.1	MS1H4-10B30CB-A330Z MS1H4-10B30CB-A332Z	0.102 (0.104)	0.50 (0.51)	7.86
0.2	MS1H4-20B30CB-A331R MS1H4-20B30CB-A334R	0.22 (0.23)	1.09 (1.14)	7.86
0.4	MS1H4-40B30CB-A331R MS1H4-40B30CB-A334R	0.43 (0.44)	2.13 (2.18)	15.72
0.55	MS1H4-55B30CB-A331R	1.12	5.54	22.39
0.75	MS1H4-75B30CB-A331R MS1H4-75B30CB-A334R	1.46 (1.51)	7.22 (7.47)	22.39
1.0	MS1H4-10C30CBA331R MS1H4-10C30CBA334R	1.87 (1.97)	9.25 (9.74)	32.39

- The following table shows the energy generated by a 380V motor in decelerating from the rated speed to a standstill during no-load operation.

Table 2–5 380V motor energy data

– Capacity (kW)	Servo Motor Model MS1H*-*******-*****	Rotor Inertia J (10^{-4} kgm ^{2})	Braking Energy E O Generated During Decelerating from Rated Speed to a Standstill (J)	Max. Braking Energy Absorbed by Capacitor E C (J)
1.0	MS1H2-10C30CD-A331R MS1H2-10C30CD-A334R	1.78 (2.6)	8.8 (12.86)	28.18
1.5	MS1H2-15C30CD-A331R MS1H2-15C30CD-A334R	2.35 (3.17)	11.62 (15.68)	34.22
2.0	MS1H2-20C30CD-A331R MS1H2-20C30CD-A334R	2.92 (3.74)	14.44 (18.49)	50.32
2.5	MS1H2-25C30CD-A331R MS1H2-25C30CD-A334R	3.49 (4.3)	17.26 (21.26)	50.32
3.0	MS1H2-30C30CD-A331R MS1H2-30C30CD-A334R	6.4 (9.38)	31.65 (46.38)	50.32

– Capacity (kW)	Servo Motor Model MS1H*-*******-*****	Rotor Inertia J (10^{-4} kgm ^{2})	Braking Energy E_O Generated During Decelerating from Rated Speed to a Standstill (J)	Max. Braking Energy Absorbed by Capacitor E_C (J)
4.0	MS1H2-40C30CD-A331R MS1H2-40C30CD-A334R	9 (11.98)	44.51 (59.24)	82.53
5.0	MS1H2-50C30CD-A331R MS1H2-50C30CD-A334R	11.6 (14.58)	57.36 (72.10)	100.64
0.85	MS1H3-85B15CD-A331R MS1H3-85B15CD-A334R	13.56 (15.8)	16.76 (19.53)	28.18
1.3	MS1H3-13C15CD-A331R MS1H3-13C15CD-A334R	19.25 (21.5)	23.8 (26.58)	34.22
1.8	MS1H3-18C15CD-A331R MS1H3-18C15CD-A334R	24.9 (27.2)	30.78 (33.63)	50.32
2.9	MS1H3-29C15CD-A331R MS1H3-29C15CD-A334R	44.7 (52.35)	55.26 (64.72)	50.32
4.4	MS1H3-44C15CD-A331R MS1H3-44C15CD-A334R	64.9 (72.55)	80.23 (89.69)	82.53
5.5	MS1H3-55C15CD-A331R MS1H3-55C15CD-A334R	86.9 (94.55)	107.43 (116.89)	100.64
7.5	MS1H3-75C15CD-A331R MS1H3-75C15CD-A334R	127.5 (135.15)	157.62 (167.08)	100.64

Note

Values inside the parentheses "()" are for the motor with a brake.

Note

If the total braking time T is known, you can determine whether an external regenerative resistor is needed and the power required using the following flowchart and formula.

- Regenerative resistor selection

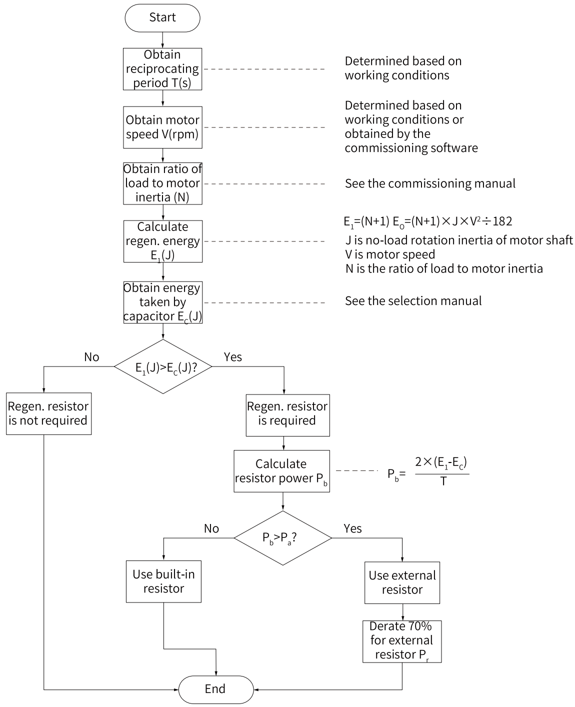


Figure 2-6 Flowchart for selecting the regenerative resistor

Note

- Take the process in which the motor decelerates from 3000 RPM to 0 RPM as an example. Assume that the load inertia is (N x Motor inertia), then the braking energy is (N + 1) x E_O when the motor decelerates from 3000 RPM to 0 RPM. The energy consumed by the braking resistor is (N + 1) x E_O - E_C (E_C represents the energy absorbed by the capacitor). Suppose the reciprocating cycle is T, then the power of the regenerative resistor needed is 2 x [(N + 1) x E_O - E_C]/T. See *"Table 2–4 220 V motor energy data" on page 51* *"Table 2–5 380V motor energy data" on page 52* for values of E_O and E_C.
- Determine whether to use the regenerative resistor according to the preceding figure and select a built-in or an external regenerative resistor as needed. Then, set H02.25 accordingly.
- The resistor with aluminum case is recommended.
- For the specification of the braking resistor, see *"Table 2–3 Specifications of the regenerative resistor" on page 50*

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H02.25	2002-1Ah	Regenerative resistor type	0: Built-in 1: External, natural ventilated 2: External, forced air cooling 3: Not needed	0	-	At stop	" H02_en.25" on page 163

Take the H1 series 750 W model as an example. Assume that the reciprocating cycle (T) is 2s, the maximum speed is 3000 RPM, and the load inertia is (4 x Motor inertia), then the required power of the braking resistor is as follows:

$$P_b = \frac{2\times[(N+1)\times E_O - E_C]}{T} = \frac{2\times[(4+1)\times 6.8-22.4]}{2} = 11.6W$$

The calculated result is smaller than the processing capacity (Pa = 40 W) of the built-in regenerative resistor, so a built-in regenerative resistor is enough.

If the inertia ratio in the preceding example is changed to 10 x motor inertia, and other conditions remain the same, the power of the regenerative resistor required will be as follows:

$$P_b = \frac{2\times[(N+1)\times E_O - E_C]}{T} = \frac{2\times[(10+1)\times 6.8-22.4]}{2} = 52.4W$$

The calculated result is larger than the processing capacity (Pa = 40 W) of the built-in regenerative resistor, so an external regenerative resistor is needed. so an external braking resistor is required. The recommended power of the external regenerative resistor is Pb/(1 – 70%) = 174.67W.

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H02.21	2002-16h	Min. permissible resistance of braking resistor	0Ω to 65535Ω	40	Ω	Unchangeable	" H02_en.21" on page 161
H02.24	2002-19h	Resistor heat dissipation coefficient	10 to 100	30	-	At stop	" H02_en.24" on page 162
H02.25	2002-1Ah	Regenerative resistor type	0: Built-in 1: External, natural ventilated 2: External, forced air cooling 3: Not needed	0	-	At stop	" H02_en.25" on page 163

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H02.26	2002-1Bh	Power of external braking resistor	1 W to 65535 W	40	W	At stop	" H02_en.26" on page 163
H02.27	2002-1Ch	Resistance of external regenerative resistor	1Ω to 1000Ω	50	Ω	At stop	" H02_en.27" on page 164

- Using an external regenerative resistor

  When P_b is greater than P_a, use an external braking resistor. Set H02.25 to 1 or 2 based on the cooling mode of the braking resistor.

  Use the external regenerative resistor with 70% derated, that is, $P_r = P_b/(1 – 70\%)$, and ensure the resistance of the regenerative resistor is higher than the minimum permissible resistance allowed by the servo drive. Remove the jumper bar between terminals P⊕ and D, and connect the external regenerative resistor between terminals P⊕ and C.

  See section "Wiring of the Regenerative Resistor" in SV660P Series Servo Drive Hardware Guide for the wiring diagram of the external regenerative resistor and the specifications of the jumper bar. Set H02.25 to 1 or 2 based on the cooling mode of the braking resistor.

  ☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H02.21	2002-16h	Min. permissible resistance of braking resistor	0Ω to 65535Ω	40	Ω	Unchangeable	" H02_en.21" on page 161
H02.26	2002-1Bh	Power of external braking resistor	1 W to 65535 W	40	W	At stop	" H02_en.26" on page 163
H02.27	2002-1Ch	Resistance of external regenerative resistor	1Ω to 1000Ω	50	Ω	At stop	" H02_en.27" on page 164

Caution

- Set the power (H02.26) and resistance (H02.27) of the external regenerative resistor.
- Ensure the resistance of the external regenerative resistor is higher than or equal to the permissible minimum resistance.
- When the regenerative resistor is used at its rated power rather than the processing power (average value) in environments within the specified temperature range, the temperature of the resistor will rise to above 120°C under continuous braking. To ensure safety, cool the resistor down through forced air cooling, or use the resistor with thermal switch. For the load characteristics of the regenerative resistor, consult with the manufacturer.

Set the heat dissipation coefficient based on the heat dissipation condition of the external regenerative resistor.

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H02.24	2002-19h	Resistor heat dissipation coefficient	10 to 100	30	-	At stop	*" H02_en.24" on page 162*

Note

Higher resistor heat dissipation coefficient indicates higher braking efficiency.

- Using the built-in braking resistor
  When $P_b < P_a$ and $E_1 > E_C$, use the built-in regenerative resistor. In this case, set H02.25 to 0.

  When using the built-in regenerative resistor, connect terminals P⊕ and D with a jumper bar.

- Regenerative resistor not needed
  When $E_1 < E_C$, the regenerative resistor is not needed because the braking energy can be absorbed by the bus capacitor. In this case, set H02.25 to 3.

- External load torque applied, motor in generating state
  When the motor direction of rotation is the same with the shaft direction of rotation, the motor outputs energy to the outside. In some applications where the motor direction of rotation is opposite to the shaft direction of rotation, the motor is in the generating state and feeds the electric energy back to the servo drive.

When the load is in the generating state continuously, it is recommended to adopt the common DC bus mode.

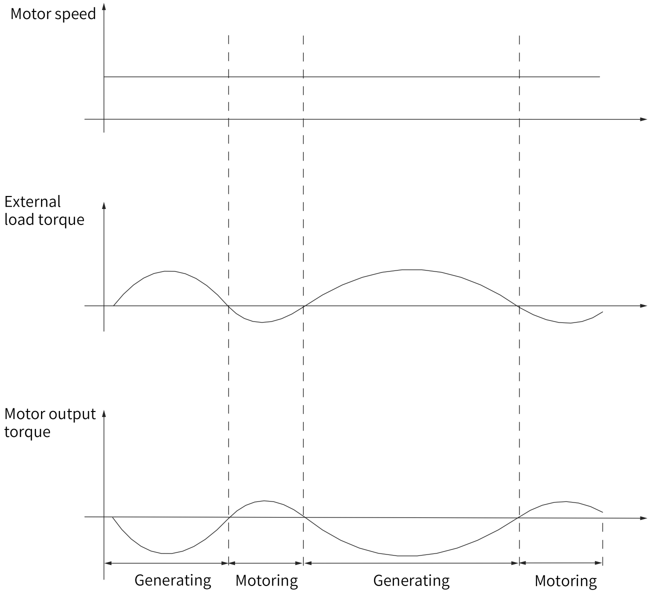


Figure 2-7 Example of the curve with external load torque

Take H1 series 0.75kW models (rated torque: 2.39 N·m) as an example. When the external load torque is 60% of the rated torque and the motor speed reaches 1500 rpm, the power fed back to the drive is (60% x 2.39) x (1500 x 2π/60) = 225 W. As the regenerative resistor needs to be derated by 70%, the power of the external regenerative resistor is 225/(1 – 70%) = 0.75kW, with resistance being 50 Ω.

2.6 Trial Run

Switch on the S-ON signal.

When the servo drive is ready to run, the keypad displays "Run". If there is no reference input at this moment, the servo motor does not rotate and stays locked. After a reference is input, the motor starts rotating.

Log	No.	Description
☐	1	During initial operation, set a proper command to make the motor run at low speed and check whether the motor rotates properly.
☐	2	Observe whether the motor rotating direction is correct. If the direction of rotation is opposite to the expected direction, check the reference signal input and the reference direction setting signal.
☐	3	If the motor rotates in the correct direction, you can view the actual speed in H0b.00 and the average load rate in H0b.12 through the keypad or the software tool.
☐	4	After checking preceding conditions, adjust related parameters to make the motor operate as desired.
☐	5	Adjust the drive according to section "Adjustment".

Power-on sequence diagram

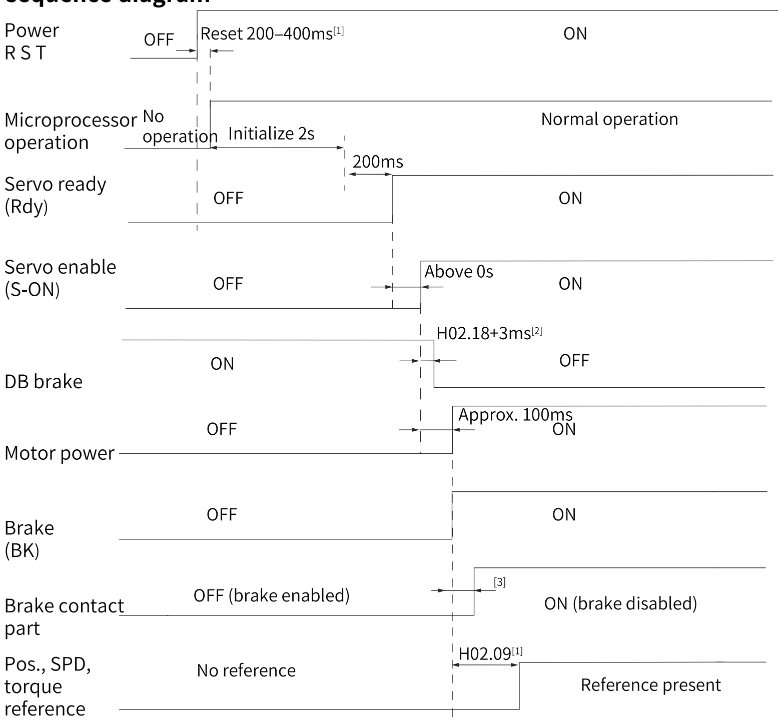


Figure 2-8 Power-on sequence diagram

Note

- [1] The reset time is determined by the setup time of the +5V power supply of the microprocessor.
- [2] The dynamic brake is included in the standard configuration.
- [3] For the delay of brake contactor actions, see for details. *"Table 2–2 " on page 44*
- [4] When FunOUT.9 (BK, brake output) is not used, H02.09 is invalid.

Sequence diagram for stop at warning or fault

- No. 1 fault: Coast to stop, keeping de-energized status

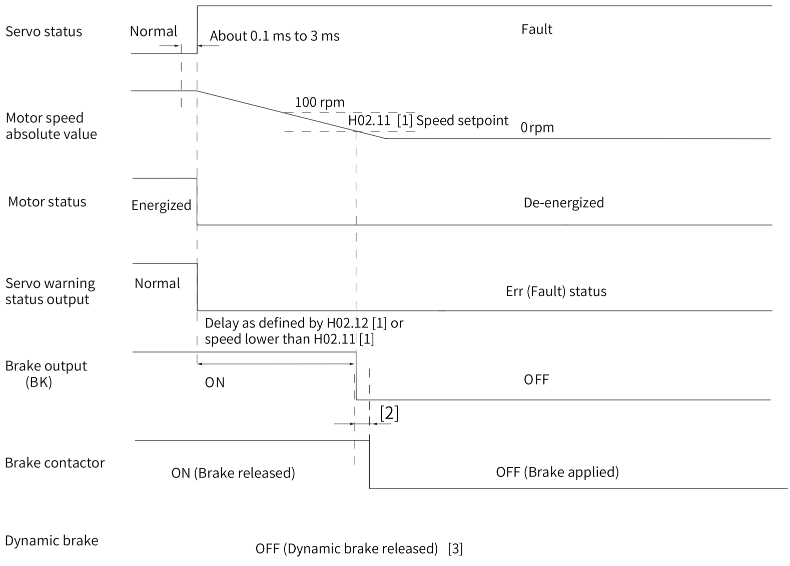


Figure 2-9 Sequence of "Coast to stop, keeping de-energized state" at No. 1 fault

Note

- [1] When FunOUT.9 (BK, brake output) is not used, H02.11 and H02.12 are invalid.
- [2] For the delay of brake contactor actions, see for details. *"Table 2–2 " on page 44*
- [3] The dynamic brake is included in the standard configuration.

- No. 1 fault: Dynamic braking stop, keeping de-energized state

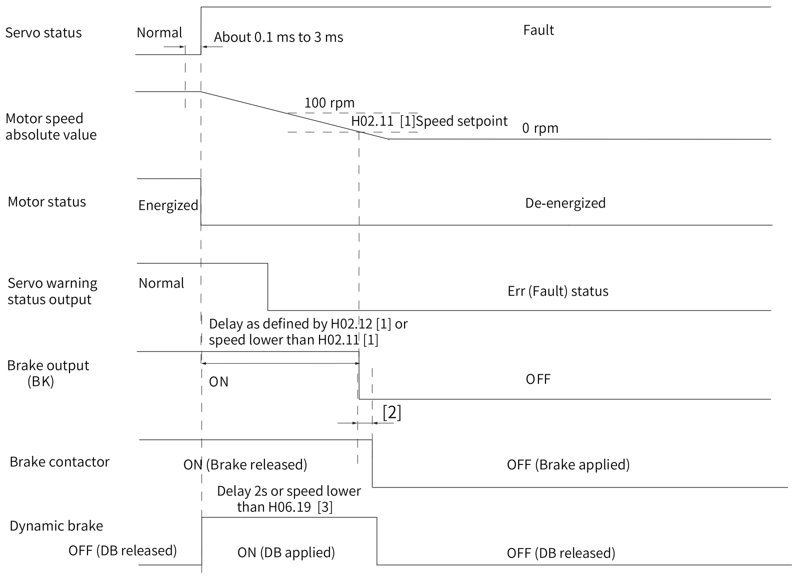


Figure 2-10 Sequence of "Dynamic braking stop, keeping de-energized state" at No. 1 fault

Note

- [1] When FunOUT.9 (BK, brake output) is not used, H02.11 and H02.12 are invalid.
- [2] For the delay of brake contactor actions, see for details. *"Table 2–2 " on page 44*
- [3] The dynamic brake is included in the standard configuration.

- No. 1 fault: Dynamic braking stop, keeping dynamic braking state

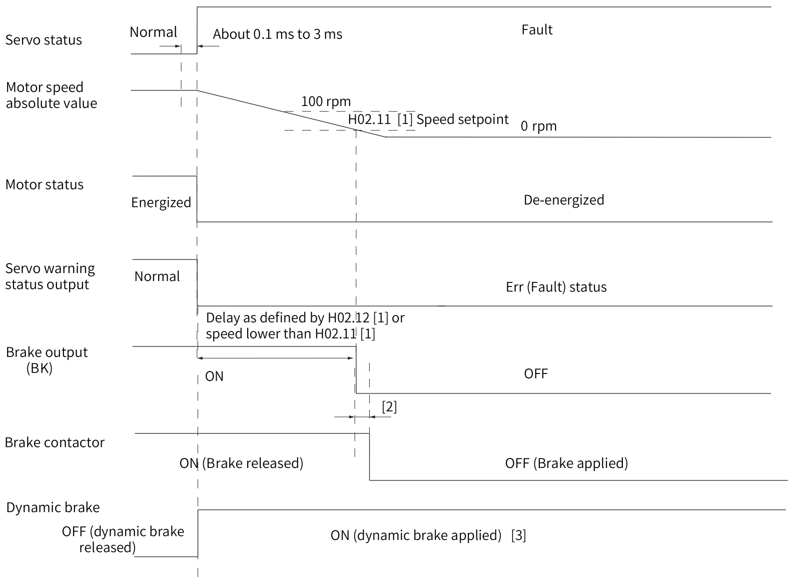


Figure 2-11 Sequence of "Dynamic braking stop, keeping dynamic braking state" at No. 1 fault

Note

- [1] When FunOUT.9 (BK, brake output) is not used, H02.11 and H02.12 are invalid.
- [2] For the delay of brake contactor actions, see for details. *"Table 2–2 " on page 44*
- [3] The dynamic brake is included in the standard configuration.

- No. 2 fault (without brake): Coast to stop, keeping de-energized state

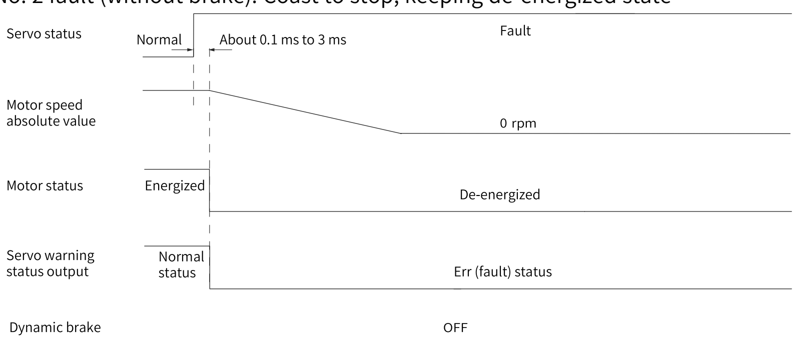


Figure 2-12 Sequence of "Coast to stop, keeping de-energized state" at No. 2 fault

- No. 2 fault (without brake): Stop at zero speed, keeping de-energized status

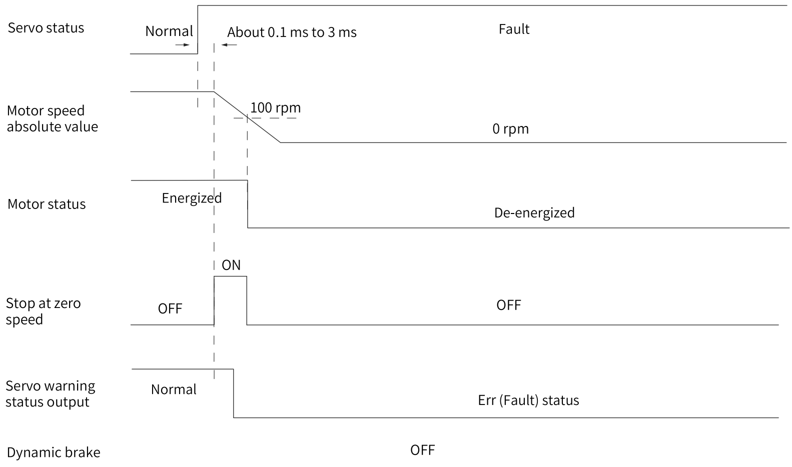


Figure 2-13 Sequence of "Stop at zero speed, keeping de-energized state" at No. 2 fault (without brake)

- No. 2 fault (without brake): Stop at zero speed, keeping dynamic braking state

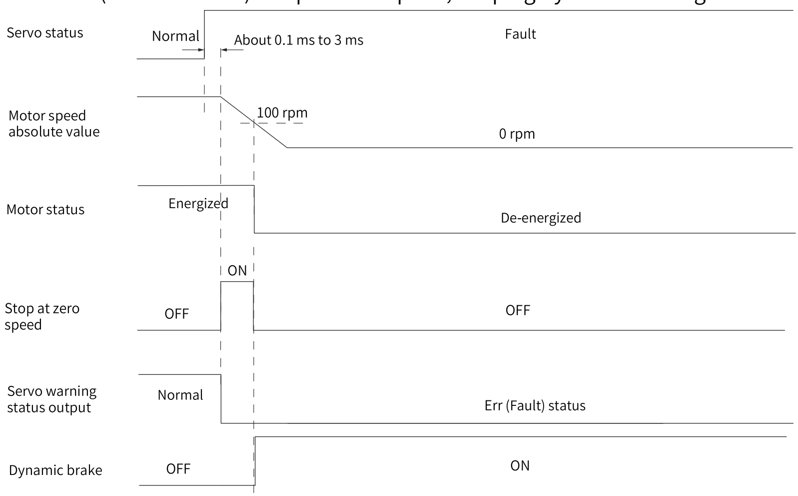


Figure 2-14 Sequence of "Stop at zero speed, keeping dynamic braking state" at No. 2 fault (without brake)

- No. 2 fault (without brake): Dynamic braking stop, keeping dynamic braking state

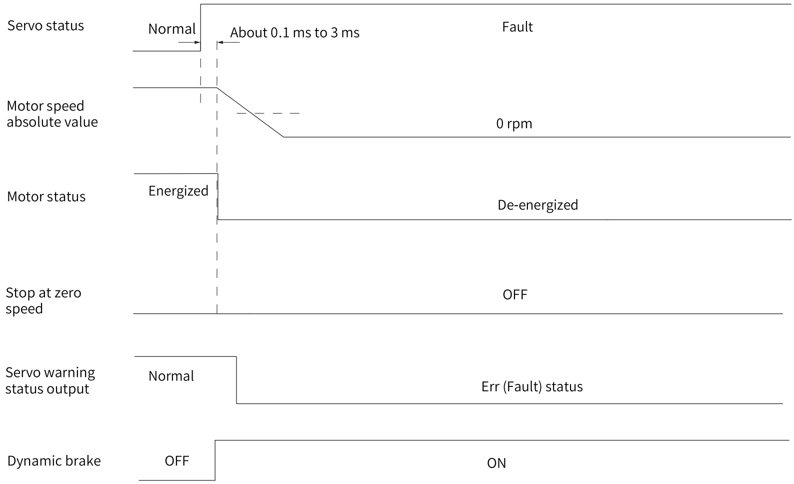


Figure 2-15 Sequence of "Dynamic braking stop, keeping dynamic braking state" at No. 2 fault (without brake)

- No. 2 fault (without brake): Dynamic braking stop, keeping de-energized state

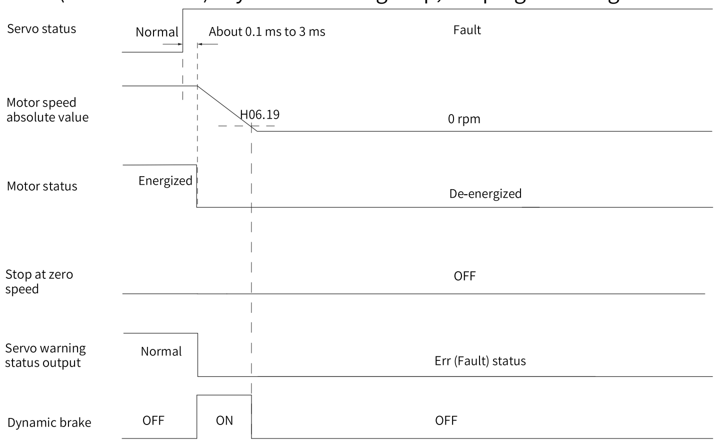


Figure 2-16 Sequence of "Dynamic braking stop, keeping de-energized state" at No. 2 fault (without brake)

- No. 2 fault (with brake): Stop at zero speed, keeping dynamic braking status

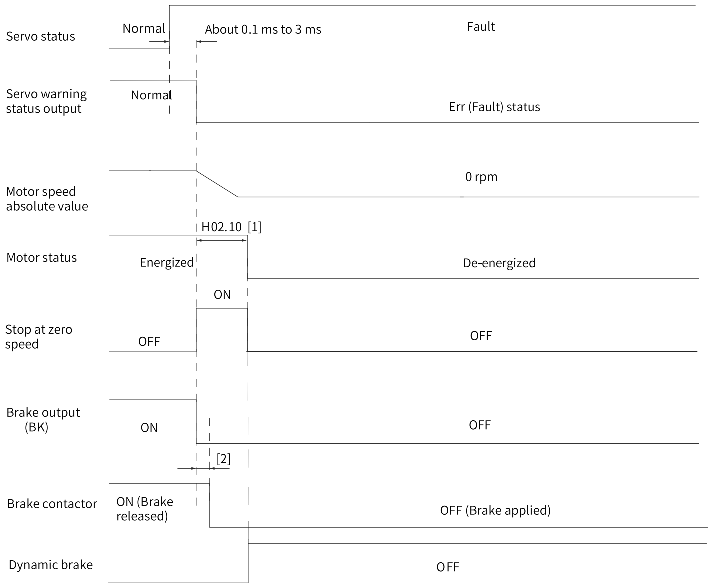


Figure 2-17 Sequence of "Stop at zero speed, keeping dynamic braking state" at No. 2 fault (with brake)

Note

- [1] When FunOUT.9 (BK, brake output) is not used, H02.10 is invalid.
- [2] For the delay of brake contactor actions, see for details. *"Table 2–2 " on page 44*

- When a No. 3 warning occurs on the servo drive, such as E900.0 (DI emergency braking), E950.0 (Positive limit switch warning), and E952.0 (Negative limit switch warning), the servo drive stops according to *"Figure 2–18 Sequence for warnings that cause stop" on page 66*.
- Warnings that cause stop: Stop at zero speed, keeping position lock status

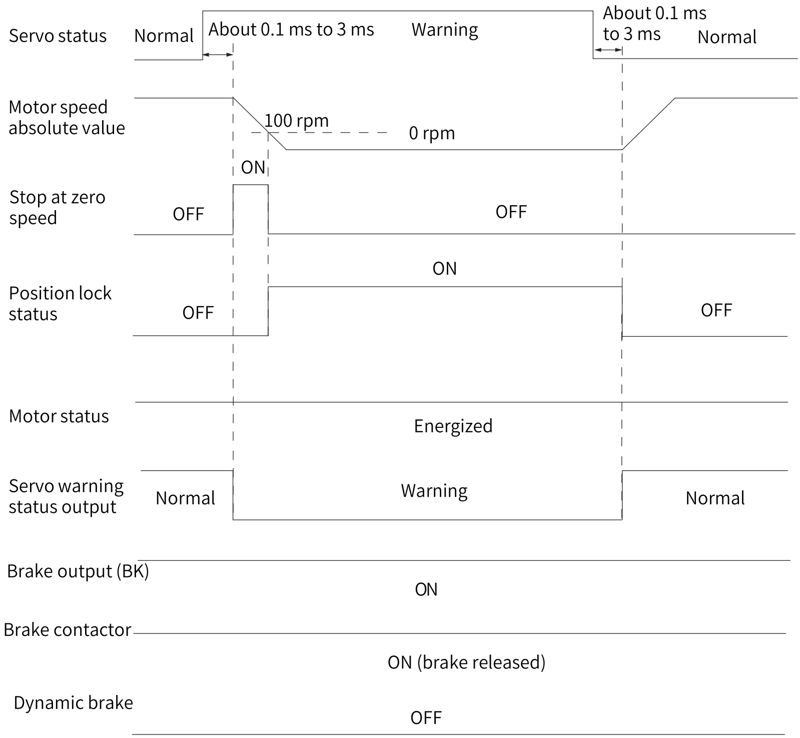


Figure 2-18 Sequence for warnings that cause stop

The other warnings do not affect the operation state of the drive. The sequence diagram for these warnings is shown in *"Figure 2–19 Sequence for warnings that do not cause stop" on page 67*.

- Warnings that do not cause stop

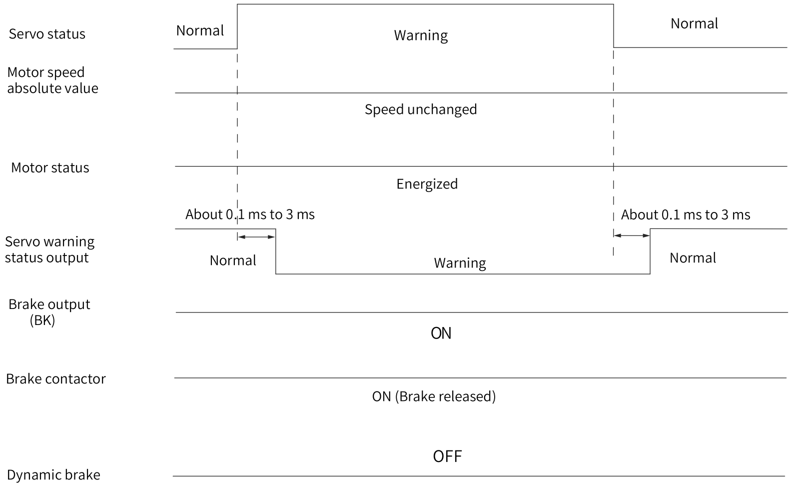


Figure 2-19 Sequence for warnings that do not cause stop

- Fault reset

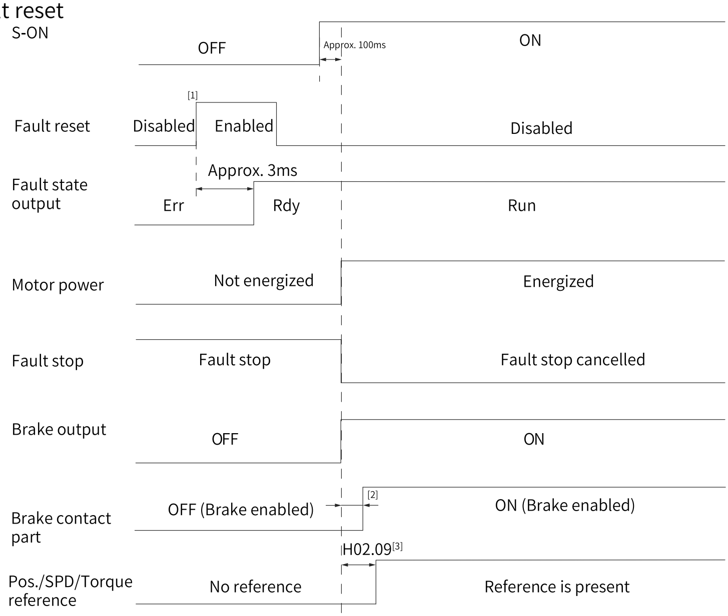


Figure 2-20 Sequence for fault reset

Note

- [1] The DI signal used for fault reset (FunIN.2: ALM-RST) is edge triggered.
- [2] For the delay of brake contactor actions, see for details. *"Table 2–2 " on page 44*
- [3] When FunOUT.9 (BK, brake output) is not used, H02.09 is invalid.

2.7 Servo OFF

There are three type of stops modes: coast to stop, stop at zero speed, and dynamic braking stop, along with three stop status: de-energized, dynamic braking, and position lock. The stop state is classified into the de-energized state, dynamic Braking state and the position lock state. See the following table for details.

Table 2–6 Comparison of three stop modes

Stop Mode	Coast to stop	Stop at zero speed	Dynamic braking stop
Description	The motor is de-energized and coasts to 0 RPM. The deceleration time is affected by the mechanical inertia and mechanical friction.	The servo drive outputs the reverse braking torque and the motor decelerates to 0 RPM quickly.	The three motor phases are short-circuited and the motor decelerates to 0 RPM under the influence of back EMF.
Features	Smooth and slow deceleration with small mechanical shock.	Quick deceleration with obvious mechanical shock.	Quick stop, with deceleration speed between coast to stop and stop at zero speed.

Table 2–7 Comparison of three stop status

De-energized	Position Lock	Dynamic Braking
The motor is de-energized and the motor shaft can be rotated freely after the motor stops rotating.	The motor shaft is locked and cannot be rotated freely after the motor stops rotating.	The motor shaft is braked after the motor stops rotating. The shaft can be rotated slowly under a large external force.

The stop causes can be divided into the following types: stop at S-ON OFF, stop at fault, stop at overtravel, and emergency stop. See the following descriptions for details.

Stop at S-ON OFF

Assign the S-ON function to a certain DI and deactivate the logic of this DI.

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H02.05	2002-06h	Stop mode at S-OFF	0: Coast to stop, keeping de-energized state 1: Stop at zero speed, keeping de-energized state 2: Stop at zero speed, keeping dynamic braking state 3: Dynamic braking stop, keeping dynamic braking state	0	-	At stop	*" H02_en.05" on page 156*

Fault reaction

The stop mode varies according to the fault type. For fault classification, see SV660P Series Servo Drive Troubleshooting Guide.

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H02.06	2002-07h	Stop mode at No.2 fault	0: Coast to stop, keeping de-energized state 1: Stop at zero speed, keeping de-energized state 2: Stop at zero speed, keeping dynamic braking state 3: Dynamic braking stop, keeping DB state 4: DB stops, keeping operation state	2	-	At stop	*" H02_en.06" on page 156*
H02.08	2002-09h	Stop mode at No.1 fault	0: Coast to stop, keeping de-energized state1: DB stop, keeping de-energized state2: DB stop, keeping DB state	2	-	At stop	*" H02_en.08" on page 157*

Note

When the brake is enabled, the following parameters are set forcibly:

- H02.05 = 2: Stop at zero speed, keeping dynamic braking state
- H02.06 = 2: Stop at zero speed, keeping dynamic braking state
- H02.07 = 1: Stop at zero speed, keeping position locking state
- H02.08=2: Dynamic braking stop, keeping de-energized state

Stop at overtravel

★ Definition of terms:

- "Overtravel": The mechanical motion exceeds the designed range of safe movement.
- Stop at overtravel: When a motion part moves beyond the range of safe movement, the limit switch outputs a level change signal, and the servo drive forcibly stops the motor.

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H02.07	2002-08h	Stop mode at overtravel	0: Coast to stop, keeping de-energized state 1: Stop at zero speed, keeping position lock state 2: Stop at zero speed, keeping de-energized state	1	-	At stop	" H02_en.07" on page 157

When overtravel occurs on a motor used to drive a vertical axis, the workpiece may fall. To prevent the risk of falling, set H02.07 (Stop mode at overtravel) to 1. When the workpiece moves linearly, install the limit switch to prevent mechanical damage. When overtravel occurs, input a reverse running command to make the motor (workpiece) run in the opposite direction.

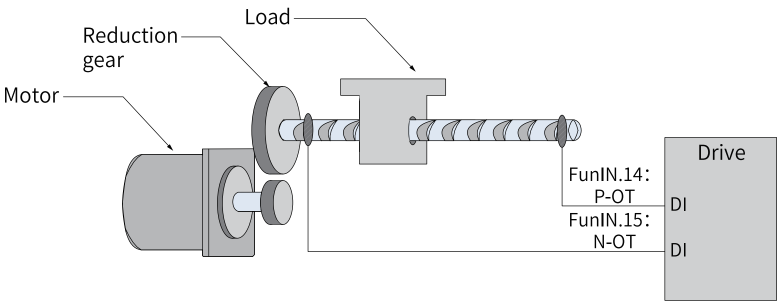


Figure 2-21 Installation of limit switches

To use the limit switches, assign FunIN.14 (P-OT, positive limit switch) and FunIN.15 (N-OT, negative limit switch) to two DIs of the servo drive and set the active logic of these DIs. This is to enable the servo drive to receive the level signals input from the limit switches. The servo drive determines whether to enable the limit switch function based on the state of the DI terminal level.

☆ Related parameters:

Code	Parameter Name	Function Name	Function
FunIN.14	P-OT	Positive limit switch	When the machine moves beyond the specified range, overtravel prevention applies. Inactive: Forward drive permitted Active: Forward drive inhibited
FunIN.15	N-OT	Negative limit switch	When the machine moves beyond the specified range, overtravel prevention applies. Inactive: Reverse drive permitted Active: Reverse drive inhibited

Emergency stop

The servo drive supports two emergency stop modes:

- Using DI function 34: FunIN.34 (EmergencyStop)
- Using the auxiliary function: emergency stop (H0d.05)

☆ Related parameters:

Code	Parameter Name	Function Name	Function
FunIN.34	Emergency Stop	Braking	Inactive: Current operating state unaffected Active: Stop quickly as defined by H02.18, keeping position lock status, with E900.0 (DI emergency braking) reported.

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H0d.05	200d-06h	Emergency stop	0: No operation 1: Emergency stop	0	-	Real-time	" H0d_en.05" on page 308

3 Adjustment

3.1 Overview

The servo drive must drive the motor as quick and accurate as possible to follow the commands from the host controller or internal setting. Gain adjustment needs to be performed to meet such requirement.

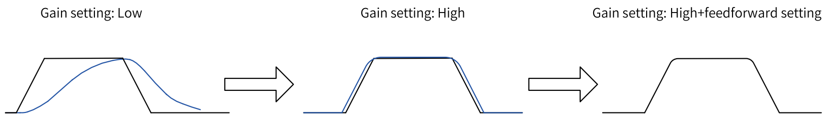


Figure 3-1 Example of gain tuning

Position loop gain: 40.0 Hz	Position loop gain: 200.0Hz	Position loop gain: 200.0Hz
Speed loop gain: 200.0 Hz	Speed loop gain: 25.0Hz	Speed loop gain: 25.0Hz
Speed loop integral time constant: 100.00 ms	Speed loop integral time constant: 50.00ms	Speed loop integral time constant: 50.00ms
Speed feedforward gain: 0	Speed feedforward gain: 0	Speed feedforward gain: 50.0%
Load inertia ratio: 30	Load inertia ratio: 30	Load inertia ratio: 30

The gain is defined by a combination of multiple parameters that affect each other. Such parameters include the position loop gain, speed loop gain, filter and load moment of inertia ratio. The values of these parameters must be balanced against each other during gain tuning.

Note

Before gain tuning, perform a trial run through jogging to ensure the motor operates properly.

The following figure shows the general flowchart for gain tuning.

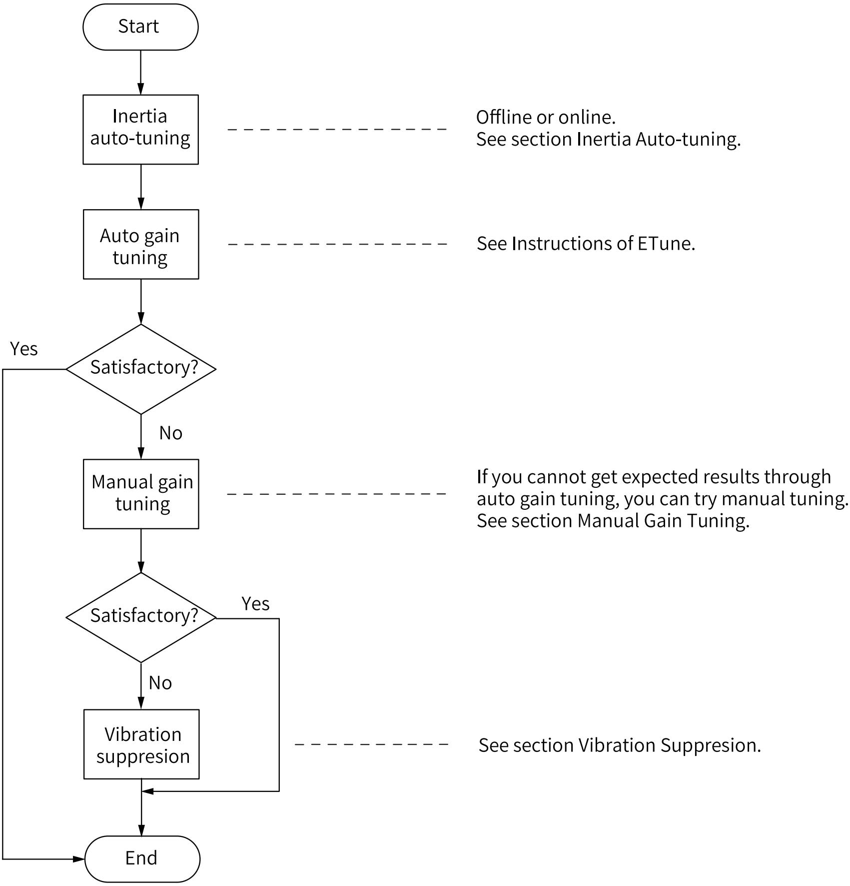


Figure 3-2 Steps

Table 3–1 Description of gain tuning

Steps			Function	Reference
1	Inertia Identification	Offline	The servo drive calculates the load inertia ratio automatically through inertia auto-tuning.	*"3.2.1 Offline Inertia Identification" on page 76*
		Online	The host controller sends a command to make the motor rotate, and the servo drive calculates the load inertia ratio in real time.	*"3.2.2 Online Inertia Auto-tuning" on page 80*
2	Auto Gain Tuning		The servo drive generates a group of gain parameters based on the correct inertia ratio.	*"3.3.1 ETune" on page 82*and *"3.3.2 STune" on page 88*
3	Manual Gain Tuning	Basic gains	If the auto-tuned gain values fail to deliver desired performance, fine-tune the gains manually to improve the performance.	*"3.4.1 Basic Parameters" on page 94*
		Reference filter	Smoothens the position, speed, and torque references.	*"3.4.3 Comparison of Filters" on page 103*
		Feedforward gain	Improves the follow-up behavior.	*"3.4.4 Feedforward gain" on page 103*
		Pseudo differential regulator	Adjusts the speed loop control mode to improve the anti-interference capability at low frequency range.	*"3.4.5 PDFF Control" on page 105*
		Torque disturbance observer	Improves the resistance against torque disturbance.	*"3.4.6 Torque disturbance observer" on page 107*

Steps			Function	Reference
4	Vibration suppression	Mechanical resonance	Suppresses mechanical resonance through the notch.	*"3.6.1 Mechanical Resonance Suppression" on page 119*
		Low-frequency resonance	Activate the filter used to suppress low-frequency resonance.	*"3.6.2 Low-Frequency Resonance Suppression at the Mechanical End" on page 125*

3.2 Inertia Identification

The load inertia ratio (H08.15) is calculated through the following formula:

$$\text{Load inertia ratio} = \frac{\text{Total mechnical load moment of inertia}}{\text{Motor moment of inertia}}$$

The inertia ratio is an important parameter of the servo system, and quick commissioning can be implemented with the correct setting of this parameter.

You can set the load inertia ratio manually or get the inertia ratio through inertia auto-tuning.

The following two inertia auto-tuning modes are available:

- Offline Inertia Identification
  To enable offline inertia auto-tuning, use H0d.02 (Offline inertia auto-tuning) and make the motor rotate and execute inertia auto-tuning through the keypad. Offline inertia auto-tuning does not involve the host controller.
- Online Inertia Auto-tuning
  Send a command to the servo drive through the host controller to make motor act accordingly to finish inertia auto-tuning. Online inertia auto-tuning involves the host controller.

Note

- The following requirements must be met to ensure correct calculation of the inertia ratio:
  - The actual maximum speed of the motor is higher than 150 rpm.
  - The acceleration rate during acceleration/deceleration of the motor is higher than 3000 rpm/s.
  - The load torque is stable without dramatic changes.
  - The actual inertia ratio does not exceed 120.
- If the actual inertia ratio is large but the gain is low, the motor may not be able to meet the maximum speed and acceleration requirements as motor actions will be slowed down. In this case, increase the speed loop gain (H08.00) and perform auto-tuning again.
- If vibration occurs during auto-tuning, stop inertia auto-tuning immediately and decrease the gains.
- Inertia auto-tuning may fail in case of a large backlash of the transmission mechanism.

3.2.1 Offline Inertia Identification

The following two methods for offline inertia auto-tuning are available: Method 1: H09.05 = 0 or 1: The setpoint of H08.15 is taken as the initial inertia ratio for inertia auto-tuning. Method 2: H09.05 = 2 or 3: No initial inertia ratio is required for inertia auto-tuning.

Method 1

Set H09.05 (Offline inertia auto-tuning mode) to 0 or 1 , switch to "H0d.02" in the parameter display mode, and press the SET key to enable offline inertia auto-tuning.

Check the following before performing offline inertia auto-tuning:

- The motor must meet the following requirements:
  - A travel distance of more than one revolutions in the forward/reverse direction is available between the mechanical limit switches.
    Ensure limit switches are installed to the machine and a travel distance as described above is reserved to prevent overtravel during inertia auto-tuning.
  - The required number of revolutions (H09.09) is fulfilled.
    View the values of H09.06 (Maximum speed of inertia auto-tuning), H09.07 (Time constant for accelerating to the maximum speed during inertia auto-tuning), and H09.09 (Number of revolutions per inertia auto-tuning) to ensure the travel distance that starts from the stop position is larger than the value of

H09.09. Otherwise, decrease the value of H09.06 or H09.07 until this requirement is met.

- Estimate the value of H08.15 (Load rotational inertia ratio).
  If the default value of H08.15 (1.00) is used but the actual inertia ratio is 30.00, the motor may run very slowly, resulting in auto-tuning failure. To solve this problem, take the following measures:
  - Set H08.15 to a large value first.
    It is recommended to set H08-15 to a large value first, such as 5.00. Then increase the value of H08-15 gradually until the display value on the keypad changes with it.
  - Increase the stiffness level (H09.01) properly so that the actual motor speed can reach H09.06 (Maximum speed of inertia auto-tuning).

The following figure shows general flowchart for offline inertia auto-tuning.

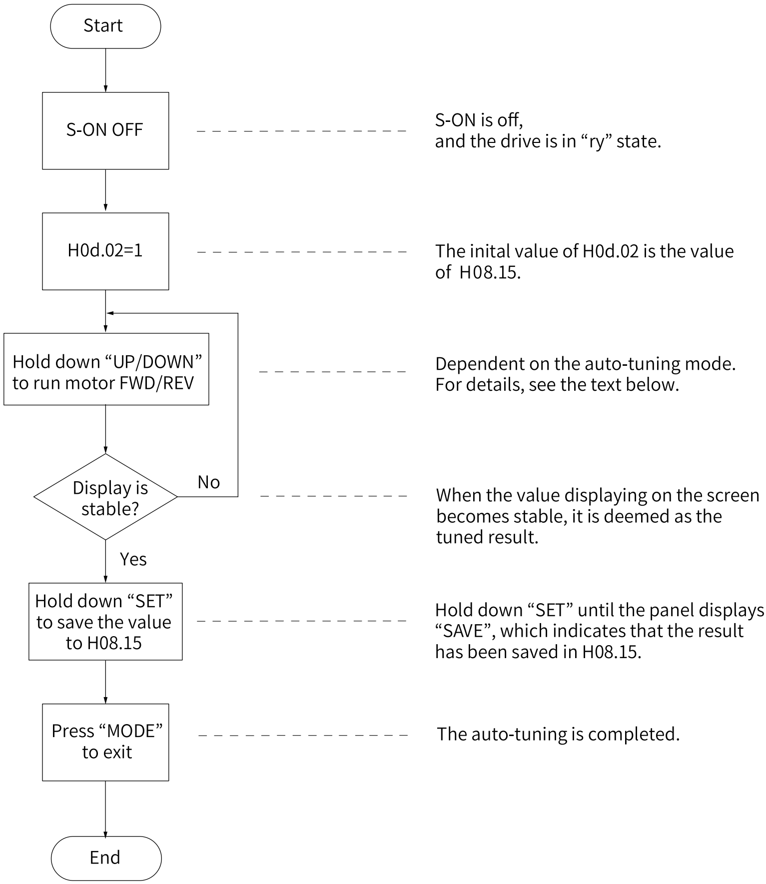
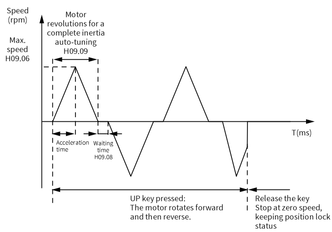
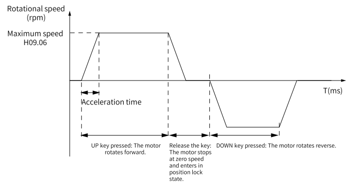


Figure 3-3 Offline inertia auto-tuning flowchart

Offline inertia auto-tuning is divided into two modes: positive/negative triangle wave mode and jog mode. The command forms for these two modes are different, as shown below.

Table 3–2 Descriptions of two offline inertia auto-tuning modes

Item	Positive and Negative Triangular Wave Mode (H09.05 = 0)	Jog mode (H09.05 = 1)
Command form	Symmetric triangle wave  	Trapezoidal wave 
Max. speed	H09.06	H09.06
Acceleration/ Deceleration time Time	H09.07	H09.07
Key description	UP key held down: The motor rotates forwardly and then reversely. DOWN key held down: The motor rotates reversely and then forwardly. UP/DOWN key released: The motor stops at zero speed, keeping position lock state.	UP key pressed: The motor rotates forwardly. DOWN key pressed: The motor rotates reversely. UP/DOWN key released: The motor stops at zero speed, keeping position lock state.
Time interval	H09.08	Interval between two key operations
Motor revolutions	⩽ H09.09	Controlled manually
Applicable Occasion	Applications where the motor travel is short	Applications where the motor travel is long and manual control is allowed

Method 2:

Set H9.05 to 2 or 3 and perform inertia auto-tuning based on the same flowchart for Method 1. To make the motor stop at zero speed, release the UP/DOWN key. Pressing the UP/DOWN key again starts a new inertia auto-tuning. The initial direction of operation is determined by the UP/DOWN key. For applications allowing unidirectional operations only, set H09-05 to 3. The running direction at start is determined by the UP/DOWN key. For applications requiring unidirectional movement, set H09.05 to 3.

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H09.05	2009-06h	Offline inertia auto-tuning mode	0: Positive/Negative triangular wave mode 1: JOG mode 2: Bidirectional auto-tuning mode 3: Unidirectional auto-tuning mode	0	-	At stop	*" H09_en.05" on page 255*
H09.06	2009-07h	Max. speed of inertia auto-tuning	100 RPM to 1000 RPM	500	RPM	At stop	*" H09_en.06" on page 256*
H09.07	2009-08h	Time constant for accelerating to max. speed during inertia auto-tuning	20ms to 800ms	125	ms	At stop	*" H09_en.07" on page 256*
H09.08	2009-09h	Interval time after an individual inertia auto-tuning	50ms to 10000ms	800	ms	At stop	*" H09_en.08" on page 257*
H09.09	2009-0Ah	Motor revolutions for an inertia auto-tuning	0.00 to 100.00	1.00	-	Real-time	*" H09_en.09" on page 257*

3.2.2 Online Inertia Auto-tuning

The servo drive supports online inertia auto-tuning. The online inertia auto-tuning flowchart is shown as follows.

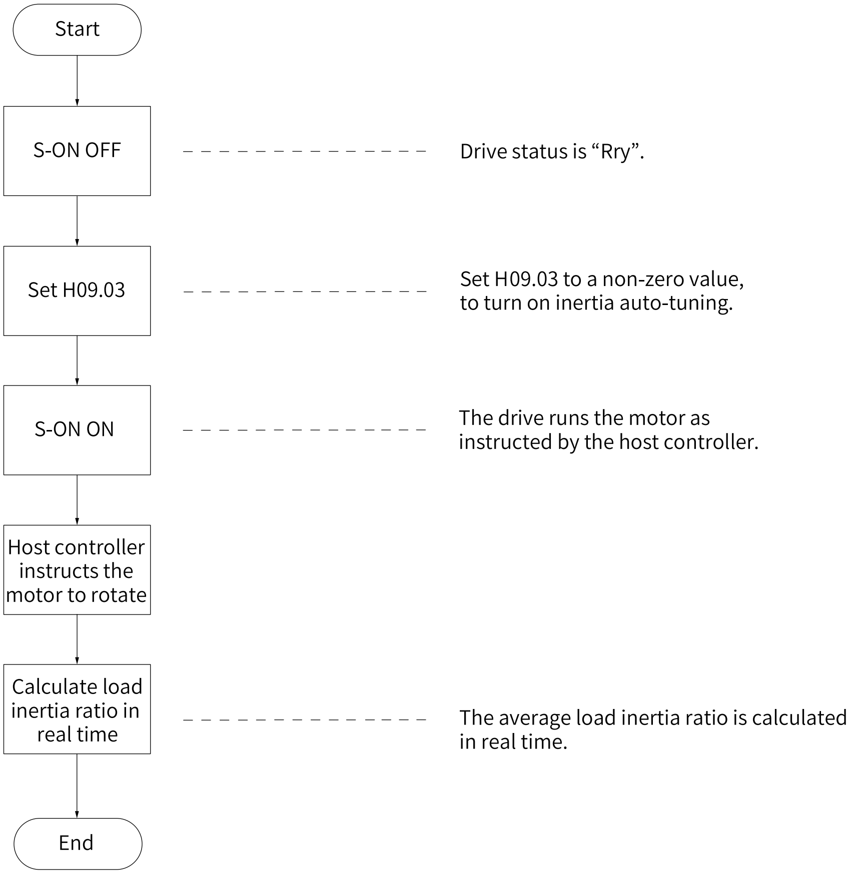


Figure 3-4 Online inertia auto-tuning flowchart

Note

H09.03 defines the real-time updating speed of the load inertia ratio (H08.15).

- H09.03 = 1: Applicable to the scenario where the actual inertia ratio rarely changes, such as machine tool and wood carving machine.
- H09.03 = 2: suitable for applications where the actual inertia ratio changes slowly
- H09.03 = 3: Applicable to cases where the actual inertia ratio changes rapidly, such as handling manipulators.

☆Related parameter

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H09.03	2009-04h	Online inertia auto-tuning mode	0: Disabled 1: Enabled, changing slowly 2: Enabled, changing normally 3: Enabled, changing quickly	0	-	Real-time	*" H09_en.03" on page 254*

3.3 Auto Gain Tuning

3.3.1 ETune

Overview

ETune is a wizard-type auto-adjustment function used to guide users to set corresponding curve trajectories and response parameters. After the curve trajectories and response parameters are set, the servo drive performs auto-tuning automatically to generate the optimal gain parameters. The auto-tuned parameters can be saved and exported as a recipe for use in other devices of the same model.

The ETune function is intended to be used in applications featuring slight load inertia change.

Description of ITune operation

- **Operation flowchart**

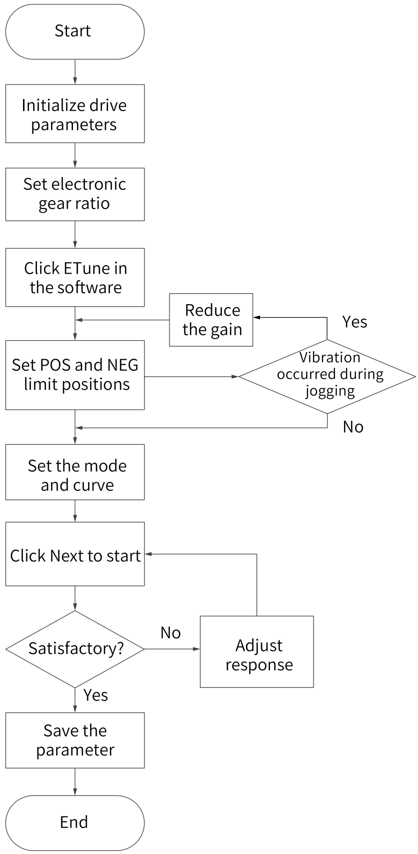
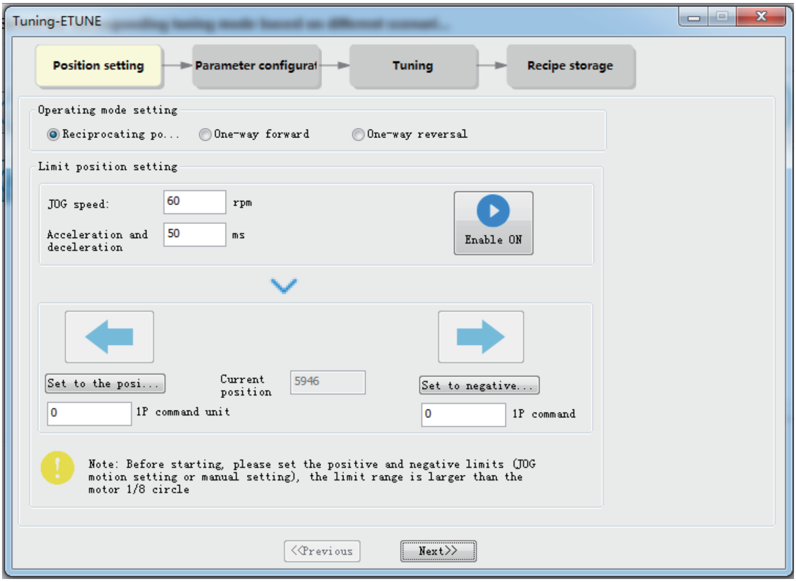


Figure 3-5 Operation flowchart

- **Detailed Description**

1. Click Tuning in the software tool, and select ETUNE.



2. Select any of the following three operation modes based on the operating direction allowed by the machine.
   - In the Reciprocating po... mode, the motor keeps reciprocating within the positive and negative position limits.
   - In the One-way forward mode, the motor takes the difference between the positive and negative position limits as the maximum distance per action and keeps running in the forward direction.
   - In the One-way forward mode, the motor takes the difference between the positive and negative position limits as the maximum distance per action and keeps running in the reverse direction.
3. Designate the positive and negative limit positions allowed by the motor. The difference between the positive and negative limits defines the position reference pulses for the motor, which is also the value before multiplication/ division by the electronic gear ratio.

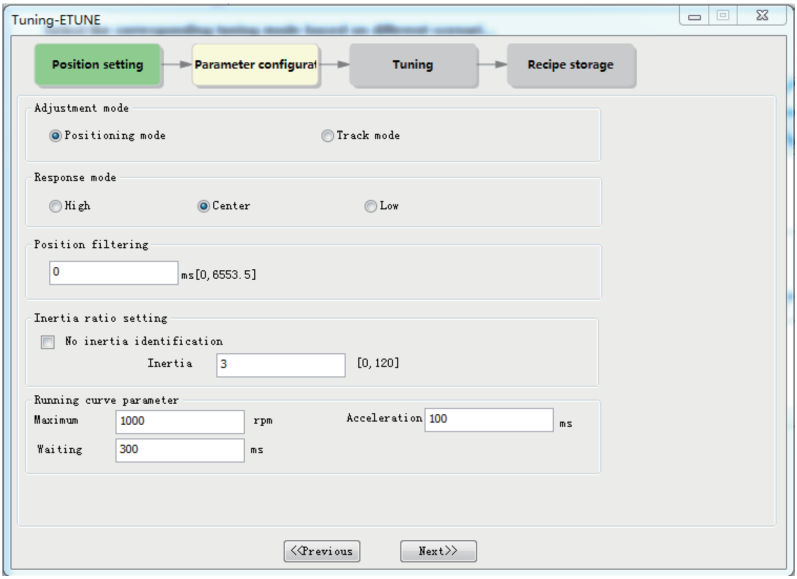
   You can set the positive and negative position limits through the following two methods.
   - Method 1: click Enable ON in JOG, and click the left arrow to make the motor move to the positive limit. Next, click **Set to the posi...**. Follow the same procedure for setting the negative position limit, and click Enable OFF (the Enable ON button changes to Enable OFF after a click).
   - Method 2: Enter the positive and negative limits directly.

Note

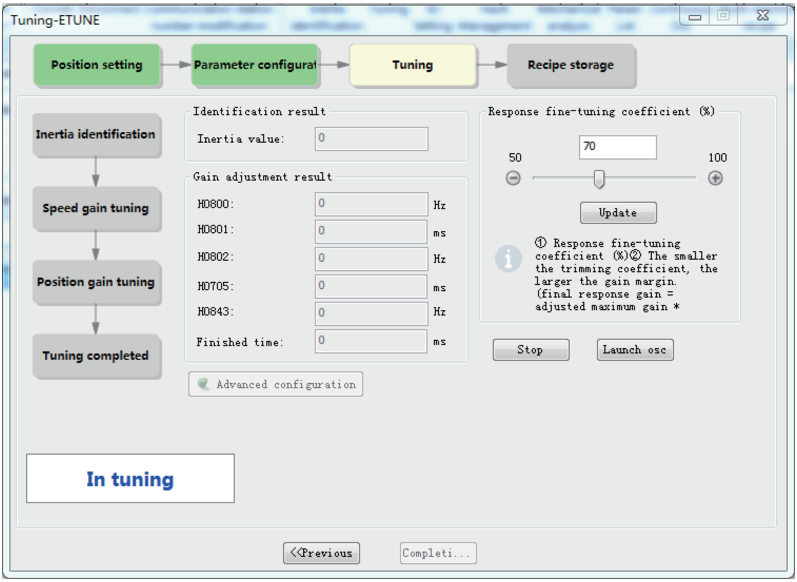
The difference between the positive and negative position limits must be larger than 1/8 of one revolution. The larger the value of the limit position, the better the adaptability of the auto-tuned parameters, but the longer will ETune adjustment take.

4. Click Next to switch to the mode parameter setting interface. The adjustment mode is divided into Positioning mode and Track mode.

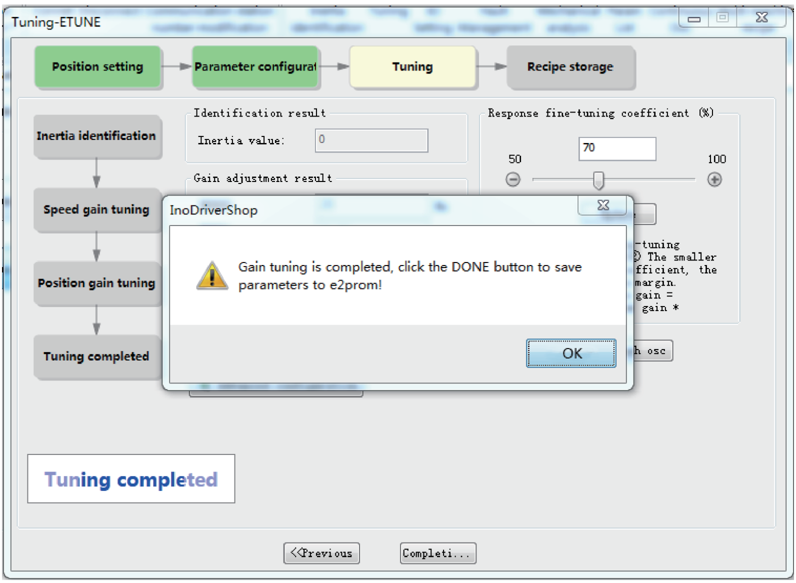
   Auto-tuning of the inertia ratio is optional. If you choose not to perform inertia auto-tuning, set the correct inertia ratio (the inertia ratio can be modified directly). You can adjust the response level and position filter time constant based on the responsiveness needed and the position reference noise generated during operation. Then configure the motion profile by setting the maximum speed, acceleration/deceleration time and interval time for auto-tuning.

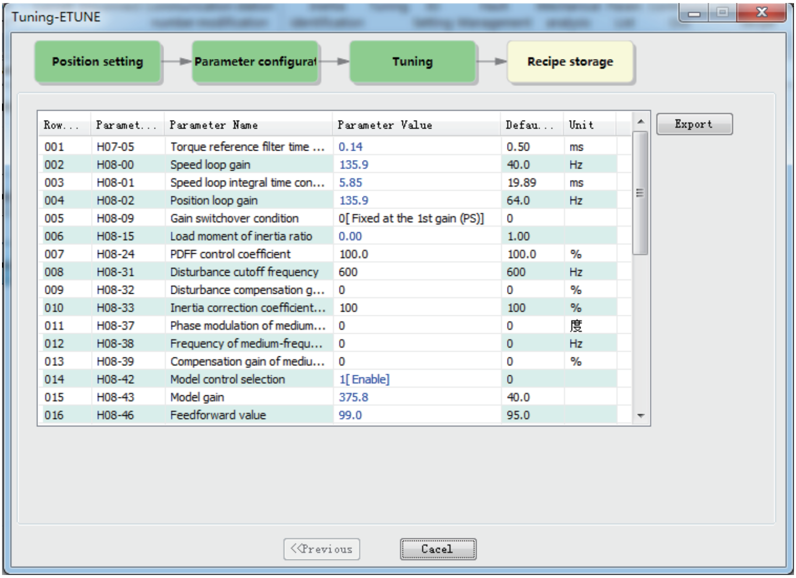


5. Click the **"start"** button to start auto-tuning.
   - If you choose to perform inertia auto-tuning, the drive starts inertia auto-tuning based on the set motion profile. After inertia auto-tuning is done, the drive starts gain auto-tuning.
   - If you choose not to perform inertia auto-tuning on the start page, the drive starts gain auto-tuning directly after start.



6. During gain auto-tuning, if you modify the Response fine-tuning coefficient and click **"Apply"**, gain auto-tuning will be continued based on the fine-tuning coefficient entered. After gain auto-tuning is done, you can click **"Done"** to save parameters to E2PROM and export parameters as a recipe file.





Precautions

- Before gain tuning, set an electronic gear ratio that fits the actual application.
- You can adjust the maximum speed and acceleration/deceleration time of the motion profile based on actual conditions. The acceleration/deceleration time can be increased properly because positioning will be quickened after auto-tuning.
- If the acceleration/deceleration time is too short, overload may occur. In this case, increase the acceleration/deceleration time properly.
- For vertical axes, take anti-drop measures beforehand and set the stop mode upon fault to "Stop at zero speed".
- For lead screw transmission, shorten the travel distance if the tuning duration is too long.

Solutions to Common Faults

Fault	Cause	Solution
E662: ETune failure	1. Vibration cannot be suppressed.	1. Enable the vibration suppression function manually.
	2. The positioning overshoot is too large.	2. Check whether the positioning threshold is too low. Increase the acceleration/deceleration time and reduce the response level.
	3. The reference is disturbed by noise.	3. Modify the electronic gear ratio to improve the reference resolution or increase the reference filter time constant in the "Parameter configuration" interface.
	4. The current fluctuates.	4. Check whether the current of the machine fluctuates regularly.
E600: Inertia auto-tuning failure	1. Vibration cannot be suppressed.	1. Enable the vibration suppression function manually and perform ETune again.
	2. The auto-tuned values fluctuate dramatically.	2. Increase the maximum operating speed and decrease the acceleration/deceleration time. For the lead screws, shorten the travel distance.
	3. Mechanical couplings of the load are loose or the mechanism is eccentric.	3. Rectify the mechanical fault.
	4. Interruption occurs due to a fault that occurs during auto-tuning.	4. Clear the fault and perform ETune again.
	5. The position reference filter time is set to an excessively high value.	Decrease the values of H05.04–H05.06 and perform ETune again.

3.3.2 STune

Overview

STune performs gain auto-tuning based on the set stiffness level to fulfill the needs for rapidity and stability.

The ETune function is intended to be used in applications featuring slight load inertia change.

Caution

Ensure that the correct load inertia ratio has been obtained before enabling automatic gain adjustment.

Description of ITune operation

- **Operation flowchart**

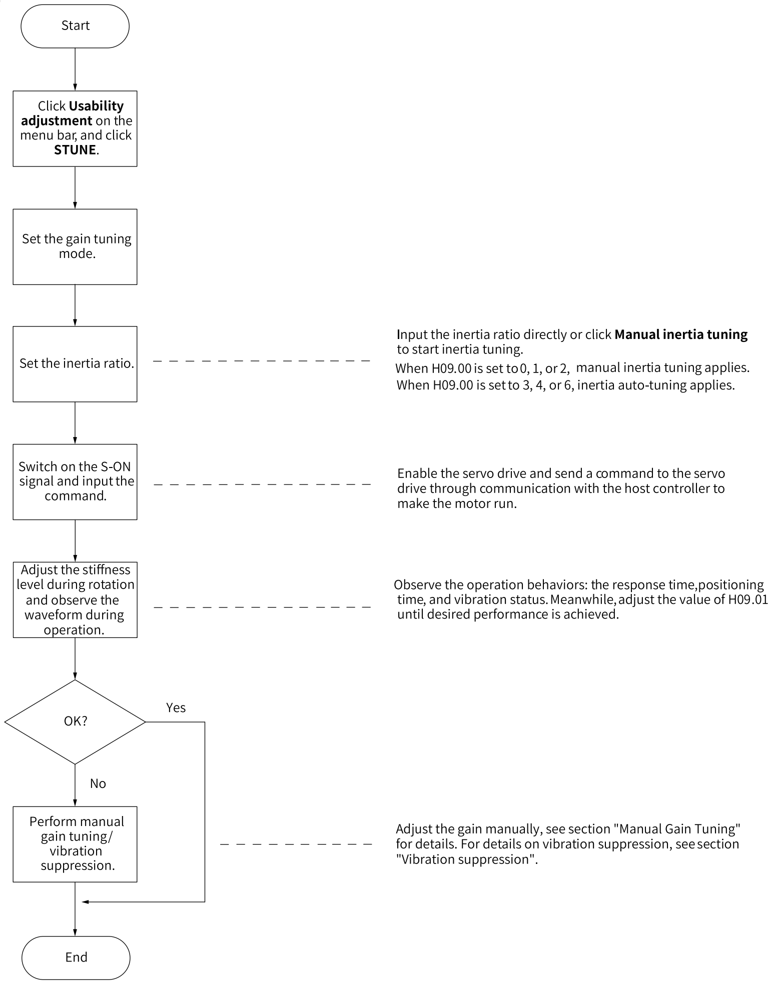


Figure 3-6 Operation flowchart

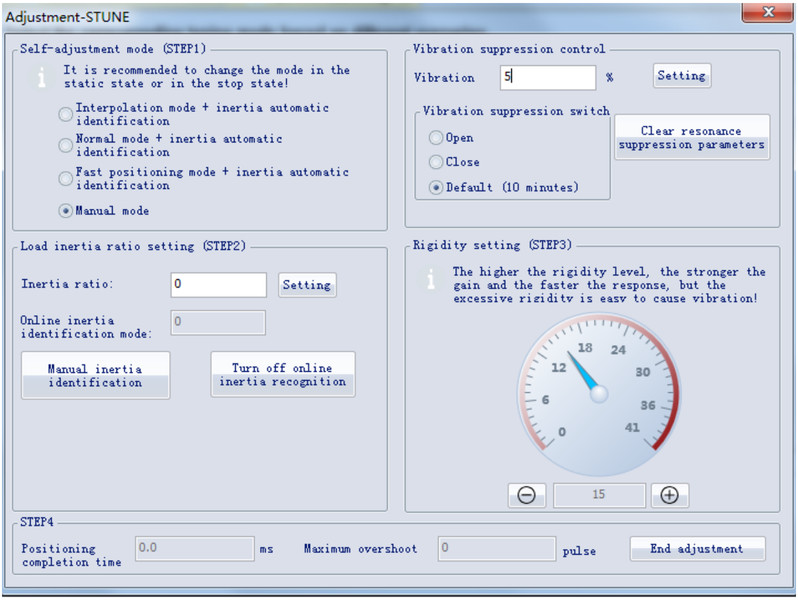
- **Detailed Description**

  You can set the gain auto-tuning mode through the keypad or the software tool.

  1. Select the gain auto-tuning mode.
     - In modes 0, 1 and 2 shown in the following table, you need to set the inertia ratio before stiffness tuning. If the inertia is unknown, adjust the inertia manually. If vibration occurs on the machine, decrease the stiffness level before adjusting the inertia manually.
     - In modes 3, 4, and 6 shown in the following table, you can perform adjustment through the wizard-type interface directly, without the need for setting an inertia ratio.

Mode	Parameter Name	Function
0	Inactive	The gains need to be adjusted manually.
1	Standard stiffness level mode	Gains are set automatically based on the set stiffness level.
2	Positioning mode	Gains are set automatically based on the set stiffness level. This mode is applicable to occasions requiring quick positioning.
3	Interpolation mode + Inertia auto-tuning	Gains are set automatically based on the set stiffness level. In this mode, inertia is auto-tuned and vibration is suppressed automatically. This mode is applicable to multi-axis interpolation.
4	Normal mode + Inertia auto-tuning	Gains are set automatically based on the set stiffness level. The inertia is auto-tuned and vibration is suppressed automatically.
6	Quick positioning mode + Inertia auto-tuning	Gains are set automatically based on the set stiffness level. Inertia is auto-tuned and vibration is suppressed automatically. This mode is applicable to occasions requiring quick positioning.

  2. Adjust the stiffness level gradually during operation of the load. The present stiffness level value will be written to the drive automatically. Keep monitoring the operating waveform after increasing the stiffness level (increase by one level at a time) until desired performance is achieved.



Precautions

Load inertia ratio range

- In scenarios requiring high response, the inertia ratio must be lower than 500% and should not exceed 1000%.
    - For belt pulley or gear rack requiring not high rigidity and accuracy, the inertia ratio should not exceed 1000%.
    - For lead screw or cardan shaft requiring high rigidity and accuracy, the inertia ratio should not exceed 500%.
    - In scenarios where high positioning accuracy or response is required, the inertia ratio should not exceed 200%.
- In scenarios requiring a certain accuracy and dynamic response, the inertia ratio should not exceed 3000%.
- When the inertia ratio exceeds 3000%, it is hard to adjust and the trajectory control cannot be performed. It is only applicable to mechanisms for point-to-point control and rotary motion but the acceleration/deceleration time should be large.

Rigidity meter setting

The setting range of H09.01 (Stiffness level selection) is 0–41. The level 0 indicates the weakest stiffness and lowest gain and level 41 indicates the strongest stiffness and highest gain.

The following table lists the stiffness levels for different load types for your reference.

Table 3–3 Reference of stiffness levels

Recommended Stiffness Level	Load Mechanisms
Level 8 to level 12	Large-scale machineries
Level 12 to level 18	Applications with low stiffness such as the conveyors
Above level 18	Applications with high stiffness such as the ball screws and direct-connected motors

The following five gain auto-tuning modes are available.

Caution

- If H09.00 is set to 3, 4, or 6, the servo drive will suppress the vibration and perform inertia auto-tuning automatically within 5 min (or other time defined by H09-37) after power-on or stiffness level setting, and then the servo drive exits from automatic adjustment.
- Do not set H09.00 to 3, 4, or 6 in applications with slow acceleration/deceleration, large vibration, and unstable mechanical couplings.

- Standard rigidity meter mode (H09.00 set to 1)

  The 1st gain parameters (H08.00 to H08.02 and H07.05) are automatically updated and saved based on the rigidity level set in H09.01.

Table 3–4 Parameters updated automatically in the standard mode

Param.	Parameter Name
H08.00	Speed loop gain
H08.01	Speed loop integral time constant
H08.02	Position loop gain
H07.05	Filter time constant of torque reference

- Positioning mode (H09.00 = 2)

  On the basis of *"Table 3–4 " on page 92*, the 2nd gain set (H08.03...H08.05, H07.06) are also updated and saved automatically according to the stiffness level defined by H09.01. The position loop gain in the 2nd gain set has a higher stiffness level than that in the 1st gain set.

Table 3–5 Parameters updated automatically in the positioning mode

Param.	Parameter Name	Description
H08.03	2nd speed loop gain	-
H08.04	2nd speed loop integral time constant	If H08.04 is set to remain at 512.00 ms, the 2nd speed loop integral action is invalid and only proportional control is used in the speed loop.
H08.05	2nd position loop gain	-
H07.06	2nd torque reference filter time constant	-

Values of speed feedforward parameters are fixed.

Table 3–6 Parameters with fixed values in the positioning mode

Param.	Parameter Name	Value
H08.19	Speed feedforward gain	30.0%
H08.18	Speed feedforward filter time constant	0.50ms

Values of gain switchover parameters are fixed.

Gain switchover is activated automatically in the positioning mode.

Param.	Parameter Name	Value	Description
H08.08	2nd gain mode setting	1	Switchover between the 1st gain set (H08.00...H08.02, H07.05) and 2nd gain set (H08.03...H08.05, H07.06) is active in the positioning mode. In other modes, the original setting is used.
H08.09	Gain switchover condition	10	In positioning mode, the gain switchover condition is that H08.09 is set to 10. In other modes, the original setting is used.
H08.10	Gain switchover delay	5.0ms	In positioning mode, the gain switchover delay is 5.0 ms. In other modes, the original setting is used.
H08.11	Gain switchover level	50	In the positioning mode, the gain switchover level is 50. In other modes, the original setting is used.
H08.12	Gain switchover hysteresis	30	In the positioning mode, the gain switchover dead time is 30. In other modes, the original setting is used.

Caution

In automatic gain adjustment mode, the parameters automatically updated along with H09-01 (Stiffness level) and those with fixed values cannot be modified. To modify these parameters, set H09-00 to 0 to exit automatic adjustment mode.

3.4 Manual Gain Tuning

3.4.1 Basic Parameters

When gain auto-tuning cannot fulfill the application needs, perform manual gain tuning. to achieve better result.

The servo system consists of three control loops, which are position loop, speed loop, and current loop from external to internal. The basic control diagram is shown in the following figure.

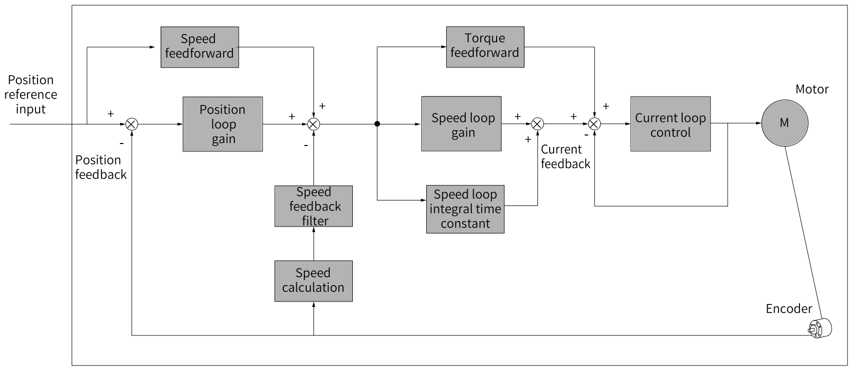


Figure 3-7 Basic control for manual gain tuning

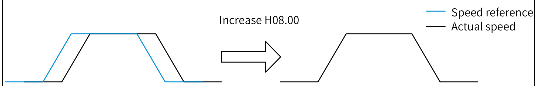
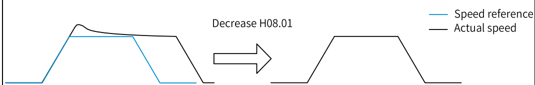
Note

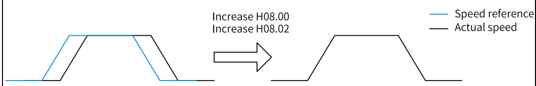
The response level of the inner loop must be higher than that of the outer loop. If it is not observed, the system may be unstable.

The current loop gain has been set with the highest level of responsiveness by default, avoiding the need for adjustment. you only need to adjust the position loop gain, speed loop gain and other auxiliary gains. For gain tuning in the position control mode, the position loop gain must be increased together with the speed loop gain, and the responsiveness of the former must be lower than the latter.

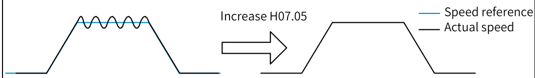
The following table describes how to adjust the basic gain parameters.

Table 3–7 Adjustment of gain parameters

Step	Param.	Parameter Name	Description
1	H08.00	Speed loop gain	Function: Determines the maximum frequency of a variable speed reference that can be followed by the speed loop. When H08.15 (Load inertia ratio) is set correctly, the maximum frequency that can be followed by the speed loop is the setpoint of H08.00.  Note: • Increasing the setpoint without incurring extra noise or vibration shortens the positioning time, stabilizes the speed, and improves the follow-up behavior. • If noise occurs, decrease the setpoint. • If mechanical vibration occurs, enable mechanical resonance suppression. For details, see *" Vibration suppression" on page 118*.
2	H08.01	Speed loop integral time constant	Function: Eliminates the speed loop deviation.  Note: Set H08.01 according to the following formula: 500 ⩽ H08.00 x H08.01 ⩽ 1000 For example, if H08.00 is set to 40.0 Hz, the setpoint of H08.01 must meet the following requirement: 12.50 ms ⩽ H08.01 ⩽ 25.00 ms Decreasing the setpoint strengthens the integral action and shortens the positioning time, but an excessively low setpoint may easily lead to mechanical vibration. An excessively high setpoint prevents the speed loop deviation from being cleared. When H08.01 is set to 512.00 ms, the integral is invalid.

<table>
<tr><th>Step</th><th>Param.</th><th>Parameter Name</th><th>Description</th></tr>
<tr><td>3</td><td>H08.02</td><td>Position loop gain</td><td>Function:
It sets the position reference maximum frequency followed by the position loop.
The maximum follow-up frequency of the position loop equals the value of H08.02.


Note:
To ensure system stability, the maximum follow-up frequency of the speed loop must be 3 to 5 times higher than that of the position loop.
$$3 \leqslant \frac{2\times\pi\times H08.00}{H08.02} \leqslant 5$$
For example, when H08.00 is set to 40.0 Hz, H08.02 must meet the following requirement:
50.2 Hz $\leqslant$ H08.02 $\leqslant$ 83.7 Hz
Adjust the setting based on the positioning time.
Increasing the setpoint shortens the positioning time and improves the anti-interference capacity of a motor at standstill.
An excessively high setpoint may easily lead to system instability and oscillation.</td></tr>
</table>

Step	Param.	Parameter Name	Description
4	H07.05	Torque reference filter time constant	Function: Eliminates the high-frequency noise and suppresses mechanical resonance.  Note: Ensure the cutoff frequency of the torque reference low-pass filter is 4 times higher than the maximum follow-up frequency of the speed loop, as shown in the following formula: $\frac{1000}{2\times\pi\times H07.05} \geqslant (H08.00)\times 4$ For example, when H08.00 is set to 40.0 Hz, the setpoint of H07.05 must be lower than or equal to 1.00 ms. If vibration occurs after H08.00 is increased, adjust H07.05 to suppress the vibration. For details, see *"Vibration suppression" on page 118*. An excessively high setpoint weakens the responsiveness of the current loop. To suppress vibration upon stop, increase the setpoint of H08.00 and decrease the setpoint of H07.05. If strong vibration occurs upon stop, decrease the setpoint of H07.05.

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H07.05	2007-06h	Torque reference filter time constant	0.00ms to 30.00ms	0.50	ms	Real-time	*"H07_en.05" on page 225*
H08.00	2008-01h	Speed loop gain	0.1Hz to 2000.0Hz	40.0	Hz	Real-time	*"H08_en.00" on page 234*
H08.01	2008-02h	Speed loop integral time constant	0.15ms to 512.00ms	19.89	ms	Real-time	*"H08_en.01" on page 234*
H08.02	2008-03h	Position loop gain	0.0Hz to 2000.0Hz	64.0	Hz	Real-time	*"H08_en.02" on page 234*

3.4.2 Gain Switchover

Gain switchover, which is active in the position control and speed control modes only, It is only effective in position and speed control modes. achieve the following purposes:

- Switching to the lower gain when the motor is at a standstill (servo ON) to suppress vibration
- Switching to the higher gain when the motor is at a standstill to shorten the positioning time
- Switching to the higher gain during operation of the motor to achieve better reference tracking performance
- Switching between different gain settings through an external signal to fit different conditions of the load devices

H08.08 = 0

When H08.08 is set to 0, the 1st gain (H08.00 to H08.02 and H07.05) is used, but you can switch between proportional control and proportional integral control through FunIN.3 (GAIN_SEL, gain switchover) for the speed loop.

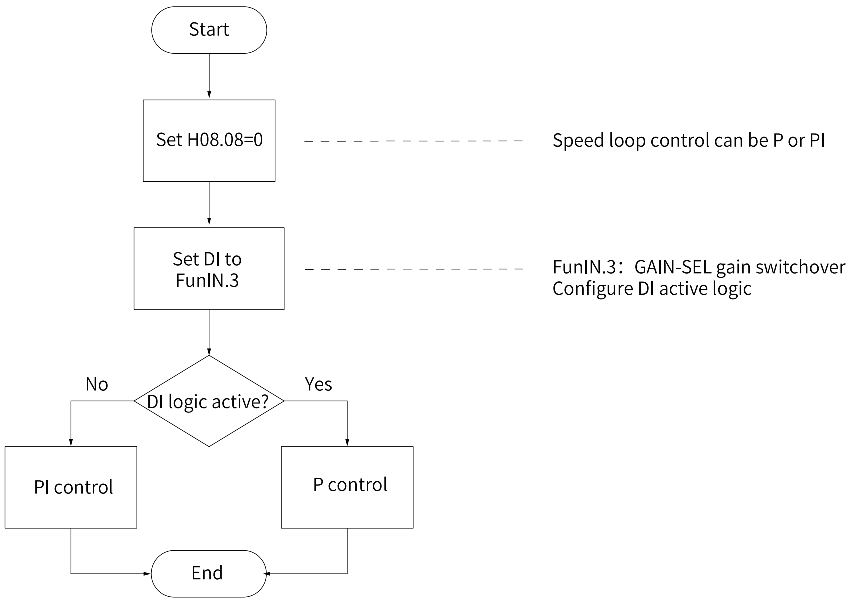


Figure 3-8 Gain switchover flowchart when H08.08 is set to 0

H08.08 = 1

You can switch between the 1st gain set (H08.00...H08.02, H07.05) and 2nd gain set (H08.03...H08.05, H07.06) based on the condition defined by H08.09.

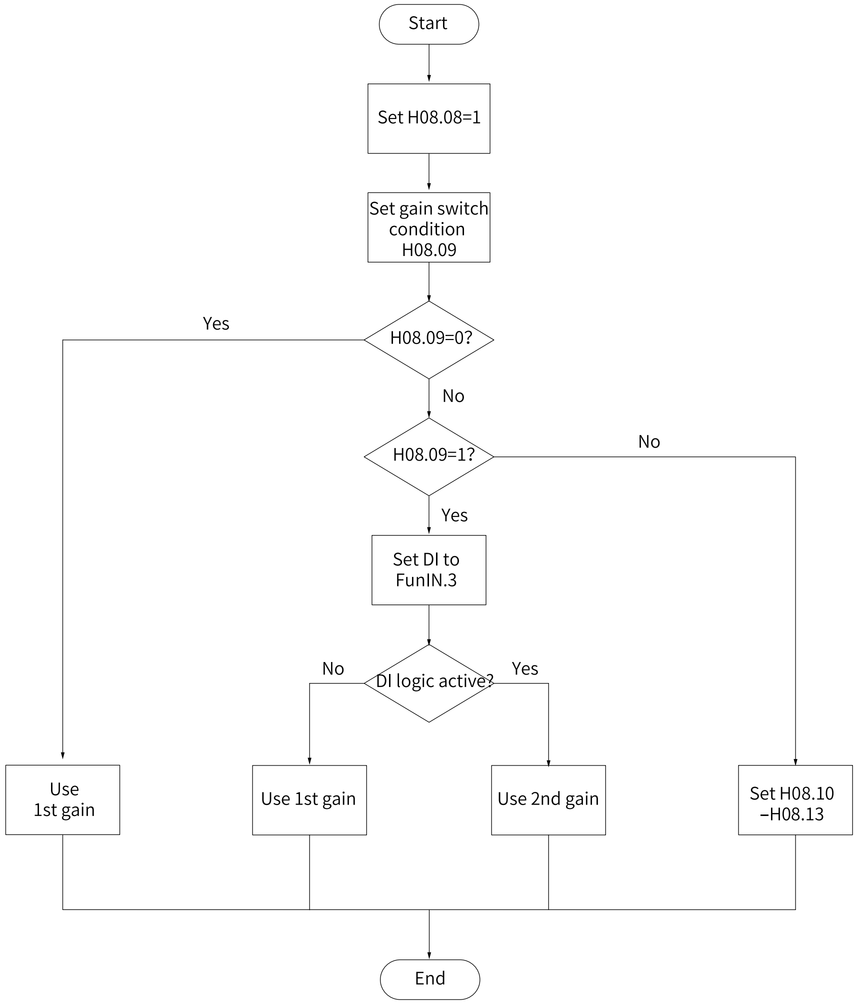
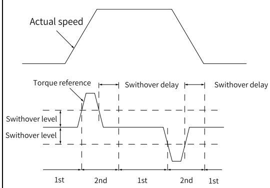
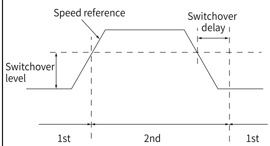
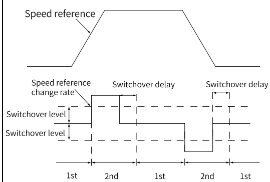
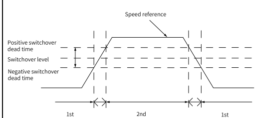
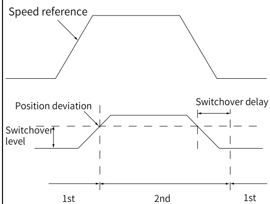
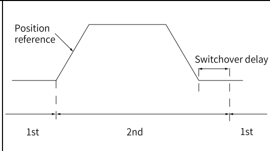
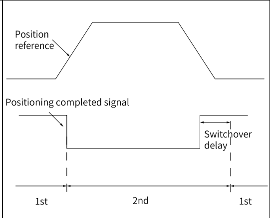
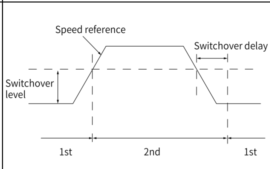


Figure 3-9 Gain switchover flowchart when H08.08 is set to 1

Table 3-8 shows diagrams and parameters for 11 kinds of gain switchover conditions. The following table describes the diagrams and related parameters of different conditions.

Table 3–8 Conditions for gain switchover

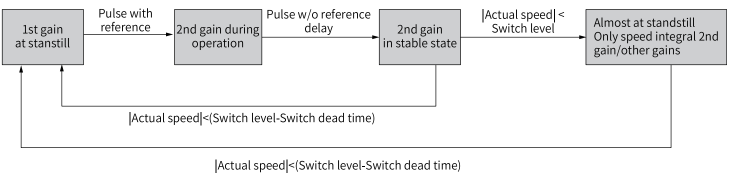
Gain Switchover Condition			Related Parameters		
H08.09	Condition	Diagram	Delay Time (H08.10)	Gain switchover level (H08.11)	Switchover Dead Time (H08.12)
0	Fixed to the 1st gain set	-	Inactive	Inactive	Inactive
1	External DI signal	-	Inactive	Inactive	Inactive
2	Torque reference		Active	Active (%)	Active (%)
3	Speed reference		Active	Active	Active
4	Speed reference change rate		Active	Active (10 rpm/s)	Active (10 rpm/s)
5	Speed reference high/ low-speed threshold		Inactive	Active (rpm)	Active (rpm)
6	Position deviation		Active	Active (encoder unit)	Active (encoder unit)

Gain Switchover Condition			Related Parameters		
H08.09	Condition	Diagram	Delay Time (H08.10)	Gain switchover level (H08.11)	Switchover Dead Time (H08.12)
7	Position reference		Active	Inactive	Inactive
8	Positioning uncompleted		Active	Inactive	Inactive
9	Actual speed		Active	Active (rpm)	Active (rpm)
10	Position reference + Actual speed	See the following note for details.	Active	Active (rpm)	Active (rpm)

Caution

H08.10 (Gain switchover delay) is valid only during switching to the 1st gain set.

Note



☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H08.02	2008-03h	Position loop gain	0.0Hz to 2000.0Hz	64.0	Hz	Real-time	" H08_en.02" on page 234
H08.09	2008-0Ah	Gain switchover condition	0: Fixed to the 1st gain set (PS) 1: Switch with external DI (PS) 2: Torque reference too large (PS) 3: Speed reference too large (PS) 4: Speed reference change rate too large (PS) 5: Speed reference low/high speed threshold (PS) 6: Position deviation too large (P) 7: Position reference available (P) 8: Positioning unfinished (P) 9: Actual speed (P) 10: Position reference + Actual speed (P)	0	-	Real-time	" H08_en.09" on page 236
H08.10	2008-0Bh	Gain switchover delay	0.0 ms to 1000.0 ms	5.0	ms	At stop	" H08_en.10" on page 238
H08.11	2008-0Ch	Gain switchover level	0 to 20000	50	-	Real-time	" H08_en.11" on page 238
H08.12	2008-0Dh	Gain switchover hysteresis	0 to 20000	30	-	At stop	" H08_en.12" on page 239
H08.13	2008-0Eh	Position gain switchover time	0.0 ms to 1000.0 ms	3.0	ms	At stop	" H08_en.13" on page 239

3.4.3 Comparison of Filters

Parameter Name	Function	Applicable Occasion	Impact of Excessive Filtering
Pulse input pin filter	Prevents interference to ensure the number of pulses received by the servo drive is accurate.	The system wiring does not comply with specifications. The ambient interference is strong.	The number of pulses received by the servo drive is smaller than those sent by the host controller.
Position reference filter	Filters the position references (encoder unit) divided or multiplied by the electronic gear ratio to smoothen the operation process of the motor and reduce shock to the machine.	The acceleration/ deceleration process is not performed on the position references sent from the host controller. The pulse reference frequency is low. The electronic gear ratio is larger than 10.	The response delay is prolonged.

3.4.4 Feedforward gain

Speed feedforward

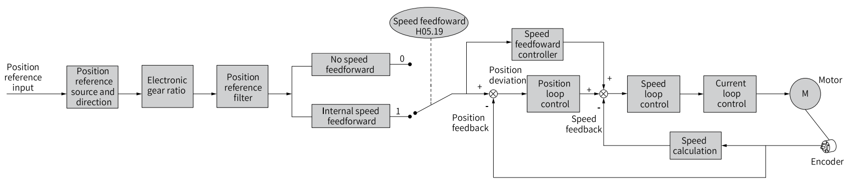


Figure 3-10 Operating procedure for speed feedforward control

Speed feedforward can be applied to the position control mode. The speed feedforward function can be used to improve the speed reference responsiveness and reduce the position deviation at fixed speed.

Operating procedure for speed feedforward:

1. Set the speed feedforward signal source.
   Set H05.19 (Speed feedforward control) to a non-zero value to enable the speed feedforward function. The corresponding signal source will be selected as well.

Param.	Parameter Name	Value	Remarks
H05.19	Speed feedforward control	0: No speed feedforward	-
		1: Internal speed feedforward	Defines the speed corresponding to the position reference (encoder unit) as the speed feedforward signal source.

2. Set speed feedforward parameters.

   Set the speed feedforward gain (H08.19) and speed feedforward filter time constant (H08.18).

   ☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H08.18	2008-13h	Time constant of speed feedforward filter	0.00ms to 64.00ms	0.50	ms	Real-time	*" H08_en.18" on page 241*
H08.19	2008-14h	Speed feedforward gain	0.0% to 100.0%	0.0	%	Real-time	*" H08_en.19" on page 241*

Torque feedforward

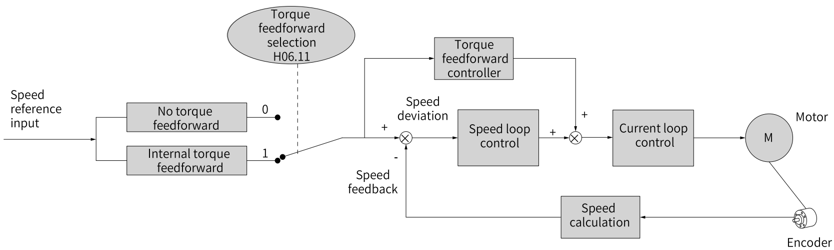


Figure 3-11 Operation diagram of torque feedforward control

In the position control mode, torque feedforward can be used to improve torque reference responsiveness and reduce the position deviation during operation at constant acceleration/deceleration rate.

In the speed control mode, torque feedforward can be used to improve speed reference responsiveness and reduce the speed deviation during operation at constant speed.

The procedure for setting torque feedforward is as follows:

1. Set the torque feedforward signal source.

Set H06.11 (Torque feedforward control) to 1 to enable the torque feedforward function. The corresponding signal source will be selected as well.

Param.	Parameter Name	Value	Remarks
H06.11	Torque feedforward control	0: No torque feedforward	-
		1: Internal torque feedforward	Use the speed reference as the source of the torque feedforward signal. In the position control mode, the speed reference is outputted from the position controller.

2. Set torque feedforward parameters.

Param.	Parameter Name	Description
H08.20	Torque feedforward filter time constant	Function: • Increasing the value of H08.21 improves the response but may cause overshoot during acceleration/deceleration. • Decreasing the value of H08.20 suppresses overshoot during acceleration/deceleration. Increasing the value of H08.20 suppresses the noise. Note: • Keep H08.20 to the default value, and then gradually increase the setpoint of H08.21 from 0 to a certain value at which torque feedforward achieves the required effect. • Adjust H08.20 and H08.21 repeatedly until a balanced performance is achieved.
H08.21	Torque feedforward gain	See this section for details.

3.4.5 PDFF Control

The pseudo derivative feedback and feedforward (PDFF) control can be used to adjust speed loop control in the non-torque control mode.

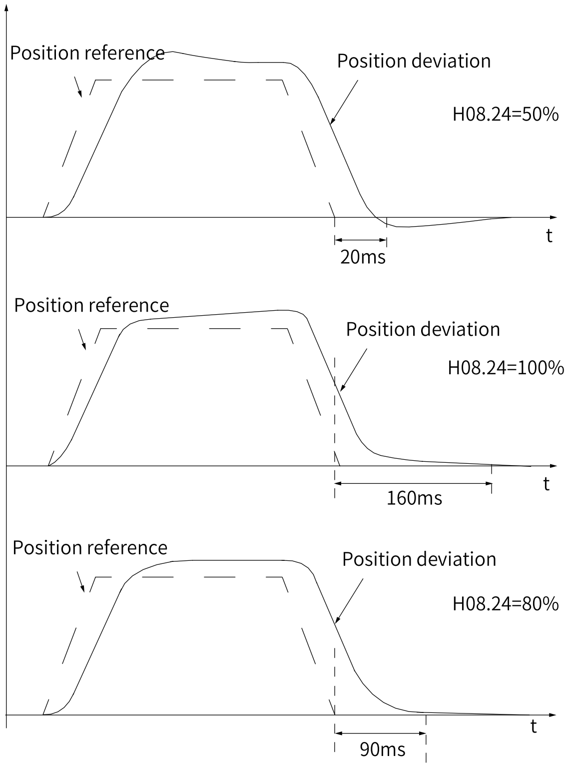


Figure 3-12 Example of PDFF control

Through adjusting the speed loop control method, PDFF control enhances the anti-disturbance capacity of the speed loop and improves the performance in following the speed references.

Param.	Parameter Name	Description
H08.24	PDFF control coefficient	Function: • Defines the control method of the speed loop in the non-torque control modes. Note: • Setting H08.24 to an excessively low value slows down the responsiveness of the speed loop. • When the speed feedback overshoots, gradually decrease the setpoint of H08.24 from 100.0 to a certain value at which the PDFF control achieves the desired effect. • When H08.24 is set to 100.0, the speed loop control method does not change and the default proportional integral control is used.

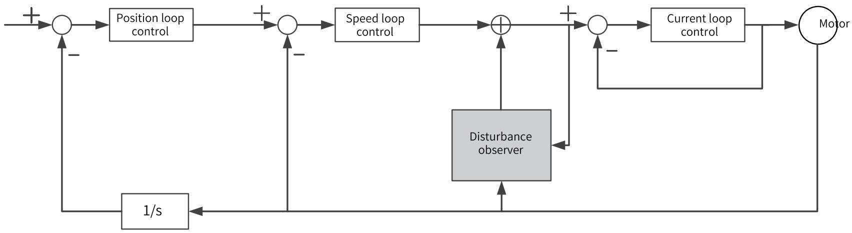
3.4.6 Torque disturbance observer

This function is intended to be used in the non-torque control modes.

Disturbance observer 1

The disturbance observer is used to observe external disturbance. You can set different cutoff frequencies and compensation values to observe and suppress the disturbance within the frequency range.

The following figure depicts the control block diagram for disturbance observer 1.



Note

1/s: Integral element

Param.	Parameter Name	Description
H08.31	Disturbance observer cutoff frequency	The higher the cutoff frequency, the more easily will vibration occur.
H08.32	Disturbance observer compensation coefficient	Defines the compensation percentage for the observer.
H08.33	Disturbance observer inertia correction	H08.33 needs to be changed only when the inertia ratio does not reflect the actual condition. The acting inertia is the product of the set inertia and H08.33. It is recommended to use the default value of H08.33.

☆Related parameters

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H08.31	2008-20h	Disturbance observer cutoff frequency	1Hz to 1700Hz	600	Hz	Real-time	" H08_en.31" on page 245
H08.32	2008-21h	Disturbance observer compensation coefficient	0% to 100%	0	%	Real-time	" H08_en.32" on page 245
H08.33	2008-22h	Disturbance inertia correction coefficient	1% to 10000%	100	%	Real-time	" H08_en.33" on page 245

Disturbance observer 2

The following figure depicts the control block diagram for disturbance observer 2.

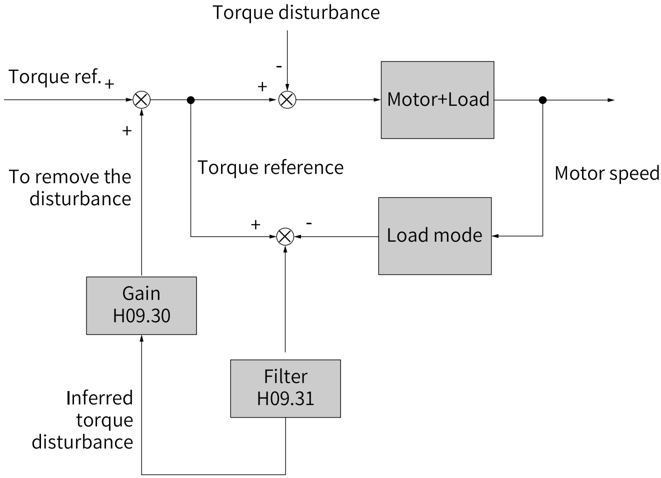


Figure 3-13 Block diagram for disturbance observation

The disturbance observer detects and estimates the external disturbance torque suffered by the system and compensates the torque reference accordingly, reducing the effect of external disturbance on the servo system and suppressing vibration.

<table>
<tr><th>Param.</th><th>Parameter Name</th><th>Description</th></tr>
<tr><td>H09.30</td><td>Torque disturbance compensation gain</td><td rowspan="2">Function:
• Increasing the value of H09.30 improves disturbance suppression but increases the noise.
• Increasing the value of H09.31 reduces the noise. Decreasing the value of H09.31 allows detection and estimation of the external disturbance torque featuring short delay, which improves the disturbance suppression capacity but increases the noise.
Note:
• Set H09.31 to a large value first and then gradually increase the value of H09.30 from 0 to a certain value at which the desired performance is achieved. Finally, decrease the value of H09.31 gradually without affect the effectiveness of the disturbance observer.
• Adjust H09.30 and H09.31 repeatedly until a balanced performance is achieved.</td></tr>
<tr><td>H09.31</td><td>Filter time constant of torque disturbance observer</td></tr>
</table>

☆ Related parameters:

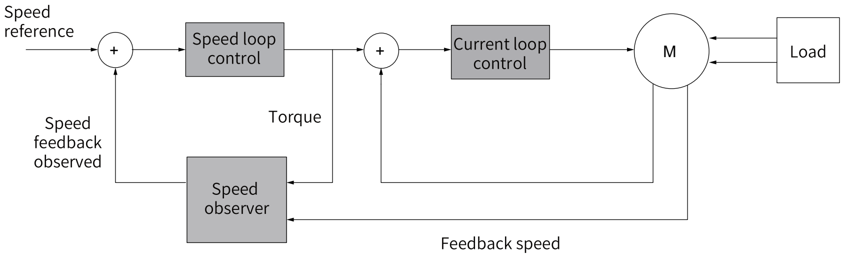
Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H08.18	2008-13h	Time constant of speed feedforward filter	0.00ms to 64.00ms	0.50	ms	Real-time	" H08_en.18" on page 241
H08.19	2008-14h	Speed feedforward gain	0.0% to 100.0%	0.0	%	Real-time	" H08_en.19" on page 241
H08.20	2008-15h	Torque feedforward filter time constant	0.00ms to 64.00ms	0.50	ms	Real-time	" H08_en.20" on page 242
H08.21	2008-16h	Torque feedforward gain	0.0% to 200.0%	0.0	%	Real-time	" H08_en.21" on page 242
H08.24	2008-19h	PDFF control coefficient	0.0% to 1000.0%	100.0	%	Real-time	" H08_en.24" on page 243

3.4.7 Speed Observer

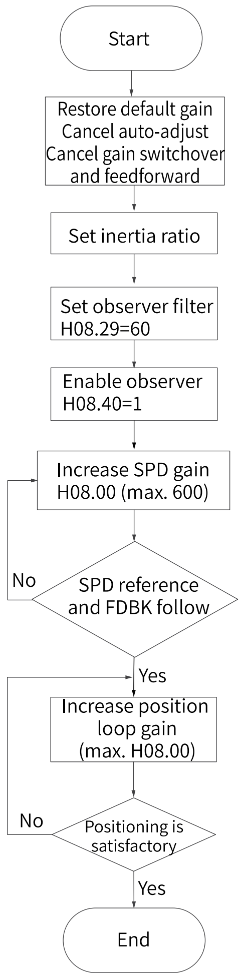
The speed observer, which facilitates quick positioning, applies in applications with slight load characteristic change and constant inertia.

It improves the responsiveness and filters high frequencies automatically, improving the gains and shortening the positioning time without incurring high-frequency vibration.

The block diagram for the speed observer is as follows.



Commissioning Steps



Related parameters

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H08.00	2008-01h	Speed loop gain	0.1Hz to 2000.0Hz	40.0	Hz	Real-time	" H08_en.00" on page 234
H08.27	2008-1Ch	Cutoff frequency of speed observer	10Hz to 2000Hz	170	Hz	Real-time	" H08_en.27" on page 244
H08.28	2008-1Dh	Speed inertia correction coefficient	10% to 10000%	100	%	Real-time	" H08_en.28" on page 244
H08.29	2008-1Eh	Speed observer filter time	0.02ms to 20.00ms	0.80	ms	Real-time	" H08_en.29" on page 244
H08.40	2008-29h	Speed observer selection	0 to 1	0	-	At stop	" H08_en.40" on page 247

3.4.8 Model Tracking

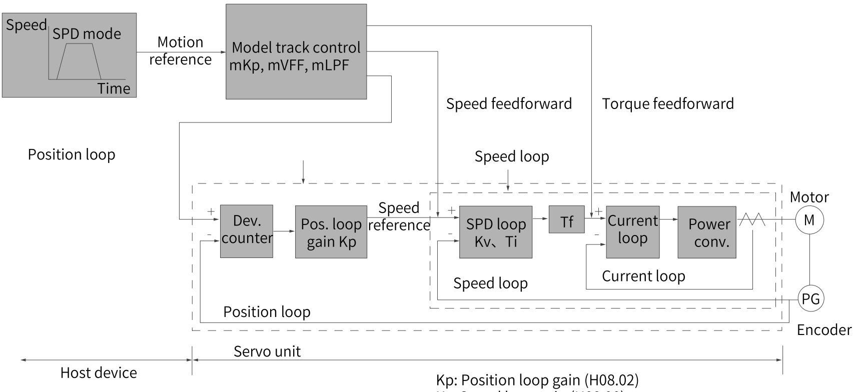
The model tracking control, which is only available in the position control mode, can be used to improve responsiveness and shorten the positioning time. It is only available in the position control mode.

Parameters used by model tracking are normally set automatically through ITune or ETune along with the gain parameters.

However, manual tuning is needed in the following situations:

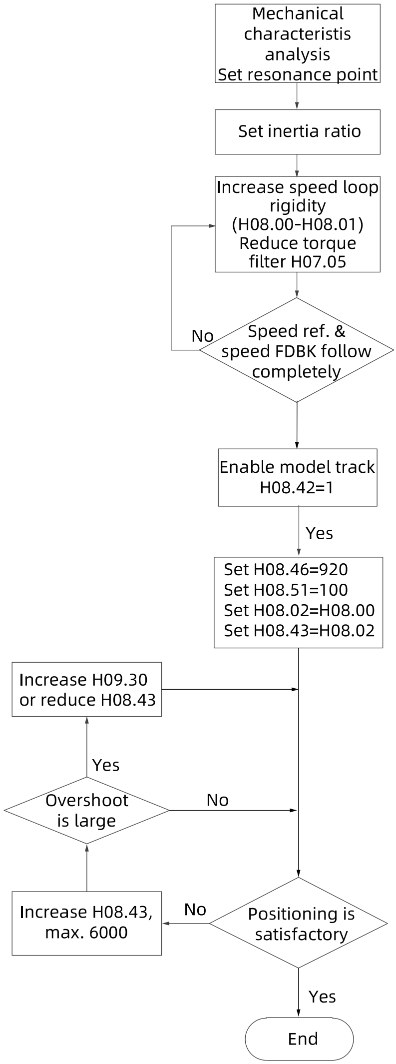
- The auto-tuned values cannot deliver desired performance.
- Improving the responsiveness takes priority over the auto-tuned or customized values.
- User-defined gain parameters or model tracking control parameters are needed.

The block diagram for model tracking control is as follows.



Kp: Position loop gain (H08.02)
Kv: Speed loop gain (H08.00)
Ti: Speed loop integral time constant (H08.01)
Tf: Torque reference filter time constant (H07.05)
mKp: Model track control gain (H08.43)
mVFF: Model track control SPD FDFWD compensation (H08.46)
mLPF: Model filter time

Commissioning Steps



Related parameters

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H07.05	2007-06h	Torque reference filter time constant	0.00ms to 30.00ms	0.50	ms	Real-time	*" H07_en.05" on page 225*
H08.00	2008-01h	Speed loop gain	0.1Hz to 2000.0Hz	40.0	Hz	Real-time	*" H08_en.00" on page 234*
H08.01	2008-02h	Speed loop integral time constant	0.15ms to 512.00ms	19.89	ms	Real-time	*" H08_en.01" on page 234*
H08.02	2008-03h	Position loop gain	0.0Hz to 2000.0Hz	64.0	Hz	Real-time	*" H08_en.02" on page 234*
H08.42	2008-2Bh	Model control selection	0 to 1	0	-	At stop	*" H08_en.42" on page 247*
H08.43	2008-2Ch	Model gain	0.0 to 2000.0	40.0	-	Real-time	*" H08_en.43" on page 248*
H08.46	2008-2Fh	Model feedforward	0.0 to 102.4	95.0	-	Real-time	*" H08_en.46" on page 248*
H08.51	2008-34h	Model filter time 2	0.00ms to 20.00ms	0.00	ms	Real-time	*" H08_en.51" on page 249*

3.4.9 Friction Compensation

Friction compensation is used to reduce the impact of the friction on the operating effect during mechanical transmission. Use different positive/negative compensation values according to the direction of operation.

Note

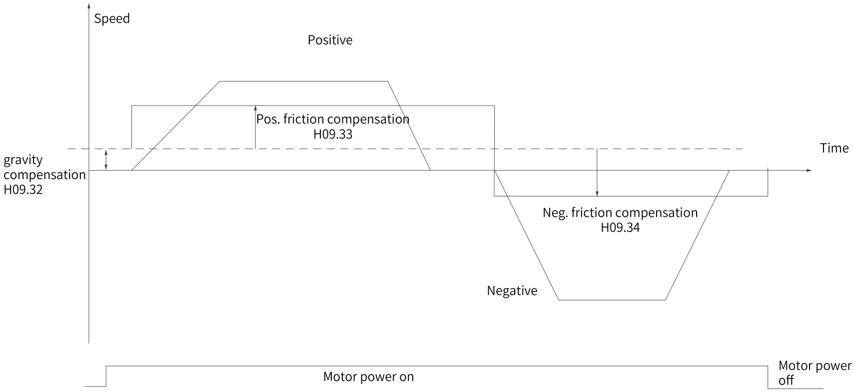
Friction compensation is effective only in the position mode.

☆Related parameters

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H09.32	2009-21h	Gravity compensation value	-100.0 to 100.0	0.0	-	Real-time	*" H09_en.32" on page 262*
H09.33	2009-22h	Positive friction compensation	-100.0% to 100.0%	0.0	%	Real-time	*" H09_en.33" on page 262*
H09.34	2009-23h	Negative friction compensation	-100.0% to 100.0%	0.0	%	Real-time	*" H09_en.34" on page 262*

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H09.35	2009-24h	Friction compensation speed threshold	0.1 RPM to 30.0 RPM	2.0	RPM	Real-time	" H09_en.35" on page 263
H09.36	2009-25h	Friction compensation speed	0: Speed reference 1: Model tracking speed 2: Speed feedback	0	-	Real-time	" H09_en.36" on page 263

The diagram for friction compensation is as follows.



Note

Note: When the speed is less than the speed threshold, static friction applies. When the speed exceeds the speed threshold, dynamic friction applies. The compensation direction is determined by the direction of the actual position reference. Forward direction requires positive compensation value. Reverse direction requires negative compensation value.

3.5 Parameter Adjustment in Different Control Modes

Perform parameter adjustment in the sequence of "Inertia auto-tuning" => "Gain auto-tuning => "Manual gain tuning" in all the control modes.

3.5.1 Parameter Adjustment in the Position Control Mode

Obtain the value of H08.15 (Load inertia ratio) through inertia auto-tuning.

2) Perform gain adjustment.

- 1st gain set:

Param.	Parameter Name	Function	Default
H07.05	Torque reference filter time constant	Defines the torque reference filter time constant.	0.79ms
H08.00	Speed loop gain	Defines the speed loop proportional gain.	40.0Hz
H08.01	Speed loop integral time constant	Defines the integral time constant of the speed loop.	19.89ms
H08.02	Position loop gain	Defines the position loop proportional gain.	64.0Hz

- 2nd gain set:

Param.	Parameter Name	Function	Default
H07.06	2nd torque reference filter time constant	Defines the torque reference filter time constant.	0.79ms
H08.03	2nd speed loop gain	Defines the speed loop proportional gain.	40.0Hz
H08.04	2nd speed loop integral time constant	Defines the integral time constant of the speed loop.	20.00ms
H08.05	2nd position loop gain	Defines the position loop proportional gain.	64.0Hz
H08.08	2nd gain mode setting	Defines the mode of the 2nd gain set.	1
H08.09	Gain switchover condition	Defines the gain switchover condition.	0
H08.10	Gain switchover delay	Defines the gain switchover delay.	5.0ms
H08.11	Gain switchover level	Defines the gain switchover level.	50
H08.12	Gain switchover hysteresis	Defines the dead time of gain switchover.	30
H08.13	Position gain switchover time	Defines the position loop gain switchover time.	3.0ms

- Common gain set

Param.	Parameter Name	Function	Default
H08.18	Time constant of speed feedforward filter	Defines the filter time constant of the speed feedforward signal.	0.50ms
H08.19	Speed feedforward gain	Defines the speed feedforward gain.	0.0%

Param.	Parameter Name	Function	Default
H08.20	Torque feedforward filter time constant	Defines the filter time constant of the torque feedforward signal.	0.50ms
H08.21	Torque feedforward gain	Defines the torque feedforward gain.	0.0%
H08.22	Speed feedback filtering option	Defines the speed feedback filtering function.	0
H08.23	Cutoff frequency of speed feedback low-pass filter	Defines the cutoff frequency of the first-order low-pass filter for speed feedback.	4000Hz
H08.24	PDFF control coefficient	Defines the coefficient of the PDFF controller.	100.0%
H09.38	Model torque feedforward differential time	Sets the frequency of low-frequency resonance suppression 1 at the mechanical end.	100.0Hz
H09.39	Speed observer selection	Defines different low-frequency resonance suppression types at the mechanical load.	2

Perform gain auto-tuning to get the initial values of the 1st gain set (or 2nd gain set) and the common gain set.

Fine-tune the following gains manually.

Param.	Parameter Name	Function
H07.05	Torque reference filter time constant	Defines the torque reference filter time constant.
H08.00	Speed loop gain	Defines the speed loop proportional gain.
H08.01	Speed loop integral time constant	Defines the integral time constant of the speed loop.
H08.02	Position loop gain	Defines the position loop proportional gain.
H08.19	Speed feedforward gain	Defines the speed feedforward gain.

3.5.2 Parameter Adjustment in the Speed Control Mode

Parameter adjustment in the speed control mode is the same as that in the position control mode, except for the position loop gain (H08.02 and H08.05). For details, see *"3.5.1 Parameter Adjustment in the Position Control Mode" on page 115*.

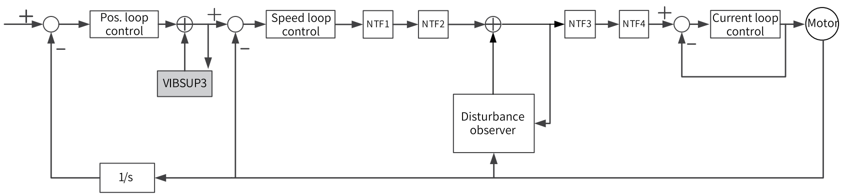
3.5.3 Parameter Adjustment in the Torque Control Mode

Parameter adjustment in the torque control mode are differentiated based on the following conditions:

- If the actual speed reaches the speed limit, the adjustment method is the same as that described in *"3.5.2 Parameter Adjustment in the Speed Control Mode" on page 117*.
- If the actual speed does not reach the speed limit, the adjustment method is the same as that described in *"3.5.2 Parameter Adjustment in the Speed Control Mode" on page 117*, except the position/speed loop gain and speed loop integral time constant.

3.6 Vibration suppression

The block diagram for vibration suppression is as follows.



Where:

- NTF1–4: 1st notch to 4th notch
- VIBSUP3: Suppression of medium- and low-frequency vibration Reduction applied at a carrier frequency lower than 8 K below 300 Hz
- 1/s: Integral element

Note

- jitter suppression phase modulation coefficient: synchronous phase adjustment of the compensation value and vibration. It is recommended to use the default value. Adjustment is needed when the compensation value phase differs greatly from the vibration phase.
- Jitter suppression frequency: Defines the jitter frequency that needs to be suppressed.
- Jitter suppression compensation coefficient: Defines the compensation coefficient for jitter suppression.

3.6.1 Mechanical Resonance Suppression

Resonance frequency is present in the mechanical system. When the gain of the drive increases, resonance may occur near the resonance frequency, disabling further increase of the gain.

Mechanical resonance can be suppressed in the following two methods:

Torque reference filter (H07.05, H07.06)

To suppress the mechanical resonance, set the filter time constant to enable the torque reference to be attenuated in the frequency range above the cutoff frequency.

Filter cutoff frequency fc (Hz) = 1/[2π x H07.05 (ms) x 0.001]

Notch

The notch reduces the gain at certain frequencies to suppress mechanical resonance. After the vibration is suppressed by the notch, you can continue to increase the gain. The operating principle of the notch is shown in the following figure.

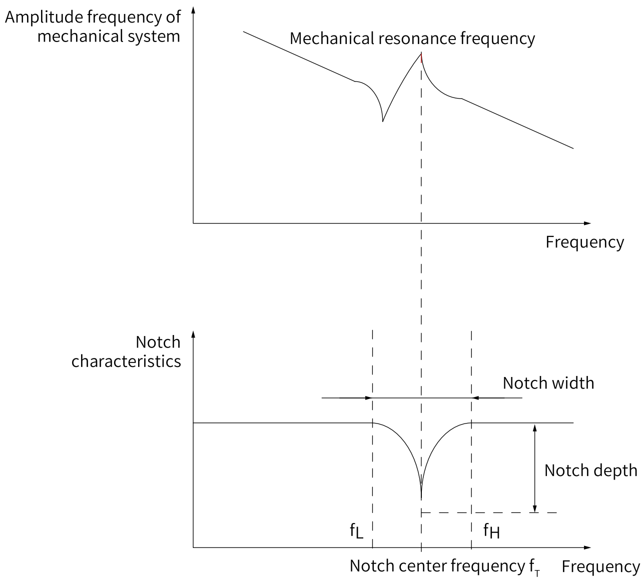


Figure 3-14 Operating principle of the notch

A total of four notches can be used, and each notch is defined by three parameters: frequency, width level, and depth level. The 1st and 2nd notches are manual notches whose parameters needs to be set by the user. Parameters of the 3rd and 4th notches can be either set by the user or set automatically after being configured as an adaptive notch (H09.02 =1 or 2).

Table 3–9 Description of notch parameters

Item	Manual Notch		Manual/Adaptive Notch	
	1st Notch	2nd Notch	3rd Notch	4th Notch
Frequency	H09.12	H09.15	H09.18	H09.21
Width level	H09.13	H09.16	H09.19	H09.22
Depth level	H09.14	H09.17	H09.20	H09.23

Note

- When the frequency is 4000Hz (default), the notch is inactive.
- The adaptive notch is preferred for resonance suppression. The manual notch can be used in cases where the adaptive notch cannot deliver desired performance.

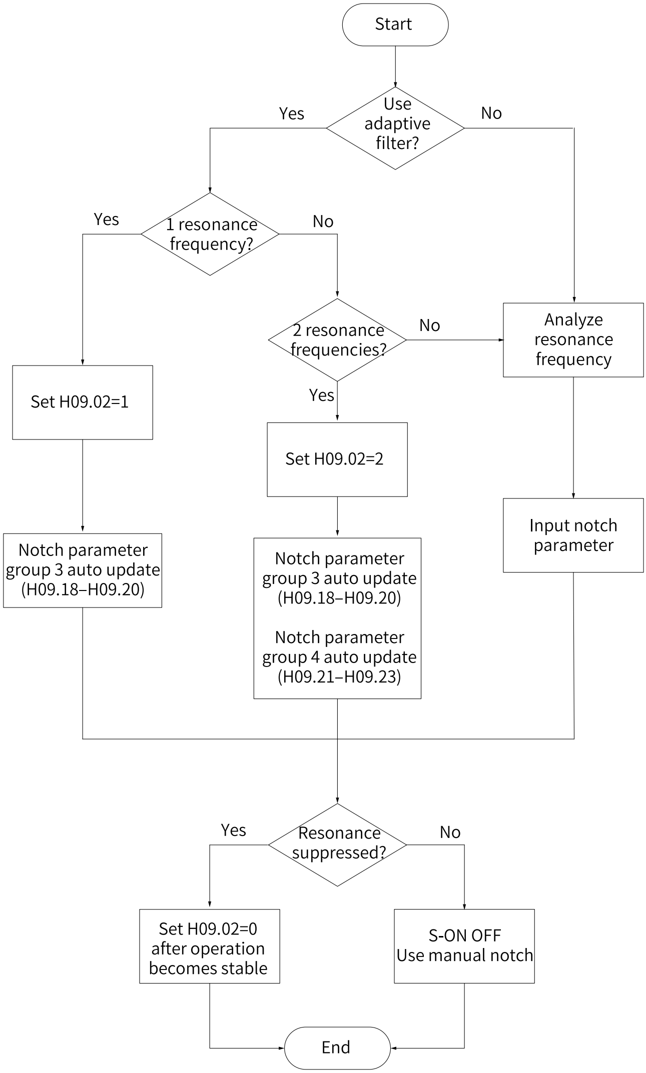


Figure 3-15 Using the notch

- Procedure for setting the adaptive notch:

1. Set H09.02 (Adaptive notch mode) to 1 or 2 based on the number of resonance points.
2. When resonance occurs, set H09.02 to 1 first to enable one adaptive notch. If new resonance occurs after gain adjustment, set H09.02 to 2 to enable two adaptive notches.

3. Parameters of the 3rd or 4th notches are updated automatically during operation, and parameter values are saved automatically to the corresponding parameters in group H09 every 30 min.
4. If resonance is suppressed, the adaptive notch works. After the servo drive runs stably for a period of time, set H09.02 to 0 and the parameters of the adaptive notch are fixed to the last updated values.

   This is to prevent notch parameters from being updated to wrong values due to misoperation. Wrong values will intensity resonance.
5. If resonance persists after the notch is working for a period of time, switch off the S-ON signal.
6. If there are more than two resonance frequencies, the problem cannot be solved by only using the adaptive notches. In this case, add a manual notch, Additionally use the manual notch, or use all the four notches as manual ones (H09.02 = 0).

Note

- When adaptive notch is applied, if the S-OFF signal is activated within 30 min, the notch parameters will not be saved to the corresponding parameter
- When the resonance frequency is below 300 Hz, the suppression effect of the adaptive notch may be degraded.

- Procedure for setting the manual notch:

1. Analyze the resonance frequency.
2. When using the manual notch, set the notch frequency to same value as the actual resonance frequency obtained in the following ways: The resonance frequency can be obtained by using the following methods:
   - Use the "Mechanical characteristic analysis" function in Inovance software tool.
   - Calculate the resonance frequency based on the motor phase current displayed on the oscilloscope interface of the software tool.
   - Set H09.02 (Adaptive notch mode) to 3. The drive detects the resonance frequency and saves the detected value to H09.24 automatically during operation.
3. Input the resonance frequency obtained in step 1 to the parameter of the selected notch, and input the width level and depth level of this notch.
4. If resonance has been suppressed, it indicates the notch functions well and you can continue adjusting the gain. If resonance occurs again, repeat steps 1 and 2.
5. If resonance persists after the notch is working for a period of time, switch off the S-ON signal.

- Notch width level
  The width level indicates the ratio of the notch width to the center frequency of the notch.

$$\text{Notch width level} = \frac{f_H - f_L}{f_T}$$

Figure 3-16

Where:

f_T: center frequency of the notch, which is also the mechanical resonance frequency

$f_H - f_L$ is the notch width, that is, the frequency bandwidth with an amplitude attenuation rate of –3 dB relative to the notch central frequency.

The following figure shows the correspondence. Use the default value 2 in normal cases.

- Depth level of the notch
  The notch depth level indicates the ratio of the input to the output at the center frequency.

  When the depth level is 0, the input is completely suppressed at the center frequency. When the depth level is 100, the input can be fully passed at the center frequency. Therefore, the lower the depth level is, the higher the notch depth is, and the stronger the suppression effect will be. Note that an excessively low depth level may lead to system oscillation.

Note

If the amplitude frequency characteristic curve obtained through the mechanical analysis function does not have obvious peak, it indicates that vibration occurs actually. Such vibration may not be mechanical resonance, and cannot be suppressed by the notch. It occurs because the gain reaches the limit, and can be suppressed only by reducing the gain or the filter time of torque reference.

The following figure shows the frequency characteristics of the notch.

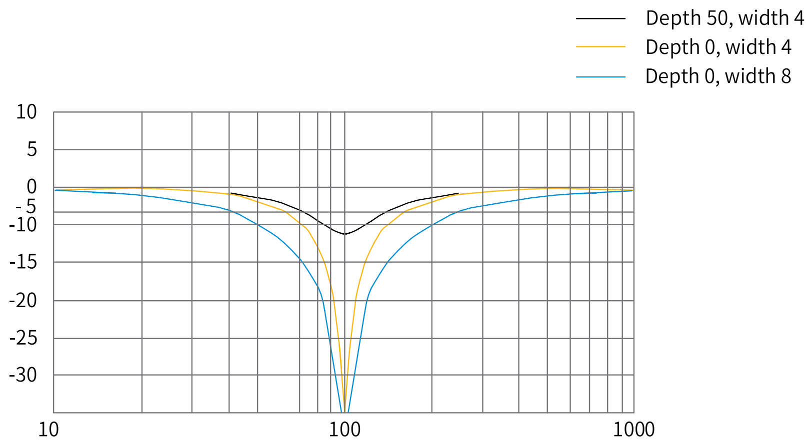


Figure 3-17 Notch frequency characteristics

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H09.02	2009-03h	Adaptive notch mode	0: Adaptive notch no longer updated; 1: One adaptive notch activated (3rd notch) 2: Two adaptive notches activated (3rd and 4th notches) 3: Resonance point tested only (displayed in H09.24) 4: Adaptive notch cleared, values of 3rd and 4th notches restored to default	0	-	Real-time	*" H09_en.02" on page 254*
H09.12	2009-0Dh	Frequency of the 1st notch	50Hz to 4000Hz	4000	Hz	Real-time	*" H09_en.12" on page 258*
H09.13	2009-0Eh	Width level of the 1st notch	0 to 40	2	-	Real-time	*" H09_en.13" on page 258*
H09.14	2009-0Fh	Depth level of the 1st notch	0 to 99	0	-	Real-time	*" H09_en.14" on page 258*
H09.15	2009-10h	Frequency of the 2nd notch	50Hz to 4000Hz	4000	Hz	Real-time	*" H09_en.15" on page 259*
H09.16	2009-11h	Width level of the 2nd notch	0 to 20	2	-	Real-time	*" H09_en.16" on page 259*
H09.17	2009-12h	Depth level of the 2nd notch	0 to 99	0	-	Real-time	*" H09_en.17" on page 259*
H09.18	2009-13h	Frequency of the 3rd notch	50Hz to 4000Hz	4000	Hz	Real-time	*" H09_en.18" on page 259*

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H09.19	2009-14h	Width level of the 3rd notch	0 to 20	2	-	Real-time	" H09_en.19" on page 260
H09.20	2009-15h	Depth level of the 3rd notch	0 to 99	0	-	Real-time	" H09_en.20" on page 260
H09.21	2009-16h	Frequency of the 4th notch	50Hz to 4000Hz	4000	Hz	Real-time	" H09_en.21" on page 260
H09.22	2009-17h	Width level of the 4th notch	0 to 20	2	-	Real-time	" H09_en.22" on page 261
H09.23	2009-18h	Depth level of the 4th notch	0 to 99	0	-	Real-time	" H09_en.23" on page 261
H09.24	2009-19h	Auto-tuned resonance frequency	0 to 2000	0	-	Unchangeable	" H09_en.24" on page 261

3.6.2 Low-Frequency Resonance Suppression at the Mechanical End

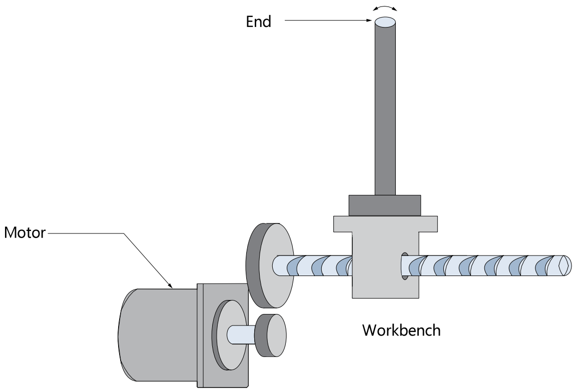


Figure 3-18 Low-frequency vibration at the mechanical end

If the mechanical load end is long and heavy, vibration may easily occur in this part during emergency stop, affecting the positioning effect. Such vibration is called low-frequency resonance as its frequency is generally within 100 Hz, which is lower than the mechanical resonance frequency mentioned in *"3.6.1 Mechanical Resonance Suppression" on page 119*. Use the low-frequency resonance suppression function to reduce such vibration.

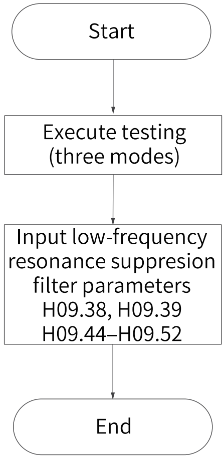


Figure 3-19 Procedure for setting low-frequency resonance suppression filter

First, use the oscilloscope function in the software tool to collect the position deviation waveform of the motor in the positioning state. Then calculate the position deviation fluctuation frequency, which is the low-frequency resonance frequency. Finally, input the value of H09.38 manually and use the default value of H09.39. Observe the resonance suppression effect after using the low-frequency resonance suppression filter.

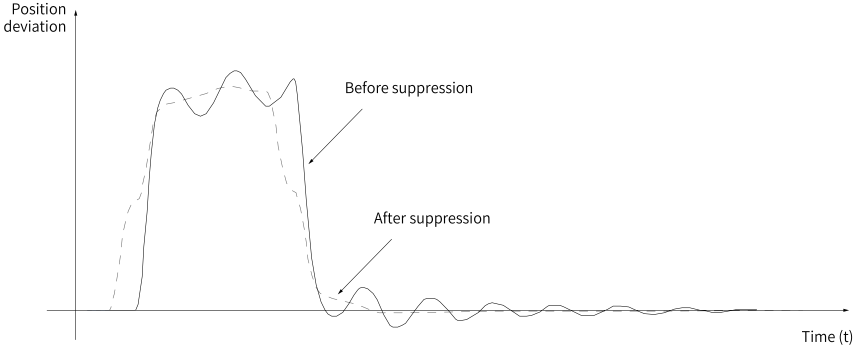


Figure 3-20 Low-frequency resonance suppression effect

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H09.38	2009-27h	Low-frequency resonance suppression frequency at the mechanical end	1.0Hz to 100.0Hz	100.0	Hz	At stop	" H09_en.38" on page 263
H09.39	2009-28h	Low-frequency resonance suppression at the mechanical end	0 to 3	2	-	At stop	" H09_en.39" on page 264
H09.44	2009-2Dh	Frequency of low-frequency resonance suppression 1 at mechanical load end	0.0Hz to 200.0Hz	0.0	Hz	Real-time	" H09_en.44" on page 265
H09.45	2009-2Eh	Responsiveness of low-frequency resonance suppression 1 at mechanical load end	0.01 to 10.00	1.00	-	Real-time	" H09_en.45" on page 265
H09.47	2009-30h	Width of low-frequency resonance suppression 1 at mechanical load end	0.00 to 2.00	1.00	-	Real-time	" H09_en.47" on page 265
H09.49	2009-32h	Frequency of low-frequency resonance suppression 2 at mechanical load end	0.0Hz to 200.0Hz	0.0	Hz	Real-time	" H09_en.49" on page 265

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H09.50	2009-33h	Responsiveness of low-frequency resonance suppression 2 at mechanical load end	0.01 to 10.00	1.00	-	Real-time	*" H09_en.50" on page 266*
H09.52	2009-35h	Width of low-frequency resonance suppression 2 at mechanical load end	0.00 to 2.00	1.00	-	Real-time	*" H09_en.52" on page 266*

3.7 Mechanical Characteristic Analysis

Overview

Mechanical characteristic analysis is used to determine the mechanical resonance point and system bandwidth. Up to 8 kHz response characteristic analysis is available and three modes including mechanical characteristics, speed open loop, and speed closed loop are supported.

Steps

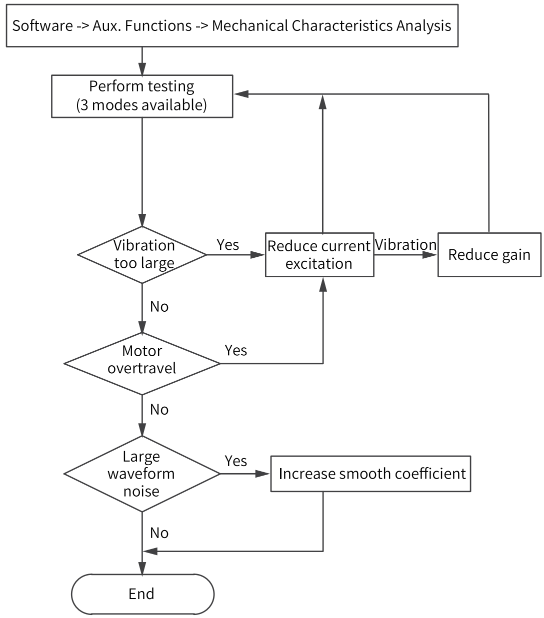


Figure 3-21 Operating procedure for mechanical characteristic analysis

Note

- To avoid large vibration during the test, set the current excitation to 10% during initial execution.
- The analysis waveform may be distorted if the current excitation is too low.
- If the vibration generated during test cannot be suppressed after reducing the current excitation, the possible causes and solutions may be: 1) The gain is too high, reduce the speed gain or set the notch based on the auto-tuned resonance point. 2) The set inertia is too high, set the correct inertia.
- After setting the notch, the waveform under mechanical characteristic test mode is the same with that before the setting, but the speed closed loop and speed open loop modes will be attenuated.

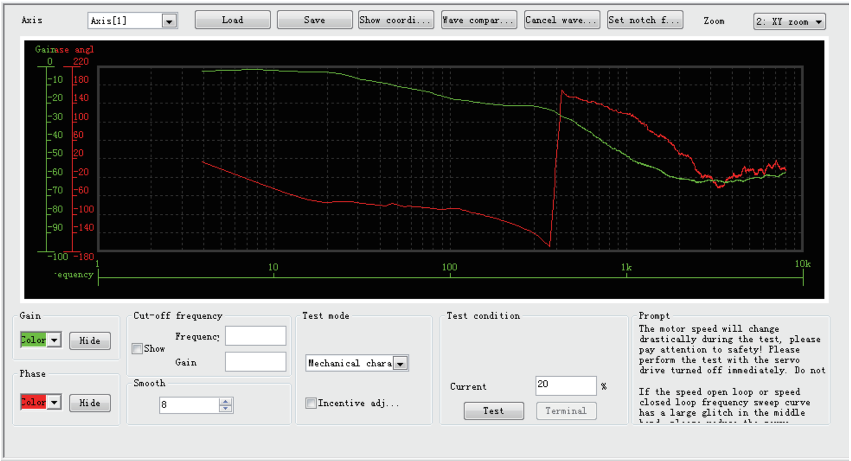


Figure 3-22 Example of the waveform obtained

An example of the waveform obtained with the mechanical characteristic analysis is shown in *"Figure 3–21 Example of the waveform obtained" on page 130*.

4 Description of Parameters

4.1 H00 Servo Motor Parameters

H00.00 Motor code

Hexadecimal:	2000-01h	Effective Time:	Upon the next power-on
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	14101	Change:	At stop

Value Range:

0–65535

Description

14000: Inovance 20-bit incremental encoder motor

14101: Inovance 23-bit absolute encoder motor

H00.02 Customized No.

Hexadecimal:	2000-03h	Effective Time:	-
Min.:	0.00	Unit:	-
Max.:	42949672.95	Data Type:	UInt32
Default:	0.00	Change:	Unchangeable

Value Range:

0.00 to 42949672.95

Description

Differentiates the customized MCU software version, which is not applicable to standard models.

H00.04 Encoder version

Hexadecimal:	2000-05h	Effective Time:	-
Min.:	0.0	Unit:	-
Max.:	6553.5	Data Type:	UInt16
Default:	0.0	Change:	Unchangeable

Value Range:

0.0 to 6553.5

Description

Saved in the encoder and used to differentiate the encoder software version.

H00.05 Serial-type motor code

Hexadecimal:	2000-06h	Effective Time:	-

Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

Displays the code of the serial-type motor, which is determined by the motor model and unchangeable.

H00.06 FPGA customized SN

Hexadecimal:	2000-07h	Effective Time:	-
Min.:	0.00	Unit:	-
Max.:	10485.75	Data Type:	UInt32
Default:	0.00	Change:	Unchangeable

Value Range:

0.00 to 10485.75

Description

Differentiates the customized FPGA software version, which is not applicable to standard models.

H00.08 Serial encoder type

Hexadecimal:	2000-09h	Effective Time:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0 to 65535

Description

14100: Multi-turn absolute encoder

Others: Single-turn absolute encoder

H00.09 Rated voltage

Hexadecimal:	2000-0Ah	Effective Time:	-
Min.:	0	Unit:	V
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: 220 V

1: 380 V

Description

0: 220 V

1: 380 V

H00.10 Rated power

Hexadecimal:	2000-0Bh	Effective Time:	-
Min.:	0.01	Unit:	kW
Max.:	655.35	Data Type:	UInt16
Default:	0.01	Change:	At stop

Value Range:

0.01 kW–655.35 kW

Description

-

H00.11 Rated current

Hexadecimal:	2000-0Ch	Effective Time:	-
Min.:	0.01	Unit:	A
Max.:	655.35	Data Type:	UInt16
Default:	0.01	Change:	At stop

Value Range:

0.01 A to 655.35 A

Description

-

H00.12 Rated torque

Hexadecimal:	2000-0Dh	Effective Time:	-
Min.:	0.10	Unit:	N·m
Max.:	655.35	Data Type:	UInt16
Default:	0.10	Change:	At stop

Value Range:

0.10N·m–655.35N·m

Description

-

H00.13 Max. torque

Hexadecimal:	2000-0Eh	Effective Time:	-
Min.:	0.10	Unit:	N·m
Max.:	655.35	Data Type:	UInt16

Default:	0.10	Change:	At stop

Value Range:

0.10N·m–655.35N·m

Description

-

H00.14 Rated speed

Hexadecimal:	2000-0Fh	Effective Time:	-
Min.:	100	Unit:	rpm
Max.:	9000	Data Type:	UInt16
Default:	100	Change:	At stop

Value Range:

100rpm–9000rpm

Description

-

H00.15 Maximum speed

Hexadecimal:	2000-10h	Effective Time:	-
Min.:	100	Unit:	rpm
Max.:	9000	Data Type:	UInt16
Default:	100	Change:	At stop

Value Range:

100rpm–9000rpm

Description

-

H00.16 Moment of inertia Jm

Hexadecimal:	2000-11h	Effective Time:	-
Min.:	0.01	Unit:	$kgcm^2$
Max.:	655.35	Data Type:	UInt16
Default:	0.01	Change:	At stop

Value Range:

0.01 $kgcm^2$–655.35 $kgcm^2$

Description

-

H00.17 Number of PMSM pole pairs

Hexadecimal:	2000-12h	Effective Time:	-
Min.:	2	Unit:	-
Max.:	360	Data Type:	UInt16
Default:	2	Change:	At stop

Value Range:

2 to 360

Description

-

H00.18 Stator resistance

Hexadecimal:	2000-13h	Effective Time:	-
Min.:	0.001	Unit:	Ω
Max.:	65.535	Data Type:	UInt16
Default:	0.001	Change:	At stop

Value Range:

0.001 Ω to 65.535 Ω

Description

-

H00.19 Stator inductance Lq

Hexadecimal:	2000-14h	Effective Time:	-
Min.:	0.01	Unit:	mH
Max.:	655.35	Data Type:	UInt16
Default:	0.01	Change:	At stop

Value Range:

0.01mH–655.35mH

Description

-

H00.20 Stator inductance Ld

Hexadecimal:	2000-15h	Effective Time:	-
Min.:	0.01	Unit:	mH
Max.:	655.35	Data Type:	UInt16
Default:	0.01	Change:	At stop

Value Range:

0.01mH–655.35mH

Description

-

H00.21 Linear back EMF coefficient

Hexadecimal:	2000-16h	Effective Time:	-
Min.:	0.01	Unit:	mV/rpm
Max.:	655.35	Data Type:	UInt16
Default:	0.01	Change:	At stop

Value Range:

0.01 mV/rpm to 655.35 mV/rpm

Description

-

H00.22 Torque coefficient Kt

Hexadecimal:	2000-17h	Effective Time:	-
Min.:	0.01	Unit:	N·m/Arms
Max.:	655.35	Data Type:	UInt16
Default:	0.01	Change:	At stop

Value Range:

0.01 N·m/Arms to 655.35 N·m/Arms

Description

-

H00.23 Electrical constant Te

Hexadecimal:	2000-18h	Effective Time:	-
Min.:	0.01	Unit:	ms
Max.:	655.35	Data Type:	UInt16
Default:	0.01	Change:	At stop

Value Range:

0.01 ms to 655.35 ms

Description

-

H00.24 Mechanical constant Tm

Hexadecimal:	2000-19h	Effective Time:	-
Min.:	0.01	Unit:	ms
Max.:	655.35	Data Type:	UInt16

Default:	0.01	Change:	At stop

Value Range:

0.01 ms to 655.35 ms

Description

-

H00.27 Sine/Cosine number of serial encoder motor

Hexadecimal:	2000-1Ch	Effective Time:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	1	Change:	Immediately

Value Range:

0 to 65535

Description

-

H00.28 Absolute encoder position offset

Hexadecimal:	2000-1Dh	Effective Time:	-
Min.:	0	Unit:	PPR
Max.:	1073741824	Data Type:	UInt32
Default:	0	Change:	At stop

Value Range:

0P/Rev–1073741824P/Rev

Description

Saves the values obtained from angle auto-tuning.

H00.30 Encoder selection (Hex)

Hexadecimal:	2000-1Fh	Effective Time:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	19	Change:	At stop

Value Range:

0: Regular incremental encoder (UVW-ABZ)

1: Wire-saving encoder (ABZ[UVW])

2: Regular incremental encoder (ABZ, without UVW)

16: TAMAGAWA encoder

18: Nikon encoder

19: Inovance encoder

48: Optical scale

Description

00: Regular incremental encoder (UVW-ABZ)
1: Wire-saving encoder (ABZ[UVW])
2: Regular incremental encoder (ABZ, without UVW)
16: TAMAGAWA encoder
18: Nikon encoder
19: Inovance encoder
48: Optical scale

H00.31 Encoder PPR

Hexadecimal:	2000-20h	Effective Time:	-
Min.:	1	Unit:	PPR
Max.:	1073741824	Data Type:	UInt32
Default:	8388608	Change:	At stop

Value Range:

1P/Rev–1073741824P/Rev

Description

Defines the number of pulses fed back by the encoder per motor revolution.

H00.35 Motor code saved in the serial encoder

Hexadecimal:	2000-24h	Effective Time:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0 to 65535

Description

-

H00.37 Encoder function setting bit

Hexadecimal:	2000-26h	Effective Time:	-
Min.:	0	Unit:	-
Max.:	255	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 255

Description

-

H00.43 **Maximum Current**

Hexadecimal:	2000-2Ch	Effective Time:	Upon the next power-on
Min.:	0.00	Unit:	A
Max.:	655.35	Data Type:	UInt16
Default:	16.95	Change:	At stop

Value Range:

0.00 A to 655.35 A

Description

-

4.2 H01 Servo Drive Parameters

H01.00 **MCU software version**

Hexadecimal:	2001-01h	Effective Time:	-
Min.:	0.0	Unit:	-
Max.:	6553.5	Data Type:	UInt16
Default:	0.0	Change:	Unchangeable

Value Range:

0.0 to 6553.5

Description

Displays MCU software version (with one decimal place).

H01.01 **FPGA software version**

Hexadecimal:	2001-02h	Effective Time:	-
Min.:	0.0	Unit:	-
Max.:	6553.5	Data Type:	UInt16
Default:	0.0	Change:	Unchangeable

Value Range:

0.0 to 6553.5

Description

Displays the FPGA software version, with 1 decimal place.

H01.02 **Servo Drive Model**

Hexadecimal:	2001-03h	Effective Time:	Upon the next power-on
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0 to 65535

Description

-

H01.04 **Voltage class**

Hexadecimal:	2001-05h	Effective Time:	-
Min.:	0	Unit:	V
Max.:	65535	Data Type:	UInt16
Default:	220	Change:	Immediately

Value Range:

0 V to 65535 V

Description

-

H01.05 **Rated power**

Hexadecimal:	2001-06h	Effective Time:	-
Min.:	0.01	Unit:	kW
Max.:	655.35	Data Type:	UInt16
Default:	75.00	Change:	Immediately

Value Range:

0.01 kW–655.35 kW

Description

-

H01.06 **Max. output power**

Hexadecimal:	2001-07h	Effective Time:	-
Min.:	0.01	Unit:	kW
Max.:	655.35	Data Type:	UInt16
Default:	75.00	Change:	Immediately

Value Range:

0.01 kW–655.35 kW

Description

Displays the maximum output power of the drive, with 2 decimal places.

H01.07 **Rated output current**

Hexadecimal:	2001-08h	Effective Time:	-

Min.:	0.01	Unit:	A
Max.:	655.35	Data Type:	UInt16
Default:	5.50	Change:	Immediately

Value Range:

0.01 A to 655.35 A

Description

Displays the rated output current of the drive, with 2 decimal places.

H01.08 Max. output current

Hexadecimal:	2001-09h	Effective Time:	-
Min.:	0.01	Unit:	A
Max.:	655.35	Data Type:	UInt16
Default:	16.90	Change:	Immediately

Value Range:

0.01 A to 655.35 A

Description

Displays the maximum output current of the drive, with 2 decimal places.

H01.10 Carrier frequency

Hexadecimal:	2001-0Bh	Effective Time:	-
Min.:	4000	Unit:	-
Max.:	20000	Data Type:	UInt16
Default:	8000	Change:	Immediately

Value Range:

4000 to 20000

Description

Displays the carrier frequency, with no decimal place.

H01.11 Current loop modulation frequency

Hexadecimal:	2001-0Ch	Effective Time:	-
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	1	Change:	At stop

Value Range:

0: Carrier frequency

1: 2 × carrier frequency

Description

-

H01.12 Speed loop scheduling frequency-division coefficient

Hexadecimal:	2001-0Dh	Effective Time:	-
Min.:	1	Unit:	-
Max.:	32	Data Type:	UInt16
Default:	1	Change:	Immediately

Value Range:

1: Current loop modulation frequency/1

2: Current loop modulation frequency/2

4: Current loop modulation frequency/4

8: Current loop modulation frequency/8

16: Current loop modulation frequency/16

32: Current loop modulation frequency/32

Description

-

H01.13 Position loop scheduling frequency-division coefficient

Hexadecimal:	2001-0Eh	Effective Time:	-
Min.:	2	Unit:	-
Max.:	128	Data Type:	UInt16
Default:	4	Change:	Immediately

Value Range:

2: Current loop modulation frequency/2

4: Current loop modulation frequency/4

8: Current loop modulation frequency/8

16: Current loop modulation frequency/16

32: Current loop modulation frequency/32

64: Current loop modulation frequency/64

128: Current loop modulation frequency/128

Description

-

H01.14 Dead zone time

Hexadecimal:	2001-0Fh	Effective Time:	-
Min.:	0.01	Unit:	us
Max.:	20.00	Data Type:	UInt16
Default:	2.00	Change:	Immediately

Value Range:

0.01us–20.00us

Description

Displays the dead zone time, with two decimal places.

H01.15 DC bus overvoltage protection threshold

Hexadecimal:	2001-10h	Effective Time:	-
Min.:	0	Unit:	V
Max.:	2000	Data Type:	UInt16
Default:	420	Change:	Immediately

Value Range:

0 V to 2000 V

Description

Displays DC bus overvoltage protection threshold, with 0 decimal place.

H01.16 DC bus voltage discharge threshold

Hexadecimal:	2001-11h	Effective Time:	-
Min.:	0	Unit:	V
Max.:	2000	Data Type:	UInt16
Default:	380	Change:	Immediately

Value Range:

0 V to 2000 V

Description

Display DC bus voltage discharge threshold, with no decimal place.

H01.17 DC bus undervoltage threshold

Hexadecimal:	2001-12h	Effective Time:	-
Min.:	0	Unit:	V
Max.:	2000	Data Type:	UInt16
Default:	200	Change:	Immediately

Value Range:

0 V to 2000 V

Description

Displays DC bus undervoltage threshold, with no decimal place.

H01.18 Servo drive overcurrent protection threshold

Hexadecimal:	2001-13h	Effective Time:	-
Min.:	10	Unit:	%
Max.:	100	Data Type:	UInt16

Default:	100	Change:	Immediately

Value Range:

10% to 100%

Description

-

H01.19 Sampling coefficient of 7860

Hexadecimal:	2001-14h	Effective Time:	-
Min.:	1	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	3200	Change:	Immediately

Value Range:

1 to 65535

Description

-

H01.20 Dead zone compensation

Hexadecimal:	2001-15h	Effective Time:	-
Min.:	0.00	Unit:	us
Max.:	20.00	Data Type:	UInt16
Default:	2.00	Change:	Immediately

Value Range:

0.00us–20.00us

Description

-

H01.21 Minimum switch-on time of bootstrap circuit

Hexadecimal:	2001-16h	Effective Time:	Upon the next power-on
Min.:	1.0	Unit:	us
Max.:	20.0	Data Type:	UInt16
Default:	4.0	Change:	At stop

Value Range:

1.0us–20.0us

Description

-

H01.22 D-axis back EMF constant

Hexadecimal:	2001-17h	Effective Time:	-

Min.:	0.0	Unit:	%
Max.:	6553.5	Data Type:	UInt16
Default:	60.0	Change:	Immediately

Value Range:

0.0% to 6553.5%

Description

-

H01.23 Q-axis back EMF constant

Hexadecimal:	2001-18h	Effective Time:	-
Min.:	0.0	Unit:	%
Max.:	6553.5	Data Type:	UInt16
Default:	100.0	Change:	Immediately

Value Range:

0.0% to 6553.5%

Description

-

H01.24 D-axis current loop gain

Hexadecimal:	2001-19h	Effective Time:	-
Min.:	1	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	1000	Change:	Immediately

Value Range:

1 to 65535

Description

Displays D-axis current loop gain, with no decimal place.

H01.25 D-axis current loop integral compensation factor

Hexadecimal:	2001-1Ah	Effective Time:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	200	Change:	Immediately

Value Range:

0 to 65535

Description

Display D-axis current loop integral compensation factor, with 2 decimal places.

H01.26 **Sinc3 filter data extraction rate in current sampling**

Hexadecimal:	2001-1Bh	Effective Time:	-
Min.:	0	Unit:	-
Max.:	3	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Extraction rate 32

1: Extraction rate 64

2: Extraction rate 128

3: Extraction rate 256

Description

Displays Sinc3 filter data extraction rate in current sampling, with no decimal place.

H01.27 **Q-axis current loop gain**

Hexadecimal:	2001-1Ch	Effective Time:	-
Min.:	1	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	1000	Change:	Immediately

Value Range:

1 to 65535

Description

Displays Q-axis current loop gain, with no decimal place.

H01.28 **Q-axis current loop integral compensation factor**

Hexadecimal:	2001-1Dh	Effective Time:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	100	Change:	Immediately

Value Range:

0 to 65535

Description

Displays Q-axis current loop integral compensation factor, with 2 decimal places.

H01.29 **Control power voltage sampling coefficient**

Hexadecimal:	2001-1Eh	Effective Time:	-

Min.:	50.0	Unit:	-
Max.:	150.0	Data Type:	UInt16
Default:	100.0	Change:	At stop

Value Range:

50.0 to 150.0

Description

-

H01.30 Bus voltage gain tuning

Hexadecimal:	2001-1Fh	Effective Time:	-
Min.:	50.0	Unit:	%
Max.:	150.0	Data Type:	UInt16
Default:	100.0	Change:	Immediately

Value Range:

50.0% to 150.0%

Description

Displays bus voltage gain adjustment, with 1 decimal place.

H01.31 FOC calculation time

Hexadecimal:	2001-20h	Effective Time:	-
Min.:	1.00	Unit:	us
Max.:	100.00	Data Type:	UInt16
Default:	2.60	Change:	Immediately

Value Range:

1.00us–100.00us

Description

-

H01.32 Relative gain of UV sampling

Hexadecimal:	2001-21h	Effective Time:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

Displays the relative gain of UV sampling, with no decimal place.

H01.37 Model identification version

Hexadecimal:	2001-26h	Effective Time:	
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0 to 65535

Description

-

H01.44 Sinc3 filter data extraction rate in 2nd group of current sampling

Hexadecimal:	2001-2Dh	Effective Time:	-
Min.:	0	Unit:	-
Max.:	3	Data Type:	UInt16
Default:	2	Change:	At stop

Value Range:

0: Extraction rate 32

1: Extraction rate 64

2: Extraction rate 128

3: Extraction rate 256

Description

-

H01.45 Phase U duty cycle obtained upon voltage injection

Hexadecimal:	2001-2Eh	Effective Time:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0 to 65535

Description

-

H01.47 MCU current reference processing time

Hexadecimal:	2001-30h	Effective Time:	-
Min.:	0.00	Unit:	us
Max.:	60.00	Data Type:	UInt16
Default:	38.00	Change:	Immediately

Value Range:

0.00us–60.00us

Description

-

H01.48 AD sampling delay

Hexadecimal:	2001-31h	Effective Time:	-
Min.:	0.00	Unit:	us
Max.:	20.00	Data Type:	UInt16
Default:	1.00	Change:	Immediately

Value Range:

0.00us–20.00us

Description

-

H01.49 Serial encoder data dissemination delay

Hexadecimal:	2001-32h	Effective Time:	-
Min.:	0.00	Unit:	us
Max.:	500.00	Data Type:	UInt16
Default:	61.00	Change:	Immediately

Value Range:

0.00us–500.00us

Description

-

H01.50 Interval version of DSP software

Hexadecimal:	2001-33h	Effective Time:	-
Min.:	0.00	Unit:	-
Max.:	655.35	Data Type:	UInt16
Default:	0.00	Change:	Immediately

Value Range:

0.00 to 655.35

Description

-

H01.52 D-axis proportional gain in performance priority mode

Hexadecimal:	2001-35h	Effective Time:	-

Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	2000	Change:	Immediately

Value Range:

0 to 65535

Description

Display D-axis proportional gain in performance priority mode, with no decimal place.

H01.53 **D-axis integral gain in performance priority mode**

Hexadecimal:	2001-36h	Effective Time:	-
Min.:	0.00	Unit:	-
Max.:	655.35	Data Type:	UInt16
Default:	2.00	Change:	Immediately

Value Range:

0.00 to 655.35

Description

Displays D-axis integral gain in performance priority mode, with 2 decimal places.

H01.54 **Q-axis proportional gain in performance priority mode**

Hexadecimal:	2001-37h	Effective Time:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	2000	Change:	Immediately

Value Range:

0 to 65535

Description

Displays Q-axis proportional gain in performance priority mode, with no decimal place.

H01.55 **Q-axis integral gain in performance priority mode**

Hexadecimal:	2001-38h	Effective Time:	-
Min.:	0.00	Unit:	-
Max.:	655.35	Data Type:	UInt16
Default:	1.00	Change:	Immediately

Value Range:

0.00 to 655.35

Description

Displays Q-axis integral gain in performance priority mode, with 2 decimal places.

H01.56 2nd group of proportional gain coefficient in performance priority mode

Hexadecimal:	2001-39h	Effective Time:	-
Min.:	0.0	Unit:	%
Max.:	1000.0	Data Type:	UInt16
Default:	100.0	Change:	Immediately

Value Range:

0.0% to 1000.0%

Description

-

H01.57 3rd group of proportional gain coefficient in performance priority mode

Hexadecimal:	2001-3Ah	Effective Time:	-
Min.:	0.0	Unit:	%
Max.:	1000.0	Data Type:	UInt16
Default:	100.0	Change:	Immediately

Value Range:

0.0% to 1000.0%

Description

-

H01.58 1st gain switchover threshold in performance priority mode

Hexadecimal:	2001-3Bh	Effective Time:	-
Min.:	0.0	Unit:	%
Max.:	300.0	Data Type:	UInt16
Default:	1.0	Change:	Immediately

Value Range:

0.0% to 300.0%

Description

-

H01.59 2nd gain switchover threshold in performance priority mode

Hexadecimal:	2001-3Ch	Effective Time:	-
Min.:	0.0	Unit:	%

Max.:	300.0	Data Type:	UInt16
Default:	2.0	Change:	Immediately

Value Range:

0.0% to 300.0%

Description

-

H01.60 3rd gain switchover threshold in performance priority mode

Hexadecimal:	2001-3Dh	Effective Time:	-
Min.:	0.0	Unit:	%
Max.:	300.0	Data Type:	UInt16
Default:	100.0	Change:	Immediately

Value Range:

0.0% to 300.0%

Description

-

H01.61 4th gain switchover threshold in performance priority mode

Hexadecimal:	2001-3Eh	Effective Time:	-
Min.:	0.0	Unit:	%
Max.:	300.0	Data Type:	UInt16
Default:	200.0	Change:	Immediately

Value Range:

0.0% to 300.0%

Description

-

H01.62 Phase U/V 7860 detection protection threshold

Hexadecimal:	2001-3Fh	Effective Time:	Upon the next power-on
Min.:	0	Unit:	-
Max.:	320	Data Type:	UInt16
Default:	280	Change:	Unchangeable

Value Range:

0 to 320

Description

-

H01.63 **Serial encoder data transmission compensation time**

Hexadecimal:	2001-40h	Effective Time:	Upon the next power-on
Min.:	0.00	Unit:	-
Max.:	10.00	Data Type:	UInt16
Default:	0.00	Change:	At stop

Value Range:

0.00 to 10.00

Description

Display the data transmission compensation time of the serial encoder, with three decimal places.

4.3 H02 Basic Control Parameters

H02.00 **Control mode**

Hexadecimal:	2002-01h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	6	Data Type:	UInt16
Default:	1	Change:	At stop

Value Range:

0: Speed control mode

1: Position control mode

2: Torque control mode

3: Torque<->Speed control mode

4: Speed<->Position control mode

5: Torque<->Position control mode

6: Torque<->Speed<->Position compound mode

Description

Defines the control mode of the servo drive.

Setpoint	Control mode	Remarks
0	Speed control mode	For parameter settings in speed control mode, see the function guide.
1	Position control mode	For parameter settings in position control mode, see the function guide.
2	Torque control mode	For parameter settings in torque control mode, see the function guide.

<table>
<tr><th>Setpoint</th><th>Control mode</th><th>Remarks</th></tr>
<tr><td>3</td><td>3: Torque control mode <-> Speed control mode</td><td>Set a DI terminal for FunIN.10: M1_SEL (Mode switchover 1) and determine terminal logic.
<table><tr><th>M1_SEL
Terminal logic</th><th>Control mode</th></tr><tr><td>Inactive</td><td>Torque control mode</td></tr><tr><td>Active</td><td>Speed control mode</td></tr></table></td></tr>
<tr><td>4</td><td>Speed control mode<->Position control mode</td><td>Set a DI terminal for FunIN.10: M1_SEL (Mode switchover 1) and determine terminal logic.
<table><tr><th>M1_SEL
Terminal logic</th><th>Control mode</th></tr><tr><td>Inactive</td><td>Speed control mode</td></tr><tr><td>Active</td><td>Position control mode</td></tr></table></td></tr>
<tr><td>5</td><td>Torque control mode<->Position control mode</td><td>Set a DI terminal for FunIN.10: M1_SEL (Mode switchover 1) and determine terminal logic.
<table><tr><th>M1_SEL
Terminal logic</th><th>Control mode</th></tr><tr><td>Inactive</td><td>Torque control mode</td></tr><tr><td>Active</td><td>Position control mode</td></tr></table></td></tr>
<tr><td>6</td><td>Torque control mode<->Speed control mode<->Position control mode</td><td>Set two DI terminal for FunIN.10: M1_SEL (Mode switchover 1) and FunIN.11: M2_SEL (Mode switch-over 2), respectively and determine terminal logic.
<table><tr><th>M2_SEL
Terminal logic</th><th>M1_SEL
Terminal logic</th><th>Control mode</th></tr><tr><td>Inactive</td><td>Inactive</td><td>Torque control mode</td></tr><tr><td>Active</td><td>Inactive</td><td>Speed control mode</td></tr><tr><td>-</td><td>Active</td><td>Position control mode</td></tr></table></td></tr>
</table>

H02.01 Absolute position detection system

Hexadecimal:	2002-02h	Effective Time:	Upon the next power-on
Min.:	0	Unit:	-
Max.:	2	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Incremental position mode
1: Absolute position linear mode
2: Absolute position rotation mode

Description

Used to set the absolute position function.

H02.02 Forward direction

Hexadecimal:	2002-03h	Effective Time:	Upon the next power-on
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

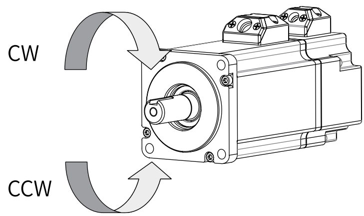
Value Range:

0: Counterclockwise (CCW) as forward direction
1: Clockwise (CW) as forward direction

Description

Defines the forward direction of the motor when viewed from the motor shaft side.

Setpoint	Direction of rotation	Remarks
0	Counterclockwise (CCW) as forward direction	Defines the CCW direction as the forward direction when a forward run command is received, indicating the motor rotates in the CCW direction when viewed from the motor shaft side.
1	CW direction as forward direction	When a forward command is input, the motor rotates in CW direction viewed from the motor shaft side, that is, the motor rotates clockwise.



H02.03 Output pulse phase

Hexadecimal:	2002-04h	Effective Time:	Upon the next power-on
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

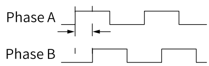
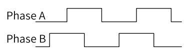
Value Range:

0: Phase A leads phase B

1: Phase A lags behind phase B

Description

Defines the relationship between phase A and phase B on the condition that the motor direction of rotation remains unchanged when pulse output is enabled.

Setpoint	Output pulse phase	Remarks
0	Phase A leads phase B.	Phase A leads phase B by 90° in encoder frequency-division output pulses. 
1	Phase A lags phase B.	Phase A lags phase B by 90° in encoder frequency-division output pulses. 

H02.05 Stop mode at S-OFF

Hexadecimal:	2002-06h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	3	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Coast to stop, keeping de-energized state

1: Stop at zero speed, keeping de-energized state

2: Stop at zero speed, keeping dynamic braking state

3: Dynamic braking stop, keeping dynamic braking state

Description

Defines the deceleration mode of the motor for stopping rotating upon S-ON OFF and the motor status after stop.

H02.06 Stop mode at No.2 fault

Hexadecimal:	2002-07h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	4	Data Type:	UInt16
Default:	2	Change:	At stop

Value Range:

0: Coast to stop, keeping de-energized state
1: Stop at zero speed, keeping de-energized state
2: Stop at zero speed, keeping dynamic braking state
3: Dynamic braking stop, keeping DB state
4: DB stops, keeping operation state

Description

Defines the deceleration mode of the servo motor for stopping rotating and the servo motor status when a No. 2 fault occurs.

H02.07 **Stop mode at overtravel**

Hexadecimal:	2002-08h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	2	Data Type:	UInt16
Default:	1	Change:	At stop

Value Range:

0: Coast to stop, keeping de-energized state
1: Stop at zero speed, keeping position lock state
2: Stop at zero speed, keeping de-energized state

Description

Defines the deceleration mode of the servo motor for stopping rotating and the servo motor status when overtravel occurs.

Setpoint	Stop Mode
0	Coast to stop, keeping de-energized status
1	Stop at zero speed, keeping position lock status
2	Stop at zero speed, keeping de-energized status

H02.08 **Stop mode at No.1 fault**

Hexadecimal:	2002-09h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	2	Data Type:	UInt16
Default:	2	Change:	At stop

Value Range:

0: Coast to stop, keeping de-energized state1: DB stop, keeping de-energized state2: DB stop, keeping DB state

Description

Defines the deceleration mode of the servo motor for stopping rotating and the servo motor status when a No. 1 fault occurs.

Setpoint	Stop Mode
0	Coast to stop, keeping de-energized status
1	Dynamic braking stop, keeping de-energized status
2	Dynamic braking stop, keeping dynamic braking status

H02.09 Delay from brake output ON to command received

Hexadecimal:	2002-0Ah	Effective Time:	Real time
Min.:	0	Unit:	ms
Max.:	500	Data Type:	UInt16
Default:	250	Change:	Immediately

Value Range:

0 ms to 500 ms

Description

Defines the delay from the moment the brake output signal is ON to the moment the servo drive starts to receive commands after power-on.

H02.10 Delay from brake output OFF to motor de-energized in the standstill state

Hexadecimal:	2002-0Bh	Effective Time:	Real time
Min.:	1	Unit:	ms
Max.:	1000	Data Type:	UInt16
Default:	150	Change:	Immediately

Value Range:

1 ms to 1000 ms

Description

Defines the delay from the moment brake output is OFF to the moment when the motor at standstill enters the de-energized status.

H02.11 Motor speed threshold at brake output OFF in rotation state

Hexadecimal:	2002-0Ch	Effective Time:	Real time
Min.:	0	Unit:	rpm
Max.:	3000	Data Type:	UInt16
Default:	30	Change:	Immediately

Value Range:

0rpm–3000rpm

Description

Defines the motor speed threshold when brake (BK) output is OFF in the rotating state.

H02.12 Delay from S-ON OFF to brake output OFF in rotation state

Hexadecimal:	2002-0Dh	Effective Time:	Real time
Min.:	1	Unit:	ms
Max.:	1000	Data Type:	UInt16
Default:	500	Change:	Immediately

Value Range:

1 ms to 1000 ms

Description

Sets the delay time from BK OFF to S-ON OFF when the motor is in rotating state.

H02.14 Stop mode and state switching speed condition

Hexadecimal:	2002-0Fh	Effective Time:	Real time
Min.:	10	Unit:	rpm
Max.:	100	Data Type:	UInt16
Default:	10	Change:	At stop

Value Range:

10rpm–100rpm

Description

Defines the stop mode of the motor for stopping rotating upon main circuit power failure.

H02.15 Warning display on the keypad

Hexadecimal:	2002-10h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Output warning information immediately

1: Not output warning information

Description

Defines whether to switch the keypad to the fault display mode when a No. 3 fault occurs.

H02.17 Stop at zero speed upon main circuit power-off

Hexadecimal:	2002-12h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	1	Change:	At stop

Value Range:

0: Disabled

1: Enabled

Description

-

H02.18 S-ON filter time constant

Hexadecimal:	2002-13h	Effective Time:	Real time
Min.:	0	Unit:	ms
Max.:	64	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0 ms to 64 ms

Description

-

H02.19 S-ON brake open delay

Hexadecimal:	2002-14h	Effective Time:	Real time
Min.:	0	Unit:	ms
Max.:	1000	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0 ms to 1000 ms

Description

-

H02.20 Dynamic brake relay coil ON delay

Hexadecimal:	2002-15h	Effective Time:	Real time
Min.:	10	Unit:	ms
Max.:	30000	Data Type:	UInt16
Default:	30	Change:	Immediately

Value Range:

10 ms to 30000 ms

Description

-

H02.21 Min. permissible resistance of regenerative resistor

Hexadecimal:	2002-16h	Effective Time:	-
Min.:	0	Unit:	Ω
Max.:	65535	Data Type:	UInt16
Default:	40	Change:	Unchangeable

Value Range:

0 Ω to 65535 Ω

Description

-

H02.22 Power of built-in regenerative resistor

Hexadecimal:	2002-17h	Effective Time:	-
Min.:	0	Unit:	W
Max.:	65535	Data Type:	UInt16
Default:	40	Change:	Unchangeable

Value Range:

0 W–65535 W

Description

The power of the built-in regenerative resistor is only related to the servo drive model, which is unmodifiable.

H02.23 Resistance of built-in regenerative resistor

Hexadecimal:	2002-18h	Effective Time:	-
Min.:	0	Unit:	Ω
Max.:	65535	Data Type:	UInt16
Default:	50	Change:	Unchangeable

Value Range:

0 Ω to 65535 Ω

Description

The resistance of the built-in regenerative resistor is only related to the servo drive model, which is unmodifiable.

Table 4–1 Specifications of the regenerative resistor

<table>
<tr><th rowspan="2">Servo drive model (SV660, SV630)</th><th colspan="2">Specifications of Built-in Regenerative Resistor</th><th rowspan="2">External regenerative resistor Min. Allowable Resistance (Ω) (H02.21)</th></tr>
<tr><th>Resistance (Ω)</th><th>Power (Pr) (W)</th></tr>
<tr><td>SV6*0PS1R6I</td><td>-</td><td>-</td><td>50</td></tr>
<tr><td>SV6*0PS2R8I</td><td>-</td><td>-</td><td>45</td></tr>
<tr><td>SV6*0PS5R5I</td><td>50</td><td>50</td><td>40</td></tr>
<tr><td>SV6*0PS7R6I</td><td rowspan="2">25</td><td rowspan="2">80</td><td>20</td></tr>
<tr><td>SV6*0PS012I</td><td>15</td></tr>
<tr><td>SV6*0PT3R5I</td><td>100</td><td>80</td><td>80</td></tr>
<tr><td>SV6*0PT5R4I</td><td>100</td><td>80</td><td>60</td></tr>
<tr><td>SV6*0PT8R4I</td><td rowspan="2">50</td><td rowspan="2">80</td><td>45</td></tr>
<tr><td>SV6*0PT012I</td><td>40</td></tr>
<tr><td>SV6*0PT017I</td><td rowspan="3">35</td><td rowspan="3">100</td><td>35</td></tr>
<tr><td>SV6*0PT021I</td><td rowspan="2">25</td></tr>
<tr><td>SV6*0PT026I</td></tr>
</table>

H02.24 **Resistor heat dissipation coefficient**

Hexadecimal:	2002-19h	Effective Time:	Real time
Min.:	10	Unit:	-
Max.:	100	Data Type:	UInt16
Default:	30	Change:	At stop

Value Range:

10 to 100

Description

Defines the heat dissipation coefficient of the regenerative resistor, which is applicable to both external and built-in regenerative resistors.

Defines the heat dissipation coefficient of the regenerative resistor, which is applicable to both external and built-in regenerative resistors.

Set this parameter properly according to actual heat dissipation conditions of the resistor.

Recommendations:

Generally, the value of H02.24 cannot exceed 30% for natural cooling.

The value of H02.24 cannot exceed 50% for forced air cooling.

H02.25 Regenerative resistor type

Hexadecimal:	2002-1Ah	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	3	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Built-in

1: External, natural ventilated

2: External, forced air cooling

3: Not needed

Description

Defines the resistor type and the mode of absorbing and releasing the braking energy.

Setpoint	Defines the regenerative resistor type and the mode of absorbing and releasing the braking energy.	Remarks
0	Using the built-in regenerative resistor	When the calculated value of the maximum braking energy is larger than the maximum braking energy absorbed by capacitors, and the calculated value of braking power is no larger than the built-in regenerative resistor power.
1	External, naturally ventilated	When the calculated value of the maximum braking energy is larger than the maximum braking energy absorbed by capacitors, and the calculated value of braking power is larger than the built-in regenerative resistor power.
2	External, forcible cooling	When the calculated value of the maximum braking energy is larger than the maximum braking energy absorbed by capacitors, and the calculated value of braking power is larger than the built-in regenerative resistor power.
3	No resistor, using only capacitor	When the calculated value of maximum braking energy is no larger than the maximum braking energy absorbed by capacitors.

H02.26 Power capacity of external regenerative resistor

Hexadecimal:	2002-1Bh	Effective Time:	Real time

Min.:	1	Unit:	W
Max.:	65535	Data Type:	UInt16
Default:	40	Change:	At stop

Value Range:

1 W–65535 W

Description

Defines the power of external regenerative resistor.

H02.27 **Resistance of external regenerative resistor**

Hexadecimal:	2002-1Ch	Effective Time:	Real time
Min.:	1	Unit:	Ω
Max.:	1000	Data Type:	UInt16
Default:	50	Change:	At stop

Value Range:

1 Ω to 1000 Ω

Description

Defines the resistance of the external regenerative resistor.

H02.28 **220 V min. bus voltage**

Hexadecimal:	2002-1Dh	Effective Time:	Upon the next power-on
Min.:	190	Unit:	V
Max.:	260	Data Type:	UInt16
Default:	235	Change:	At stop

Value Range:

190 V to 260 V

Description

-

H02.30 **User password**

Hexadecimal:	2002-1Fh	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0 to 65535

Description

-

H02.31 **System parameter initialization**

Hexadecimal:	2002-20h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	2	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: No operation

1: Restore default settings

2: Clear fault records

Description

Used to restore default values or clear fault records.

Setpoint	Stop Mode	Remarks
0	No operation	-
1	Restore default setting	Restore parameters to default values except parameters in groups H00 and H01.
2	Clear fault records	Clear the latest 10 faults and warnings.

H02.32 **Default keypad display**

Hexadecimal:	2002-21h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	99	Data Type:	UInt16
Default:	50	Change:	Immediately

Value Range:

0–99

Description

According to the setting, the keypad can switch to monitoring parameter display mode (parameters in group H0b) automatically. H02.32 is used to set the offset in group H0b.

Setpoint	Parameters in group H0b	Remarks
0	H0b.00	Motor speed is not zero, the keypad displays the setting of H0b.00 (Actual motor speed).
1	H0b.01	The keypad displays the setting of H0b.01 (speed reference).

H02.34 **CAN software version**

Hexadecimal:	2002-23h	Effective Time:	-

Min.:	0.00	Unit:	-
Max.:	655.35	Data Type:	UInt16
Default:	0.00	Change:	Unchangeable

Value Range:

0.00 to 655.35

Description

-

H02.35 Keypad display refresh frequency

Hexadecimal:	2002-24h	Effective Time:	Real time
Min.:	0	Unit:	Hz
Max.:	29	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0 Hz to 29 Hz

Description

-

H02.41 Manufacturer password

Hexadecimal:	2002-2Ah	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0 to 65535

Description

-

4.4 H03 Terminal Input Parameters

H03.00 DI function allocation 1 (activated upon power-on)

Hexadecimal:	2003-01h	Effective Time:	Upon the next power-on
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0: Corresponding to null
1: Corresponding to FunIN.1
2: Corresponding to FunIN.2
4: Corresponding to FunIN.3
8: Corresponding to FunIN.4
16: Corresponding to FunIN.5
32: Corresponding to FunIN.6
64: Corresponding to FunIN.7
128: Corresponding to FunIN.8
256: Corresponding to FunIN.9
512: Corresponding to FunIN.10
1024: Corresponding to FunIN.11
2048: Corresponding to FunIN.12
4096: Corresponding to FunIN.13
8192: Corresponding to FunIN.14
16384: Corresponding to FunIN.15

Description

Used to enable a certain DI function (FunIN.1 to FunIN.16) to be activated immediately at next power-on.

H03.01 **DI function allocation 2 (activated upon power-on)**

Hexadecimal:	2003-02h	Effective Time:	Upon the next power-on
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0: Corresponding to null
1: Corresponding to FunIN.17
2: Corresponding to FunIN.18
4: Corresponding to FunIN.19
8: Corresponding to FunIN.20
16: Corresponding to FunIN.21
32: Corresponding to FunIN.22
64: Corresponding to FunIN.23
128: Corresponding to FunIN.24
256: Corresponding to FunIN.25
512: Corresponding to FunIN.26
1024: Corresponding to FunIN.27
2048: Corresponding to FunIN.28
4096: Corresponding to FunIN.29
8192: Corresponding to FunIN.30
16384: Corresponding to FunIN.31

Description

Used to enable a certain DI function (FunIN.17 to FunIN.32) to be activated immediately at next power-on.

H03.02 **DI1 function selection**

Hexadecimal:	2003-03h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	41	Data Type:	UInt16
Default:	14	Change:	Immediately

Value Range:

0: No assignment
1: S-ON
2: Warning reset signal
3: Gain switchover switch
4: Switchover between main and auxiliary commands
5: Multi-reference direction
6: Multi-reference switchover CMD1
7: Multi-reference switchover CMD2
8: Multi-reference switchover CMD3
9: Multi-reference switchover CMD4
10: Mode switchover M1-SEL

11: Mode switchover M2-SEL
12: Zero clamp enable signal
13: Position reference inhibited
14: Positive limit switch
15: Reverse limit switch
16: Positive external torque limit
17: Negative external torque limit
18: Forward jog
19: Reverse jog
20: Step enable
21: Hand wheel override signal 1
22: Hand wheel override signal 2
23: Hand wheel enable signal
24: Electronic gear ratio selection
25: Torque reference direction
26: Speed reference direction
27: Position reference direction
28: Multi-position reference enable
29: Interrupt positioning canceled
30: None
31: Home switch
32: Homing enable
33: Interrupt positioning inhibited
34: Emergency stop
35: Clear position deviation
36: Internal speed limit source
37: Pulse reference inhibited
38: Writing reference causes interrupt
39: Writing reference does not cause interrupt
40: Clear positioning and reference completed signals
41: Current position as home

Description

Defines the function of DI1.

H03.03 **DI1 logic selection**

Hexadecimal:	2003-04h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	Immediately

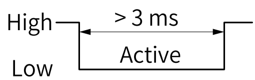
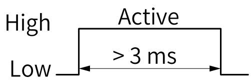
Value Range:

0: Active low
1: Active high

Description

Used to set the level logic of DI1 when the function assigned to DI1 is active. DI1–DI5 are standard DIs, and DI8 and DI9 are high speed DIs. The width of the input signal must be larger than 3 ms. Set the valid logic correctly according to the host controller and peripheral circuits. The width of the input signal is shown in the following table.

Table 4–2 Signal logic of low-speed DI terminals

Setpoint	DI Logic Upon Active DI Function	Remarks
0	Low level	
1	High level	

H03.04 **DI2 function selection**

Hexadecimal:	2003-05h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	41	Data Type:	UInt16
Default:	15	Change:	Immediately

Value Range:

See H03.02.

Description

-

H03.05 **DI2 logic selection**

Hexadecimal:	2003-06h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0: Active low
1: Active high

Description

-

H03.06 DI3 function selection

Hexadecimal:	2003-07h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	41	Data Type:	UInt16
Default:	13	Change:	Immediately

Value Range:

See H03.02.

Description

-

H03.07 DI3 logic selection

Hexadecimal:	2003-08h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0: Active low

1: Active high

Description

-

H03.08 DI4 function selection

Hexadecimal:	2003-09h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	41	Data Type:	UInt16
Default:	2	Change:	Immediately

Value Range:

See H03.02.

Description

-

H03.09 DI4 logic selection

Hexadecimal:	2003-0Ah	Effective Time:	At stop
Min.:	0	Unit:	-

Max.:	1	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0: Active low

1: Active high

Description

-

H03.10 DI5 function selection

Hexadecimal:	2003-0Bh	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	41	Data Type:	UInt16
Default:	1	Change:	Immediately

Value Range:

See H03.02.

Description

-

H03.11 DI5 logic selection

Hexadecimal:	2003-0Ch	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0: Active low

1: Active high

Description

-

H03.16 DI8 function selection

Hexadecimal:	2003-11h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	41	Data Type:	UInt16
Default:	31	Change:	Immediately

Value Range:

See H03.02.

Description

-

H03.17 DI8 logic selection

Hexadecimal:	2003-12h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0: Active low

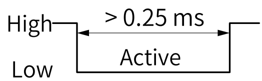
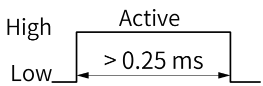
1: Active high

Description

It sets the DI8 logic when the DI function allocated to DI8 is enabled.

DI8 and DI9 are high-speed DI terminals. The width of the input signal must be larger than 0.25 ms. The width of the input signal must be larger than 3 ms. Set the valid logic correctly according to the host controller and peripheral circuits. The width of the input signal is shown in the following table.

Table 4–3 Signal logic of high-speed DI terminals

Setpoint	DI Logic Upon Active DI Function	Remarks
0	Low level	
1	High level	

H03.18 DI9 function selection

Hexadecimal:	2003-13h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	41	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

See H03.02.

Description

-

H03.19 DI9 logic selection

Hexadecimal:	2003-14h	Effective Time:	At stop

Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0: Active low

1: Active high

Description

-

H03.34 DI function allocation 3 (activated upon power-on)

Hexadecimal:	2003-23h	Effective Time:	Upon the next power-on
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0: 0x0: Corresponding to null

1: 0x1: Corresponding to FunIN.33

2: 0x2: Corresponding to FunIN.34

4: 0x4: Corresponding to FunIN.35

8: 0x8: Corresponding to FunIN.36

16: 0x10: Corresponding to FunIN.37

32: 0x20: Corresponding to FunIN.38

64: 0x40: Corresponding to FunIN.39

128: 0x80: Corresponding to FunIN.40

256: 0x100: Corresponding to FunIN.41

512: 0x200: Corresponding to FunIN.42

1024: 0x400: Corresponding to FunIN.43

2048: 0x800: Corresponding to FunIN.44

4096: 0x1000: Corresponding to FunIN.45

8192: 0x2000: Corresponding to FunIN.46

16384: 0x4000: Corresponding to FunIN.47

Description

-

H03.35 DI function allocation 4 (activated upon power-on)

Hexadecimal:	2003-24h	Effective Time:	Upon the next power-on
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0: 0x0: Corresponding to null
1: 0x1: Corresponding to FunIN.49
2: 0x2: Corresponding to FunIN.50
4: 0x4: Corresponding to FunIN.51
8: 0x8: Corresponding to FunIN.52
16: 0x10: Corresponding to FunIN.53
32: 0x20: Corresponding to FunIN.54
64: 0x40: Corresponding to FunIN.55
128: 0x80: Corresponding to FunIN.56
256: 0x100: Corresponding to FunIN.57
512: 0x200: Corresponding to FunIN.58
1024: 0x400: Corresponding to FunIN.59
2048: 0x800: Corresponding to FunIN.60
4096: 0x1000: Corresponding to FunIN.61
8192: 0x2000: Corresponding to FunIN.62
16384: 0x4000: Corresponding to FunIN.63

Description

-

H03.60 **DI1 filter**

Hexadecimal:	2003-3Dh	Effective Time:	Real time
Min.:	0.00	Unit:	ms
Max.:	500.00	Data Type:	UInt16
Default:	3.00	Change:	Immediately

Value Range:

0.00 ms to 500.00 ms

Description

Defines the filter time of DI1. The DI function is active only after the effective level is kept within the time defined by H03.60.

H03.61 **DI2 filter**

Hexadecimal:	2003-3Eh	Effective Time:	Real time
Min.:	0.00	Unit:	ms
Max.:	500.00	Data Type:	UInt16
Default:	3.00	Change:	Immediately

Value Range:

0.00 ms to 500.00 ms

Description

Defines the filter time of DI2. The DI function is active only after the effective level is kept within the time defined by H03.61.

H03.62 **DI3 filter**

Hexadecimal:	2003-3Fh	Effective Time:	Real time
Min.:	0.00	Unit:	ms
Max.:	500.00	Data Type:	UInt16
Default:	3.00	Change:	Immediately

Value Range:

0.00 ms to 500.00 ms

Description

Defines the filter time of DI3. The DI function is active only after the effective level is kept within the time defined by H03.62.

H03.63 **DI4 filter**

Hexadecimal:	2003-40h	Effective Time:	Real time
Min.:	0.00	Unit:	ms
Max.:	500.00	Data Type:	UInt16
Default:	3.00	Change:	Immediately

Value Range:

0.00 ms to 500.00 ms

Description

Defines the filter time of DI4. The DI function is active only after the effective level is kept within the time defined by H03.63.

H03.64 **DI5 filter**

Hexadecimal:	2003-41h	Effective Time:	Real time
Min.:	0.00	Unit:	ms
Max.:	500.00	Data Type:	UInt16
Default:	3.00	Change:	Immediately

Value Range:

0.00 ms to 500.00 ms

Description

Defines the filter time of DI5. The DI function is active only after the effective level is kept within the time defined by H03.64.

H03.65 **DI8 filter 1**

Hexadecimal:	2003-42h	Effective Time:	Real time
Min.:	0.00	Unit:	ms
Max.:	500.00	Data Type:	UInt16
Default:	0.00	Change:	Immediately

Value Range:

0.00 ms to 500.00 ms

Description

Defines the filter time of DI8. The DI function is active only after the effective level is kept within the time defined by H03.65.

H03.66 **DI9 filter 1**

Hexadecimal:	2003-43h	Effective Time:	Real time
Min.:	0.00	Unit:	ms
Max.:	500.00	Data Type:	UInt16
Default:	0.00	Change:	Immediately

Value Range:

0.00 ms to 500.00 ms

Description

Defines the filter time of DI9. The DI function is active only after the effective level is kept within the time defined by H03.66.

4.5 H04 Terminal Output Parameters

H04.00 **DO1 function selection**

Hexadecimal:	2004-01h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	27	Data Type:	UInt16
Default:	1	Change:	Immediately

Value Range:

0: N/A
1: Servo ready
2: Motor rotating
3: Zero speed signal
4: Speed consistent
5: Positioning completed
6: Positioning approaches
7: Torque limit
Speed limit
9: Braking
10: Warning
11: Fault
12: Output 3-digit alarm code
13: Output 3-digit alarm code
14: Output 3-digit alarm code
15: Interrupt positioning completed
16: Homing completed
17: Electrical homing completed
18: Torque reached
19: Speed reached
20: Angle identification output
21: DB brake output
22: Internal command completed
23: Writing next command allowed
24: Internal movement completed
26: Servo enabled to receive operating command
27: Fault or warning

Description

Defines the function of DO1.

H04.01 **DO1 logic level**

Hexadecimal:	2004-02h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	Immediately

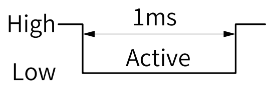
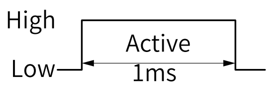
Value Range:

0: Output low (L) level when active (optocoupler ON)
1: Output high (H) level when active (optocoupler OFF)

Description

Defines the level logic of DO1 when the function assigned to DO1 is active.

DO1 to DO5 are normal DOs, requiring the minimum output signal width to be 1 ms. The host controller must be able to receive valid DO logic changes.

Set point	DO1 Logic Upon Active DO Function	Transistor Status	Remarks
0	Low level	ON	
1	High level	OFF	

View the setting of H04.22 (DO source) before receiving DO logic change to check whether DO output level is determined by the servo drive state or the communication.

H04.02 DO2 function selection

Hexadecimal:	2004-03h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	27	Data Type:	UInt16
Default:	5	Change:	Immediately

Value Range:

See H04.00.

Description

-

H04.03 DO2 logic level

Hexadecimal:	2004-04h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0: Output low (L) level when active (optocoupler ON)

1: Output high (H) level when active (optocoupler OFF)

Description

-

H04.04 DO3 function selection

Hexadecimal:	2004-05h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	27	Data Type:	UInt16
Default:	9	Change:	Immediately

Value Range:

See H04.00.

Description

-

H04.05 DO3 logic level

Hexadecimal:	2004-06h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0: Output low (L) level when active (optocoupler ON)

1: Output high (H) level when active (optocoupler OFF)

Description

-

H04.06 DO4 function selection

Hexadecimal:	2004-07h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	27	Data Type:	UInt16
Default:	11	Change:	Immediately

Value Range:

See H04.00.

Description

-

H04.07 DO4 logic level

Hexadecimal:	2004-08h	Effective Time:	At stop
Min.:	0	Unit:	-

Max.:	1	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0: Output low (L) level when active (optocoupler ON)

1: Output high (H) level when active (optocoupler OFF)

Description

-

H04.08 DO5 function selection

Hexadecimal:	2004-09h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	27	Data Type:	UInt16
Default:	16	Change:	Immediately

Value Range:

See H04.00.

Description

-

H04.09 DO5 logic level

Hexadecimal:	2004-0Ah	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0: Output low (L) level when active (optocoupler ON)

1: Output high (H) level when active (optocoupler OFF)

Description

-

H04.22 DO source selection

Hexadecimal:	2004-17h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	31	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

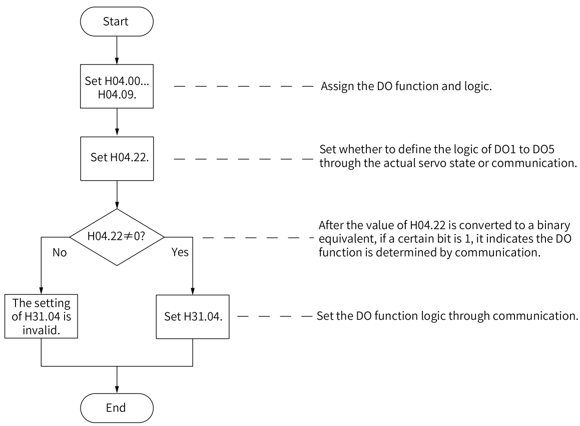
0–31

Description

Defines whether the logic of a physical DO terminal is defined by the actual state of the drive or by communication.
The value of H04.22 is displayed in decimal on the keypad. When the value is converted to a binary equivalent: If bit(n) is 0, it indicates the logic of DO(n+1) is defined by the actual state of the drive. If bit(n) is 1, it indicates the logic of DO (n+1) is defined by communication (H31.04).

Setpoint (decimal)	Setpoint (binary)					DO logic	
	bit4	bit3	bit2	bit1	bit0	Defined by the Drive State	Defined by Communica tion (H31.04)
	DO5	DO4	DO3	DO2	DO1		
0	0	0	0	0	0	DO1–DO5	/
1	0	0	0	0	1	DO2–DO5	DO1
…	…	…	…	…	…	…	…
31	1	1	1	1	1	/	DO1–DO5

Set H04.22 to a value listed in the preceding table.
H31.04 is not displayed on the keypad and can only be modified through communication. For H31.04, "bit(n) = 1" indicates the logic of DO(n+1) is active. "bit(n) = 0" indicates the logic of DO(n+1) is inactive.



4.6 H05 Position Control Parameters

H05.00 Main position reference source

Hexadecimal:	2005-01h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	2	Data Type:	UInt16

Default:	0	Change:	At stop

Value Range:

0: Pulse reference

1: Step reference

2: Multi-position reference

Description

Defines the position reference source in position control mode.

Pulse references are external position references. Step references and multi-position references are internal position references.

Setpoint	Reference source	Instruction receiving method
0	Pulse reference	The host controller or other pulse generator generates pulses, which is input into the servo drive by hardware terminals. The hardware terminal is selected in H05.01.
1	Step reference	The step displacement is set in H05.05 (step value). The step reference is sent by the DI set for function FunIN.20.
2	Multi-position reference	The running mode of the multi-position function is set in parameters in group H11. The multi-position reference is sent by the DI set for function FunIN.28.

H05.01 **Position pulse reference input terminal**

Hexadecimal:	2005-02h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

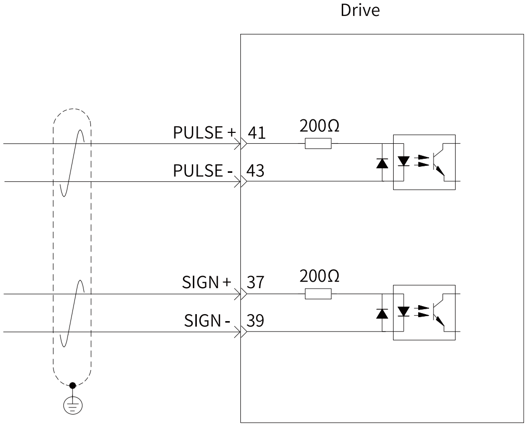
Value Range:

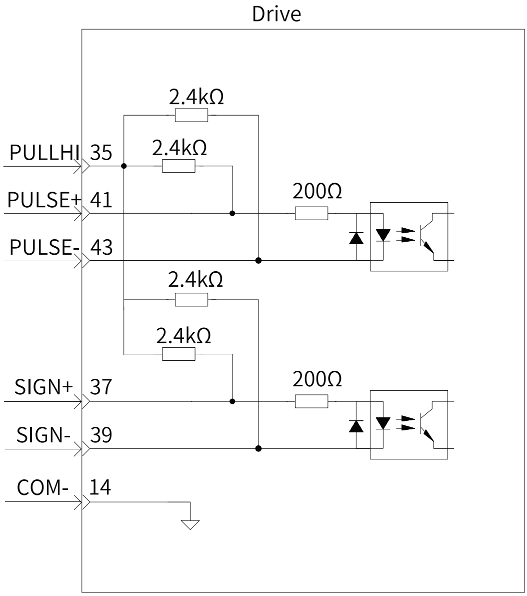
0: Low speed

1: High speed

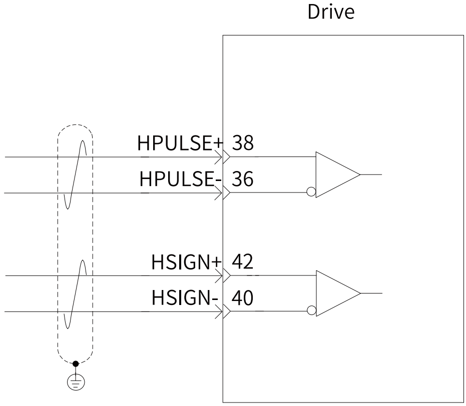
Description

Used to select the physical input terminal based on the input pulse frequency when the pulse reference acts as the position reference source in the position control mode.

<table>
<tr><th>Setpoint</th><th>Input Terminal</th><th>Instruction receiving method</th></tr>
<tr><td rowspan="2">0</td><td rowspan="2">Low-speed</td><td>Differential input terminals: PULSE+, PULSE-, SIGN+, SIGN-


Max. pulse frequency: 500 kpps</td></tr>
<tr><td>Open-collector input terminals: PULLHI, PULSE+, PULSE-, SIGN+, SIGN-


Max. pulse frequency: 200 kbps</td></tr>
</table>

<table>
<tr><th>Setpoint</th><th>Input Terminal</th><th>Instruction receiving method</th></tr>
<tr><td>1</td><td>High speed</td><td>Differential input terminals: HPULSE+, HPULSE-, HSIGN+, HSIGN-


Max. pulse frequency: $ Mbps.</td></tr>
</table>

H05.02 **Pulses per revolution**

Hexadecimal:	2005-03h	Effective Time:	Upon the next power-on
Min.:	0	Unit:	PPR
Max.:	1048576	Data Type:	UInt32
Default:	0	Change:	At stop

Value Range:

0P/Rev–1048576P/Rev

Description

Defines the number of pulses required per revolution of the motor.

H05.04 **First-order low-pass filter time constant**

Hexadecimal:	2005-05h	Effective Time:	Real time
Min.:	0.0	Unit:	ms
Max.:	6553.5	Data Type:	UInt16
Default:	0.0	Change:	At stop

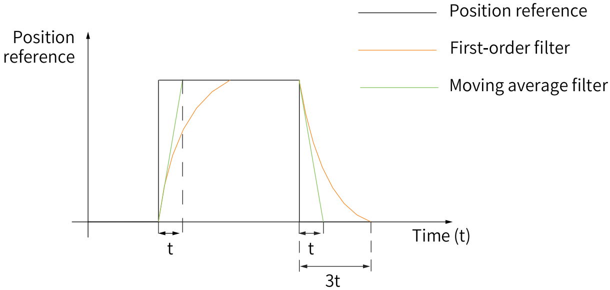
Value Range:

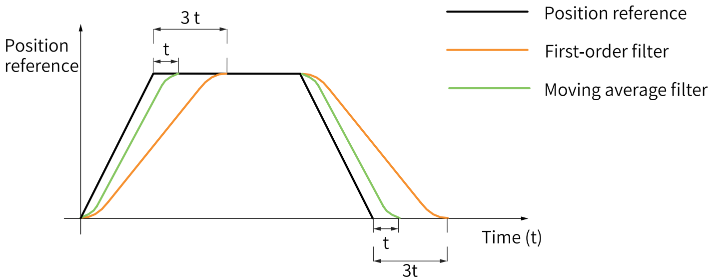
0.0 ms to 6553.5 ms

Description

Defines the first-order low pass filter time constant of position references.

If position reference P is rectangular wave or trapezoidal wave, the position reference after first-order low pass filtering is as follows:





This function does not affect the displacement value (position reference sum). An excessively high setpoint delays the responsiveness, so set a proper filter time constant based on actual conditions.

H05.05 **Step reference**

Hexadecimal:	2005-06h	Effective Time:	Real time
Min.:	-9999	Unit:	Reference unit
Max.:	9999	Data Type:	Int16
Default:	50	Change:	At stop

Value Range:

-9999 to +9999

Description

Defines the position reference sum when the step reference acts as the main position reference source.

H05.06 Moving average filtering time constant

Hexadecimal:	2005-07h	Effective Time:	Real time
Min.:	0.0	Unit:	ms
Max.:	128.0	Data Type:	UInt16
Default:	0.0	Change:	At stop

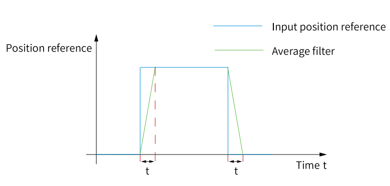
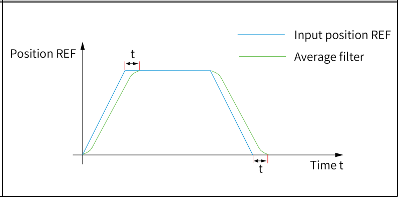
Value Range:

0.0 ms to 128.0 ms

Description

Defines the moving average filter time constant of position references.

If position reference P is rectangular wave or trapezoidal wave, the position reference after average value filter is as follows:

Position reference being rectangular wave	Position reference being trapezoidal wave
	

This function does not affect the displacement value (position reference sum). An excessively high setpoint delays the responsiveness, so set a proper filter time constant based on actual conditions.

H05.07 Electronic gear ratio 1 (numerator)

Hexadecimal:	2005-08h	Effective Time:	Real time
Min.:	1	Unit:	-
Max.:	1073741824	Data Type:	UInt32
Default:	8388608	Change:	Immediately

Value Range:

1 to 1073741824

Description

Defines the numerator of electronic gear ratio 1.

H05.09 Electronic gear ratio 1 (denominator)

Hexadecimal:	2005-0Ah	Effective Time:	Real time
Min.:	1	Unit:	-
Max.:	1073741824	Data Type:	UInt32

Default:	10000	Change:	Immediately

Value Range:

1 to 1073741824

Description

Defines the denominator of electronic gear ratio 1.

H05.11 **Electronic gear ratio 2 (numerator)**

Hexadecimal:	2005-0Ch	Effective Time:	Real time
Min.:	1	Unit:	-
Max.:	1073741824	Data Type:	UInt32
Default:	8388608	Change:	Immediately

Value Range:

1 to 1073741824

Description

Defines the numerator of electronic gear ratio 2.

H05.13 **Electronic gear ratio 2 (denominator)**

Hexadecimal:	2005-0Eh	Effective Time:	Real time
Min.:	1	Unit:	-
Max.:	1073741824	Data Type:	UInt32
Default:	10000	Change:	Immediately

Value Range:

1 to 1073741824

Description

Defines the denominator of electronic gear ratio 2.

H05.15 **Pulse reference form**

Hexadecimal:	2005-10h	Effective Time:	Upon the next power-on
Min.:	0	Unit:	-
Max.:	3	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Direction + Pulse, positive logic

1: Direction + Pulse, negative logic

2: Phase A + phase B quadrature pulse, quadrupled frequency

3: CW + CCW

Description

Defines the input pulse form when the main position reference source is pulse input.

Table 4–4 Descriptions of the pulse form

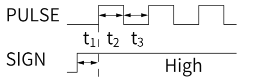
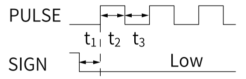
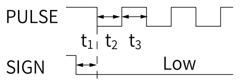
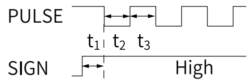
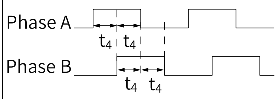
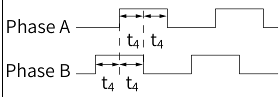
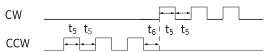
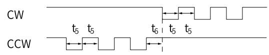
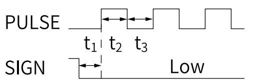
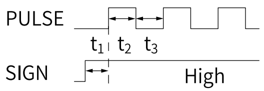
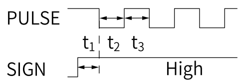
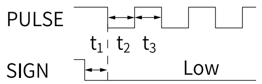
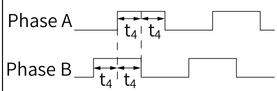
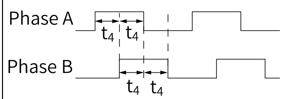
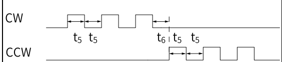
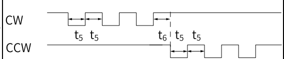
H02.02	H05.15	Pulse form	Signal	Diagram of forward pulses	Diagram of reverse pulses
0	0	Pulse + Direction Positive Logic	PULSE SIGN		
	1	Pulse + Direction Negative Logic	PULSE SIGN		
	2	Phase A + Phase B Quadrature pulse Quadrupled frequency	PULSE (phase A) SIGN (phase B)	Phase A leads phase B by 90°. 	Phase B leads phase A by 90°. 
	3	CW+CCW	PULSE (CW) SIGN (CCW)		
1	0	Pulse + Direction Positive Logic	PULSE SIGN		
	1	Pulse + Direction Negative Logic	PULSE SIGN		
	2	Phase A + Phase B Quadrature pulse Quadrupled frequency	PULSE (phase A) SIGN (phase B)	Phase B leads phase A by 90°. 	Phase A leads phase B by 90°. 
	3	CW+CCW	PULSE (CW) SIGN (CCW)		

Table 4–5 Specifications of pulse references

Input Terminal		Maximum Frequency	Minimum Time Width (unit: us)					
			t1	t2	t3	t4	t5	t6
High-speed pulse input terminal		4 Mpps	0.125	0.125	0.125	0.25	0.125	0.125
Low-speed pulse input terminal	Differential input	200 kpps	2.5	2.5	2.5	5	2.5	2.5
	Open collector input	200 kpps	2.5	2.5	2.5	5	2.5	2.5

H05.16 **Clear action**

Hexadecimal:	2005-11h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	2	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Clear position deviation upon S-OFF and fault

1: Clear position deviation pulses upon S-OFF and fault

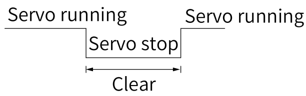
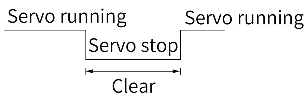
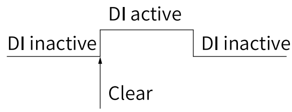
2: Clear position deviation by ClrPosErr signal input from DI

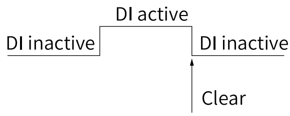
Description

Defines the condition for clearing the position deviation.

Position deviation = (Position reference – Position feedback) (encoder unit)

Table 4–6 Position deviation clear

<table>
<tr><th>Setpoint</th><th>Clear Condition</th><th>Clear Time</th></tr>
<tr><td>H05.16 = 0</td><td>Clear the position deviation when the S-ON signal is switched off or when a fault occurs.</td><td>
</td></tr>
<tr><td>H05.16 = 1</td><td>Clear the position deviation when the S-ON signal is switched off or when the servo drive stops upon a fault event.</td><td>
</td></tr>
<tr><td rowspan="2">H05.16 = 2</td><td rowspan="2">Clear the position deviation cleared when the S-ON signal is switched off or when a fault occurs. Clear the position deviation when ClrPosErr signal is inputted through a DI when the servo drive is in the RUN state.</td><td>

(Rising edge-triggered)</td></tr>
<tr><td>

(Falling edge-triggered)</td></tr>
</table>

If absolute value of position deviation is larger than H0A.10 (Threshold of position deviation excess), EB00.0 (Position deviation being large) will occur.

H05.17 Number of encoder frequency-division pulses

Hexadecimal:	2005-12h	Effective Time:	Upon the next power-on
Min.:	35	Unit:	PPR
Max.:	32767	Data Type:	UInt16
Default:	2500	Change:	At stop

Value Range:

35P/Rev–32767P/Rev

Description

Defines the number of pulses output by PAO or PBO per revolution.

Pulse output resolution per revolution = (H05.17) x 4

H05.19 Speed feedforward control

Hexadecimal:	2005-14h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	1	Change:	At stop

Value Range:

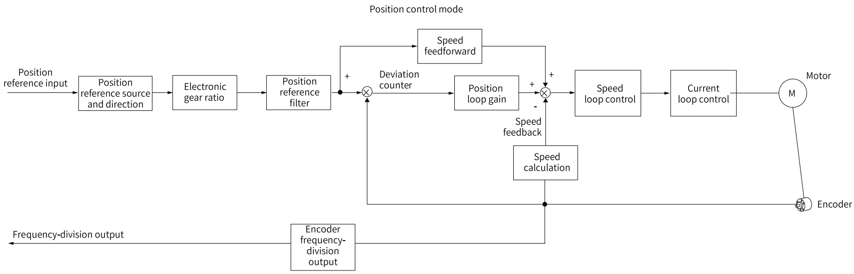
0: No speed feedforward

1: Internal speed feedforward

Description

Defines the source of the speed loop feedforward signal.

In the position control mode, speed feedforward can be used to improve the position reference response speed.



H05.20 Condition for positioning completed signal output

Hexadecimal:	2005-15h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	3	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0: Absolute position deviation lower than the setpoint of H05.21

1: Absolute position deviation lower than the setpoint of H05.21 and the filtered position reference is 0

2: Absolute position deviation lower than the setpoint of H05.21 and the unfiltered position reference is 0

3: Absolute position deviation kept lower than the setpoint of H05.21 within the time defined by H05.60 and the unfiltered position reference is 0

Description

Defines the condition for outputting positioning completed/proximity signal. In the position control mode, if the absolute value of the position deviation during operation is within the setpoint of H05.21, the drive outputs the positioning completed/proximity signal. You can set the condition for outputting the positioning completed/proximity signal in H05.20.

Setpoint	Output conditions
0	Absolute value of position deviation is smaller than the value of H05.21
1	Absolute value of position deviation is smaller than the value of H05.21 and the position reference after filtering is 0
2	Absolute value of position deviation is smaller than the value of H05.21 and the position reference before filtering is 0
3	Absolute value of position deviation kept lower than H05.21 within the time defined by H05.60 and unfiltered position reference being 0

H05.21 Threshold of positioning completed

Hexadecimal:	2005-16h	Effective Time:	Real time
Min.:	1	Unit:	Encoder unit
Max.:	65535	Data Type:	UInt16
Default:	5872	Change:	Immediately

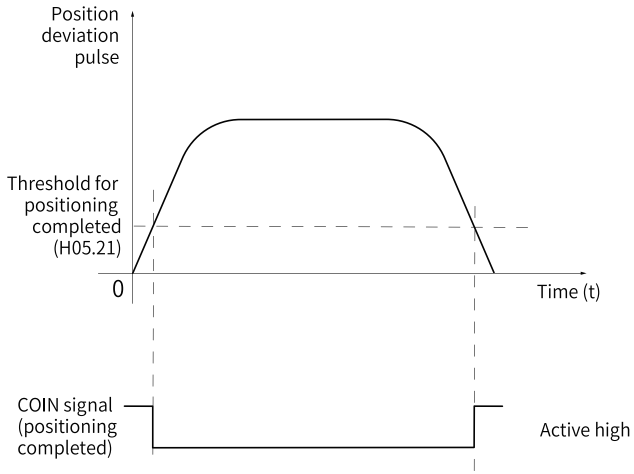
Value Range:

1 to 65535

Description

Defines the threshold of the absolute value of position deviation when the drive outputs the positioning completed signal.

Positioning completed signal: DO function 5 (FunOUT.5: COIN).



The positioning completed signal is valid only when the servo drive is in running state and in position control.

H05.22 **Proximity threshold**

Hexadecimal:	2005-17h	Effective Time:	Real time
Min.:	1	Unit:	Encoder unit
Max.:	65535	Data Type:	UInt16
Default:	65535	Change:	Immediately

Value Range:

1 to 65535

Description

Defines the threshold of the absolute value of position deviation when the drive outputs the proximity signal.

H05.23 **Interrupt positioning selection**

Hexadecimal:	2005-18h	Effective Time:	Upon the next power-on
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Disable

1: Enabled

Description

Setpoint	Interrupt Positioning
0	Prohibit
1	Working

H05.24 Displacement of interrupt positioning

Hexadecimal:	2005-19h	Effective Time:	Real time
Min.:	0	Unit:	Reference unit
Max.:	1073741824	Data Type:	UInt32
Default:	10000	Change:	Immediately

Value Range:

0 to 1073741824

Description

Defines the position reference value during interrupt positioning.

H05.26 Constant operating speed in interrupt positioning

Hexadecimal:	2005-1Bh	Effective Time:	Real time
Min.:	0	Unit:	rpm
Max.:	6000	Data Type:	UInt16
Default:	200	Change:	Immediately

Value Range:

0rpm–6000rpm

Description

Defines the maximum speed during interrupt positioning.

Table 4–7 Motor speed during interrupt positioning

H05.26	Motor Speed before Triggering Interrupt Positioning	Interrupt Positioning	Constant operating speed in interrupt positioning
0	< 10	Inactive	-
	⩾ 10	Active	Motor Speed before Triggering Interrupt Positioning
1 to 6000	-	Active	H05.26

H05.27 **Acceleration/Deceleration time of interrupt positioning**

Hexadecimal:	2005-1Ch	Effective Time:	Real time
Min.:	0	Unit:	ms
Max.:	1000	Data Type:	UInt16
Default:	10	Change:	Immediately

Value Range:

0 ms to 1000 ms

Description

Defines the time for the motor to change from 0 rpm to 1000 rpm at a constant speed during interrupt positioning.

The actual motor acceleration time "t" during interrupt positioning is as follows:

$$t = \frac{|\text{H05.26-Motor speed before interrupt positioning}|}{1000} \times (\text{H05.27})$$

H05.29 **Interrupt positioning cancel signal**

Hexadecimal:	2005-1Eh	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	1	Change:	Immediately

Value Range:

0: Disabled

1: Enabled

Description

Defines whether to unlock the interrupt positioning signal.

Setpoint	Interrupt positioning cancel signal	Remarks
0	Disabled	After interrupt positioning is completed, the servo drive responds to the other position references directly.
1	Enabled	• After interrupt positioning is completed, the servo drive does not respond to the other position references directly. • The servo drive can respond to other position references only after the DI function 29 (FunIN.29: XintFree, interrupt positioning unlock) is enabled.

H05.30 Homing selection

Hexadecimal:	2005-1Fh	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	8	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0: Disabled

1: Homing enabled through the HomingStart signal input from DI

2: Electrical homing enabled through the HomingStart signal input from DI

3: Homing started immediately upon power-on

4: Homing executed immediately

5: Electrical homing started

6: Current position as home

8: D-triggered position as home

Description

Defines the homing mode and the trigger signal source.

Setpoint	Trigger Signal	Remarks	
		Homing mode	Trigger Signal
0	Disabled	Homing is disabled.	
1	Homing enabled through the HomingStart signal inputted from DI	Homing	DI signal FunIN.32 (HomingStart: homing enabled)
2	Electrical homing enabled through the HomingStart signal inputted from DI	Electrical homing	DI signal FunIN.32 (HomingStart: homing enabled)
3	Homing enabled immediately upon power-on	Homing	S-ON signal active for the first time after next power-on in position control
4	Homing executed immediately	Homing	S-ON signal active in position control After homing is done, set H05.30 to 0.
5	Electrical homing started	Electrical homing	S-ON signal active in position control After homing is done, set H05.30 to 0.
6	Current position as home	Homing	Not required After homing is done, set H05.30 to 0.
8	Current position as the home enabled through signal input from DI	Homing	DI signal FunIN.38 (current position as the home)

H05.31 **Homing mode**

Hexadecimal:	2005-20h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	16	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0: Forward, home switch as deceleration point and home
1: Reverse, home switch as deceleration point and home
2: Forward, Z signal as deceleration point and home
3: Reverse, motor Z signal as deceleration point and home
4: Forward, home switch as deceleration point and Z signal as home
5: Reverse, home switch as deceleration point and Z signal as home
6: Forward, positive limit switch as deceleration point and home
7: Reverse, negative limit switch as deceleration point and home
8: Forward, positive limit switch as deceleration point and Z signal as home
9: Reverse, negative limit switch as deceleration point and Z signal as home
10: Forward, mechanical limit position as deceleration point and home
11: Reverse, mechanical limit position as deceleration point and home
12: Forward, mechanical limit position as deceleration point and Z signal as home
13: Reverse, mechanical limit position as deceleration point and Z signal as home
14: Forward single-turn homing
15: Reverse single-turn homing
16: Nearby single-turn homing

Description

Defines the default motor direction of rotation, deceleration point, and home during homing.

H05.32 Speed in high-speed searching for the home switch signal

Hexadecimal:	2005-21h	Effective Time:	Real time
Min.:	0	Unit:	rpm
Max.:	3000	Data Type:	UInt16
Default:	100	Change:	Immediately

Value Range:

0rpm–3000rpm

Description

Defines the motor speed for searching for the deceleration point signal during homing.

H05.33 Speed in low-speed searching for the home switch signal

Hexadecimal:	2005-22h	Effective Time:	Real time
Min.:	0	Unit:	rpm
Max.:	1000	Data Type:	UInt16
Default:	10	Change:	Immediately

Value Range:

0rpm–1000rpm

Description

Defines the motor speed for searching for the home signal during homing.

H05.34 Acceleration/Deceleration time during homing

Hexadecimal:	2005-23h	Effective Time:	Real time
Min.:	0	Unit:	ms
Max.:	1000	Data Type:	UInt16
Default:	1000	Change:	Immediately

Value Range:

0 ms to 1000 ms

Description

Defines the time for the motor to accelerate from 0 rpm to 1000 rpm at a constant speed during homing.

H05.35 Home search time limit

Hexadecimal:	2005-24h	Effective Time:	Real time
Min.:	0	Unit:	ms
Max.:	65535	Data Type:	UInt16
Default:	10000	Change:	Immediately

Value Range:

0 ms to 65535 ms

Description

Defines the maximum homing time.

H05.36 Mechanical home offset

Hexadecimal:	2005-25h	Effective Time:	Real time
Min.:	-1073741824	Unit:	Reference unit
Max.:	1073741824	Data Type:	Int32
Default:	0	Change:	Immediately

Value Range:

-1073741824 to 1073741824

Description

Defines the absolute position of the motor after homing.

H05.38 Servo pulse output source

Hexadecimal:	2005-27h	Effective Time:	Upon the next power-on
Min.:	0	Unit:	-
Max.:	2	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Encoder frequency division output

1: Pulse reference synchronous output

2: Frequency division or synchronous output inhibited

Description

Defines the output source of the pulse output terminal.

Setpoint	Output Source	Remarks
0	Encoder frequency-division output	The encoder feedback signal is outputted only after being divided by the value of H05.17 during rotation of the motor. Encoder frequency-division output mode is recommended when the host controller is used for closed-loop feedback.
1	Pulse reference synchronous output	The input pulse references are outputted synchronously only when H05.00 is set to 0. When the pulses of multi-axis servo is tracked synchronously, synchronous output of pulse references is recommended.
2	Frequency-division output inhibited	No output is generated from pulse output terminals.

The pulse output terminals are as follows:

Signal Name	Output Mode	Output Port	Max. pulse frequency
A-phase signal	Differential output	PAO+, PAO-	2Mpps
B-phase signal	Differential output	PBO+, PBO-	2Mpps
Phase Z signal	Differential output	PZO+, PZO-	2Mpps
	Open-collector output	PZ-OUT, GND	100kpps

Signal width of phase A/B pulse is determined by motor speed. Signal width of phase Z pulse is half of that of phase A/B pulse.

The output polarity of phase Z signal is determined by the setting of H05.41 (Output polarity of pulse Z).

H05.39 Electronic gear ratio switchover condition

Hexadecimal:	2005-28h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Switchover after position reference is kept 0 for 2.5 ms

1: Switched in real time

Description

Defines the condition for switching the electronic gear ratio.

Setpoint	switchover conditions	Remarks
0	Switching after the position pulse reference kept 0 for 2.5 ms	DI function 24 must be set for a DI terminal. (FunIN.24: GEAR_SEL, electronic gear ratio selection)
1	Real-time switchover	

H05.40 Mechanical home offset and action upon overtravel

Hex:	2005-29h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	3	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: H05.36 as the coordinate after homing, reverse homing applied after homing triggered again on overtravel

1: H05.36 as the relative offset after homing, reverse homing applied after homing triggered again on overtravel

2: H05.36 as the coordinate after homing, reverse homing auto-applied on overtravel

3: H05.36 as the relative offset after homing, reverse homing auto-applied on overtravel

Description

Defines the offset relationship between the mechanical home and mechanical zero point, and the action upon overtravel during homing.

Note: The following logic takes effect when H11.00 is not 5.

Set point	Mechanical home offset and action upon overtravel	Remarks	
		Mechanical home	Overtravel handling
0	H05.36 as the coordinate after homing, reverse homing applied after homing triggered again on overtravel	The mechanical home differs from the mechanical zero point. After homing, the motor stops at the home position and the home coordinate is forced to the value of H05.36.	When homing is triggered again, the drive performs homing in reverse direction.
1	H05.36 as the relative offset after homing, reverse homing triggered on hitting the limit	The mechanical home overlaps with the mechanical zero point. After locating the home position, the motor will not stop until reaching the value of H05.36.	When homing is triggered again, the drive performs homing in reverse direction.
2	H05.36 as the coordinate after homing, reverse homing auto-applied on overtravel	The mechanical home differs from the mechanical zero point. After homing, the motor stops at the home position and the home coordinate is forced to the value of H05.36.	The drive continues to perform homing in reverse direction.
3	H05.36 as the relative offset after homing, reverse homing auto-applied on overtravel	The mechanical home overlaps with the mechanical zero point. After locating the home position, the motor will not stop until reaching the value of H05.36.	The drive continues to perform homing in reverse direction.

After homing (including homing and electrical homing), the absolute motor position (H0b.07) is consistent with H05.36.

Homing completed signal (FunOUT.16: HomeAttain) or electrical homing completed signal (FunOUT.17: ElecHomeAttain) will be output only after H0b.07 = H05.36. Regardless of S-ON signal state.

H05.41 **Z pulse output polarity**

Hexadecimal:	2005-2Ah	Effective Time:	Upon the next power-on
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16

Default: 1 Change: At stop

Value Range:

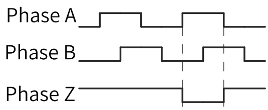
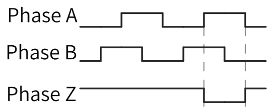
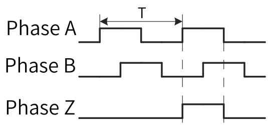
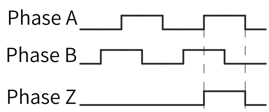
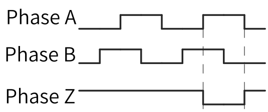
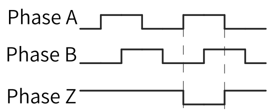
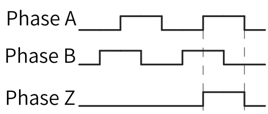
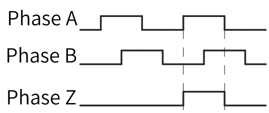
0: Negative (Z pulse active low)

1: Positive (Z pulse active high)

Description

Defines the output level when the Z pulse of pulse output terminal is active.

Table 4–8 Pulse diagrams of encoder frequency-division output (H05.38 = 0)

H02.03 (Output pulse phase)	H05.41 (Z pulse output polarity)	Pulse Output Diagram of Forward RUN	Pulse Output Diagram of Reverse RUN
0	0	 Phase A leads phase B by 90°.	 Phase B leads phase A by 90°.
	1	 Phase A leads phase B by 90°.	 Phase B leads phase A by 90°.
1	0	 Phase B leads phase A by 90°.	 Phase A leads phase B by 90°.
	1	 Phase B leads phase A by 90°.	 Phase A leads phase B by 90°.

It is recommended to use the active edge outputted by Z signal when a high precision frequency-division output of Z signal is required.

Setpoint	Z pulse output polarity
0	Negative (low level upon active Z pulse)
1	Positive (high level upon active Z pulse)

H05.41 = 0: Falling-edge triggered; H05.41 = 1: Rising-edge triggered

H05.43 Position pulse edge

Hexadecimal:	2005-2Ch	Effective Time:	Upon the next power-on
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	1	Change:	Immediately

Value Range:

0: Falling edge-triggered

1: Rising edge-triggered

Description

-

H05.44 Encoder multi-turn data offset

Hexadecimal:	2005-2Dh	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0 to 65535

Description

H05.46 Position offset in absolute position linear mode (low 32 bits)

Hexadecimal:	2005-2Fh	Effective Time:	Upon the next power-on
Min.:	-2147483648	Unit:	Encoder unit
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	At stop

Value Range:

-2147483648 to 2147483647

Description

-

H05.48 **Position offset in absolute position linear mode (high 32 bits)**

Hexadecimal:	2005-31h	Effective Time:	Upon the next power-on
Min.:	-2147483648	Unit:	Encoder unit
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	At stop

Value Range:

-2147483648 to 2147483647

Description

-

H05.50 **Mechanical gear ratio in absolute position rotation mode (numerator)**

Hexadecimal:	2005-33h	Effective Time:	Real time
Min.:	1	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	1	Change:	At stop

Value Range:

1 to 65535

Description

Defines the transmission ratio between the mechanical rotary load and the motor in the absolute position rotation mode.

H05.51 **Mechanical gear ratio in absolute position rotation mode (denominator)**

Hexadecimal:	2005-34h	Effective Time:	Real time
Min.:	1	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	1	Change:	At stop

Value Range:

1 to 65535

Description

Defines the transmission ratio between the mechanical rotary load and the motor in the absolute position rotation mode.

H05.52 **Pulses per revolution of the load in absolute position rotation mode (low 32 bits)**

Hexadecimal:	2005-35h	Effective Time:	Real time
Min.:	0	Unit:	Encoder unit
Max.:	2147483647	Data Type:	UInt32

Default:	0	Change:	At stop

Value Range:

0 to 2147483647

Description

Defines the number of pulses per revolution of the rotary load in the absolute position rotation mode.

H05.54 Pulses per revolution of the load in absolute position rotation mode (high 32 bits)

Hexadecimal:	2005-37h	Effective Time:	Real time
Min.:	0	Unit:	Encoder unit
Max.:	127	Data Type:	UInt32
Default:	0	Change:	At stop

Value Range:

0 to 127

Description

Defines the number of pulses per revolution of the rotary load in the absolute position rotation mode.

H05.56 Speed threshold in homing upon hit-and-stop

Hexadecimal:	2005-39h	Effective Time:	Real time
Min.:	0	Unit:	rpm
Max.:	1000	Data Type:	UInt16
Default:	2	Change:	Immediately

Value Range:

0rpm–1000rpm

Description

-

H05.57 Mechanical limit times threshold

Hexadecimal:	2005-3Ah	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	20	Change:	Immediately

Value Range:

0 to 65535

Description

-

H05.58 **Torque threshold in homing upon hit-and-stop**

Hexadecimal:	2005-3Bh	Effective Time:	Real time
Min.:	0.0	Unit:	%
Max.:	300.0	Data Type:	UInt16
Default:	100.0	Change:	Immediately

Value Range:

0.0% to 300.0%

Description

Defines the maximum positive/negative torque limit in homing upon hit-and-stop.

H05.59 **Positioning window time**

Hexadecimal:	2005-3Ch	Effective Time:	Real time
Min.:	0	Unit:	ms
Max.:	30000	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0 ms to 30000 ms

Description

If the positioning deviation is less than the time threshold of positioning completed, the positioning completed signal is active only if the set time threshold is exceeded.

H05.60 **Hold time of positioning completed**

Hexadecimal:	2005-3Dh	Effective Time:	Real time
Min.:	0	Unit:	ms
Max.:	30000	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0 ms to 30000 ms

Description

Defines the hold time of an active positioning completed signal.

H05.61 **Encoder frequency-division pulse output (32-bit)**

Hexadecimal:	2005-3Eh	Effective Time:	Upon the next power-on
Min.:	0	Unit:	PPR
Max.:	262143	Data Type:	UInt32

Default:	0	Change:	At stop

Value Range:

0P/Rev–262143P/Rev

Description

When the capacity of H05.17 is insufficient, defines the number of pulses output by PAO or PBO per revolution.

Pulse output resolution per revolution = (H05.61) x 4

H05.63 Real time update of position reference source

Hexadecimal:	2005-40h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0 to 1

Description

-

H05.66 Homing time unit

Hexadecimal:	2005-43h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	2	Data Type:	Int32
Default:	0	Change:	At stop

Value Range:

0: 1 ms

1: 10 ms

2: 100 ms

Description

Defines the homing time unit. The actual timeout time is H05.35 x H05.66 ms.

H05.67 Offset between zero point and single-turn absolute position

Hexadecimal:	2005-44h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	2147483648	Data Type:	UInt32
Default:	0	Change:	At stop

Value Range:

0 to 2147483648

Description

-

H05.69 Auxiliary homing function

Hexadecimal:	2005-46h	Effective Time:	Upon the next power-on
Min.:	0	Unit:	-
Max.:	4	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Disabled
1: Enable single-turn homing
2: Record deviation position
3: Start a new search for the Z signal (homing)
4: Clear the position deviation

Description

Single-turn homing mode setting
0: Disabled
1: Enable single-turn homing
2: Record deviation position
3: Start a new search for the Z signal (homing)
4: Clear the position deviation

4.7 H06 Speed Control Parameters

H06.00 Source of main speed reference A

Hexadecimal:	2006-01h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	0	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Digital setting (H06.03)

Description

Defines the source of main speed reference A.

Setpoint	Reference source	Instruction receiving method
0	Digital setting	The source of speed reference A is set by H06.03.

H06.01 Source of auxiliary speed reference B

Hexadecimal:	2006-02h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	5	Data Type:	UInt16
Default:	5	Change:	At stop

Value Range:

0: Digital setting (H06.03)

5: Multi-speed reference

Description

Defines the source of auxiliary speed reference B.

Setpoint	Reference source	Instruction receiving method
0	Digital setting	The source of speed reference A is set by H06.03.
1	-	-
2	-	-
3	-	-
4	-	-
5	Multi-speed reference	The source of auxiliary speed reference B is defined by internal multi-speed references. For details on multi-speed, see parameters in group H12.

H06.02 Speed reference source

Hexadecimal:	2006-03h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	4	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Source of main speed reference A

1: Source of auxiliary speed reference B

2: A+B

3: Switched between A and B

4: Communication

Description

Defines the source of speed references.

<table>
<tr><th>Setpoint</th><th>Control mode</th><th>Remarks</th></tr>
<tr><td>0</td><td>Source of main speed reference A</td><td>The reference source is defined by H06.00.</td></tr>
<tr><td>1</td><td>Source of auxiliary speed reference B</td><td>The reference source is defined by H06.01.</td></tr>
<tr><td>2</td><td>A+B</td><td>The reference source is the product of A+B (H06.00+H06.01).</td></tr>
<tr><td>3</td><td>Switched between A and B</td><td>The reference source is switched between A and B as defined by FunIN.4 (Cmd_SEL).
<table><tr><th>State of FunIN.4 (Cmd_SEL)</th><th>Reference Source</th></tr><tr><td>Inactive</td><td>Source of main speed reference A</td></tr><tr><td>Active</td><td>Source of auxiliary speed reference B</td></tr></table></td></tr>
<tr><td>4</td><td>Communication</td><td>The speed reference is defined by operating on H31.09 through communication (unit: 0.001 RPM).</td></tr>
</table>

H06.03 **Speed reference set through keypad**

Hexadecimal:	2006-04h	Effective Time:	Real time
Min.:	-6000	Unit:	rpm
Max.:	6000	Data Type:	Int16
Default:	200	Change:	Immediately

Value Range:

–6000 rpm to 6000 rpm

Description

Defines the speed reference value set through the keypad.

H06.04 **Jog speed setpoint**

Hexadecimal:	2006-05h	Effective Time:	Real time
Min.:	0	Unit:	rpm
Max.:	6000	Data Type:	UInt16
Default:	100	Change:	Immediately

Value Range:

0rpm–6000rpm

Description

Defines the DI jog speed reference.

H06.05 Acceleration ramp time constant of speed reference

Hexadecimal:	2006-06h	Effective Time:	Real time
Min.:	0	Unit:	ms
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0 ms to 65535 ms

Description

Sets acceleration ramp time of speed reference. The acceleration/deceleration time constant of multi-speed references are defined only by parameters in group H12.

H06.05 defines the time for the speed reference to change from 0 rpm to 1000 rpm.

H06.06 defines the time for the speed reference to change from 1000 rpm to 0 rpm.

The formulas for calculating the actual acceleration/deceleration time are as follows:

Actual acceleration time t1= Speed reference ÷ 1000 x Acceleration ramp time of speed reference

Actual deceleration time t2= Speed reference ÷ 1000 x Deceleration ramp time of speed reference

H06.06 Deceleration ramp time constant of speed reference

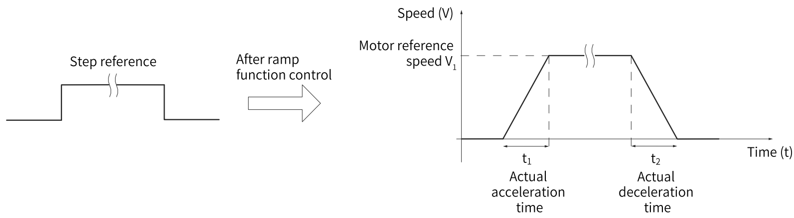
Hexadecimal:	2006-07h	Effective Time:	Real time
Min.:	0	Unit:	ms
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0 ms to 65535 ms

Description

Set the acceleration/deceleration ramp time constant of speed reference. The acceleration/deceleration ramp time constant is determined by parameters in group H12.



H06.05 defines the time for the speed reference to change from 0 rpm to 1000 rpm.
H06.06 defines the time for the speed reference to change from 1000 rpm to 0 rpm.
The formulas for calculating the actual acceleration/deceleration time are as follows:

$$\text{Actual acceleration time } t_1 = \frac{\text{Speed reference}}{1000} \times \text{Speed reference acceleration ramp time}$$

$$\text{Actual deceleration time } t_2 = \frac{\text{Speed reference}}{1000} \times \text{Speed reference deceleration ramp time}$$

H06.07 Maximum speed limit

Hexadecimal:	2006-08h	Effective Time:	Real time
Min.:	0	Unit:	rpm
Max.:	6000	Data Type:	UInt16
Default:	6000	Change:	Immediately

Value Range:

0rpm–6000rpm

Description

Defines the maximum speed limit.

H06.08 Forward speed limit

Hexadecimal:	2006-09h	Effective Time:	Real time
Min.:	0	Unit:	rpm
Max.:	6000	Data Type:	UInt16

Default:	6000	Change:	Immediately

Value Range:

0rpm–6000rpm

Description

Defines the forward speed threshold.

H06.09 Reverse speed limit

Hexadecimal:	2006-0Ah	Effective Time:	Real time
Min.:	0	Unit:	rpm
Max.:	6000	Data Type:	UInt16
Default:	6000	Change:	Immediately

Value Range:

0rpm–6000rpm

Description

Defines the reverse speed threshold.

In the speed control mode, the sources of speed reference limit include:

- H06.07 (Maximum speed limit): Defines the speed reference limit in both directions. The limit value applies when speed references exceed it.
- H06.08 (Forward speed limit): Defines the speed limit in the forward direction. The limit value applies when forward speed references exceed it.
- H06.09 (Reverse speed limit): Defines the speed limit in the reverse direction. The limit value applies when reverse speed references exceed it.
- Maximum speed of the motor (default threshold): Depends on the motor model.

The actual motor speed limit complies with the following range:

- |Forward speed limit| ⩽ min {maximum motor speed, H06.07, H06.08}
- |Reverse speed limit| ⩽ min {maximum motor speed, H06.07, H06.09}

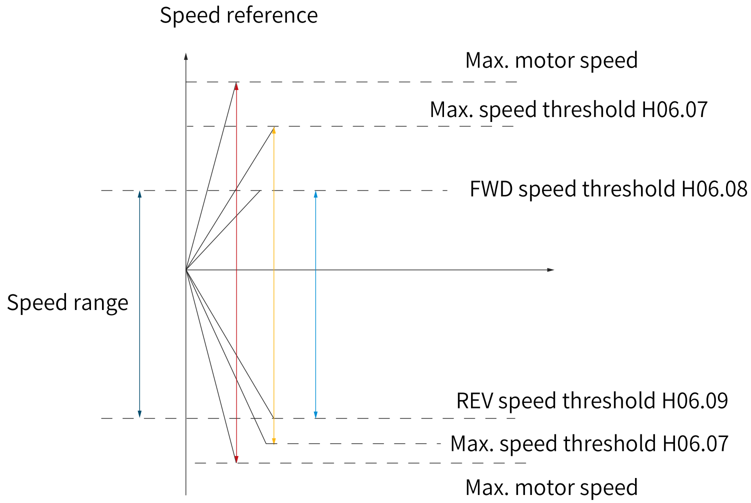


Figure 4-1 Example of speed reference limit

H06.11 **Torque feedforward control**

Hexadecimal:	2006-0Ch	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	1	Change:	Immediately

Value Range:

0: No torque feedforward

1: Internal torque feedforward

Description

Defines the source for torque feedforward control.

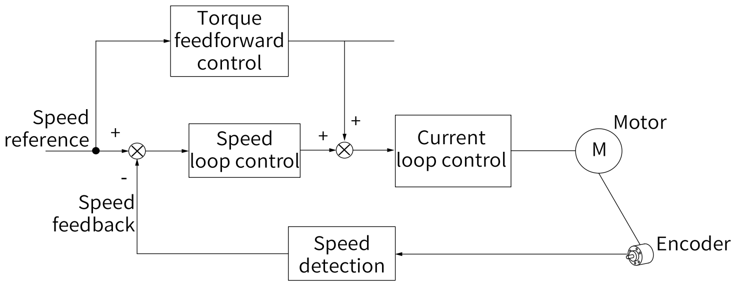
Defines whether to enable internal torque feedforward in the control modes other than torque control.

Torque feedforward can be used to improve the torque reference response speed and reduce the position deviation during acceleration/deceleration at constant speed.

Setpoint	Torque feedforward control	Remarks
0	/	-
1	Internal torque feedforward	The speed reference is used as the torque feedforward signal source, which is further divided into the following two situations: • In the position control mode, the speed reference refers to that output from the position controller. • In the speed control mode, the speed reference refers to that set by the user.

Parameters of the torque feedforward function include H08.20 (Torque feedforward filter time constant) and H08.21 (Torque feedforward gain).

The block diagram for torque feedforward control in control modes other than torque control is as follows:



H06.13 Speed smoothing time

Hexadecimal:	2006-0Eh	Effective Time:	Real time
Min.:	0	Unit:	us
Max.:	20000	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0us–20000us

Description

Defines the speed feedforward smoothing filter time.

H06.15 Zero clamp speed threshold

Hexadecimal:	2006-10h	Effective Time:	Real time
Min.:	0	Unit:	rpm
Max.:	6000	Data Type:	UInt16
Default:	10	Change:	Immediately

Value Range:

0rpm–6000rpm

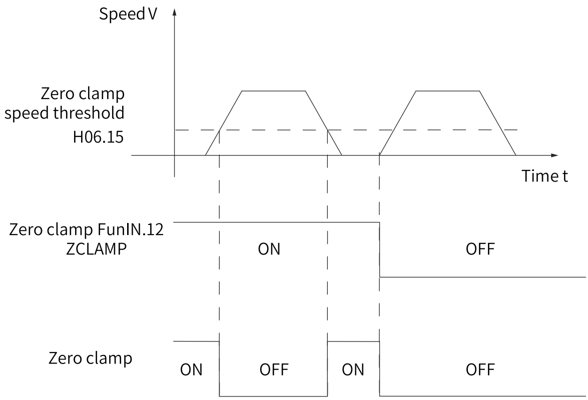
Description

Defines the zero clamp speed threshold.

In the speed control mode, if FunIN.12 (ZCLAMP) is enabled, and the speed reference amplitude is smaller than or equal to the value of H06.15, the motor enters zero position clamp state. In this case, a position loop is built inside the drive and the speed reference is invalid.

The motor is clamped within ±1 pulse of the position at which zero clamp is activated. Even if it rotates due to external force, it will return to the zero position and be clamped.

When the speed reference amplitude exceeds the value of H06.15, the motor exits from the zero clamp state and continues running according to the speed reference received. Zero clamp is deactivated when the ZCLAMP (FunIN.12) signal is inactive.



H06.16 Threshold of TGON (motor rotation) signal

Hexadecimal:	2006-11h	Effective Time:	Real time

Min.: 0
Max.: 1000
Default: 20
Unit: rpm
Data Type: UInt16
Change: Immediately

Value Range:

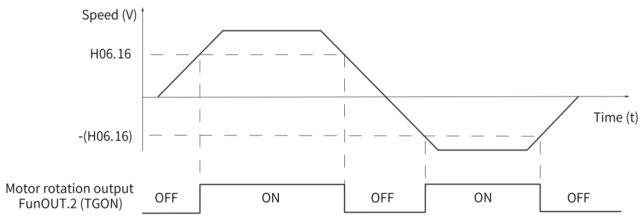
0rpm–1000rpm

Description

Sets the threshold of TGON (motor rotation) signal.

When the absolute value of the filtered actual motor speed reaches the value of H06.16 (Threshold of TGON (motor rotation) signal), the motor is acknowledged to be rotating. In this case, the drive outputs the motor rotation signal (FunOUT.2: TGON) to acknowledge that the motor is rotating. When the absolute value of the filtered actual motor speed is lower than the value of H06.16, the motor is not rotating.

Judgment on the motor rotation signal (FunOUT.2, TGON) is not affected by the operating state or control mode of the drive.



Note: In the preceding figure, ON indicates that the motor rotation DO signal is active. OFF indicates that the motor rotation DO signal is inactive.

The filter time constant of the motor speed can be set in H0A.27 (Speed DO filter time constant).

H06.17 Threshold of V-Cmp (speed matching) signal

Hexadecimal: 2006-12h
Effective Time: Real time
Min.: 0
Max.: 100
Default: 10
Unit: rpm
Data Type: UInt16
Change: Immediately

Value Range:

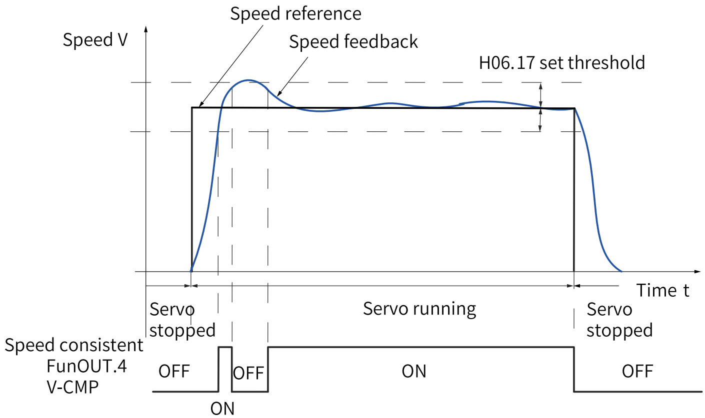
0rpm–100rpm

Description

Defines the threshold of speed match signal.

In speed control, when the absolute value of the difference between the motor speed after filter and the speed reference satisfies the setting of H06.17, the actual motor speed is considered to reach the speed reference. At this moment, the servo drive outputs the speed matching signal (FunOUT.4: V-CMP). When the absolute value of the difference between the motor speed after filter and the speed reference exceeds the setting of H06-17, the speed matching signal is inactive.

If the drive is not in the operational state or the speed control mode, the speed matching signal (FunOUT.4: V-Cmp) is always inactive.



In the preceding figure, "ON" indicates the the V-Cmp (speed matching) signal is active. "OFF" indicates the V-Cmp signal is inactive.

The filter time constant of the motor speed can be set in H0A.27 (Speed DO filter time constant).

H06.18 **Threshold of speed reach signal**

Hexadecimal:	2006-13h	Effective Time:	Real time
Min.:	10	Unit:	rpm
Max.:	6000	Data Type:	UInt16
Default:	1000	Change:	Immediately

Value Range:

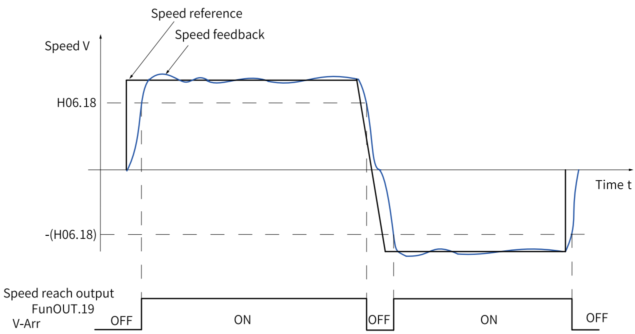
10rpm–6000rpm

Description

Defines the threshold of speed reached signal.

When the absolute value of the motor speed after filter exceeds the setting of H06.18 (Threshold of speed arrival signal), the motor speed is considered to reach the desired value. At this moment, the servo drive outputs the speed arrival signal (FunOUT.19: V-Arr). When the absolute value of the motor speed after filter is smaller than or equal to the setting of H06-18, the speed arrival signal is inactive.

Acknowledgment of the speed reach (FunOUT.19: V-Arr) signal is not affected by the operating state or control mode of the drive.



Note: In the preceding figure, "ON" indicates the V-Arr (speed reached) signal is active. "OFF" indicates the V-Arr (speed reached) signal is inactive.

The filter time constant of the motor speed can be set in H0A.27 (Speed DO filter time constant).

H06.19 Threshold of zero speed output signal

Hexadecimal:	2006-14h	Effective Time:	Real time
Min.:	1	Unit:	rpm
Max.:	6000	Data Type:	UInt16
Default:	10	Change:	Immediately

Value Range:

1 rpm to 6000 rpm

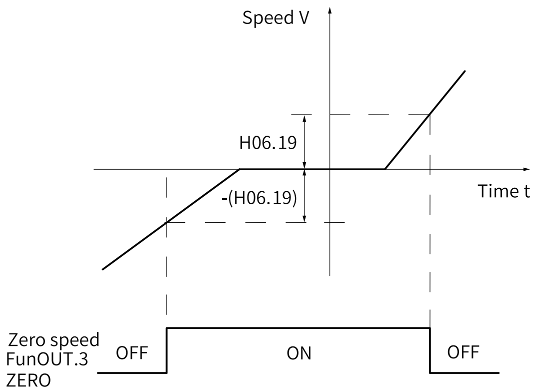
Description

Defines the threshold of zero speed output signal.

The servo drive outputs the V-Zero (FunOUT.3: zero speed) signal only when the absolute value of actual motor speed is lower than the threshold defined by H06.19. When the absolute value of the motor speed after filter is equal to or large than to the setting of H06-19, the zero speed signal is inactive.

Acknowledgment of the zero speed (FunOUT.3: V-Zero) signal is not affected by the operating state and control mode of the drive.

The interference in the speed feedback can be filtered by the speed feedback DO filter. You can set the corresponding filter time constant in H0A.27.



Note: In the preceding figure, "ON" indicates the V-Zero (zero speed) signal is active. "OFF" indicates the V-Zero (zero speed) signal is inactive.

The filter time constant of the motor speed can be set in H0A.27 (Speed DO filter time constant).

H06.28 Cogging torque ripple compensation

Hexadecimal:	2006-1Dh	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	1	Change:	Immediately

Value Range:

0 to 1

Description

Used to enable the cogging torque fluctuation compensation function.

H06.31 Sine frequency

Hexadecimal:	2006-20h	Effective Time:	Real time

Min.:	0	Unit:	-
Max.:	16000	Data Type:	UInt16
Default:	50	Change:	Immediately

Value Range:

0 to 16000

Description

-

H06.32 Sine amplitude

Hexadecimal:	2006-21h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	30000	Data Type:	UInt16
Default:	30	Change:	Immediately

Value Range:

0 to 30000

Description

-

H06.33 Sine amplitude

Hexadecimal:	2006-22h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	3	Data Type:	UInt16
Default:	30	Change:	Immediately

Value Range:

0: Disabled

1: Position reference sine

2: Speed reference sine

3: Torque reference sine

Description

-

H06.35 Sine offset

Hexadecimal:	2006-24h	Effective Time:	Real time
Min.:	-9900	Unit:	-
Max.:	9900	Data Type:	Int16
Default:	0	Change:	Immediately

Value Range:

-9900 to 9900

Description

-

4.8 H07 Torque Control Parameters

H07.00 **Source of main torque reference A**

Hexadecimal:	2007-01h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	0	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Keypad (H07.03)

Description

Defines the source of the main torque reference A.

Setpoint	Reference source	Instruction receiving method
0	Keypad (H07.03)	Torque reference A is set by H07.03.

H07.01 **Source of auxiliary torque reference B**

Hexadecimal:	2007-02h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	2	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Keypad (H07.03)

Description

Defines the source of auxiliary torque references.

Setpoint	Reference source	Instruction receiving method
0	Keypad (H07.03)	Torque reference A is set by H07.03.

H07.02 **Torque reference source**

Hexadecimal:	2007-03h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	4	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Source of main torque reference A
1: Source of auxiliary torque reference B
2: Source of A+B
3: Switched between A and B
4: Communication

Description

Selects torque reference.

<table>
<tr><th>Setpoint</th><th>Control mode</th><th>Remarks</th></tr>
<tr><td>0</td><td>Source of main torque reference A</td><td>The reference source is defined by H07.00.</td></tr>
<tr><td>1</td><td>Source of auxiliary torque reference B</td><td>The reference source is defined by H07.01.</td></tr>
<tr><td>2</td><td>A+B</td><td>The reference source is the product of A+B (H07.00+H07.01).</td></tr>
<tr><td>3</td><td>Switched between A and B</td><td>The reference source is switched between A and B as defined by FunIN.4 (Cmd_SEL).
<table><tr><th>State of FunIN.4 (Cmd_SEL)</th><th>Reference Source</th></tr><tr><td>Inactive</td><td>Source of main torque reference A</td></tr><tr><td>Active</td><td>Source of auxiliary torque reference B</td></tr></table></td></tr>
<tr><td>4</td><td>Communication</td><td>The torque reference is defined by operating on H31.11 through communication.</td></tr>
</table>

H07.03 Torque reference set through keypad

Hexadecimal:	2007-04h	Effective Time:	Real time
Min.:	-400.0	Unit:	%
Max.:	400.0	Data Type:	Int16
Default:	0.0	Change:	Immediately

Value Range:

-400.0% to 400.0%

Description

Sets torque reference set through keypad.

H07.05 Torque reference filter time constant

Hexadecimal:	2007-06h	Effective Time:	Real time
Min.:	0.00	Unit:	ms

Max.:	30.00	Data Type:	UInt16
Default:	0.50	Change:	Immediately

Value Range:

0.00 ms to 30.00 ms

Description

Defines the torque reference filter time constant 1.

H07.06 2nd torque reference filter time constant

Hexadecimal:	2007-07h	Effective Time:	Real time
Min.:	0.00	Unit:	ms
Max.:	30.00	Data Type:	UInt16
Default:	0.27	Change:	Immediately

Value Range:

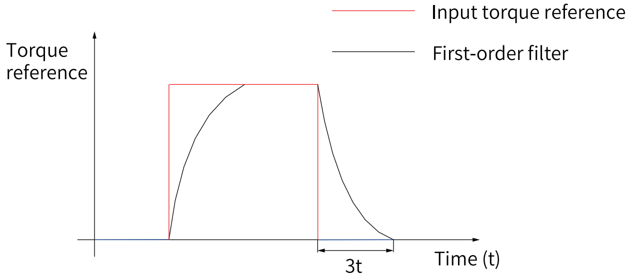
0.00 ms to 30.00 ms

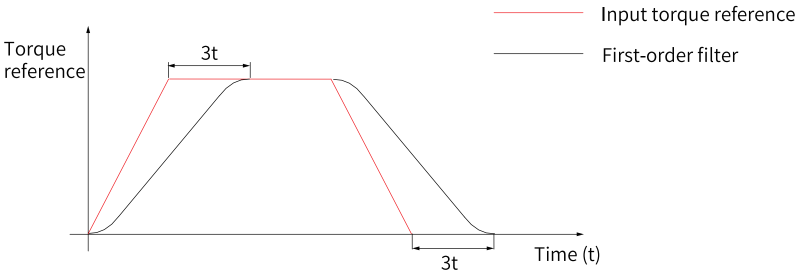
Description

Defines the torque reference filter time constant 2.

Low-pass filtering of torque references helps smoothen torque references and reduce vibration.

Pay attention to the responsiveness during setting as an excessively high setpoint lowers down the responsiveness.





Note

- The servo drive offers two low-pass filters for torque references, in which the low-pass filter 1 is used by default.
- The gain switchover function can be used In the position or speed control mode. Once certain conditions are satisfied, you can switch to low-pass filter 2.

H07.07 **Torque limit source**

Hexadecimal:	2007-08h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Forward/Reverse internal torque limit (default)

1: Forward/Reverse external torque limit (selected through P-CL and N-CL)

Description

Sets the torque limit source.

Setpoint	Torque limit source
0	Positive/Negative internal torque limit
1	Forward/Reverse external torque limit (selected through P-CL and N-CL)

H07.09 Positive internal torque limit

Hexadecimal:	2007-0Ah	Effective Time:	Real time
Min.:	0.0	Unit:	%
Max.:	400.0	Data Type:	UInt16
Default:	350.0	Change:	Immediately

Value Range:

0.0% to 400.0%

Description

Sets the forward run internal torque limit.

H07.10 Negative internal torque limit

Hexadecimal:	2007-0Bh	Effective Time:	Real time
Min.:	0.0	Unit:	%
Max.:	400.0	Data Type:	UInt16
Default:	350.0	Change:	Immediately

Value Range:

0.0% to 400.0%

Description

Sets the reverse run internal torque limit.

H07.11 Positive external torque limit

Hexadecimal:	2007-0Ch	Effective Time:	Real time
Min.:	0.0	Unit:	%
Max.:	400.0	Data Type:	UInt16
Default:	350.0	Change:	Immediately

Value Range:

0.0% to 400.0%

Description

Sets the positive external torque limit.

H07.12 **Negative external torque limit**

Hexadecimal:	2007-0Dh	Effective Time:	Real time
Min.:	0.0	Unit:	%
Max.:	400.0	Data Type:	UInt16
Default:	350.0	Change:	Immediately

Value Range:

0.0% to 400.0%

Description

Sets the negative external torque limit.

H07.15 **Emergency-stop torque**

Hexadecimal:	2007-10h	Effective Time:	Real time
Min.:	0.0	Unit:	%
Max.:	300.0	Data Type:	UInt16
Default:	100.0	Change:	At stop

Value Range:

0.0% to 300.0%

Description

-

H07.17 **Speed limit source**

Hexadecimal:	2007-12h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	2	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0: Internal speed limit (in torque control)

1: 0 (no action)

2: 1st or 2nd speed limit input selected by FunIN.36

Description

Sets the speed limit source.

Setpoint	Reference source	Description
0	Internal speed limit	The speed limit is defined by both H07.19 and H07.20.
1	-	-
2	H07.19 or H07.20 used as speed limit as defined by DI	DI (FunIN.36) inactive: H07.19 used as positive/negative speed limit DI (FunIN.36) active: H07.20 used as positive/negative speed limit

H07.19 Forward speed limit/1st speed limit in torque control

Hexadecimal:	2007-14h	Effective Time:	Real time
Min.:	0	Unit:	rpm
Max.:	6000	Data Type:	UInt16
Default:	3000	Change:	Immediately

Value Range:

0rpm–6000rpm

Description

Defines the positive speed limit in torque control.

H07.20 Reverse speed limit/2nd speed limit in torque control

Hexadecimal:	2007-15h	Effective Time:	Real time
Min.:	0	Unit:	rpm
Max.:	6000	Data Type:	UInt16
Default:	3000	Change:	Immediately

Value Range:

0rpm–6000rpm

Description

Defines the negative speed limit in torque control.

H07.21 Base value for torque reach

Hexadecimal:	2007-16h	Effective Time:	Real time
Min.:	0.0	Unit:	%
Max.:	300.0	Data Type:	UInt16
Default:	0.0	Change:	Immediately

Value Range:

0.0% to 300.0%

Description

Defines the torque reference of the base value for torque reach.

H07.22 Torque reach valid value

Hexadecimal:	2007-17h	Effective Time:	Real time
Min.:	0.0	Unit:	%
Max.:	300.0	Data Type:	UInt16
Default:	20.0	Change:	Immediately

Value Range:

0.0% to 300.0%

Description

Defines the torque reference for torque reach DO active.

H07.23 Torque reach invalid value

Hexadecimal:	2007-18h	Effective Time:	Real time
Min.:	0.0	Unit:	%
Max.:	300.0	Data Type:	UInt16
Default:	10.0	Change:	Immediately

Value Range:

0.0% to 300.0%

Description

Defines the torque reference for torque reach DO inactive.

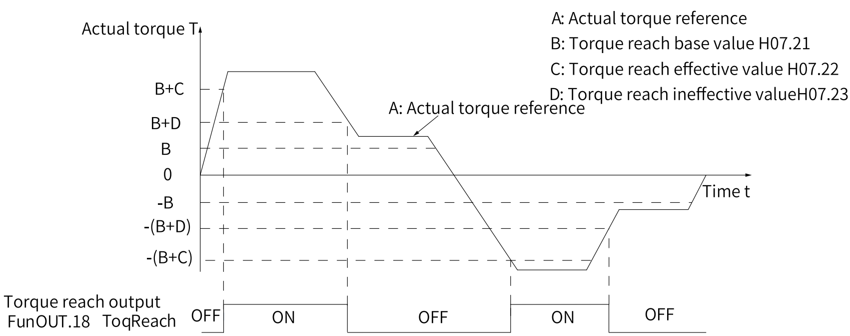
The torque reach output is used to determine whether the actual torque reference reaches the set range. The drive outputs TorReach (FunOUT.18: torque reach) signal to the host controller when the actual torque reference reaches the torque reference threshold.

- Actual torque reference (viewed in H0b.02): A
- Base value for torque reach (H07.21): B.
- Threshold of valid torque arrival (H07.22): C.
- Threshold of invalid torque reach (H07.23): D.

C and D are the offset based on B.

The torque reach DO signal can be activated only when the actual torque reference meets the following condition: |A| ⩾ B + C for 10 ms. Otherwise, the torque reach DO signal remains inactive.

For the torque reach DO signal to become inacive, the actual torque reference must meet the following condition: |A| < B + D. Otherwise, the torque reach signal remains active.



H07.24 **Field weakening depth**

Hexadecimal:	2007-19h	Effective Time:	Real time
Min.:	60	Unit:	%
Max.:	120	Data Type:	UInt16
Default:	115	Change:	Immediately

Value Range:

60% to 120%

Description

Set the flux eakening depth.

H07.25 **Max. permissible demagnetizing current**

Hexadecimal:	2007-1Ah	Effective Time:	Real time
Min.:	0	Unit:	%
Max.:	200	Data Type:	UInt16
Default:	100	Change:	Immediately

Value Range:

0% to 200%

Description

Set the maximum allowable demagnetization current value.

H07.26 **Field weakening selection**

Hexadecimal:	2007-1Bh	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	1	Change:	Immediately

Value Range:

0 to 1

Description

Disable or enable field weakening.

H07.27 **Flux weakening gain**

Hexadecimal:	2007-1Ch	Effective Time:	Real time
Min.:	1	Unit:	Hz
Max.:	1000	Data Type:	UInt16
Default:	30	Change:	Immediately

Value Range:

1 Hz to 1000 Hz

Description

Set the gain of flux weakening.

H07.40 Speed limit window in the torque control mode

Hexadecimal:	2007-29h	Effective Time:	Real time
Min.:	0.5	Unit:	ms
Max.:	30.0	Data Type:	UInt16
Default:	1.0	Change:	Immediately

Value Range:

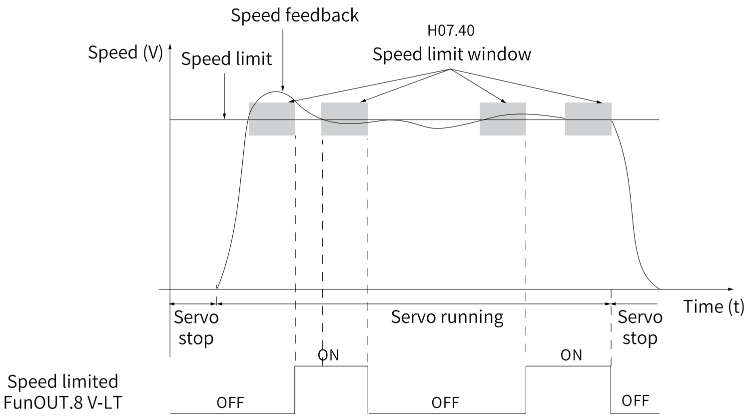
0.5 ms to 30.0 ms

Description

Sets speed limit window in the torque control mode.

In the torque control mode, the servo drive outputs the V- LT (FunOUT.8: speed limit) signal to the host controller when the absolute value of the motor speed keeps exceeding the speed limit in the period defined by H07.40. If either of the preceding two conditions is not satisfied, the speed limit signal will be deactivated.

Acknowledgment of the V-LT (Speed limit) signal is executed only during operation in the torque control mode.



Note

In the preceding figure, ON indicates that the speed limit DO signal is valid. OFF indicates that the speed limit DO signal is invalid.

4.9 H08 Gain Parameters

H08.00 Speed loop gain

Hexadecimal:	2008-01h	Effective Time:	Real time
Min.:	0.1	Unit:	Hz
Max.:	2000.0	Data Type:	UInt16
Default:	40.0	Change:	Immediately

Value Range:

0.1 Hz to 2000.0 Hz

Description

Defines the responsiveness of the speed loop. The higher the setpoint, the faster the speed loop response is. Note that an excessively high setpoint may cause vibration.

In the position control mode, the position loop gain must be increased together with the speed loop gain.

H08.01 Speed loop integral time constant

Hexadecimal:	2008-02h	Effective Time:	Real time
Min.:	0.15	Unit:	ms
Max.:	512.00	Data Type:	UInt16
Default:	19.89	Change:	Immediately

Value Range:

0.15 ms to 512.00 ms

Description

Defines the integral time constant of the speed loop.

The lower the setpoint, the better the integral action, and the quicker will the deviation value be close to 0.

Note:

There is no integral action when H08.01 is set to 512.00.

H08.02 Position loop gain

Hexadecimal:	2008-03h	Effective Time:	Real time
Min.:	0.0	Unit:	Hz
Max.:	2000.0	Data Type:	UInt16
Default:	64.0	Change:	Immediately

Value Range:

0.0 Hz to 2000.0 Hz

Description

Defines the proportional gain of the position loop.

Defines the responsiveness of the position loop. A high setpoint shortens the positioning time. Note that an excessively high setpoint may cause vibration. The 1st group of gain parameters include H08.00 (Speed loop gain), H08.01 (Speed loop integral time constant), H08.02, and H07.05 (Filter time constant of torque reference).

H08.03 **2nd speed loop gain**

Hexadecimal:	2008-04h	Effective Time:	Real time
Min.:	0.1	Unit:	Hz
Max.:	2000.0	Data Type:	UInt16
Default:	75.0	Change:	Immediately

Value Range:

0.1 Hz to 2000.0 Hz

Description

-

H08.04 **2nd speed loop integral time constant**

Hexadecimal:	2008-05h	Effective Time:	Real time
Min.:	0.15	Unit:	ms
Max.:	512.00	Data Type:	UInt16
Default:	10.61	Change:	Immediately

Value Range:

0.15 ms to 512.00 ms

Description

-

H08.05 **2nd position loop gain**

Hexadecimal:	2008-06h	Effective Time:	Real time
Min.:	0.0	Unit:	Hz
Max.:	2000.0	Data Type:	UInt16
Default:	120.0	Change:	Immediately

Value Range:

0.0 Hz to 2000.0 Hz

Description

Defines the second gain set of the position loop and speed loop. The 2nd group of gain parameters include H08.03 (Speed loop gain), H08.04 (Speed loop integral time constant), H08.05, and H07.06 (Torque reference filter time constant 2).

H08.08 2nd gain mode setting

Hexadecimal:	2008-09h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	1	Change:	Immediately

Value Range:

0: Fixed to the 1st group of gains, P/PI switched through external

DI1:Switched between the 1st and 2nd group of gains as defined by H08.09

Description

Defines the mode for switching to the 2nd gain set.

Setpoint	Mode
0	Fixed at 1st gain. P/PI of speed control is switched through DI function 3 (FunIN.3: GAIN_SEL, gain switchover). • GAIN_SEL invalid: PI control • GAIN_SEL valid: P control
1	Switchover between the 1st gain and the 2nd gain, determined by H08.09. The 1st gain includes H08.00 (Speed loop gain), H08-01 (Speed loop integral time constant), H08.02 (Position loop gain), and H07.05 (Filter time constant of torque reference). The 2nd gain includes H08.03 (2nd speed loop gain), H08-04 (2nd speed loop integral time constant), H08.05 (2nd position loop gain), and H07.06 (Filter time constant of 2nd torque reference).

H08.09 Gain switchover condition

Hexadecimal:	2008-0Ah	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	10	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0: Fixed to the 1st gain set (PS)

1: Switch with external DI (PS)

2: Torque reference too large (PS)

3: Speed reference too large (PS)

4: Speed reference change rate too large (PS)

5: Speed reference low/high speed threshold (PS)

6: Position deviation too large (P)

7: Position reference available (P)

8: Positioning unfinished (P)

9: Actual speed (P)

10: Position reference + Actual speed (P)

Description

Used to set the condition for gain switchover.

Set point	Gain switchover condition	Remarks
0	Fixed to the 1st gain set	The 1st gain set applies.
1	Switched as defined by bit26 of 60FEh	-
2	Torque reference too large	If the torque reference absolute value exceeds (Level + Dead time) [%] in the last 1st gain set, the drive switches to the 2nd gain set. If the absolute value of the torque reference is lower than (level – Dead time) [%] and such status lasts within the delay defined by H08.10 (Gain switchover delay) in the 2nd gain, the drive returns to the 1st gain set.
3	Speed reference too large	If the speed reference absolute value exceeds (Level + Dead time) [rpm] in the last 1st gain set, the drive switches to the 2nd gain set. If the absolute value of the speed reference is lower than (level - Dead time) [rpm] and such status lasts within the delay defined by H08.10 (Gain switchover delay) in the 2nd gain, the drive returns to the 1st gain set.
4	Speed reference too large	Active in the control modes other than speed control If the absolute value of the change rate of the speed reference exceeds (Level + Dead time) [10 rpm/s] in the last 1st gain set, the drive switches to the 2nd gain set. If the absolute value of the speed reference change rate is lower than (level – hysteresis) [10 rpm/s] and such status lasts within the delay defined by H08.10 (Gain switchover delay) in the 2nd gain, the drive returns to the 1st gain set. In the speed control mode, the 1st gain set always applies.
5	Speed reference high/low-speed threshold	If the speed reference absolute value exceeds (Level - Dead time) [rpm] in the last 1st gain set, the drive starts to switch to the 2nd gain set, with gains changed gradually. When the speed reference absolute value reaches (Level + Dead time) [rpm], the 2nd gain set applies. If the speed reference absolute value is lower than (Level + Dead time) [rpm] in the last 2nd gain set, the drive starts to return to the 1st gain set, with gains changed gradually. When the speed reference absolute value reaches (Level - Dead time) [rpm], the 1st gain set applies.
6	Position deviation too large	Active only in position control and full closed-loop control. If the position deviation absolute value exceeds (Level + Dead time) [encoder unit] in the last 1st gain set, the drive switches to the 2nd gain set. When the absolute value of the position deviation is lower than (Level - Dead time) [encoder unit] and such status lasts within the delay defined by H08.10 (Gain switchover delay) in the 2nd gain, the drive returns to the 1st gain set. If the drive is not in position control or full closed-loop control, the 1st gain set always applies.
7	Position reference available	Active only in position control and full closed-loop control. If the position reference is not 0 in the last 1st gain set, the drive switches to the 2nd gain set. When the position reference is 0 and such status lasts within the delay defined by H08.10 (Gain switchover delay) in the 2nd gain, the drive returns to the 1st gain set. If the drive is not in position control or full closed-loop control, the 1st gain set always applies.

Set point	Gain switchover condition	Remarks
8	Positioning uncompleted	Active only in position control and full closed-loop control. If positioning has not been completed in the last 1st gain set, the drive switches to the 2nd gain set. If positioning is not completed and such status lasts within the delay defined by H08.10 (Gain switchover delay) in the 2nd gain set, the servo drive returns to the 1st gain set. If the drive is not in position control or full closed-loop control, the 1st gain set always applies.
9	Actual speed too high	Active only in position control and full closed-loop control. If the absolute value of actual speed exceeds (Level + Dead time) [rpm] in the last 1st gain set, the drive switches to the 2nd gain set. If the absolute value of actual speed is lower than (Level - Dead time) [rpm] and such status lasts within the delay defined by H08.10 (Gain switchover delay) in the 2nd gain set, the drive returns to the 1st gain set. If the drive is not in position control or full closed-loop control, the 1st gain set always applies.
10	Position reference + Actual speed	Active only in position control and full closed-loop control. If the position reference is not 0 in the last 1st gain set, the drive switches to the 2nd gain set. If the position reference is 0 and such status lasts within the delay defined by H08.10 (Gain switchover delay) in the 2nd gain set, the 2nd gain set applies. When the position reference is 0 and the delay defined by (H08.10) is reached, if the absolute value of actual speed is lower than (Level) [rpm], the speed loop integral time constant is fixed to the setpoint of H08.04 (2nd speed loop integral time constant), and others return to the 1st gain set; if the absolute value of actual speed does not reach (Level - Dead time) [rpm], the speed integral also returns to the setpoint of H08.01 (Speed loop integral time constant). If the drive is not in position control or full closed-loop control, the 1st gain set always applies.

H08.10 Gain switchover delay

Hexadecimal:	2008-0Bh	Effective Time:	Real time
Min.:	0.0	Unit:	ms
Max.:	1000.0	Data Type:	UInt16
Default:	5.0	Change:	At stop

Value Range:

0.0 ms to 1000.0 ms

Description

Defines the delay when the drive switches from the 2nd gain set to the 1st gain set.

H08.11 Gain switchover level

Hexadecimal:	2008-0Ch	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	20000	Data Type:	UInt16
Default:	50	Change:	Immediately

Value Range:

0 to 20000

Description

Defines the gain switchover level.

Gain switchover is affected by both the level and the dead time, as defined by H08.09. The unit of gain switchover level varies with the switchover condition.

H08.12 Gain switchover dead time

Hexadecimal:	2008-0Dh	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	20000	Data Type:	UInt16
Default:	30	Change:	At stop

Value Range:

0 to 20000

Description

Defines the dead time for gain switchover.

Gain switchover is affected by both the level and the dead time, as defined by H08.09. The unit of gain switchover hysteresis varies with the switchover condition.

Note:

The set value of H08.11 (Gain switchover level) must be no less than that of H08.12; otherwise, the H08.11 will be set to a value equal to H08.12 automatically.

H08.13 Position gain switchover time

Hexadecimal:	2008-0Eh	Effective Time:	Real time
Min.:	0.0	Unit:	ms
Max.:	1000.0	Data Type:	UInt16
Default:	3.0	Change:	At stop

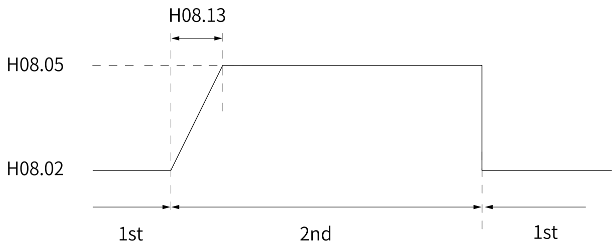
Value Range:

0.0 ms to 1000.0 ms

Description

In position control, if H08.05 (2nd position loop gain) is much higher than H08.02 (Position loop gain), set the time for switching from H08.02 to H08.05. This parameter can be used to reduce the impact caused by an increase in the position loop gain.

Position gain switching time



If the set value of H08.05 is no more than that of H08.02, H08-13 will be invalid and the servo drive switches to the 2nd gain immediately.

H08.14 Auto-tuned inertia value

Hexadecimal:	2008-0Fh	Effective Time:	-
Min.:	0.00	Unit:	-
Max.:	200.00	Data Type:	UInt16
Default:	0.00	Change:	Unchangeable

Value Range:

0.00 to 200.00

Description

-

H08.15 Load moment of inertia ratio

Hexadecimal:	2008-10h	Effective Time:	Real time
Min.:	0.00	Unit:	-
Max.:	120.00	Data Type:	UInt16
Default:	2.00	Change:	Immediately

Value Range:

0.00 to 120.00

Description

Defines the mechanical load inertia ratio relative to the motor moment of inertia.

$$\text{Load moment of inertia ratio} = \frac{\text{Moment of inertia of mechanical load}}{\text{Moment of inertia of the motor}}$$

When H08.15 is set to 0, it indicates the motor carries no load; if it is set to 1.00, it indicates the mechanical load inertia is the same as the motor moment of inertia.

H08.18 **Speed feedforward filter time constant**

Hexadecimal:	2008-13h	Effective Time:	Real time
Min.:	0.00	Unit:	ms
Max.:	64.00	Data Type:	UInt16
Default:	0.50	Change:	Immediately

Value Range:

0.00 ms to 64.00 ms

Description

Defines the filter time constant of speed feedforward.

H08.19 **Speed feedforward gain**

Hexadecimal:	2008-14h	Effective Time:	Real time
Min.:	0.0	Unit:	%
Max.:	100.0	Data Type:	UInt16
Default:	0.0	Change:	Immediately

Value Range:

0.0% to 100.0%

Description

In position control and full closed-loop control, speed feedforward is the product of speed feedforwad signal multiplied by H08.19 and is part of the speed reference.

Increasing the setpoint improves the responsiveness to position references and reduces the position deviation during operation at a constant speed.

Set H08.18 to a fixed value first, and then increase the value of H08.19 gradually from 0 to a certain value at which speed feedforward achieves the desired effect.

Adjust H08.18 and H08.19 repeatedly until a balanced performance is achieved.

Note:

For how to enable the speed feedforward function and select the speed feedforward signal, see H05.19 (Speed feedforward control).

H08.20 Torque feedforward filter time constant

Hexadecimal:	2008-15h	Effective Time:	Real time
Min.:	0.00	Unit:	ms
Max.:	64.00	Data Type:	UInt16
Default:	0.50	Change:	Immediately

Value Range:

0.00 ms to 64.00 ms

Description

Defines the filter time constant of torque feedforward.

H08.21 Torque feedforward gain

Hexadecimal:	2008-16h	Effective Time:	Real time
Min.:	0.0	Unit:	%
Max.:	200.0	Data Type:	UInt16
Default:	0.0	Change:	Immediately

Value Range:

0.0% to 200.0%

Description

In control modes other than torque control, torque feedforward is the product of torque feedforwad signal multiplied by H08.21 and is part of the torque reference.

Increasing the setpoint improves the responsiveness to variable speed references.

Increasing the setpoint improves the responsiveness to position references and reduces the position deviation during operation at a constant speed.

During parameter adjustment, set H08.20 (Torque feedforward filter time constant) to the default value first, and then increase H08.21 gradually to enhance the effect of torque feedforward. When speed overshoot occurs, keep H08.21 unchanged and increase the value of H08.20. Adjust H08.20 and H08.21 repeatedly until a balanced performance is achieved.

Note:

For how to enable the torque feedforward function and select the torque feedforward signal, see H06.11 (Torque feedforward control).

H08.22 Speed feedback filtering option

Hexadecimal:	2008-17h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	4	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Inhibited

1: 2 times

2: 4 times

3: 8 times

4: 16 times

Description

Defines the moving average filtering times for speed feedback.

The higher the setpoint, the weaker the speed feedback fluctuation, but the longer the feedback delay will be.

Setpoint	Setting of speed feedback filter
0	Moving average filtering of speed feedback inhibited
1	2 times of moving average filtering on speed feedback
2	4 times of moving average filtering on speed feedback
3	8 times of moving average filtering on speed feedback
4	16 times of moving average filtering on speed feedback

H08.23 **Cutoff frequency of speed feedback low-pass filter**

Hexadecimal:	2008-18h	Effective Time:	Real time
Min.:	100	Unit:	Hz
Max.:	4000	Data Type:	UInt16
Default:	4000	Change:	Immediately

Value Range:

100 Hz to 4000 Hz

Description

Defines the cutoff frequency for first-order low-pass filtering on the speed feedback.

Note:

The lower the setpoint, the weaker the speed feedback fluctuation, and the longer the feedback delay will be.

Setting this parameter to 4000 Hz negates the filtering effect.

H08.24 **PDFF control coefficient**

Hexadecimal:	2008-19h	Effective Time:	Real time
Min.:	0.0	Unit:	%
Max.:	1000.0	Data Type:	UInt16
Default:	100.0	Change:	Immediately

Value Range:

0.0% to 1000.0%

Description

Defines the control mode of the speed loop.

When this parameter is set to 100.0, the speed loop adopts PI control (default) with quick dynamic response.

When this parameter is set to 0.0, speed loop integral action is enhanced, which filters out low-frequency interference but also slows down the dynamic response.

H08.24 can be used to keep a good responsiveness of the speed loop, with the anti-interference capacity in low-frequency bands improved and the speed feedback overshoot unaffected.

H08.27 Cutoff frequency of speed observer

Hexadecimal:	2008-1Ch	Effective Time:	Real time
Min.:	10	Unit:	Hz
Max.:	2000	Data Type:	UInt16
Default:	170	Change:	Immediately

Value Range:

10 Hz to 2000 Hz

Description

Defines the cutoff frequency of the speed observer. Note that an excessively high setpoint may incur resonance. Decrease the setpoint properly in case of large speed feedback noise.

H08.28 Speed inertia correction coefficient

Hexadecimal:	2008-1Dh	Effective Time:	Real time
Min.:	10	Unit:	%
Max.:	10000	Data Type:	UInt16
Default:	100	Change:	Immediately

Value Range:

10% to 10000%

Description

Defines the speed observer inertia correction coefficient. If H08.15 is set based on the actual inertia, there is no need to adjust this parameter.

H08.29 Speed observer filter time

Hexadecimal:	2008-1Eh	Effective Time:	Real time
Min.:	0.02	Unit:	ms

Max.:	20.00	Data Type:	UInt16
Default:	0.80	Change:	Immediately

Value Range:

0.02 ms to 20.00 ms

Description

Defines the speed observer filter time. It is recommended to set this parameter to a value equal to the sum of H07.05 plus 0.2 ms.

H08.31 Disturbance observer cutoff frequency

Hexadecimal:	2008-20h	Effective Time:	Real time
Min.:	1	Unit:	Hz
Max.:	1700	Data Type:	UInt16
Default:	600	Change:	Immediately

Value Range:

1 Hz to 1700 Hz

Description

-

H08.32 Disturbance observer compensation coefficient

Hexadecimal:	2008-21h	Effective Time:	Real time
Min.:	0	Unit:	%
Max.:	100	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0% to 100%

Description

-

H08.33 Disturbance inertia correction coefficient

Hexadecimal:	2008-22h	Effective Time:	Real time
Min.:	1	Unit:	%
Max.:	10000	Data Type:	UInt16
Default:	100	Change:	Immediately

Value Range:

1% to 10000%

Description

-

H08.34 Medium- and high-frequency jitter suppression phase modulation 1

Hexadecimal:	2008-23h	Effective Time:	Real time
Min.:	0	Unit:	%
Max.:	1600	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0% to 1600%

Description

-

H08.35 Medium- and high-frequency jitter suppression frequency 1

Hexadecimal:	2008-24h	Effective Time:	Real time
Min.:	0	Unit:	Hz
Max.:	1000	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0 Hz to 1000 Hz

Description

-

H08.36 Medium- and high-frequency jitter suppression compensation 1

Hexadecimal:	2008-25h	Effective Time:	Real time
Min.:	0	Unit:	%
Max.:	200	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0% to 200%

Description

-

H08.37 Phase modulation for medium-frequency jitter suppression 2

Hexadecimal:	2008-26h	Effective Time:	Real time
Min.:	-90	Unit:	-
Max.:	90	Data Type:	Int16
Default:	0	Change:	Immediately

Value Range:

-90 to 90

Description

-

H08.38 Frequency of medium-frequency jitter suppression 2

Hexadecimal:	2008-27h	Effective Time:	Real time
Min.:	0	Unit:	Hz
Max.:	1000	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0 Hz to 1000 Hz

Description

-

H08.39 Compensation gain of medium-frequency jitter suppression 2

Hexadecimal:	2008-28h	Effective Time:	Real time
Min.:	0	Unit:	%
Max.:	300	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0% to 300%

Description

-

H08.40 Speed observer selection

Hexadecimal:	2008-29h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0 to 1

Description

Used to set the enable bit for speed observer.

H08.42 Model control selection

Hexadecimal:	2008-2Bh	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16

Default:	0	Change:	At stop

Value Range:

0 to 1

Description

Used to enable model tracking control.

H08.43 Model gain

Hexadecimal:	2008-2Ch	Effective Time:	Real time
Min.:	0.0	Unit:	-
Max.:	2000.0	Data Type:	UInt16
Default:	40.0	Change:	Immediately

Value Range:

0.0 to 2000.0

Description

Defines the single inertia model gain. The higher the gain, the faster the position response. Note that an excessively high setpoint may incur excessive overshoot.

H08.45 Feedforward position

Hexadecimal:	2008-2Eh	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0 to 1

Description

-

H08.46 Model feedforward

Hexadecimal:	2008-2Fh	Effective Time:	Real time
Min.:	0.0	Unit:	-
Max.:	102.4	Data Type:	UInt16
Default:	95.0	Change:	Immediately

Value Range:

0.0 to 102.4

Description

-

H08.51 Model filtering time 2

Hexadecimal:	2008-34h	Effective Time:	Real time
Min.:	0.00	Unit:	ms
Max.:	20.00	Data Type:	UInt16
Default:	0.00	Change:	Immediately

Value Range:

0.00 ms to 20.00 ms

Description

-

H08.53 Medium- and low-frequency jitter suppression frequency 3

Hexadecimal:	2008-36h	Effective Time:	Real time
Min.:	0.0	Unit:	Hz
Max.:	600.0	Data Type:	UInt16
Default:	0.0	Change:	Immediately

Value Range:

0.0 Hz to 600.0 Hz

Description

-

H08.54 Medium- and low-frequency jitter suppression compensation 3

Hexadecimal:	2008-37h	Effective Time:	Real time
Min.:	0	Unit:	%
Max.:	200	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0% to 200%

Description

-

H08.56 Medium- and low-frequency jitter suppression phase modulation 3

Hexadecimal:	2008-39h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	1600	Data Type:	UInt16
Default:	100	Change:	Immediately

Value Range:

0 to 1600

Description

-

H08.58 Er.660 (Vibration too strong) switch

Hexadecimal:	2008-3Bh	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	2	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0 to 2

Description

-

H08.59 Medium- and low-frequency jitter suppression frequency 4

Hexadecimal:	2008-3Ch	Effective Time:	Real time
Min.:	0.0	Unit:	Hz
Max.:	600.0	Data Type:	UInt16
Default:	0.0	Change:	Immediately

Value Range:

0.0 Hz to 600.0 Hz

Description

-

H08.60 Medium- and low-frequency jitter suppression compensation 4

Hexadecimal:	2008-3Dh	Effective Time:	Real time
Min.:	0	Unit:	%
Max.:	200	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0% to 200%

Description

-

H08.61 Medium- and low-frequency jitter suppression phase modulation 4

Hexadecimal:	2008-3Eh	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	1600	Data Type:	UInt16

Default:	100	Change:	Immediately

Value Range:

0 to 1600

Description

-

H08.62 **Position loop integral time constant**

Hexadecimal:	2008-3Fh	Effective Time:	Real time
Min.:	0.15	Unit:	ms
Max.:	512.00	Data Type:	UInt16
Default:	512.00	Change:	Immediately

Value Range:

0.15 ms to 512.00 ms

Description

Defines the position loop integral time constant.

H08.63 **2nd position loop integral time constant**

Hexadecimal:	2008-40h	Effective Time:	Real time
Min.:	0.15	Unit:	ms
Max.:	512.00	Data Type:	UInt16
Default:	512.00	Change:	Immediately

Value Range:

0.15 ms to 512.00 ms

Description

-

H08.64 **Speed observer feedback selection**

Hexadecimal:	2008-41h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0 to 1

Description

-

4.10 H09 Gain auto-tuning parameters

H09.00 **Gain auto-tuning mode**

Hexadecimal:	2009-01h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	7	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0: Disabled, manual gain tuning required

1: Enabled, gain parameters generated automatically based on the stiffness level

2: Positioning mode, gain parameters generated automatically based on the stiffness level

3: Interpolation mode+Inertia auto-tuning

4: Standard mode+Inertia auto-tuning

6: Quick positioning mode+Inertia auto-tuning

Description

Defines different gain tuning modes. Related gain parameters can be set manually or automatically according to the stiffness level.

Setpoint	Auto	Remarks
0	Disabled Gain parameters set manually	-
1	Standard stiffness level mode, gain parameters tuned automatically based on the stiffness level.	The 2nd gain does not follow the stiffness table to change automatically.
2	Positioning mode, gain parameters tuned automatically based on stiffness table	It is one stiffness level higher than the 1st gain but does not exceed the highest stiffness level.
3	Interpolation mode + Inertia auto-tuning	In this mode, gain and inertia is auto-tuned and vibration is suppressed automatically according to the rigidity level. This mode is applicable to multi-axis interpolation.
4	Standerd mode + Inertia auto-tuning	The gain and inertia is auto-tuned and vibration is suppressed automatically according to the rigidity level.
6	Quick positioning mode + Inertia auto-tuning	In this mode, gain and inertia is auto-tuned and vibration is suppressed automatically according to the rigidity level. This mode is applicable to applications requiring quick positioning.

H09.01 **Stiffness level**

Hexadecimal:	2009-02h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	41	Data Type:	UInt16
Default:	15	Change:	Immediately

Value Range:

0 to 41

Description

Defines the stiffness level of the servo system. The higher the stiffness level, the stronger the gains and the quicker the response will be. But an excessively high stiffness level will cause vibration.
The setpoint 0 indicates the weakest stiffness and 41 indicates the strongest stiffness.

H09.02 **Adaptive notch mode**

Hexadecimal:	2009-03h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	4	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0: Adaptive notch no longer updated;
1: One adaptive notch activated (3rd notch)
2: Two adaptive notches activated (3rd and 4th notches)
3: Resonance point tested only (displayed in H09.24)
4: Adaptive notch cleared, values of 3rd and 4th notches restored to default

Description

Defines the operation mode of the adaptive notch.

Setpoint	Defines the operation mode of the adaptive notch.
0	Parameters not updated
1	Only one notch (3rd notch) valid, parameters updated in real time
2	Both notches (3rd and 4th notches) valid, parameters updated in real time
3	Only detect resonance frequency (displayed in H09.24)
4	Clear 3rd and 4th notches, restore parameters to default setting

H09.03 **Online inertia auto-tuning mode**

Hexadecimal:	2009-04h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	3	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0: Disabled
1: Enabled, changing slowly
2: Enabled, changing normally
3: Enabled, changing quickly

Description

Defines whether to enable online inertia auto-tuning and the inertia ratio update speed during online inertia auto-tuning.

Setpoint	Online inertia auto-tuning mode	Remarks
0	Online auto-tuning disabled	-
1	Enabled, changing slowly	Applicable to the scenario where the inertia ratio almost does not change.
2	Enabled, changing normally	Applicable to the scenario where the inertia ratio changes slowly.
3	Enabled, changing quickly	Applicable to the scenario where the inertia ratio changes quickly.

H09.04 Low-frequency resonance suppression mode

Hexadecimal:	2009-05h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0: Set vibration frequency manually

1: Identify vibration frequency

Description

-

H09.05 Offline inertia auto-tuning mode

Hexadecimal:	2009-06h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	3	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Positive/Negative triangular wave mode

1: JOG mode

2: Bidirectional auto-tuning mode

3: Unidirectional auto-tuning mode

Description

Defines the offline inertia auto-tuning mode. The offline inertia auto-tuning function can be enabled through H0d.02.

Setpoint	Offline inertia auto-tuning mode	Remarks
0	Positive and negative triangular wave	Applicable to the scenario where the motor movement travel is short.
1	Jog	Applicable to the scenario where the motor movement travel is long.
2	0: Bidirectional auto-tuning.	No pre-set ratio of inertia is required, suitable for applications where the motor can rotate in both directions.
3	1: Unidirectional auto-tuning	No preset ratio of inertia is required, suitable for applications where the motor can only rotate in one direction.

H09.06 Max. speed of inertia auto-tuning

Hexadecimal:	2009-07h	Effective Time:	Real time
Min.:	100	Unit:	rpm
Max.:	1000	Data Type:	UInt16
Default:	500	Change:	At stop

Value Range:

100rpm–1000rpm

Description

Defines the maximum permissible speed reference in offline inertia auto-tuning mode.

During inertia auto-tuning, the higher the speed, the more accurate the auto-tuned values. Use the default setpoint in general cases.

H09.07 Time constant for accelerating to max. speed during inertia auto-tuning

Hexadecimal:	2009-08h	Effective Time:	Real time
Min.:	20	Unit:	ms
Max.:	800	Data Type:	UInt16
Default:	125	Change:	At stop

Value Range:

20 ms to 800 ms

Description

Defines the time for the motor to accelerate from 0 rpm to the maximum speed of inertia auto-tuning (H09.06) during offline inertia auto-tuning.

H09.08 **Interval time after an individual inertia auto-tuning**

Hexadecimal:	2009-09h	Effective Time:	Real time
Min.:	50	Unit:	ms
Max.:	10000	Data Type:	UInt16
Default:	800	Change:	At stop

Value Range:

50 ms to 10000 ms

Description

Defines the interval time between two consecutive speed references when H09.05 (Offline inertia auto-tuning mode) is set to 1 (Positive/Negative triangular wave mode).

H09.09 **Motor revolutions per inertia auto-tuning**

Hexadecimal:	2009-0Ah	Effective Time:	Real time
Min.:	0.00	Unit:	-
Max.:	100.00	Data Type:	UInt16
Default:	1.00	Change:	Immediately

Value Range:

0.00 to 100.00

Description

Defines the motor revolutions per inertia auto-tuning when H09.05 (Offline inertia auto-tuning mode) is set to 1 (Positive/Negative triangular wave mode).

Note:

When using the offline inertia auto-tuning function, check that the travel distance of the motor at the stop position is larger than the value of H09.09. If not, decrease the value of H09.06 (Maximum speed for inertia auto-tuning) or H09.07 (Time constant of accelerating to max. speed during inertia auto-tuning) properly until the motor travel distance fulfills the requirement.

H09.11 **Vibration threshold**

Hexadecimal:	2009-0Ch	Effective Time:	Real time
Min.:	0.0	Unit:	%
Max.:	100.0	Data Type:	UInt16
Default:	5.0	Change:	Immediately

Value Range:
0.0% to 100.0%
Description
Defines the warning threshold for current feedback vibration.

H09.12 Frequency of the 1st notch

Hexadecimal:	2009-0Dh	Effective Time:	Real time
Min.:	50	Unit:	Hz
Max.:	4000	Data Type:	UInt16
Default:	4000	Change:	Immediately

Value Range:
50 Hz to 4000 Hz
Description
Defines the center frequency of the notch, which is the mechanical resonance frequency.
In the torque control mode, setting the notch frequency to 4000 Hz deactivates the notch function.

H09.13 Width level of the 1st notch

Hexadecimal:	2009-0Eh	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	40	Data Type:	UInt16
Default:	2	Change:	Immediately

Value Range:
0 to 40
Description
Defines the width level of the notch. Use the default setpoint in general cases.
Width level is the ratio of the notch width to the notch center frequency.

H09.14 Depth level of the 1st notch

Hexadecimal:	2009-0Fh	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	99	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:
0 to 99
Description
Defines the depth level of the notch.

The depth level of the notch is the ratio between the input to the output at the notch center frequency.
The higher the setpoint, the lower the notch depth and the weaker the mechanical resonance suppression will be. Note that an excessively high setpoint may cause system instability.

H09.15 Frequency of the 2nd notch

Hexadecimal:	2009-10h	Effective Time:	Real time
Min.:	50	Unit:	Hz
Max.:	4000	Data Type:	UInt16
Default:	4000	Change:	Immediately

Value Range:
50 Hz to 4000 Hz
Description
-

H09.16 Width level of the 2nd notch

Hexadecimal:	2009-11h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	20	Data Type:	UInt16
Default:	2	Change:	Immediately

Value Range:
0 to 20
Description
-

H09.17 Depth level of the 2nd notch

Hexadecimal:	2009-12h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	99	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:
0 to 99
Description
-

H09.18 Frequency of the 3rd notch

Hexadecimal:	2009-13h	Effective Time:	Real time

Min.:	50	Unit:	Hz
Max.:	4000	Data Type:	UInt16
Default:	4000	Change:	Immediately

Value Range:

50 Hz to 4000 Hz

Description

-

H09.19 Width level of the 3rd notch

Hexadecimal:	2009-14h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	20	Data Type:	UInt16
Default:	2	Change:	Immediately

Value Range:

0 to 20

Description

-

H09.20 Depth level of the 3rd notch

Hexadecimal:	2009-15h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	99	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0 to 99

Description

-

H09.21 Frequency of the 4th notch

Hexadecimal:	2009-16h	Effective Time:	Real time
Min.:	50	Unit:	Hz
Max.:	4000	Data Type:	UInt16
Default:	4000	Change:	Immediately

Value Range:

50 Hz to 4000 Hz

Description

-

H09.22 Width level of the 4th notch

Hexadecimal:	2009-17h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	20	Data Type:	UInt16
Default:	2	Change:	Immediately

Value Range:

0 to 20

Description

-

H09.23 Depth level of the 4th notch

Hexadecimal:	2009-18h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	99	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0 to 99

Description

-

H09.24 Auto-tuned resonance frequency

Hexadecimal:	2009-19h	Effective Time:	-
Min.:	0	Unit:	-
Max.:	2000	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 2000

Description

When H09.02 (Adaptive notch mode) is set to 3, the current mechanical resonance frequency is displayed.

H09.30 Torque disturbance compensation gain

Hexadecimal:	2009-1Fh	Effective Time:	Real time
Min.:	-100.0	Unit:	%
Max.:	100.0	Data Type:	UInt16
Default:	0.0	Change:	Immediately

Value Range:

-100.0% to 100.0%

Description

-

H09.31 Filter time constant of torque disturbance observer

Hexadecimal:	2009-20h	Effective Time:	Real time
Min.:	0.00	Unit:	ms
Max.:	25.00	Data Type:	UInt16
Default:	0.50	Change:	Immediately

Value Range:

0.00 ms to 25.00 ms

Description

-

H09.32 Gravity compensation value

Hexadecimal:	2009-21h	Effective Time:	Real time
Min.:	-100.0	Unit:	-
Max.:	100.0	Data Type:	UInt16
Default:	0.0	Change:	Immediately

Value Range:

-100.0 to 100.0

Description

Defines the gravity compensation value. Setting this parameter properly in vertical axis applications can reduce the falling amplitude upon start.

H09.33 Positive friction compensation

Hexadecimal:	2009-22h	Effective Time:	Real time
Min.:	-100.0	Unit:	%
Max.:	100.0	Data Type:	Int16
Default:	0.0	Change:	Immediately

Value Range:

-100.0% to 100.0%

Description

Defines the forward friction compensation value.

H09.34 Negative friction compensation

Hexadecimal:	2009-23h	Effective Time:	Real time
Min.:	-100.0	Unit:	%

Max.:	100.0	Data Type:	Int16
Default:	0.0	Change:	Immediately

Value Range:

-100.0% to 100.0%

Description

Defines the reverse direction friction compensation value.

H09.35 Friction compensation speed threshold

Hexadecimal:	2009-24h	Effective Time:	Real time
Min.:	0.1	Unit:	rpm
Max.:	30.0	Data Type:	UInt16
Default:	2.0	Change:	Immediately

Value Range:

0.1rpm–30.0rpm

Description

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H09.36 Friction compensation speed

Hexadecimal:	2009-25h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	2	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0: Speed reference

1: Model tracking speed

2: Speed feedback

Description

-

H09.38 Low-frequency resonance suppression frequency at the mechanical end

Hexadecimal:	2009-27h	Effective Time:	Real time
Min.:	1.0	Unit:	Hz
Max.:	100.0	Data Type:	UInt16
Default:	100.0	Change:	At stop

Value Range:

1.0 Hz to 100.0 Hz

Description

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H09.39 Low-frequency resonance suppression at the mechanical end

Hexadecimal:	2009-28h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	3	Data Type:	UInt16
Default:	2	Change:	At stop

Value Range:

0 to 3

Description

-

H09.41 Frequency of the 5th notch

Hexadecimal:	2009-2Ah	Effective Time:	Real time
Min.:	50	Unit:	Hz
Max.:	8000	Data Type:	UInt16
Default:	4000	Change:	At stop

Value Range:

50 Hz to 8000 Hz

Description

-

H09.42 Width level of the 5th notch

Hexadecimal:	2009-2Bh	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	20	Data Type:	UInt16
Default:	2	Change:	Immediately

Value Range:

0 to 20

Description

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H09.43 Depth level of the 5th notch

Hexadecimal:	2009-2Ch	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	99	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0 to 99

Description

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H09.44 Frequency of low-frequency resonance suppression 1 at mechanical load end

Hexadecimal:	2009-2Dh	Effective Time:	Real time
Min.:	0.0	Unit:	Hz
Max.:	200.0	Data Type:	UInt16
Default:	0.0	Change:	Immediately

Value Range:

0.0 Hz to 200.0 Hz

Description

-

H09.45 Responsiveness of low-frequency resonance suppression 1 at mechanical load end

Hexadecimal:	2009-2Eh	Effective Time:	Real time
Min.:	0.01	Unit:	-
Max.:	10.00	Data Type:	UInt16
Default:	1.00	Change:	Immediately

Value Range:

0.01 to 10.00

Description

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H09.47 Width of low-frequency resonance suppression 1 at mechanical load end

Hexadecimal:	2009-30h	Effective Time:	Real time
Min.:	0.00	Unit:	-
Max.:	2.00	Data Type:	UInt16
Default:	1.00	Change:	Immediately

Value Range:

0.00 to 2.00

Description

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H09.49 Frequency of low-frequency resonance suppression 2 at mechanical load end

Hexadecimal:	2009-32h	Effective Time:	Real time

Min.:	0.0	Unit:	Hz
Max.:	200.0	Data Type:	UInt16
Default:	0.0	Change:	Immediately

Value Range:

0.0 Hz to 200.0 Hz

Description

Set this parameter based on the actual jitter frequency.

H09.50 Responsiveness of low-frequency resonance suppression 2 at mechanical load end

Hexadecimal:	2009-33h	Effective Time:	Real time
Min.:	0.01	Unit:	-
Max.:	10.00	Data Type:	UInt16
Default:	1.00	Change:	Immediately

Value Range:

0.01 to 10.00

Description

Use the default setpoint in general cases. To increase the setpoint, reduce the delay time.

H09.52 Width of low-frequency resonance suppression 2 at mechanical load end

Hexadecimal:	2009-35h	Effective Time:	Real time
Min.:	0.00	Unit:	-
Max.:	2.00	Data Type:	UInt16
Default:	1.00	Change:	Immediately

Value Range:

0.00 to 2.00

Description

Use the default setpoint in general cases. To increase the setpoint, increase the delay time.

H09.57 STune resonance suppression switchover frequency

Hexadecimal:	2009-3Ah	Effective Time:	Real time
Min.:	0	Unit:	Hz
Max.:	4000	Data Type:	UInt16
Default:	850	Change:	Immediately

Value Range:

0 Hz to 4000 Hz

Description

If the resonance frequency is lower than the setpoint, use medium-frequency resonance suppression 2 to suppress resonance. Otherwise, use the notch to suppress resonance.

H09.58 **STune resonance suppression reset selection**

Hexadecimal:	2009-3Bh	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0: Disable

1: Enable

Description

Used to enable STune resonance suppression reset to clear parameters related to resonance suppression, medium-frequency resonance suppression 2 and notches 3 and 4.

4.11 H0A Fault and Protection

H0A.00 **Power input phase loss protection**

Hexadecimal:	200A-01h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	2	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0: Enable phase loss fault and inhibit phase loss warning

1: Enable phase loss fault and warning

2: Disable phase loss fault and warning

Description

The main circuit power specifications vary according to the servo drive model. Servo drives supporting single-phase/three-phase 220 V and three-phase 380 V power supplies Objects available. When voltage fluctuation or phase loss occurs on the power supply, the drive triggers power input phase loss protection based on H0A.00.

Setpoint	Phase loss protection method	Remarks
0	Enable faults and inhibit warnings	If the main circuit input voltage is single phase for the drive with rated power of 1 kW and above (H01.02 ⩾ 6), E420.0 occurs.
1	Enable faults and warnings	• If the main circuit input voltage is single phase for the drive with rated power of 1 kW and above (H01.02 ⩾ 6), E420.0 occurs. • If the main circuit input voltage is single phase for the servo drive with 0.75 kW rated power (H01.02 = 5), E990.0 (Power input phase loss warning) occurs.
2	Inhibit faults and warnings	Er.420 and E990.0 will not be detected. In common bus mode, set H0A.00 to 2. Otherwise, the servo drive cannot enter "rdy" state after power-on. Note that power-off discharge and power-off retentive are not supported when H0A.00 is set to 2.

H0A.02 Vibration alarm switch

Hexadecimal:	200A-03h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0: On

1: Off

Description

-

H0A.03 Power-off memory

Hexadecimal:	200A-04h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16

Default: 0 Change: Immediately

Value Range:

0: Disabled

1: Enabled

Description

It sets whether to enable the function of retentive at power failure.

Setpoint	Function	Instruction receiving method
0	Disabled	The function of retentive at power failure is disabled.
1	Enabled	The function of retentive at power failure is enabled. The servo drive automatically stores the encoder feedback pulse count (H0b.17) at power failure, which can be viewed in the corresponding function code after power-on again.

H0A.04 Motor overload protection gain

Hexadecimal: 200A-05h Effective Time: Real time

Min.: 50 Unit: %

Max.: 300 Data Type: UInt16

Default: 100 Change: At stop

Value Range:

50% to 300%

Description

Determines the motor overload duration before E620.0 (Motor overload) is reported.

You can change the setpoint to advance or delay the time when overload protection is triggered based on the motor temperature. The setpoint 50% indicates the time is cut by half; 150% indicates the time is increased by 50%. Set this parameter based on the actual temperature of the motor.

H0A.08 Overspeed threshold

Hexadecimal: 200A-09h Effective Time: Real time

Min.: 0 Unit: rpm

Max.: 10000 Data Type: UInt16

Default: 0 Change: Immediately

Value Range:

0rpm–10000rpm

Description

Defines the overspeed threshold of the motor.

Setpoint	Overspeed Threshold	Condition for Reporting E500.0
0	Maximum motor speed x 1.2	If the speed feedback exceeds the overspeed threshold several times, the drive reports E500.0 (Motor overspeed).
1 to 10000	If H0A-08 ⩾ (Maximum motor speed x 1.2): Overspeed threshold = Maximum motor speed x 1.2	
	If H0A-08 < (Maximum motor speed x 1.2): Overspeed threshold = H0A.08	

H0A.09 **Maximum position pulse frequency**

Hexadecimal:	200A-0Ah	Effective Time:	Real time
Min.:	100	Unit:	kHz
Max.:	4000	Data Type:	UInt16
Default:	4000	Change:	At stop

Value Range:

100 kHz–4000 kHz

Description

Defines the maximum frequency of input pulses when the position reference source is pulse reference (H05.00 = 0) in the position control mode.

When the actual pulse input frequency exceeds the value of H0A.09, the drive reports EB01.0 (excessive position reference increment).

H0A.10 **Threshold of excessive position deviation**

Hexadecimal:	200A-0Bh	Effective Time:	Real time
Min.:	1	Unit:	Encoder unit
Max.:	1073741824	Data Type:	UInt32
Default:	27486951	Change:	Immediately

Value Range:

1 to 1073741824

Description

Defines the threshold for excessive position deviation in the position control mode.

When the position deviation exceeds this threshold, the drive reports EB00.0 (Position deviation too large).

H0A.12 Runaway protection

Hexadecimal:	200A-0Dh	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	1	Change:	Immediately

Value Range:

0: Disabled

1: Enabled

Description

Defines whether to enable runaway protection.

0: Disables E234.0 detection when the motor drives a vertical axis or is driven by the load

1: Enables runaway protection

H0A.16 Threshold of low-frequency resonance position deviation

Hexadecimal:	200A-11h	Effective Time:	Real time
Min.:	1	Unit:	-
Max.:	1000	Data Type:	UInt16
Default:	5	Change:	Immediately

Value Range:

1 to 1000

Description

-

H0A.17 Reference/Pulse selection

Hexadecimal:	200A-12h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Pulse unit

1: Reference unit

Description

Defines the unit for the position settings in H05.21, H05.22, and H0A.10.

Setpoint	Description
0	Pulse unit
1	Reference unit

H0A.19 DI8 filter time constant

Hexadecimal:	200A-14h	Effective Time:	Upon the next power-on
Min.:	0	Unit:	-
Max.:	255	Data Type:	UInt16
Default:	80	Change:	At stop

Value Range:

0 to 255

Description

-

H0A.20 DI9 filter time constant

Hexadecimal:	200A-15h	Effective Time:	Upon the next power-on
Min.:	0	Unit:	-
Max.:	255	Data Type:	UInt16
Default:	80	Change:	At stop

Value Range:

0 to 255

Description

-

H0A.22 Sigma_Delta filter time

Hexadecimal:	200A-17h	Effective Time:	Upon the next power-on
Min.:	0	Unit:	-
Max.:	3	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0 to 3

Description

-

H0A.23 Tz signal filter time

Hexadecimal:	200A-18h	Effective Time:	Upon the next power-on
Min.:	0	Unit:	-
Max.:	31	Data Type:	UInt16
Default:	15	Change:	At stop

Value Range:

0 to 31

Description

-

H0A.24 Filter time constant of low-speed pulse input pin

Hexadecimal:	200A-19h	Effective Time:	Upon the next power-on
Min.:	0	Unit:	-
Max.:	255	Data Type:	UInt16
Default:	30	Change:	At stop

Value Range:

0–255

Description

Defines the filter time constant of low-speed pulse input terminal which is enabled (H05.01 = 0) when the position reference source is pulse input (H05.00 = 0) in the position control mode.

When peak interference exists in the low-speed pulse input terminal, set this parameter to suppress peak interference and prevent motor malfunction due to interference signal inputted to the servo drive.

Maximum Frequency of Input Pulses	Recommended filter value (25 ns)
< 167 kbps	30
167k–250k	20
250k–500k	10

H0A.25 Filter time constant of speed feedback display value

Hexadecimal:	200A-1Ah	Effective Time:	Real time
Min.:	0	Unit:	ms
Max.:	5000	Data Type:	UInt16
Default:	200	Change:	At stop

Value Range:

0 ms to 5000 ms

Description

Defines the low-pass filter time constant of the speed information for speed feedback and position references.

H0A.26 Motor overload detection

Hexadecimal:	200A-1Bh	Effective Time:	Real time
Min.:	0	Unit:	-

Max.:	3	Data Type:	UInt16
Default:	3	Change:	At stop

Value Range:

0: Show motor overload warning (E909.0) and fault (E620.0)

1: Hide motor overload warning (E909.0) and fault (E620.0)

2: No meaning

3: Enabled for new motors

Description

Defines whether to enable motor overload detection.

Setpoint	Function
0	Not hide
1	Hide motor overload warning (E909.0) and motor overload fault (E620.0)
2	No assignment
3	Enabled for new motors

H0A.27 Speed DO filter time constant

Hexadecimal:	200A-1Ch	Effective Time:	Real time
Min.:	0	Unit:	ms
Max.:	5000	Data Type:	UInt16
Default:	10	Change:	At stop

Value Range:

0 ms to 5000 ms

Description

Defines the the average filter time constant of the speed information for speed feedback and position references.

H0A.28 Quadrature encoder filter time constant

Hexadecimal:	200A-1Dh	Effective Time:	Upon the next power-on
Min.:	0	Unit:	ns
Max.:	255	Data Type:	UInt16
Default:	30	Change:	At stop

Value Range:

0 ns to 255 ns

Description

-

H0A.30 **Filter time constant of high-speed pulse input pin**

Hexadecimal:	200A-1Fh	Effective Time:	Upon the next power-on
Min.:	0	Unit:	ns
Max.:	255	Data Type:	UInt16
Default:	2	Change:	At stop

Value Range:

0 ns to 255 ns

Description

Defines the filter time constant of high-speed pulse input terminal which is enabled (H05.01 = 1) when the position reference source is pulse reference (H05.00 = 0) in the position control mode.

When peak interference exists in the high-speed pulse input terminal, set this parameter to suppress peak interference and prevent motor malfunction due to interference signal inputted to the servo drive.

Maximum Frequency of Input Pulses	Recommended Filter Time Constant (Unit: 25 ns)
500k–1M	5
> 1 Mpps	3

H0A.32 **Motor stall over-temperature protection time window**

Hexadecimal:	200A-21h	Effective Time:	Real time
Min.:	10	Unit:	ms
Max.:	65535	Data Type:	UInt16
Default:	200	Change:	Immediately

Value Range:

10 ms to 65535 ms

Description

Defines the overtemperature duration before E630.0 (Motor stall) is detected by the servo drive.

H0A.32 can be used to adjust the sensitivity of motor stall overtemperature detection.

H0A.33 **Motor stall over-temperature detection**

Hexadecimal:	200A-22h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	1	Change:	Immediately

Value Range:

0: Disabled

1: Enable

2: Enabled for new over-temperature

Description

Enables or disables the detection for E630.0 (Motor stall overtemperature protection).

Setpoint	Function
0	Shield
1	Enabled
2	New over-temperature protection

H0A.35 Inhibit reading encoder EEPRROM on power-on (for third-party encoders)

Hexadecimal:	200A-24h	Effective Time:	Upon the next power-on
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0: Allow

1: Inhibit

Description

-

H0A.36 Encoder multi-turn overflow fault

Hexadecimal:	200A-25h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Not hide

1: Hide

Description

Defines whether to hide the encoder multi-turn overflow fault in the absolute position linear mode (H02.01 = 1).

Setpoint	Function
0	Not hide
1	Shield

H0A.38 IGBT over-temperature threshold

Hexadecimal:	200A-27h	Effective Time:	Upon the next power-on
Min.:	0	Unit:	°C
Max.:	175	Data Type:	UInt16
Default:	135	Change:	At stop

Value Range:

0°C to 175°C

Description

-

H0A.39 IGBT over-temperature protection switch

Hexadecimal:	200A-28h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Disabled

1: Enabled

Description

-

H0A.40 Software limit selection

Hexadecimal:	200A-29h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	2	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: No operation

1: Activated immediately

2: Activated after homing is done

Description

Setpoint	Function
0	No operation
1	At once
2	Activated after homing is done

H0A.41 Forward position of software limit

Hexadecimal:	200A-2Ah	Effective Time:	Real time
Min.:	-2147483648	Unit:	-
Max.:	2147483647	Data Type:	Int32
Default:	2147483647	Change:	At stop

Value Range:

-2147483648 to 2147483647

Description

When the absolute position counter (H0b.07) is larger than H0A.41, the servo drive reports E950.0 (Forward limit switch warning) and executes stop at forward limit.

H0A.43 Reverse position of software limit

Hexadecimal:	200A-2Ch	Effective Time:	Real time
Min.:	-2147483648	Unit:	-
Max.:	2147483647	Data Type:	Int32
Default:	-2147483648	Change:	At stop

Value Range:

-2147483648 to 2147483647

Description

When the absolute position counter (H0b.07) is smaller than H0A.43, the servo drive reports warning E952.0 (Reverse limit switch warning) and executes stop at reverse limit.

H0A.47 Brake protection

Hexadecimal:	200A-30h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0 to 1

Description

-

H0A.48 Gravity load

Hexadecimal:	200A-31h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	3000	Data Type:	UInt16

Default:	300	Change:	Immediately

Value Range:

0 to 3000

Description

-

H0A.49 Regenerative wafer over-temperature threshold

Hexadecimal:	200A-32h	Effective Time:	Upon the next power-on
Min.:	0	Unit:	°C
Max.:	175	Data Type:	UInt16
Default:	115	Change:	At stop

Value Range:

0°C to 175°C

Description

Defines the temperature threshold for regenerative resistor overload.

H0A.50 Torque reference display filter time

Hexadecimal:	200A-33h	Effective Time:	Real time
Min.:	0	Unit:	ms
Max.:	5000	Data Type:	UInt16
Default:	200	Change:	At stop

Value Range:

0 ms to 5000 ms

Description

-

H0A.51 Encoder fault tolerance count

Hexadecimal:	200A-34h	Effective Time:	Upon the next power-on
Min.:	0	Unit:	-
Max.:	31	Data Type:	UInt16
Default:	31	Change:	Immediately

Value Range:

0 to 31

Description

-

H0A.52 Defines the temperature threshold for encoder overtemperature protection.

Hexadecimal:	200A-35h	Effective Time:	Real time
Min.:	0	Unit:	°
Max.:	175	Data Type:	UInt16
Default:	105	Change:	Immediately

Value Range:

0° to 175°

Description

When the number of communication failures between the encoder and the drive exceeds H0A.50, the communication between the encoder and the drive fails.

H0A.55 Runaway current threshold

Hexadecimal:	200A-38h	Effective Time:	Real time
Min.:	100.0	Unit:	%
Max.:	400.0	Data Type:	UInt16
Default:	200.0	Change:	Immediately

Value Range:

100.0% to 400.0%

Description

Defines the current threshold for runaway protection detection.

H0A.57 Runaway speed threshold

Hexadecimal:	200A-3Ah	Effective Time:	Real time
Min.:	1	Unit:	rpm
Max.:	1000	Data Type:	UInt16
Default:	10	Change:	Immediately

Value Range:

1rpm–1000rpm

Description

Defines the overspeed threshold for runaway protection detection.

H0A.58 Speed feedback filtering time

Hexadecimal:	200A-3Bh	Effective Time:	Upon the next power-on
Min.:	0.1	Unit:	ms
Max.:	100.0	Data Type:	UInt16

Default:	2.0	Change:	Immediately

Value Range:

0.1 ms to 100.0 ms

Description

Defines the speed feedback filter time for runaway protection detection.

H0A.59 Runaway protection detection time

Hexadecimal:	200A-3Ch	Effective Time:	Real time
Min.:	10	Unit:	ms
Max.:	1000	Data Type:	UInt16
Default:	30	Change:	Immediately

Value Range:

10 ms to 1000 ms

Description

The runaway fault will be reported when runaway keeps active for a period longer than H0A.59.

H0A.61 Phase loss detection time threshold

Hexadecimal:	200A-3Eh	Effective Time:	Real time
Min.:	30	Unit:	ms
Max.:	65535	Data Type:	UInt16
Default:	50	Change:	Immediately

Value Range:

30 ms to 65535 ms

Description

-

H0A.85 Wire breakage detection torque threshold

Hexadecimal:	200A-56h	Effective Time:	Real time
Min.:	4.0	Unit:	%
Max.:	400.0	Data Type:	UInt16
Default:	5.0	Change:	At stop

Value Range:

4.0% to 400.0%

Description

-

H0A.86 **Wire breakage detection filter time**

Hexadecimal:	200A-57h	Effective Time:	Real time
Min.:	5	Unit:	ms
Max.:	1000	Data Type:	UInt16
Default:	30	Change:	At stop

Value Range:

5 ms to 1000 ms

Description

-

4.12 H0B Display Parameters

H0b.00 **Motor speed actual value**

Hexadecimal:	200b-01h	Effective Time:	-
Min.:	-9999	Unit:	rpm
Max.:	9999	Data Type:	Int16
Default:	0	Change:	Unchangeable

Value Range:

-9999rpm to 9999rpm

Description

Indicates the round actual motor speed, which is accurate to 1 rpm.

Set in H0A.25 (Filter time constant of speed feedback display) the filter time constant for H0b.00.

H0b.01 **Speed reference**

Hexadecimal:	200b-02h	Effective Time:	-
Min.:	-9999	Unit:	rpm
Max.:	9999	Data Type:	Int16
Default:	0	Change:	Unchangeable

Value Range:

-9999rpm to 9999rpm

Description

Indicates the present speed reference (accurate to 1rpm) of the drive in the position and speed control modes.

H0b.02 **Internal torque reference**

Hexadecimal:	200b-03h	Effective Time:	-

Min.:	-300.0	Unit:	%
Max.:	300.0	Data Type:	Int16
Default:	0.0	Change:	Unchangeable

Value Range:

-300.0% to 300.0%

Description

Displays present torque reference (accurate to 0.1%). The value 100.0% corresponds to the rated torque of the motor.

H0b.03 Monitored DI status

Hexadecimal:	200b-04h	Effective Time:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

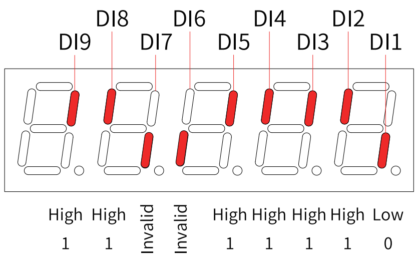
0–65535

Description

Displays the level status of 8 DI terminals without filtering.

Upper LED segments ON: high level (indicated by "1") Lower LED segments ON: low level (indicated by "0")

Assume that the DI1 terminal is low level and DI2 to DI9 terminals are high level, and the corresponding binary number is "110011110". In this case, the value of H0b.03 (Monitored DO signal) read by the software tool is 414 (decimal). See the following figure.



H0b.05 Monitored DO status

Hexadecimal:	200b-06h	Effective Time:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

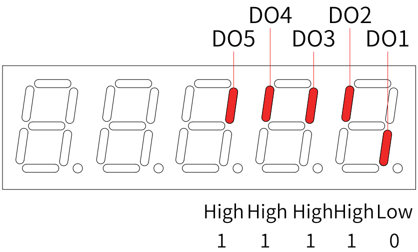
0–65535

Description

Displays the level status of 5 DO terminals without filtering.

Upper LED segments ON: high level (indicated by "1") Lower LED segments ON: low level (indicated by "0")

Assume that the DO1 terminal is low level and DO2 to DO5 terminals are high level, and the corresponding binary number is "11110". In this case, the value of H0b.05 (Monitored DO signal) read by the software tool is 30 (decimal). See the following figure.



H0b.07 Absolute position counter

Hexadecimal:	200b-08h	Effective Time:	-
Min.:	-2147483648	Unit:	Reference unit
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Unchangeable

Value Range:

-2147483648 to 2147483647

Description

Indicates present absolute position (reference unit) of the motor in the position control mode.

This parameter is a 32-bit integer, which is displayed as a decimal on the keypad.

H0b.09 Mechanical angle

Hexadecimal:	200b-0Ah	Effective Time:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

Displays present mechanical angle (encoder unit) of the motor. The setpoint 0 indicates the mechanical angle is 0°.
Actual mechanical angle = 360° x H0b.09/(Maximum value of H0b.09 + 1)

Maximum value of H0b.09 for an absolute encoder: 65535

H0b.10 Electrical angle

Hexadecimal:	200b-0Bh	Effective Time:	-
Min.:	0.0	Unit:	°
Max.:	360.0	Data Type:	UInt16
Default:	0.0	Change:	Unchangeable

Value Range:
0.0° to 360.0°

Description
Indicates the present electrical angle of the motor, which is accurate to 0.1°. The electrical angle variation range is ±360.0° during rotation. If the motor has four pairs of poles, each revolution generates four rounds of angle change from 0° to 359°. Similarly, if the motor has five pairs of poles, each revolution generates five rounds of angle change from 0° to 359°.

H0b.11 Speed corresponding to the input position reference

Hexadecimal:	200b-0Ch	Effective Time:	-
Min.:	-9999	Unit:	rpm
Max.:	9999	Data Type:	Int16
Default:	0	Change:	Unchangeable

Value Range:
-9999rpm to 9999rpm

Description
-

H0b.12 Average load rate

Hexadecimal:	200b-0Dh	Effective Time:	-
Min.:	0.0	Unit:	%
Max.:	6553.5	Data Type:	UInt16
Default:	0.0	Change:	Unchangeable

Value Range:
0.0% to 6553.5%

Description

Displays the percentage of the average load torque to the rated torque of the motor, which is accurate to 0.1%. The value 100.0% corresponds to the rated torque of the motor.

H0b.13 Input position reference counter

Hexadecimal:	200b-0Eh	Effective Time:	-
Min.:	-2147483648	Unit:	Reference unit
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Unchangeable

Value Range:

-2147483648 to 2147483647

Description

-

H0b.15 Encoder position deviation counter

Hexadecimal:	200b-10h	Effective Time:	-
Min.:	-2147483648	Unit:	Encoder unit
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Unchangeable

Value Range:

-2147483648 to 2147483647

Description

-

H0b.17 Feedback pulse counter

Hexadecimal:	200b-12h	Effective Time:	-
Min.:	-2147483648	Unit:	Encoder unit
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Unchangeable

Value Range:

-2147483648 to 2147483647

Description

Used to count the position pulses fed back by the encoder in any control mode. This parameter is a 32-bit integer, which is displayed as a decimal on the keypad.

H0b.19 **Total power-on time**

Hexadecimal:	200b-14h	Effective Time:	-
Min.:	0.0	Unit:	s
Max.:	214748364.7	Data Type:	UInt32
Default:	0.0	Change:	Unchangeable

Value Range:

0.0s–214748364.7s

Description

Used to record the total operating time of the servo drive.

This parameter is a 32-bit integer, which is displayed as a decimal on the keypad.

Note:

If the servo drive is switched on and off repeatedly within a short period of time, a deviation within 1h may be present in the total power-on time record.

H0b.24 **RMS value of phase current**

Hexadecimal:	200b-19h	Effective Time:	-
Min.:	0.00	Unit:	A
Max.:	655.35	Data Type:	UInt16
Default:	0.00	Change:	Unchangeable

Value Range:

0.00 A to 655.35 A

Description

Displays the RMS value of the phase current of the motor, accurate to 0.01 A.

H0b.26 **Bus voltage**

Hexadecimal:	200b-1Bh	Effective Time:	-
Min.:	0.0	Unit:	V
Max.:	6553.5	Data Type:	UInt16
Default:	0.0	Change:	Unchangeable

Value Range:

0.0 V to 6553.5 V

Description

Displays the DC bus voltage of the main circuit input voltage after rectification, which is accurate to 0.01 V.

H0b.27 **Module temperature**

Hexadecimal:	200b-1Ch	Effective Time:	-

Min.:	0	Unit:	°C
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0°C to 65535°C

Description

Indicates the temperature of the module inside the servo drive, which can be used as a reference for estimating the actual temperature of the drive.

H0b.28 Absolute encoder fault information given by FPGA

Hexadecimal:	200b-1Dh	Effective Time:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

-

H0b.29 System status information given by FPGA

Hexadecimal:	200b-1Eh	Effective Time:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

-

H0b.30 System fault information given by FPGA

Hexadecimal:	200b-1Fh	Effective Time:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

-

H0b.33 **Fault log**

Hexadecimal:	200b-22h	Effective Time:	-
Min.:	0	Unit:	-
Max.:	19	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0: Present fault

1: Last fault2: 2nd to last fault3: 3rd to last fault4: 4th to last fault

5: 5th to last fault 6: 6th to last fault7: 7th to last fault8: 8th to last fault9: 9th to last fault10: 10th to last fault11: 11th to last fault12: 12th to last fault13: 13th to last fault14: 14th to last fault15: 15th to last fault16: 16th to last fault17: 17th to last fault18: 18th to last fault19: 19th to last fault

Description

Used to view the latest 20 faults of the drive.

H0b.34 **Fault code of the selected fault**

Hexadecimal:	200b-23h	Effective Time:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

-

H0b.35 **Time stamp upon occurrence of the selected fault**

Hexadecimal:	200b-24h	Effective Time:	-
Min.:	0.0	Unit:	s
Max.:	214748364.7	Data Type:	UInt32
Default:	0.0	Change:	Unchangeable

Value Range:

0.0s–214748364.7s

Description

-

H0b.37 **Motor speed upon occurrence of the selected fault**

Hexadecimal:	200b-26h	Effective Time:	-
Min.:	-32767	Unit:	rpm

Max.:	32767	Data Type:	Int16
Default:	0	Change:	Unchangeable

Value Range:

-32767rpm to 32767rpm

Description

-

H0b.38 Motor phase U current upon occurrence of the selected fault

Hexadecimal:	200b-27h	Effective Time:	-
Min.:	-327.67	Unit:	A
Max.:	327.67	Data Type:	Int16
Default:	0.00	Change:	Unchangeable

Value Range:

-327.67 A to 327.67 A

Description

-

H0b.39 Motor phase V current upon occurrence of the selected fault

Hexadecimal:	200b-28h	Effective Time:	-
Min.:	-327.67	Unit:	A
Max.:	327.67	Data Type:	Int16
Default:	0.00	Change:	Unchangeable

Value Range:

-327.67 A to 327.67 A

Description

-

H0b.40 Bus voltage upon occurrence of the selected fault

Hexadecimal:	200b-29h	Effective Time:	-
Min.:	0.0	Unit:	V
Max.:	6553.5	Data Type:	UInt16
Default:	0.0	Change:	Unchangeable

Value Range:

0.0 V to 6553.5 V

Description

-

H0b.41 DI status upon occurrence of the selected fault

Hexadecimal:	200b-2Ah	Effective Time:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

-

H0b.42 DO status upon occurrence of the selected fault

Hexadecimal:	200b-2Bh	Effective Time:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

-

H0b.43 Group No. of the abnormal parameter

Hexadecimal:	200b-2Ch	Effective Time:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

-

H0b.44 Offset of the abnormal parameter within the parameter group

Hexadecimal:	200b-2Dh	Effective Time:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

-

H0b.45 Internal fault code

Hexadecimal:	200b-2Eh	Effective Time:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

-

H0b.46 Absolute encoder fault information given by FPGA upon occurrence of the selected fault

Hexadecimal:	200b-2Fh	Effective Time:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

-

H0b.47 System status information given by FPGA upon occurrence of the selected fault

Hexadecimal:	200b-30h	Effective Time:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

-

H0b.48 System fault information given by FPGA upon occurrence of the selected fault

Hexadecimal:	200b-31h	Effective Time:	-

Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

-

H0b.51 Internal fault code upon occurrence of the selected fault

Hexadecimal:	200b-34h	Effective Time:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

-

H0b.52 Timeout fault flat bit given by FPGA upon occurrence of the selected fault

Hexadecimal:	200b-35h	Effective Time:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

-

H0b.53 Position deviation counter

Hexadecimal:	200b-36h	Effective Time:	-
Min.:	-2147483648	Unit:	Reference unit
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Unchangeable

Value Range:

-2147483648 to 2147483647

Description

-

H0b.55 Motor speed actual value

Hexadecimal:	200b-38h	Effective Time:	-
Min.:	-6000.0	Unit:	rpm
Max.:	6000.0	Data Type:	Int32
Default:	0.0	Change:	Unchangeable

Value Range:

-6000.0rpm to 6000.0rpm

Description

Indicates the round actual motor speed, which is accurate to 1 rpm.

Set in H0A.25 (Filter time constant of speed feedback display) the filter time constant for H0b.00.

H0b.57 Bus voltage of the control circuit

Hexadecimal:	200b-3Ah	Effective Time:	-
Min.:	0.0	Unit:	V
Max.:	65535.0	Data Type:	UInt16
Default:	0.0	Change:	Unchangeable

Value Range:

0.0 V to 65535.0 V

Description

Displays the bus voltage of the control circuit.

H0b.58 Mechanical absolute position (low 32 bits)

Hexadecimal:	200b-3Bh	Effective Time:	-
Min.:	-2147483647	Unit:	Encoder unit
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Unchangeable

Value Range:

-2147483647 to 2147483647

Description

Displays the low 32-bit value (encoder unit) of the mechanical position feedback when the absolute encoder is used.

H0b.60 Mechanical absolute position (high 32 bits)

Hexadecimal:	200b-3Dh	Effective Time:	-
Min.:	-2147483647	Unit:	Encoder unit
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Unchangeable

Value Range:

-2147483647 to 2147483647

Description

Displays the high 32-bit value (encoder unit) of the mechanical position feedback when the absolute encoder is used.

H0b.64 Real-time input position reference counter

Hexadecimal:	200b-41h	Effective Time:	-
Min.:	-2147483648	Unit:	Reference unit
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Unchangeable

Value Range:

-2147483648 to 2147483647

Description

Displays the value of the pulse reference counter before being divided or multiplied by the electronic gear ratio. This value is independent of the servo drive status and the control mode.

H0b.63 NotRdy state

Hexadecimal:	200b-22h	Effective Time:	-
Min.:	0	Unit:	-
Max.:	7	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

1: Control circuit error

2: Main circuit power input error

3: Bus undervoltage

4: Soft start failed

5: Encoder initialization undone

6: Short circuit to ground failed

7: Others

Description

-

H0b.66 Encoder temperature

Hexadecimal:	200b-43h	Effective Time:	-
Min.:	-32768	Unit:	°C
Max.:	32767	Data Type:	Int16
Default:	0	Change:	Unchangeable

Value Range:

-32768°C to 32767°C

Description

-

H0b.70 Number of revolutions recorded in the absolute encoder

Hexadecimal:	200b-47h	Effective Time:	-
Min.:	0	Unit:	Rev
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0Rev–65535Rev

Description

-

H0b.71 Single-turn position fed back by the absolute encoder

Hexadecimal:	200b-48h	Effective Time:	-
Min.:	0	Unit:	Encoder unit
Max.:	2147483647	Data Type:	UInt32
Default:	0	Change:	Unchangeable

Value Range:

0 to 2147483647

Description

Displays the position feedback of the absolute encoder within one turn.

H0b.73 Single-turn offset position of absolute encoder

Hexadecimal:	200b-4Ah	Effective Time:	-
Min.:	0	Unit:	Encoder unit
Max.:	2147483647	Data Type:	UInt32
Default:	0	Change:	Unchangeable

Value Range:

0 to 2147483647

Description

-

H0b.75 Load inertia ratio in online inertia auto-tuning

Hexadecimal:	200b-4Ch	Effective Time:	-

Min.:	0.00	Unit:	-
Max.:	655.35	Data Type:	UInt16
Default:	0.00	Change:	Unchangeable

Value Range:

0.00 to 655.35

Description

-

H0b.76 External load in online inertia auto-tuning

Hexadecimal:	200b-4Dh	Effective Time:	-
Min.:	0.0	Unit:	-
Max.:	6553.5	Data Type:	UInt16
Default:	0.0	Change:	Unchangeable

Value Range:

0.0 to 6553.5

Description

-

H0b.77 Absolute position fed back by the absolute encoder (low 32 bits)

Hexadecimal:	200b-4Eh	Effective Time:	-
Min.:	-2147483647	Unit:	Encoder unit
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Unchangeable

Value Range:

-2147483647 to 2147483647

Description

-

H0b.79 Absolute position fed back by the absolute encoder (high 32 bits)

Hexadecimal:	200b-50h	Effective Time:	-
Min.:	-2147483647	Unit:	Encoder unit
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Unchangeable

Value Range:

-2147483647 to 2147483647

Description

-

H0b.81 Load position within one turn in absolute position rotation mode (low 32 bits)

Hexadecimal:	200b-52h	Effective Time:	-
Min.:	-2147483647	Unit:	Encoder unit
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Unchangeable

Value Range:

-2147483647 to 2147483647

Description

-

H0b.83 Load position within one turn in absolute position rotation mode (high 32 bits)

Hexadecimal:	200b-54h	Effective Time:	-
Min.:	-2147483647	Unit:	Encoder unit
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Unchangeable

Value Range:

-2147483647 to 2147483647

Description

-

H0b.85 Load position within one turn in absolute position rotation mode

Hexadecimal:	200b-56h	Effective Time:	-
Min.:	-2147483647	Unit:	Reference unit
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Unchangeable

Value Range:

-2147483647 to 2147483647

Description

-

4.13 H0C Communication Parameters

H0C.00 Drive axis address

Hexadecimal:	200C-01h	Effective Time:	Real time
Min.:	0	Unit:	-

Max.:	247	Data Type:	UInt16
Default:	1	Change:	Immediately

Value Range:

0 to 247

Description

CAN Indicates the slave node address. Ensure this parameter is consistent with the configuration of the host controller.

H0C.02 Serial baud rate

Hexadecimal:	200C-03h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	6	Data Type:	UInt16
Default:	5	Change:	Immediately

Value Range:

0: 2400bps

1: 4800bps

2: 9600bps

3: 19200bps

4: 38400bps

5: 57600bps

6: 115200bps

Description

Setpoint	Baud rate
0	2400bps
1	4800bps
2	9600bps
3	19200bps
4	38400bps
5	57600bps
6	115200bps

H0C.03 Modbus data format

Hexadecimal:	200C-04h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	3	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0: No parity, 2 stop bits
1: Even parity, 1 stop bit
2: Odd parity, 1 stop bit
3: No parity, 1 stop bit

Description

Defines the data check mode between the servo drive and the host controller during communication.

Setpoint	Data format
0	No check, 2 stop bits
1	Even parity check, 1 stop bit
2	Odd parity check, 1 stop bit
3	No check, 1 stop bits

The data format set in the servo drive must be the same as that in the host controller. Otherwise, communication will fail.

H0C.08 **CAN communication rate**

Hexadecimal:	200C-09h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	8	Data Type:	UInt16
Default:	5	Change:	Immediately

Value Range:

0: 20K
1: 50K
2: 100K
3: 125K
4: 250K
5: 500K
6: 1M
7: 1M

Description

It sets the CAN (CANlink or CANopen) communication rate between the servo drive and the host controller. The communication rate set in the servo drive must be the same as that in the host controller. Otherwise, communication will fail. If H0C.08 is set to 6, the baud rate is 1 Mbps. 80% sampling points are used to match most PLCs with a 1M standard baud rate.
If H0C.08 is set to 7, the baud rate is 1 Mbps. 70% sampling points are used to match most PLCs with a 1M non-standard (deviated) baud rate. Reducing sampling points can also reduce error frames.

Setpoint	Baud rate
0	20K
1	50K
2	100K
3	125K
4	250K
5	500K
6	1M
7	1M

H0C.09 **Communication VDI**

Hexadecimal:	200C-0Ah	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Disabled

1: Enabled

Description

To use the VDI function:

1. Set H0C.09 to enable VDI.
2. Set the default level after power-on through H0C.10.
3. Set the DI function of the VDI terminal through parameters in group H17.
4. Set VDI output through H31.00.

H0C.10 **VDI default value upon power-on**

Hexadecimal:	200C-0Bh	Effective Time:	Upon the next power-on
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0–65535

Description

Configures the initial value of VDI upon power-on.

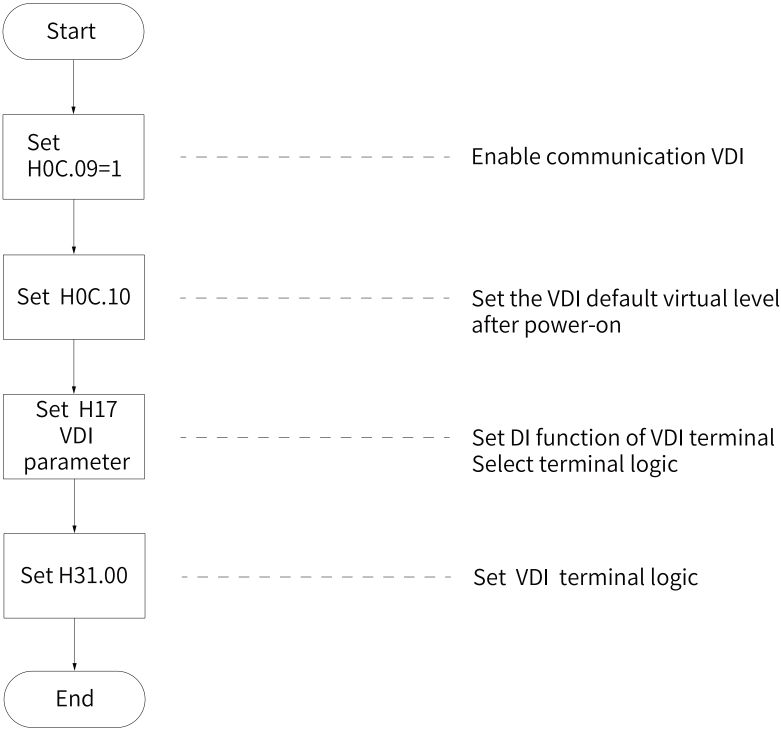
Bit 0 corresponds to VDI1.

Bit 1 corresponds to VDI2.

…

bit15 corresponds to VDI16.

Use the VDI according to the following procedure:



H0C.11 **Communication VDO**

Hexadecimal:	200C-0Ch	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Disabled

1: Enabled

Description

To use the VDO function:

1. Enable VDO through H0C.11.
2. Set the default level after power-on through H0C.12.
3. Set the DO function of the VDO terminal through parameters in group H17.

4: Read the output level of the VDO terminal through H17.32.

H0C.12 **Default level of the VDO allocated with function 0**

Hexadecimal:	200C-0Dh	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0 to 65535

Description

Used to configure the initial values of VDO upon power-on.

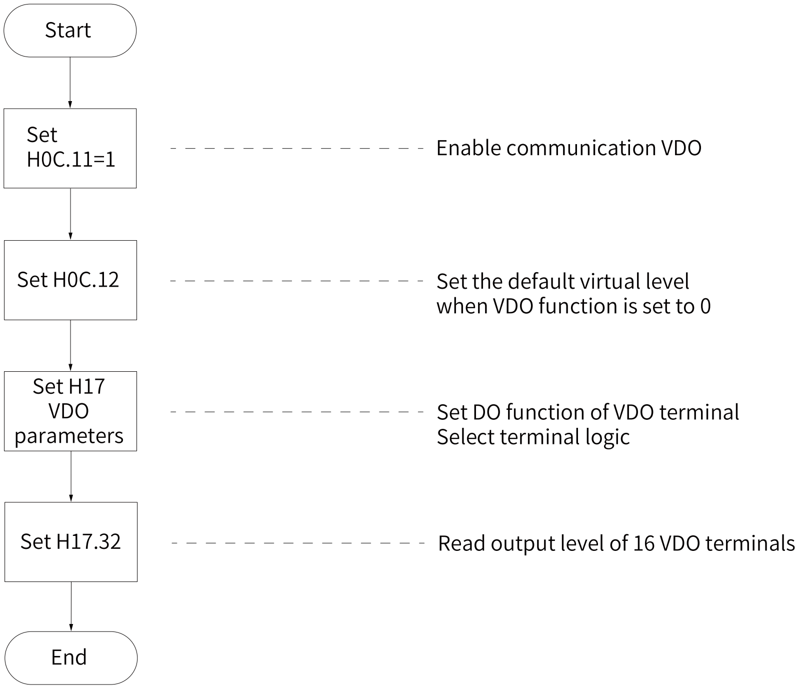
bit0 corresponds to VDO1.

bit1 corresponds to VDO2.

…

bit15 corresponds to VDO16.

Use the VDO according to the following procedure:



H0C.13 Update parameter values written through communication to EEPROM

Hexadecimal:	200C-0Eh	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	1	Change:	Immediately

Value Range:

0: Not update EEPROM

1: Update EEPROM

Description

-

H0C.14 Modbus error code

Hexadecimal:	200C-0Fh	Effective Time:	-
Min.:	0	Unit:	-

Max.:	4	Data Type:	UInt16
Default:	2	Change:	Unchangeable

Value Range:

0: N/A

1: Illegal parameter (command code)

2: Command code data address

3: Illegal data

4: Slave device fault

Description

-

H0C.16 Update parameter values written through CAN communication to EEPROM

Hexadecimal:	200C-11h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0: Not update EEPROM

1: Update EEPROM

Description

-

H0C.25 Modbus command response delay

Hexadecimal:	200C-1Ah	Effective Time:	Real time
Min.:	0	Unit:	ms
Max.:	20	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0 ms to 20 ms

Description

Defines the delay from the moment when the slave receives a command from the host controller to the moment when the slave returns a response.

H0C.26 Modbus communication data sequence

Hexadecimal:	200C-1Bh	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	1	Change:	Immediately

Value Range:

0: High 16 bits before low 16 bits

1: Low 16 bits before high 16 bits

Description

-

H0C.30 **Modbus error frame format**

Hexadecimal:	200C-1Fh	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	1	Change:	Immediately

Value Range:

0: Old protocol

1: New protocol (standard)

Description

-

H0C.31 **Modbus receiving selection**

Hexadecimal:	200C-20h	Effective Time:	Upon the next power-on
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0: Receiving interrupt enabled

1: Current loop interrupt inquiry

Description

-

4.14 H0d Auxiliary Parameters

H0d.00 **Software Reset**

Hexadecimal:	200d-01h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: No operation

1: Enable

Description

Programs in the drive are reset automatically (similar to the program reset upon power-on) after the software reset function is enabled, without the need for a power cycle.

H0d.01 Fault Reset

Hexadecimal:	200d-02h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: No operation

1: Enable

Description

When a No. 1 or No. 2 resettable fault occurs, you can enable the fault reset function in the non-operational state after rectifying the fault cause, stopping the keypad from displaying the fault and allowing the drive to enter the "rdy" state.

When a No. 3 warning occurs, you can enable the fault reset function directly, regardless of the servo drive status.

Defines whether to enable fault reset.

Setpoint	Function	Remarks
0	No operation	-
1	Fault Reset	• When a No. 1 or No. 2 resettable fault occurs, you can enable the fault reset function in the non-operational state after rectifying the fault cause, stopping the keypad from displaying the fault and allowing the drive to enter the "rdy" state. • When a No. 3 warning occurs, you can enable the fault reset function directly, regardless of the servo drive status.

H0d.02 Inertia auto-tuning selection

Hexadecimal:	200d-03h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	65	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0 to 65

Description

-

H0d.03 Initial angle auto-tuning

Hexadecimal:	200d-04h	Effective Time:	-
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: No operation

1: Enabled

Description

-

H0d.04 Read/write in encoder ROM

Hexadecimal:	200d-05h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	2	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: No operation

1: Write ROM

2: Read ROM

Description

-

H0d.05 Emergency stop

Hexadecimal:	200d-06h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0: No operation

1: Emergency stop

Description

Setpoint	Function
0	No operation
1	Emergency stop

H0d.06 Current loop parameter auto-tuning

Hexadecimal:	200d-07h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	2	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: No operation

1: Save parameters

2: Do not save parameters

Description

-

H0d.12 Phase U/V current balance correction

Hexadecimal:	200d-0Dh	Effective Time:	-
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 1

Description

-

H0d.17 Forced DI/DO selection

Hexadecimal:	200d-12h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	3	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0: No operation

1: Forced DI enabled, forced DO disabled

2: Forced DO enabled, forced DI disabled

3: Forced DI and DO enabled

Description

Forced DI/DO selection.

H0d.18 Forced DI setting

Hexadecimal:	200d-13h	Effective Time:	Real time
Min.:	0	Unit:	-

Max.: 511
Default: 511
Data Type: UInt16
Change: Immediately

Value Range:

0–511

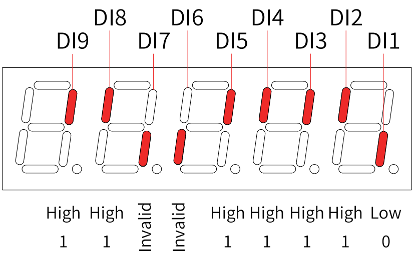
Description

Defines whether the DI functions set in group H03 is active when forced DI is activated (H0d.17 = 1 or 3).

The value of H0d.18 is displayed as a hexadecimal on the keypad. When it is converted to a binary value, "bit(n) = 1" indicates the level logic of DI function is high level; "bit(n) = 0" indicates the level logic of the DI function is low level.

Example:

H0d.18 value is 414 (decimal), and the corresponding binary value is 110011110, indicating that DI1 is low level and DI2 to DI9 are high level. The nine DI levels can also be monitored through H0b.03 (Monitored DI states).



View also the DI terminal logic in group H03 when checking whether a DI function is valid.

H0d.19 Forced DO setting

Hexadecimal: 200d-14h
Effective Time: Real time
Min.: 0
Unit: -
Max.: 31
Data Type: UInt16
Default: 0
Change: Immediately

Value Range:

0–31

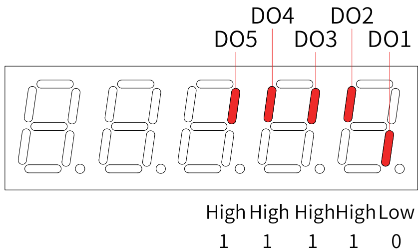
Description

Defines whether the DO functions assigned in group H04 are active when forced DO is active (H0d.17 = 2 or 3).

The value of H0d.19 is displayed as a hexadecimal on the keypad. When it is converted to a binary value, "bit(n) = 1" indicates the DO function is active; "bit (n) = 0" indicates the DO function is inactive.

Example:

If H0d.19 value is 30 (decimal), the corresponding binary is 11110, indicating that the DO1 function is invalid and functions of DO2 to DO5 are valid. The DO levels obtained based on the DO logics in group H04 and viewed in H0b.05 are shown as below:Assume that DO1 to DO5 logics in group H04 use 0 to indicate low level output at function valid.



H0d.20 **Multi-turn absolute encoder reset**

Hexadecimal:	200d-15h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	2	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: No operation

1 Reset

2: Reset the fault and multi-turn data

Description

You can reset the encoder error or the multi-turn data fed back by the encoder by setting H0d.20.

Setpoint	Function
0	No operation
1	Reset encoder fault
2	Reset encoder fault and multi-turn data

4.15 H11 Multi-Position Function Parameters

H11.00 **Multi-position operation mode**

Hexadecimal:	2011-01h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	5	Data Type:	UInt16
Default:	1	Change:	At stop

Value Range:

0: Single run (number of displacements selected in H11.01)

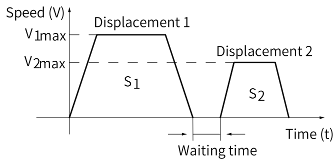
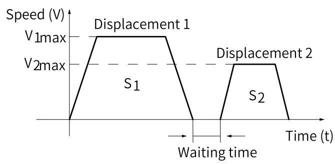
1: Cyclic operation (number of displacement selected in H11.01)

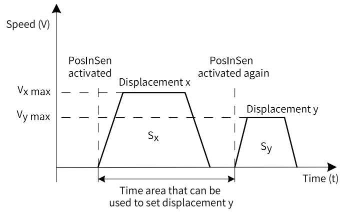
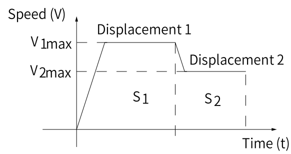
2: DI-based operation (selected by DI)

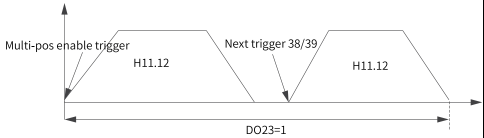
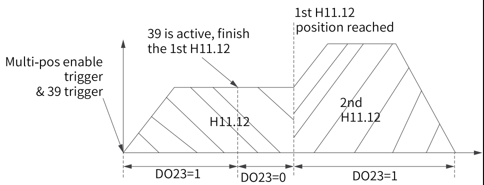
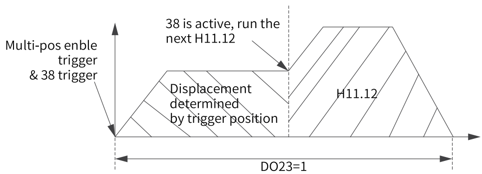
3: Sequential operation

5: Axis-controlled continuous operation

Description

Set point	Operation Mode	Remarks	Operation Curve
0	Individual operation	• The drive stops after one cycle of operation. • The drive switches to the next displacement automatically. • The interval time between displacements can be set as needed. • The PoslnSen (multi-position reference enable) signal is level-triggered.	 V_{1max} , V_{2max} : maximum operating speeds in displacement 1 and displacement 2 S_1 , S_2 : displacement 1 and displacement 2
1	Cyclic operation	• The drive starts from displacement 1 again after each cycle of operation. • The drive switches to the next displacement automatically. • The interval time between displacements can be set as needed. • The cyclic operation mode is kept when the FunIN.28 (Multi-position reference enable) is active. • The PoslnSen (multi-position reference enable) signal is level-triggered.	 V_{1max} , V_{2max} : maximum operating speeds in displacement 1 and displacement 2 S_1 , S_2 : displacement 1 and displacement 2

Set point	Operation Mode	Remarks	Operation Curve
2	DI-based operation	• The displacement to be executed next can be set when the current displacement is in progress. The motor stops after current displacement is done executing. After the PoslnSen (position reference enable) signal is enabled again, the present displacement will be executed. • The speed No. is determined by the DI logic. • The interval time between displacements is determined by the command delay of the host controller. • The PoslnSen (multi-position reference enable) signal is edge-triggered.	 V_{xmax} , V_{ymax} : maximum operating speeds in displacement x and displacement y S_x , S_y : displacement x and displacement y
3	Sequential operation	• The drive stops after one cycle of operation. • (H11.05 = 0 or H11.05 > H11.01). • The starting displacement after the first cycle of operation is defined by H11.05. • The drive switches to the next displacement automatically. • There is no interval time between displacements. • The PoslnSen (multi-position reference enable) signal is level-triggered.	 V_{1max} , V_{2max} : maximum operating speeds in displacement 1 and displacement 2 S_1 , S_2 : displacement 1 and displacement 2

Set point	Operation Mode	Remarks	Operation Curve
5	Axis-controlled continuous operation	• The drives executes one displacement only. • The individual operation mode, sequential operation mode, and interrupted operation mode are included. • The PoslnSen (multi-position reference enable) signal is level-triggered.	• Individual operation  The PoslnSen (multi-position reference enable) signal is triggered only once (FunIN.39/38 triggered later). The drive stops after executing the distance defined by H11.12. • Sequential operation  The PoslnSen (multi-position reference enable) signal is triggered only once. Write H11.12 again and activate FunIN.39 when the distance defined by the first H11.12 is still in progress.After receiving the new distance (or speed), which is the second H11.12, the drive continues executing the first H11.12 until the distance defined by the first H11.12 is done. Then it starts to execute the second H11.12 directly. The travel distance therefore is the sum of the first H11.12 and the second H11.12. • Interrupted operation  The PoslnSen (Multi-position reference enable) signal is triggered only once. Write H11.12 (such as 1000000) again and activate FunIN.38 when the first H11.12 (such as 9000000) is still in progress. After receiving the new distance (or speed), which is the second H11.12, the servo drive stops executing the first H11.12 and turns to executing the second H11.12.

To use the multi-position function, assign FunIN.28 (PosInSen, multi-position reference enable) to a DI first. See "Group H03: Terminal input parameters" for the setting mode.

The positioning completed (COIN) signal is activated each time upon completion of a displacement. To determine whether a certain displacement is done executing, use FunOUT.5 (COIN, positioning completed). See "Group H04: Terminal output parameters" for details.

Ensure the S-ON signal is active during operation of each displacement. Otherwise, the drive stops immediately as defined by H02.05 (Stop mode at S-ON OFF) and the positioning completed (COIN) signal in inactive. In modes other than DI-based operation, if the S-ON signal is active but multi-position is disabled during operation of a certain displacement, the drive abandons the unsent displacement reference and stops, with the positioning completed (COIN) signal being active. If the multi-position function is enabled again, the displacement to be executed is defined by H11.02.

H11.01 **Number of displacement references in multi-position mode**

Hexadecimal:	2011-02h	Effective Time:	Real time
Min.:	1	Unit:	-
Max.:	16	Data Type:	UInt16
Default:	1	Change:	At stop

Value Range:

1 to 16

Description

Defines the total number of displacement references in the multi-position mode. You can set different displacements, operating speeds, and acceleration/deceleration time for each displacement.

H11.00 ≠ 2: Displacements are switched automatically in a sequence from 1, 2... H11.01.

H11.00 = 2: Assign four DIs (hardware DI or VDI) with DI functions 6 to 9 (FunIN.6: CMD1 to FunIN.9: CMD4) and you can switch between different speeds by controlling the DI logic through the host controller. The segment No. is a 4-bit binary value. Bit0 to bit 3 correspond to CMD1 to CMD4.

The displacement No. is a 4-bit binary value. The relationship between the displacement numbers and CMD1...CMD4 is shown in the following table.

FunIN.9	FunIN.8	FunIN.7	FunIN.6	Segment No.
CMD4	CMD3	CMD2	CMD1	
0	0	0	0	1
0	0	0	1	2
...				
1	1	1	1	16

H11.02 **Starting displacement No. after pause**

Hexadecimal:	2011-03h	Effective Time:	Real time

Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Continue to execute the unexecuted displacements

1: Start from displacement 1

Description

Defines the starting displacement No. when the multi-position operation recovers from a pause.

Pause:

1. The servo drive switches to another control mode or the interrupt positioning function is enabled during multi-position operation.
2. The internal multi-position enable signal (FunIN.28:PosInSen) changes from "active" to "inactive".

Setpoint	Starting displacement No. after pause	Remarks
0	Complete the remaining distance	For example, if H11.01 = 16 and the servo drive pauses when running to the 2nd position, it starts running from the 3rd position after restoring the multi-position running.
1	Start running again from 1st position	For example, if H11.01 = 16 and the servo drive pauses when running to the 2nd position, it starts running from the 1st position after restoring the multi-position running.

H11.03 **Interval time unit**

Hexadecimal:	2011-04h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

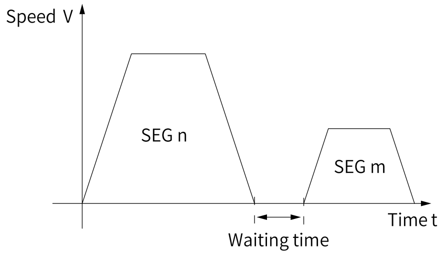
0: ms

1: s

Description

Defines the unit of acceleration/deceleration time and the interval time during multi-position operation.

Acceleration/Deceleration time: time for the motor to change from 0 rpm to 1000 rpm at a constant speed.
Interval time: interval time that starts from the end of the last reference to the beginning of the next reference

<table>
<tr><th>Setpoint</th><th>Interval time unit</th><th>Remarks</th></tr>
<tr><td>0</td><td>ms</td><td rowspan="2">
</td></tr>
<tr><td>1</td><td>s</td></tr>
</table>

When H11.00 = 3 (Sequential running), H11.03 is invalid, and there is no waiting time between positions.
When H11.00 = 2 (DI switchover), H11.03 is invalid, and the time interval between positions is determined by the delay time command from the host controller.

H11.04 Displacement reference type

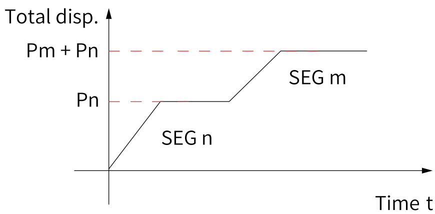
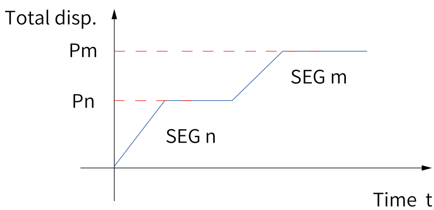
Hexadecimal:	2011-05h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0: Relative displacement reference
1: Absolute displacement reference

Description

Relative displacement: position increment of the target position relative to the current motor position
Absolute displacement: position increment of the target position relative to the motor home.
It sets the displacement reference type when the multi-position function is used.
Displacement reference: sum of position references in a certain period.
Relative displacement: position increment of the target position relative to the current motor position. Absolute displacement: position increment of the target position relative to motor home position. For example, the displacements of the nth position and mth position are Pn (Pn > 0) and Pm (Pm > 0) respectively. Suppose Pm is larger than Pn, the comparison diagram will be as follows.

Setpoint	Displacement instruction type	Remarks
0	Relative displacement reference	 mth actual displacement: Pm
1	Absolute displacement reference	 mth actual displacement: Pm

When the actual displacement is a negative value, the motor runs in the reverse direction.

H11.05 Starting displacement No. in sequential operation

Hexadecimal:	2011-06h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	16	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0–16

Description

Defines whether to perform cyclic operation and the starting displacement No. after the first cycle of operation in the sequential operation mode (H11.00 = 3).

Setpoint	Starting displacement No. in sequential operation	Remarks
0	Not cyclic	The servo drive runs positions set in H11.01 only once, and stops after the running is completed. Then, the motor becomes in locked state.
1–16	1–16	The drive operates cyclically, with the starting displacement No. defined by H11.05 after the first cycle of operation. The value of H11.05 should be lower than or equal to H11.01.

H11.09 **Deceleration upon axis control OFF**

Hexadecimal:	2011-0Ah	Effective Time:	Real time
Min.:	0	Unit:	ms
Max.:	65535	Data Type:	UInt16
Default:	65535	Change:	Immediately

Value Range:

0 ms to 65535 ms

Description

-

H11.10 **Start speed of the 1st displacement**

Hexadecimal:	2011-0Bh	Effective Time:	Real time
Min.:	0	Unit:	rpm
Max.:	6000	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0rpm–6000rpm

Description

-

H11.11 Stop speed of the 1st displacement

Hexadecimal:	2011-0Ch	Effective Time:	Real time
Min.:	0	Unit:	rpm
Max.:	6000	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0rpm–6000rpm

Description

-

H11.12 Displacement 1

Hexadecimal:	2011-0Dh	Effective Time:	Real time
Min.:	-1073741824	Unit:	Reference unit
Max.:	1073741824	Data Type:	Int32
Default:	10000	Change:	Immediately

Value Range:

-1073741824 to 1073741824

Description

Defines displacement 1 (reference unit) in multi-position operation.

H11.14 Max. speed of displacement 1

Hexadecimal:	2011-0Fh	Effective Time:	Real time
Min.:	1	Unit:	rpm
Max.:	6000	Data Type:	UInt16
Default:	200	Change:	Immediately

Value Range:

1 rpm to 6000 rpm

Description

Defines the maximum speed of displacement 1 in multi-position operation. The maximum speed is the average operating speed when the motor is not in the acceleration/deceleration process. If H11.12 is set to a too low value, the actual motor speed will be lower than H11.14.

H11.15 Acc/Dec time of displacement 1

Hexadecimal:	2011-10h	Effective Time:	Real time
Min.:	0	Unit:	ms
Max.:	65535	Data Type:	UInt16

Default:	10	Change:	Immediately

Value Range:

0 ms to 65535 ms

Description

Defines the time for the motor to change from 0 rpm 1000 rpm at a constant speed during displacement 1.

Actual time needed for accelerating to H11.14 (Max. speed of displacement 1):

$$t = \frac{(H11.14) \times (H11.15)}{1000}$$

Note: The rigidity must be good, and the speed loop can follow the position command.

H11.16 **Interval time after displacement 1**

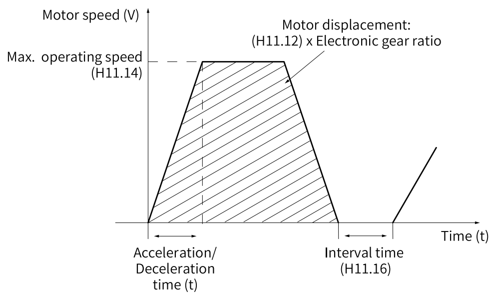
Hexadecimal:	2011-11h	Effective Time:	Real time
Min.:	0	Unit:	ms (s)
Max.:	10000	Data Type:	UInt16
Default:	10	Change:	Immediately

Value Range:

0 ms(s) to 10000 ms(s)

Description

Defines the interval time that starts from the end of displacement 1 to the beginning of the next displacement.



H11.17 **Displacement 2**

Hexadecimal:	2011-12h	Effective Time:	Real time
Min.:	-1073741824	Unit:	Reference unit
Max.:	1073741824	Data Type:	Int32
Default:	10000	Change:	Immediately

Value Range:

-1073741824 to 1073741824

Description

-

H11.19 Max. speed of displacement 2

Hexadecimal:	2011-14h	Effective Time:	Real time
Min.:	1	Unit:	rpm
Max.:	6000	Data Type:	UInt16
Default:	200	Change:	Immediately

Value Range:

1 rpm to 6000 rpm

Description

-

H11.20 Acc/Dec time of displacement 2

Hexadecimal:	2011-15h	Effective Time:	Real time
Min.:	0	Unit:	ms
Max.:	65535	Data Type:	UInt16
Default:	10	Change:	Immediately

Value Range:

0 ms to 65535 ms

Description

-

H11.21 Interval time after displacement 2

Hexadecimal:	2011-16h	Effective Time:	Real time
Min.:	0	Unit:	ms (s)
Max.:	10000	Data Type:	UInt16
Default:	10	Change:	Immediately

Value Range:

0 ms(s) to 10000 ms(s)

Description

-

H11.22 Displacement 3

Hexadecimal:	2011-17h	Effective Time:	Real time

Min.:	-1073741824	Unit:	Reference unit
Max.:	1073741824	Data Type:	Int32
Default:	10000	Change:	Immediately

Value Range:

-1073741824 to 1073741824

Description

-

H11.24 Max. speed of displacement 3

Hexadecimal:	2011-19h	Effective Time:	Real time
Min.:	1	Unit:	rpm
Max.:	6000	Data Type:	UInt16
Default:	200	Change:	Immediately

Value Range:

1 rpm to 6000 rpm

Description

-

H11.25 Acc/Dec time of displacement 3

Hexadecimal:	2011-1Ah	Effective Time:	Real time
Min.:	0	Unit:	ms
Max.:	65535	Data Type:	UInt16
Default:	10	Change:	Immediately

Value Range:

0 ms to 65535 ms

Description

-

H11.26 Interval time after displacement 3

Hexadecimal:	2011-1Bh	Effective Time:	Real time
Min.:	0	Unit:	ms (s)
Max.:	10000	Data Type:	UInt16
Default:	10	Change:	Immediately

Value Range:

0 ms(s) to 10000 ms(s)

Description

-

H11.27 **Displacement 4**

Hexadecimal:	2011-1Ch	Effective Time:	Real time
Min.:	-1073741824	Unit:	Reference unit
Max.:	1073741824	Data Type:	Int32
Default:	10000	Change:	Immediately

Value Range:

-1073741824 to 1073741824

Description

-

H11.29 **Max. speed of displacement 4**

Hexadecimal:	2011-1Eh	Effective Time:	Real time
Min.:	1	Unit:	rpm
Max.:	6000	Data Type:	UInt16
Default:	200	Change:	Immediately

Value Range:

1 rpm to 6000 rpm

Description

-

H11.30 **Acc/Dec time of displacement 4**

Hexadecimal:	2011-1Fh	Effective Time:	Real time
Min.:	0	Unit:	ms
Max.:	65535	Data Type:	UInt16
Default:	10	Change:	Immediately

Value Range:

0 ms to 65535 ms

Description

-

H11.31 **Interval time after displacement 4**

Hexadecimal:	2011-20h	Effective Time:	Real time
Min.:	0	Unit:	ms (s)
Max.:	10000	Data Type:	UInt16
Default:	10	Change:	Immediately

Value Range:

0 ms(s) to 10000 ms(s)

Description

-

H11.32 **Displacement 5**

Hexadecimal:	2011-21h	Effective Time:	Real time
Min.:	-1073741824	Unit:	Reference unit
Max.:	1073741824	Data Type:	Int32
Default:	10000	Change:	Immediately

Value Range:

-1073741824 to 1073741824

Description

-

H11.34 **Max. speed of displacement 5**

Hexadecimal:	2011-23h	Effective Time:	Real time
Min.:	1	Unit:	rpm
Max.:	6000	Data Type:	UInt16
Default:	200	Change:	Immediately

Value Range:

1 rpm to 6000 rpm

Description

-

H11.35 **Acc/Dec time of displacement 5**

Hexadecimal:	2011-24h	Effective Time:	Real time
Min.:	0	Unit:	ms
Max.:	65535	Data Type:	UInt16
Default:	10	Change:	Immediately

Value Range:

0 ms to 65535 ms

Description

-

H11.36 **Interval time after displacement 5**

Hexadecimal:	2011-25h	Effective Time:	Real time
Min.:	0	Unit:	ms (s)
Max.:	10000	Data Type:	UInt16

Default:	10	Change:	Immediately

Value Range:

0 ms(s) to 10000 ms(s)

Description

-

H11.37 **Displacement 6**

Hexadecimal:	2011-26h	Effective Time:	Real time
Min.:	-1073741824	Unit:	Reference unit
Max.:	1073741824	Data Type:	Int32
Default:	10000	Change:	Immediately

Value Range:

-1073741824 to 1073741824

Description

-

H11.39 **Max. speed of displacement 6**

Hexadecimal:	2011-28h	Effective Time:	Real time
Min.:	1	Unit:	rpm
Max.:	6000	Data Type:	UInt16
Default:	200	Change:	Immediately

Value Range:

1 rpm to 6000 rpm

Description

-

H11.40 **Acc/Dec time of displacement 6**

Hexadecimal:	2011-29h	Effective Time:	Real time
Min.:	0	Unit:	ms
Max.:	65535	Data Type:	UInt16
Default:	10	Change:	Immediately

Value Range:

0 ms to 65535 ms

Description

-

H11.41 **Interval time after displacement 6**

Hexadecimal:	2011-2Ah	Effective Time:	Real time

Min.:	0	Unit:	ms (s)
Max.:	10000	Data Type:	UInt16
Default:	10	Change:	Immediately

Value Range:

0 ms(s) to 10000 ms(s)

Description

-

H11.42 Displacement 7

Hexadecimal:	2011-2Bh	Effective Time:	Real time
Min.:	-1073741824	Unit:	Reference unit
Max.:	1073741824	Data Type:	Int32
Default:	10000	Change:	Immediately

Value Range:

-1073741824 to 1073741824

Description

-

H11.44 Max. speed of displacement 7

Hexadecimal:	2011-2Dh	Effective Time:	Real time
Min.:	1	Unit:	rpm
Max.:	6000	Data Type:	UInt16
Default:	200	Change:	Immediately

Value Range:

1 rpm to 6000 rpm

Description

-

H11.45 Acc/Dec time of displacement 7

Hexadecimal:	2011-2Eh	Effective Time:	Real time
Min.:	0	Unit:	ms
Max.:	65535	Data Type:	UInt16
Default:	10	Change:	Immediately

Value Range:

0 ms to 65535 ms

Description

-

H11.46 Interval time after displacement 7

Hexadecimal:	2011-2Fh	Effective Time:	Real time
Min.:	0	Unit:	ms (s)
Max.:	10000	Data Type:	UInt16
Default:	10	Change:	Immediately

Value Range:

0 ms(s) to 10000 ms(s)

Description

-

H11.47 Displacement 8

Hexadecimal:	2011-30h	Effective Time:	Real time
Min.:	-1073741824	Unit:	Reference unit
Max.:	1073741824	Data Type:	Int32
Default:	10000	Change:	Immediately

Value Range:

-1073741824 to 1073741824

Description

-

H11.49 Max. speed of displacement 8

Hexadecimal:	2011-32h	Effective Time:	Real time
Min.:	1	Unit:	rpm
Max.:	6000	Data Type:	UInt16
Default:	200	Change:	Immediately

Value Range:

1 rpm to 6000 rpm

Description

-

H11.50 Acc/Dec time of displacement 8

Hexadecimal:	2011-33h	Effective Time:	Real time
Min.:	0	Unit:	ms
Max.:	65535	Data Type:	UInt16
Default:	10	Change:	Immediately

Value Range:

0 ms to 65535 ms

Description

-

H11.51 Interval time after displacement 8

Hexadecimal:	2011-34h	Effective Time:	Real time
Min.:	0	Unit:	ms (s)
Max.:	10000	Data Type:	UInt16
Default:	10	Change:	Immediately

Value Range:

0 ms(s) to 10000 ms(s)

Description

-

H11.52 Displacement 9

Hexadecimal:	2011-35h	Effective Time:	Real time
Min.:	-1073741824	Unit:	Reference unit
Max.:	1073741824	Data Type:	Int32
Default:	10000	Change:	Immediately

Value Range:

-1073741824 to 1073741824

Description

-

H11.54 Max. speed of displacement 9

Hexadecimal:	2011-37h	Effective Time:	Real time
Min.:	1	Unit:	rpm
Max.:	6000	Data Type:	UInt16
Default:	200	Change:	Immediately

Value Range:

1 rpm to 6000 rpm

Description

-

H11.55 Acc/Dec time of displacement 9

Hexadecimal:	2011-38h	Effective Time:	Real time
Min.:	0	Unit:	ms
Max.:	65535	Data Type:	UInt16

Default:	10	Change:	Immediately

Value Range:

0 ms to 65535 ms

Description

-

H11.56 Interval time after displacement 9

Hexadecimal:	2011-39h	Effective Time:	Real time
Min.:	0	Unit:	ms (s)
Max.:	10000	Data Type:	UInt16
Default:	10	Change:	Immediately

Value Range:

0 ms(s) to 10000 ms(s)

Description

-

H11.57 Displacement 10

Hexadecimal:	2011-3Ah	Effective Time:	Real time
Min.:	-1073741824	Unit:	Reference unit
Max.:	1073741824	Data Type:	Int32
Default:	10000	Change:	Immediately

Value Range:

-1073741824 to 1073741824

Description

-

H11.59 Max. speed of displacement 10

Hexadecimal:	2011-3Ch	Effective Time:	Real time
Min.:	1	Unit:	rpm
Max.:	6000	Data Type:	UInt16
Default:	200	Change:	Immediately

Value Range:

1 rpm to 6000 rpm

Description

-

H11.60 Acc/Dec time of displacement 10

Hexadecimal:	2011-3Dh	Effective Time:	Real time
Min.:	0	Unit:	ms
Max.:	65535	Data Type:	UInt16
Default:	10	Change:	Immediately

Value Range:

0 ms to 65535 ms

Description

-

H11.61 Interval time after displacement 10

Hexadecimal:	2011-3Eh	Effective Time:	Real time
Min.:	0	Unit:	ms (s)
Max.:	10000	Data Type:	UInt16
Default:	10	Change:	Immediately

Value Range:

0 ms(s) to 10000 ms(s)

Description

-

H11.62 Displacement 11

Hexadecimal:	2011-3Fh	Effective Time:	Real time
Min.:	-1073741824	Unit:	Reference unit
Max.:	1073741824	Data Type:	Int32
Default:	10000	Change:	Immediately

Value Range:

-1073741824 to 1073741824

Description

-

H11.64 Max. speed of displacement 11

Hexadecimal:	2011-41h	Effective Time:	Real time
Min.:	1	Unit:	rpm
Max.:	6000	Data Type:	UInt16
Default:	200	Change:	Immediately

Value Range:

1 rpm to 6000 rpm

Description

-

H11.65 Acc/Dec time of displacement 11

Hexadecimal:	2011-42h	Effective Time:	Real time
Min.:	0	Unit:	ms
Max.:	65535	Data Type:	UInt16
Default:	10	Change:	Immediately

Value Range:

0 ms to 65535 ms

Description

-

H11.66 Interval time after displacement 11

Hexadecimal:	2011-43h	Effective Time:	Real time
Min.:	0	Unit:	ms (s)
Max.:	10000	Data Type:	UInt16
Default:	10	Change:	Immediately

Value Range:

0 ms(s) to 10000 ms(s)

Description

-

H11.67 Displacement 12

Hexadecimal:	2011-44h	Effective Time:	Real time
Min.:	-1073741824	Unit:	Reference unit
Max.:	1073741824	Data Type:	Int32
Default:	10000	Change:	Immediately

Value Range:

-1073741824 to 1073741824

Description

-

H11.69 Max. speed of displacement 12

Hexadecimal:	2011-46h	Effective Time:	Real time
Min.:	1	Unit:	rpm
Max.:	6000	Data Type:	UInt16

Default:	200	Change:	Immediately

Value Range:

1 rpm to 6000 rpm

Description

-

H11.70 Acc/Dec time of displacement 12

Hexadecimal:	2011-47h	Effective Time:	Real time
Min.:	0	Unit:	ms
Max.:	65535	Data Type:	UInt16
Default:	10	Change:	Immediately

Value Range:

0 ms to 65535 ms

Description

-

H11.71 Interval time after displacement 12

Hexadecimal:	2011-48h	Effective Time:	Real time
Min.:	0	Unit:	ms (s)
Max.:	10000	Data Type:	UInt16
Default:	10	Change:	Immediately

Value Range:

0 ms(s) to 10000 ms(s)

Description

-

H11.72 Displacement 13

Hexadecimal:	2011-49h	Effective Time:	Real time
Min.:	-1073741824	Unit:	Reference unit
Max.:	1073741824	Data Type:	Int32
Default:	10000	Change:	Immediately

Value Range:

-1073741824 to 1073741824

Description

-

H11.74 Max. speed of displacement 13

Hexadecimal:	2011-4Bh	Effective Time:	Real time
Min.:	1	Unit:	rpm
Max.:	6000	Data Type:	UInt16
Default:	200	Change:	Immediately

Value Range:

1 rpm to 6000 rpm

Description

-

H11.75 Acc/Dec time of displacement 13

Hexadecimal:	2011-4Ch	Effective Time:	Real time
Min.:	0	Unit:	ms
Max.:	65535	Data Type:	UInt16
Default:	10	Change:	Immediately

Value Range:

0 ms to 65535 ms

Description

-

H11.76 Interval time after displacement 13

Hexadecimal:	2011-4Dh	Effective Time:	Real time
Min.:	0	Unit:	ms (s)
Max.:	10000	Data Type:	UInt16
Default:	10	Change:	Immediately

Value Range:

0 ms(s) to 10000 ms(s)

Description

-

H11.77 Displacement 14

Hexadecimal:	2011-4Eh	Effective Time:	Real time
Min.:	-1073741824	Unit:	Reference unit
Max.:	1073741824	Data Type:	Int32
Default:	10000	Change:	Immediately

Value Range:

-1073741824 to 1073741824

Description

-

H11.79 Max. speed of displacement 14

Hexadecimal:	2011-50h	Effective Time:	Real time
Min.:	1	Unit:	rpm
Max.:	6000	Data Type:	UInt16
Default:	200	Change:	Immediately

Value Range:

1 rpm to 6000 rpm

Description

-

H11.80 Acc/Dec time of displacement 14

Hexadecimal:	2011-51h	Effective Time:	Real time
Min.:	0	Unit:	ms
Max.:	65535	Data Type:	UInt16
Default:	10	Change:	Immediately

Value Range:

0 ms to 65535 ms

Description

-

H11.81 Interval time after displacement 14

Hexadecimal:	2011-52h	Effective Time:	Real time
Min.:	0	Unit:	ms (s)
Max.:	10000	Data Type:	UInt16
Default:	10	Change:	Immediately

Value Range:

0 ms(s) to 10000 ms(s)

Description

-

H11.82 Displacement 15

Hexadecimal:	2011-53h	Effective Time:	Real time
Min.:	-1073741824	Unit:	Reference unit
Max.:	1073741824	Data Type:	Int32

Default:	10000	Change:	Immediately

Value Range:

-1073741824 to 1073741824

Description

-

H11.84 Max. speed of displacement 15

Hexadecimal:	2011-55h	Effective Time:	Real time
Min.:	1	Unit:	rpm
Max.:	6000	Data Type:	UInt16
Default:	200	Change:	Immediately

Value Range:

1 rpm to 6000 rpm

Description

-

H11.85 Acc/Dec time of displacement 15

Hexadecimal:	2011-56h	Effective Time:	Real time
Min.:	0	Unit:	ms
Max.:	65535	Data Type:	UInt16
Default:	10	Change:	Immediately

Value Range:

0 ms to 65535 ms

Description

-

H11.86 Interval time after displacement 15

Hexadecimal:	2011-57h	Effective Time:	Real time
Min.:	0	Unit:	ms (s)
Max.:	10000	Data Type:	UInt16
Default:	10	Change:	Immediately

Value Range:

0 ms(s) to 10000 ms(s)

Description

-

H11.87 Displacement 16

Hexadecimal:	2011-58h	Effective Time:	Real time
Min.:	-1073741824	Unit:	Reference unit
Max.:	1073741824	Data Type:	Int32
Default:	10000	Change:	Immediately

Value Range:

-1073741824 to 1073741824

Description

-

H11.89 Max. speed of displacement 16

Hexadecimal:	2011-5Ah	Effective Time:	Real time
Min.:	1	Unit:	rpm
Max.:	6000	Data Type:	UInt16
Default:	200	Change:	Immediately

Value Range:

1 rpm to 6000 rpm

Description

-

H11.90 Acc/Dec time of displacement 16

Hexadecimal:	2011-5Bh	Effective Time:	Real time
Min.:	0	Unit:	ms
Max.:	65535	Data Type:	UInt16
Default:	10	Change:	Immediately

Value Range:

0 ms to 65535 ms

Description

-

H11.91 Interval time after displacement 16

Hexadecimal:	2011-5Ch	Effective Time:	Real time
Min.:	0	Unit:	ms (s)
Max.:	10000	Data Type:	UInt16
Default:	10	Change:	Immediately

Value Range:

0 ms(s) to 10000 ms(s)

Description

-

4.16 H12 Multi-Speed Operation References

H12.00 **Multi-speed operation mode**

Hexadecimal:	2012-01h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	2	Data Type:	UInt16
Default:	1	Change:	At stop

Value Range:

0: Stop after running for one cycle (number of speeds defined by H12.01)

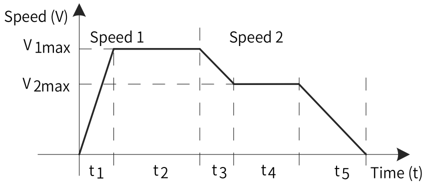
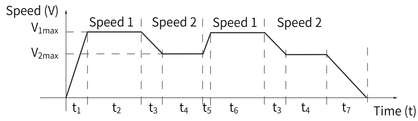
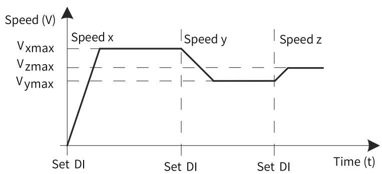
1: Cyclic operation (number of speeds defined by H12.01)

2: DI-based operation

Description

Defines the multi-speed operation mode when the speed reference source is multi-speed reference (H06.01 = 5, H06.02 = 1/2/3) in the speed control mode.

Speed arrival (FunOUT.19: V-Arr) signal is valid when a certain speed reference reaches the set value.

Set point	Operation Mode	Remarks	Operation Curve
0	Individual operation	The drive stops after one cycle of operation. The drive switches to the next displacement automatically.	 V_{1max}, V_{2max}: reference values of speed 1 and speed 2 t_1: actual acceleration/deceleration time of speed 1 t_3, t_5: acceleration/deceleration time of speed 2
1	Cyclic operation	The drive starts from speed 1 after each cycle of operation. The drive automatically switches to the next speed. The cyclic operation state remains active as long as the S-ON signal is active.	 V_{1max}, V_{2max}: maximum operating speeds in displacement 1 and displacement 2
2	External DI signal	The drive operates continuously as long as the S-ON signal is active. The speed No. is determined by the DI logic. The operating time of each speed is determined only by the interval time of speed switchover. The speed reference direction can be switched through FunIN.5 (DIR-SEL).	 x, y: speed No. (The relationship between the speed No. and the DI logic is described below.) V_x, V_y: speed references for speeds x and y The speed No. determined by DI does not change, which means the speed reference operates continuously regardless of the reference operating time.

H12.01 Number of speed references in multi-speed mode

Hexadecimal:	2012-02h	Effective Time:	Real time
Min.:	1	Unit:	-
Max.:	16	Data Type:	UInt16
Default:	16	Change:	At stop

Value Range:

1 to 16

Description

Defines the total number of speed references in the multi-speed mode. Different speed references, operating time, and acceleration/deceleration time (four groups optional) can be set for each speed.

H12.00 ≠ 2: Speeds are switched automatically in a sequence from 1, 2... H12.01.

H12.00 is 2: Assign four DIs (Hardware DI or VDI) with DI functions 6 to 9 (FunIN.6: CMD1 to FunIN.9: CMD4) and control the DI logic through the host controller to switch between different speeds. The displacement No. is a 4-bit binary value. Bit 0 to bit 3 correspond to CMD1 to CMD4.

FunIN.9	FunIN.8	FunIN.7	FunIN.6	Segment No.
CMD4	CMD3	CMD2	CMD1	
0	0	0	0	1
0	0	0	1	2
...				
1	1	1	1	16

The value of CMD(n) is 1 upon active DI logic and 0 upon inactive DI logic.

H12.02 Operating time unit

Hexadecimal:	2012-03h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: sec

1: min

Description

Defines the time unit of multi-speed operation.

0: s

1: min

H12.03 **Acceleration time 1**

Hexadecimal:	2012-04h	Effective Time:	Real time
Min.:	0	Unit:	ms
Max.:	65535	Data Type:	UInt16
Default:	10	Change:	Immediately

Value Range:

0 ms to 65535 ms

Description

Four groups of acceleration/deceleration time can be set for each speed reference.

Acceleration time is the time for the motor to accelerate from 0 RPM to 1000 RPM at a constant speed.

H12.04 **Deceleration time 1**

Hexadecimal:	2012-05h	Effective Time:	Real time
Min.:	0	Unit:	ms
Max.:	65535	Data Type:	UInt16
Default:	10	Change:	Immediately

Value Range:

0 ms to 65535 ms

Description

Four groups of acceleration/deceleration time can be set for each speed reference.

Deceleration time is the time for the motor to decelerate from 1000 RPM to 0 RPM at a constant speed.

H12.05 **Acceleration time 2**

Hexadecimal:	2012-06h	Effective Time:	Real time
Min.:	0	Unit:	ms
Max.:	65535	Data Type:	UInt16
Default:	50	Change:	Immediately

Value Range:

0 ms to 65535 ms

Description

Four groups of acceleration/deceleration time can be set for each speed reference.

Acceleration time is the time for the motor to accelerate from 0 RPM to 1000 RPM at a constant speed.

H12.06 Deceleration time 2

Hexadecimal:	2012-07h	Effective Time:	Real time
Min.:	0	Unit:	ms
Max.:	65535	Data Type:	UInt16
Default:	50	Change:	Immediately

Value Range:

0 ms to 65535 ms

Description

Four groups of acceleration/deceleration time can be set for each speed reference.

Deceleration time is the time for the motor to decelerate from 1000 RPM to 0 RPM at a constant speed.

H12.07 Acceleration time 3

Hexadecimal:	2012-08h	Effective Time:	Real time
Min.:	0	Unit:	ms
Max.:	65535	Data Type:	UInt16
Default:	100	Change:	Immediately

Value Range:

0 ms to 65535 ms

Description

Four groups of acceleration/deceleration time can be set for each speed reference.

Acceleration time is the time for the motor to accelerate from 0 RPM to 1000 RPM at a constant speed.

H12.08 Deceleration time 3

Hexadecimal:	2012-09h	Effective Time:	Real time
Min.:	0	Unit:	ms
Max.:	65535	Data Type:	UInt16
Default:	100	Change:	Immediately

Value Range:

0 ms to 65535 ms

Description

Four groups of acceleration/deceleration time can be set for each speed reference.

Deceleration time is the time for the motor to decelerate from 1000 RPM to 0 RPM at a constant speed.

H12.09 **Acceleration time 4**

Hexadecimal:	2012-0Ah	Effective Time:	Real time
Min.:	0	Unit:	ms
Max.:	65535	Data Type:	UInt16
Default:	150	Change:	Immediately

Value Range:

0 ms to 65535 ms

Description

Four groups of acceleration/deceleration time can be set for each speed reference.

Acceleration time is the time for the motor to accelerate from 0 RPM to 1000 RPM at a constant speed.

H12.10 **Deceleration time 4**

Hexadecimal:	2012-0Bh	Effective Time:	Real time
Min.:	0	Unit:	ms
Max.:	65535	Data Type:	UInt16
Default:	150	Change:	Immediately

Value Range:

0 ms to 65535 ms

Description

Four groups of acceleration/deceleration time can be set for each speed reference.

Deceleration time is the time for the motor to decelerate from 1000 RPM to 0 RPM at a constant speed.

H12.20 **Speed reference 1**

Hexadecimal:	2012-15h	Effective Time:	Real time
Min.:	-6000	Unit:	rpm
Max.:	6000	Data Type:	Int16
Default:	0	Change:	Immediately

Value Range:

–6000 rpm to 6000 rpm

Description

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H12.21 **Operating time of speed 1**

Hexadecimal:	2012-16h	Effective Time:	Real time

Min.:	0.0	Unit:	s (m)
Max.:	6553.5	Data Type:	UInt16
Default:	5.0	Change:	Immediately

Value Range:

0.0s(m) to 6553.5s(m)

Description

Defines the operating time of speed 1.

The operating time is the sum of the speed variation time from previous speed reference to present speed reference plus the average operating time of present speed reference.

If the operating time is set to 0, the drive skips this speed reference automatically.

As long as H12.00 (Multi-speed operation mode) is set to 2 (DI-based operation) and the speed No. determined by the external DI does not change, the drive continues operating at the speed defined by this speed reference, not affected by the reference operating time.

H12.22 **Acceleration/Deceleration time of speed 1**

Hexadecimal:	2012-17h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	4	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0: Zero acceleration/deceleration time

1: Acceleration/Deceleration time 1

2: Acceleration/Deceleration time 2

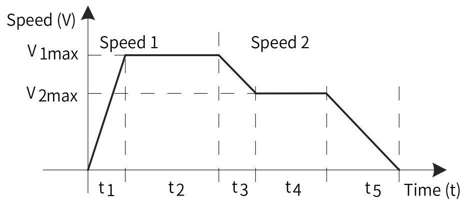
3: Acceleration/Deceleration time 3

4: Acceleration/Deceleration time 4

Description

Defines the acceleration/deceleration time of speed 1.

Setpoint	Acceleration/ Deceleration time	Remarks
0	Zero acceleration/ deceleration time	Acceleration time: 0 Deceleration time: 0
1	Acceleration/ Deceleration time 1	Acceleration time: H12.03 Deceleration time: H12.04
2	Acceleration/ Deceleration time 2	Acceleration time: H12.05 Deceleration time: H12.06
3	Acceleration/ Deceleration time 3	Acceleration time: H12.07 Deceleration time: H12.08
4	Acceleration/ Deceleration time 4	Acceleration time: H12.09 Deceleration time: H12.10



- V_{1max} , V_{2max} : reference values of speed 1 and speed 2
- t_1 : actual acceleration/deceleration time of speed 1
- t_3 , t_5 : acceleration/deceleration time of speed 2
- Operating time = Time taken in switching from the last speed to current speed + Duration of constant-speed operation at current speed (For example, the operating time of speed 1 is the sum of t_1 and t_2 ; the operating time of speed 2 is the sum of t_3 and t_4 .)
- Do not set the operating time of a certain speed to 0. Otherwise, the drive skips this speed and switches to the next speed directly.

The actual acceleration time t1 is as follows.

$$t_1 = \frac{V_1}{1000} \times \text{Acc. time set for the speec}$$

The actual deceleration time t_2 is:

$$t_2 = \frac{V_1}{1000} \times \text{Dec. time set for the speed}$$

H12.23 Reference 2

Hexadecimal:	2012-18h	Effective Time:	Real time
Min.:	-6000	Unit:	rpm

Max.:	6000	Data Type:	Int16
Default:	100	Change:	Immediately

Value Range:

–6000 rpm to 6000 rpm

Description

-

H12.24 Operating time of speed 2

Hexadecimal:	2012-19h	Effective Time:	Real time
Min.:	0.0	Unit:	s (m)
Max.:	6553.5	Data Type:	UInt16
Default:	5.0	Change:	Immediately

Value Range:

0.0s(m) to 6553.5s(m)

Description

-

H12.25 Acceleration/Deceleration time of speed 2

Hexadecimal:	2012-1Ah	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	4	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

See H12.22.

Description

-

H12.26 Reference 3

Hexadecimal:	2012-1Bh	Effective Time:	Real time
Min.:	-6000	Unit:	rpm
Max.:	6000	Data Type:	Int16
Default:	300	Change:	Immediately

Value Range:

–6000 rpm to 6000 rpm

Description

-

H12.27 Operating time of speed 3

Hexadecimal:	2012-1Ch	Effective Time:	Real time
Min.:	0.0	Unit:	s (m)
Max.:	6553.5	Data Type:	UInt16
Default:	5.0	Change:	Immediately

Value Range:

0.0s(m) to 6553.5s(m)

Description

-

H12.28 Acceleration/Deceleration time of speed 3

Hexadecimal:	2012-1Dh	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	4	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

See H12.22.

Description

-

H12.29 Reference 4

Hexadecimal:	2012-1Eh	Effective Time:	Real time
Min.:	-6000	Unit:	rpm
Max.:	6000	Data Type:	Int16
Default:	500	Change:	Immediately

Value Range:

–6000 rpm to 6000 rpm

Description

-

H12.30 Operating time of speed 4

Hexadecimal:	2012-1Fh	Effective Time:	Real time
Min.:	0.0	Unit:	s (m)
Max.:	6553.5	Data Type:	UInt16
Default:	5.0	Change:	Immediately

Value Range:

0.0s(m) to 6553.5s(m)

Description

-

H12.31 Acceleration/Deceleration time of speed 4

Hexadecimal:	2012-20h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	4	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

See H12.22.

Description

-

H12.32 Reference 5

Hexadecimal:	2012-21h	Effective Time:	Real time
Min.:	-6000	Unit:	rpm
Max.:	6000	Data Type:	Int16
Default:	700	Change:	Immediately

Value Range:

–6000 rpm to 6000 rpm

Description

-

H12.33 Operating time of speed 5

Hexadecimal:	2012-22h	Effective Time:	Real time
Min.:	0.0	Unit:	s (m)
Max.:	6553.5	Data Type:	UInt16
Default:	5.0	Change:	Immediately

Value Range:

0.0s(m) to 6553.5s(m)

Description

-

H12.34 Acceleration/Deceleration time of speed 5

Hexadecimal:	2012-23h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	4	Data Type:	UInt16

Default:	0	Change:	Immediately

Value Range:

See H12.22.

Description

-

H12.35 Reference 6

Hexadecimal:	2012-24h	Effective Time:	Real time
Min.:	-6000	Unit:	rpm
Max.:	6000	Data Type:	Int16
Default:	900	Change:	Immediately

Value Range:

–6000 rpm to 6000 rpm

Description

-

H12.36 Operating time of speed 6

Hexadecimal:	2012-25h	Effective Time:	Real time
Min.:	0.0	Unit:	s (m)
Max.:	6553.5	Data Type:	UInt16
Default:	5.0	Change:	Immediately

Value Range:

0.0s(m) to 6553.5s(m)

Description

-

H12.37 Acc./dec. time of speed 6

Hexadecimal:	2012-26h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	4	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

See H12.22.

Description

-

H12.38 Reference 7

Hexadecimal:	2012-27h	Effective Time:	Real time

Min.:	-6000	Unit:	rpm
Max.:	6000	Data Type:	Int16
Default:	600	Change:	Immediately

Value Range:

–6000 rpm to 6000 rpm

Description

-

H12.39 Operating time of speed 7

Hexadecimal:	2012-28h	Effective Time:	Real time
Min.:	0.0	Unit:	s (m)
Max.:	6553.5	Data Type:	UInt16
Default:	5.0	Change:	Immediately

Value Range:

0.0s(m) to 6553.5s(m)

Description

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H12.40 Acceleration/Deceleration time of speed 7

Hexadecimal:	2012-29h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	4	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

See H12.22.

Description

-

H12.41 Reference 8

Hexadecimal:	2012-2Ah	Effective Time:	Real time
Min.:	-6000	Unit:	rpm
Max.:	6000	Data Type:	Int16
Default:	300	Change:	Immediately

Value Range:

–6000 rpm to 6000 rpm

Description

-

H12.42 Operating time of speed 8

Hexadecimal:	2012-2Bh	Effective Time:	Real time
Min.:	0.0	Unit:	s (m)
Max.:	6553.5	Data Type:	UInt16
Default:	5.0	Change:	Immediately

Value Range:

0.0s(m) to 6553.5s(m)

Description

-

H12.43 Acceleration/Deceleration time of speed 8

Hexadecimal:	2012-2Ch	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	4	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

See H12.22.

Description

-

H12.44 Reference 9

Hexadecimal:	2012-2Dh	Effective Time:	Real time
Min.:	-6000	Unit:	rpm
Max.:	6000	Data Type:	Int16
Default:	100	Change:	Immediately

Value Range:

–6000 rpm to 6000 rpm

Description

-

H12.45 Operating time of speed 9

Hexadecimal:	2012-2Eh	Effective Time:	Real time
Min.:	0.0	Unit:	s (m)
Max.:	6553.5	Data Type:	UInt16
Default:	5.0	Change:	Immediately

Value Range:

0.0s(m) to 6553.5s(m)

Description

-

H12.46 **Acceleration/Deceleration time of speed 9**

Hexadecimal:	2012-2Fh	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	4	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

See H12.22.

Description

-

H12.47 **Reference 10**

Hexadecimal:	2012-30h	Effective Time:	Real time
Min.:	-6000	Unit:	rpm
Max.:	6000	Data Type:	Int16
Default:	-100	Change:	Immediately

Value Range:

–6000 rpm to 6000 rpm

Description

-

H12.48 **Operating time of speed 10**

Hexadecimal:	2012-31h	Effective Time:	Real time
Min.:	0.0	Unit:	s (m)
Max.:	6553.5	Data Type:	UInt16
Default:	5.0	Change:	Immediately

Value Range:

0.0s(m) to 6553.5s(m)

Description

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H12.49 **Acceleration/Deceleration time of speed 10**

Hexadecimal:	2012-32h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	4	Data Type:	UInt16

Default:	0	Change:	Immediately

Value Range:

See H12.22.

Description

-

H12.50 Reference 11

Hexadecimal:	2012-33h	Effective Time:	Real time
Min.:	-6000	Unit:	rpm
Max.:	6000	Data Type:	Int16
Default:	-300	Change:	Immediately

Value Range:

–6000 rpm to 6000 rpm

Description

-

H12.51 Operating time of speed 11

Hexadecimal:	2012-34h	Effective Time:	Real time
Min.:	0.0	Unit:	s (m)
Max.:	6553.5	Data Type:	UInt16
Default:	5.0	Change:	Immediately

Value Range:

0.0s(m) to 6553.5s(m)

Description

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H12.52 Acceleration/Deceleration time of speed 11

Hexadecimal:	2012-35h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	4	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

See H12.22.

Description

-

H12.53 Reference 12

Hexadecimal:	2012-36h	Effective Time:	Real time

Min.:	-6000	Unit:	rpm
Max.:	6000	Data Type:	Int16
Default:	-500	Change:	Immediately

Value Range:

–6000 rpm to 6000 rpm

Description

-

H12.54 Operating time of speed 12

Hexadecimal:	2012-37h	Effective Time:	Real time
Min.:	0.0	Unit:	s (m)
Max.:	6553.5	Data Type:	UInt16
Default:	5.0	Change:	Immediately

Value Range:

0.0s(m) to 6553.5s(m)

Description

-

H12.55 Acceleration/Deceleration time of speed 12

Hexadecimal:	2012-38h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	4	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

See H12.22.

Description

-

H12.56 Reference 13

Hexadecimal:	2012-39h	Effective Time:	Real time
Min.:	-6000	Unit:	rpm
Max.:	6000	Data Type:	Int16
Default:	-700	Change:	Immediately

Value Range:

–6000 rpm to 6000 rpm

Description

-

H12.57 Operating time of speed 13

Hexadecimal:	2012-3Ah	Effective Time:	Real time
Min.:	0.0	Unit:	s (m)
Max.:	6553.5	Data Type:	UInt16
Default:	5.0	Change:	Immediately

Value Range:

0.0s(m) to 6553.5s(m)

Description

-

H12.58 Acceleration/Deceleration time of speed 13

Hexadecimal:	2012-3Bh	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	4	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

See H12.22.

Description

-

H12.59 Reference 14

Hexadecimal:	2012-3Ch	Effective Time:	Real time
Min.:	-6000	Unit:	rpm
Max.:	6000	Data Type:	Int16
Default:	-900	Change:	Immediately

Value Range:

–6000 rpm to 6000 rpm

Description

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H12.60 Operating time of speed 14

Hexadecimal:	2012-3Dh	Effective Time:	Real time
Min.:	0.0	Unit:	s (m)
Max.:	6553.5	Data Type:	UInt16
Default:	5.0	Change:	Immediately

Value Range:

0.0s(m) to 6553.5s(m)

Description

-

H12.61 Acceleration/Deceleration time of speed 14

Hexadecimal:	2012-3Eh	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	4	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

See H12.22.

Description

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H12.62 Reference 15

Hexadecimal:	2012-3Fh	Effective Time:	Real time
Min.:	-6000	Unit:	rpm
Max.:	6000	Data Type:	Int16
Default:	-600	Change:	Immediately

Value Range:

–6000 rpm to 6000 rpm

Description

-

H12.63 Operating time of speed 15

Hexadecimal:	2012-40h	Effective Time:	Real time
Min.:	0.0	Unit:	s (m)
Max.:	6553.5	Data Type:	UInt16
Default:	5.0	Change:	Immediately

Value Range:

0.0s(m) to 6553.5s(m)

Description

-

H12.64 Acceleration/Deceleration time of speed 15

Hexadecimal:	2012-41h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	4	Data Type:	UInt16

Default:	0	Change:	Immediately

Value Range:

See H12.22.

Description

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H12.65 Reference 16

Hexadecimal:	2012-42h	Effective Time:	Real time
Min.:	-6000	Unit:	rpm
Max.:	6000	Data Type:	Int16
Default:	-300	Change:	Immediately

Value Range:

–6000 rpm to 6000 rpm

Description

-

H12.66 Operating time of speed 16

Hexadecimal:	2012-43h	Effective Time:	Real time
Min.:	0.0	Unit:	s (m)
Max.:	6553.5	Data Type:	UInt16
Default:	5.0	Change:	Immediately

Value Range:

0.0s(m) to 6553.5s(m)

Description

-

H12.67 Acc./dec. time of speed 16

Hexadecimal:	2012-44h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	4	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

See H12.22.

Description

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4.17 H17 VDO/VDI settings

H17.00 **VDI1 function selection**

Hexadecimal:	2017-01h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	41	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0: No assignment
1: S-ON
2: Warning reset signal
3: Gain switchover switch
4: Switchover between main and auxiliary commands
5: Multi-reference direction
6: Multi-reference switchover CMD1
7: Multi-reference switchover CMD2
8: Multi-reference switchover CMD3
9: Multi-reference switchover CMD4
10: Mode switchover M1-SEL
11: Mode switchover M2-SEL
12: Zero clamp enable signal
13: Position reference inhibited
14: Positive limit switch
15: Reverse limit switch
16: Positive external torque limit
17: Negative external torque limit
18: Forward jog
19: Reverse jog
20: Step enable
21: Hand wheel override signal 1
22: Hand wheel override signal 2
23: Hand wheel enable signal
24: Electronic gear ratio selection
25: Torque reference direction
26: Speed reference direction
27: Position reference direction
28: Multi-position reference enable
29: Interrupt positioning canceled
30: None

31: Home switch
32: Homing enable
33: Interrupt positioning inhibited
34: Emergency stop
35: Clear position deviation
36: Internal speed limit source
37: Pulse reference inhibited
38: Writing reference causes interrupt
39: Writing reference does not cause interrupt
40: Clear positioning and reference completed signals
41: Current position as home

Description

-

H17.01 VDI1 logic selection

Hexadecimal:	2017-02h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

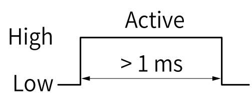
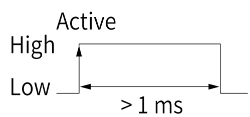
Value Range:

0: Active when the written value is 1

1: Active when the written value changes from 0 to 1

Description

It sets the input level logic of VDI1 for enabling the VDI1 function.

Setpoint	VDI1 logic upon active DI function	Remarks
0	0: Active when 1 is written	
1	Active when written value changes from 0 to 1	

H17.02 VDI2 function selection

Hexadecimal:	2017-03h	Effective Time:	At stop

Min.:	0	Unit:	-
Max.:	41	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

See H17.00.

Description

-

H17.03 VDI2 logic selection

Hexadecimal:	2017-04h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Active when the written value is 1

1: Active when the written value changes from 0 to 1

Description

-

H17.04 VDI3 function selection

Hexadecimal:	2017-05h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	41	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

See H17.00.

Description

-

H17.05 VDI3 logic selection

Hexadecimal:	2017-06h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Active when the written value is 1

1: Active when the written value changes from 0 to 1

Description

-

H17.06 **VDI4 function selection**

Hexadecimal:	2017-07h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	41	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

See H17.00.

Description

-

H17.07 **VDI4 logic selection**

Hexadecimal:	2017-08h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Active when the written value is 1

1: Active when the written value changes from 0 to 1

Description

-

H17.08 **VDI5 function selection**

Hexadecimal:	2017-09h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	41	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

See H17.00.

Description

-

H17.09 **VDI5 logic selection**

Hexadecimal:	2017-0Ah	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Active when the written value is 1
1: Active when the written value changes from 0 to 1

Description

-

H17.10 VDI6 function selection

Hexadecimal:	2017-0Bh	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	41	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

See H17.00.

Description

-

H17.11 VDI6 logic selection

Hexadecimal:	2017-0Ch	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Active when the written value is 1
1: Active when the written value changes from 0 to 1

Description

-

H17.12 VDI7 function selection

Hexadecimal:	2017-0Dh	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	41	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

See H17.00.

Description

-

H17.13 VDI7 logic selection

Hexadecimal:	2017-0Eh	Effective Time:	At stop

Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Active when the written value is 1

1: Active when the written value changes from 0 to 1

Description

-

H17.14 VDI8 function selection

Hexadecimal:	2017-0Fh	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	41	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

See H17.00.

Description

-

H17.15 VDI8 logic selection

Hexadecimal:	2017-10h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Active when the written value is 1

1: Active when the written value changes from 0 to 1

Description

-

H17.16 VDI9 function selection

Hexadecimal:	2017-11h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	41	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

See H17.00.

Description

-

H17.17 **VDI9 logic selection**

Hexadecimal:	2017-12h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Active when the written value is 1

1: Active when the written value changes from 0 to 1

Description

-

H17.18 **VDI10 function selection**

Hexadecimal:	2017-13h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	41	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

See H17.00.

Description

-

H17.19 **VDI10 logic selection**

Hexadecimal:	2017-14h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Active when the written value is 1

1: Active when the written value changes from 0 to 1

Description

-

H17.20 **VDI11 function selection**

Hexadecimal:	2017-15h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	41	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

See H17.00.

Description

-

H17.21 **VDI11 logic selection**

Hexadecimal:	2017-16h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Active when the written value is 1

1: Active when the written value changes from 0 to 1

Description

-

H17.22 **VDI12 function selection**

Hexadecimal:	2017-17h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	41	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

See H17.00.

Description

-

H17.23 **VDI12 logic selection**

Hexadecimal:	2017-18h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Active when the written value is 1

1: Active when the written value changes from 0 to 1

Description

-

H17.24 **VDI13 function selection**

Hexadecimal:	2017-19h	Effective Time:	At stop

Min.:	0	Unit:	-
Max.:	41	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

See H17.00.

Description

-

H17.25 VDI13 logic selection

Hexadecimal:	2017-1Ah	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Active when the written value is 1

1: Active when the written value changes from 0 to 1

Description

-

H17.26 VDI14 function selection

Hexadecimal:	2017-1Bh	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	41	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

See H17.00.

Description

-

H17.27 VDI14 logic selection

Hexadecimal:	2017-1Ch	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Active when the written value is 1

1: Active when the written value changes from 0 to 1

Description

-

H17.28 VDI15 function selection

Hexadecimal:	2017-1Dh	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	41	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

See H17.00.

Description

-

H17.29 VDI15 logic selection

Hexadecimal:	2017-1Eh	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Active when the written value is 1

1: Active when the written value changes from 0 to 1

Description

-

H17.30 VDI16 function selection

Hexadecimal:	2017-1Fh	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	41	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

See H17.00.

Description

-

H17.31 VDI16 logic selection

Hexadecimal:	2017-20h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Active when the written value is 1

1: Active when the written value changes from 0 to 1

Description

-

H17.32 VDO virtual level

Hexadecimal:	2017-21h	Effective Time:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

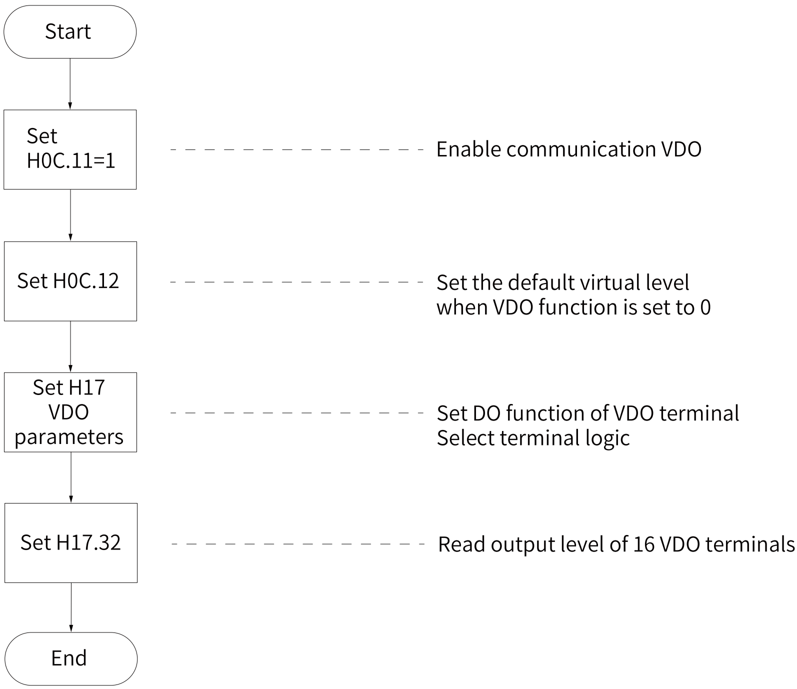
Value Range:

0–65535

Description

It sets the default virtual level of the VDO allocated with function 0 (disabled).

Use the VDO according to the following procedure:



H17.33 VDO1 function selection

Hexadecimal:	2017-22h	Effective Time:	At stop

Min.:	0	Unit:	-
Max.:	24	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: No assignment
1: Servo ready
2: Motor rotation
3: Zero speed
4: Speed matching
5: Positioning completed
6: Proximity
7: Torque limited
8: Speed limited
9: Brake
10: Warning
11: Fault
12: Output 3-bit warning code
13: Output 3-bit warning code
14: Output 3-bit warning code
15: Interrupt positioning completed
16: Homing completed
17: Electrical homing completed
18: Torque reach
19: Speed reach
22: Internal command completed
23: Writing next command allowed
24: Internal motion completed

Description

-

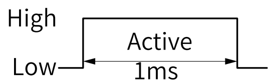
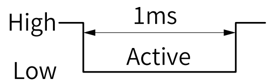
H17.34 VDO1 logic level

Hexadecimal:	2017-23h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Output 1 upon active logic
1: Output 0 upon active logic

Description

Setpoint	VDO1 terminal logic	Remarks
0	Output 1 when function valid	
1	Output 0 when function valid	

H17.35 VDO2 function selection

Hexadecimal:	2017-24h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	24	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

See H17.33.

Description

-

H17.36 VDO2 logic level

Hexadecimal:	2017-25h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Output 1 upon active logic

1: Output 0 upon active logic

Description

-

H17.37 VDO3 function selection

Hexadecimal:	2017-26h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	24	Data Type:	UInt16

Default:	0	Change:	At stop

Value Range:

See H17.33.

Description

-

H17.38 VDO3 logic level

Hexadecimal:	2017-27h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Output 1 upon active logic

1: Output 0 upon active logic

Description

-

H17.39 VDO4 function selection

Hexadecimal:	2017-28h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	24	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

See H17.33.

Description

-

H17.40 VDO4 logic level

Hexadecimal:	2017-29h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Output 1 upon active logic

1: Output 0 upon active logic

Description

-

H17.41 VDO5 function selection

Hexadecimal:	2017-2Ah	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	24	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

See H17.33.

Description

-

H17.42 VDO5 logic level

Hexadecimal:	2017-2Bh	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Output 1 upon active logic

1: Output 0 upon active logic

Description

-

H17.43 VDO6 function selection

Hexadecimal:	2017-2Ch	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	24	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

See H17.33.

Description

-

H17.44 VDO6 logic level

Hexadecimal:	2017-2Dh	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Output 1 upon active logic
1: Output 0 upon active logic

Description

-

H17.45 VDO7 function selection

Hexadecimal:	2017-2Eh	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	24	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

See H17.33.

Description

-

H17.46 VDO7 logic level

Hexadecimal:	2017-2Fh	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Output 1 upon active logic
1: Output 0 upon active logic

Description

-

H17.47 VDO8 function selection

Hexadecimal:	2017-30h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	24	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

See H17.33.

Description

-

H17.48 VDO8 logic level

Hexadecimal:	2017-31h	Effective Time:	At stop

Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Output 1 upon active logic

1: Output 0 upon active logic

Description

-

H17.49 VDO9 function selection

Hexadecimal:	2017-32h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	24	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

See H17.33.

Description

-

H17.50 VDO9 logic level

Hexadecimal:	2017-33h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Output 1 upon active logic

1: Output 0 upon active logic

Description

-

H17.51 VDO10 function selection

Hexadecimal:	2017-34h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	24	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

See H17.33.

Description

-

H17.52 VDO10 logic level

Hexadecimal:	2017-35h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Output 1 upon active logic

1: Output 0 upon active logic

Description

-

H17.53 VDO11 function selection

Hexadecimal:	2017-36h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	24	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

See H17.33.

Description

-

H17.54 VDO11 logic level

Hexadecimal:	2017-37h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Output 1 upon active logic

1: Output 0 upon active logic

Description

-

H17.55 VDO12 function selection

Hexadecimal:	2017-38h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	24	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

See H17.33.

Description

-

H17.56 **VDO12 logic level**

Hexadecimal:	2017-39h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Output 1 upon active logic

1: Output 0 upon active logic

Description

-

H17.57 **VDO13 function selection**

Hexadecimal:	2017-3Ah	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	24	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

See H17.33.

Description

-

H17.58 **VDO13 logic level**

Hexadecimal:	2017-3Bh	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Output 1 upon active logic

1: Output 0 upon active logic

Description

-

H17.59 **VDO14 function selection**

Hexadecimal:	2017-3Ch	Effective Time:	At stop

Min.:	0	Unit:	-
Max.:	24	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

See H17.33.

Description

-

H17.60 VDO14 logic level

Hexadecimal:	2017-3Dh	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Output 1 upon active logic

1: Output 0 upon active logic

Description

-

H17.61 VDO15 function selection

Hexadecimal:	2017-3Eh	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	24	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

See H17.33.

Description

-

H17.62 VDO15 logic level

Hexadecimal:	2017-3Fh	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Output 1 upon active logic

1: Output 0 upon active logic

Description

-

H17.63 **VDO16 function selection**

Hexadecimal:	2017-40h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	24	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

See H17.33.

Description

-

H17.64 **VDO16 logic level**

Hexadecimal:	2017-41h	Effective Time:	At stop
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Output 1 upon active logic

1: Output 0 upon active logic

Description

-

4.18 H1B Motor Storage Property

H1B.14 **Bit01 of motor SN code**

Hexadecimal:	201B-0Fh	Effective Time:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0 to 65535

Description

-

H1B.15 **Bit23 of motor SN code**

Hexadecimal:	201B-10h	Effective Time:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16

Default:	0	Change:	At stop

Value Range:

0 to 65535

Description

-

H1B.16 Bit45 of motor SN code

Hexadecimal:	201B-11h	Effective Time:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0 to 65535

Description

-

H1B.17 Bit67 of motor SN code

Hexadecimal:	201B-12h	Effective Time:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0 to 65535

Description

-

H1B.18 Bit89 of motor SN code

Hexadecimal:	201B-13h	Effective Time:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0 to 65535

Description

-

H1B.19 Bit11 of motor SN code

Hexadecimal:	201B-14h	Effective Time:	-

Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0 to 65535

Description

-

H1B.20 Bit13 of motor SN code

Hexadecimal:	201B-15h	Effective Time:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0 to 65535

Description

-

H1B.21 Bit15 of motor SN code

Hexadecimal:	201B-16h	Effective Time:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0 to 65535

Description

-

H1B.47 Motor storage property shield word 1

Hexadecimal:	201B-30h	Effective Time:	Upon the next power-on
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0 to 65535

Description

-

H1B.48 Motor storage property shield word 2

Hexadecimal:	201B-31h	Effective Time:	Upon the next power-on
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0 to 65535

Description

-

4.19 H30 Servo status variables read through communication

H30.00 Servo status read through communication

Hexadecimal:	2030-01h	Effective Time:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

H30.00 value is hexadecimal, and is not displayed on the keypad. It is read as binary, and each bit of the binary is defined as follows:

bit	Servo State	Remarks
0	Servo ready	It determines whether the servo main circuit DC bus voltage is ready and the servo drive is ready for running. 0: Servo drive not ready 1: Servo ready
1–11	Reserved	-
12–13	Servo running state	It determines the servo running state. 00: Servo drive not ready (main circuit DC bus voltage not set up correctly) 01: Servo drive ready (main circuit DC bus voltage set up correctly, servo drive is ready for running) 10: Servo drive running (S-ON active) 11: Servo drive fault (a level 1 or level 2 fault occurs)
14–15	Reserved	-

H30.01 DO function state 1 read through communication

Hexadecimal:	2030-02h	Effective Time:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

Used to read the state of DO functions 1 to 16 through communication. H30.01 is a hexadecimal which is not displayed on the keypad and must be converted to a binary equivalent when it is being read through communication.

bit	DO Function	Remarks
0	DO function 1 (FunOUT.1: S-RDY, servo ready)	0: Servo drive not ready 1: Servo ready
...		
15	DO function 16 (FunOUT.16: HomeAttain, homing output)	0: Home not found 1: Home found

H30.02 DO function state 2 read through communication

Hexadecimal:	2030-03h	Effective Time:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

Bit 0 corresponds to DO function 17.

Bit 1 corresponds to DO function 18.

Bit 2 corresponds to DO function 19.

…

By analogy

bit	DO Function	Remarks
0	DO function 17 (FunOUT.17: S-ElecHomeAttain, electrical homing output)	0: Electrical homing not completed 1: Electrical homing completed
...		
4 to 15	Reserved	-

H30.03 Input pulse reference sampling value read through communication

Hexadecimal:	2030-04h	Effective Time:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

-

H30.04 DI status read through communication

Hexadecimal:	2030-05h	Effective Time:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

-

4.20 H31 Related variables set through communication

H31.00 VDI virtual level set through communication

Hexadecimal:	2031-01h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Immediately

Value Range:

0–65535

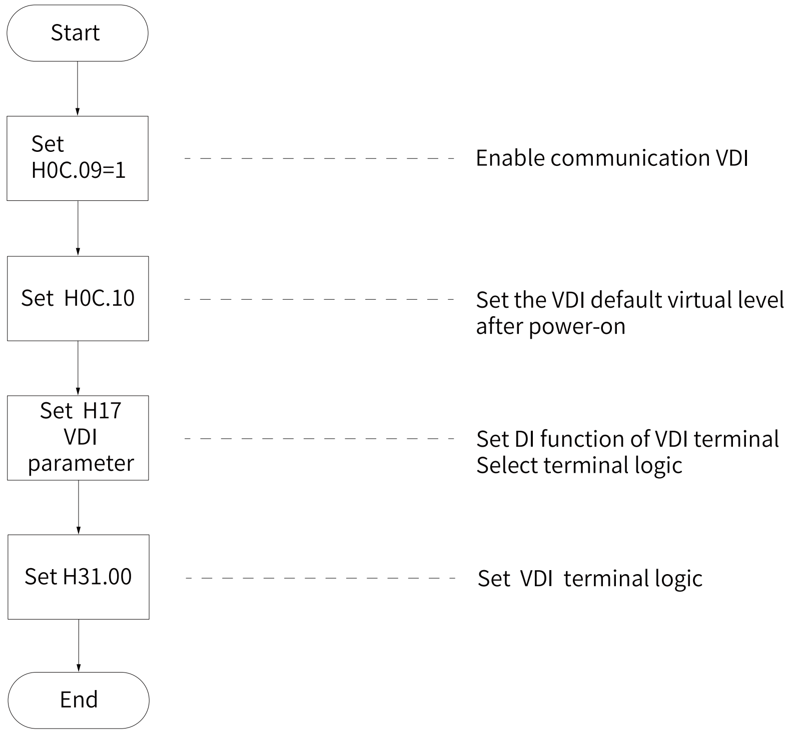
Description

When H0C.09 is set to 1, the VDI state is defined by H31.00.

The VDI logic is determined by H0C.10 (Default VDI virtual level value upon power-on) upon initial power-on. Then, H31.00 is determined by the VDI logic.

"bit(n) = 1" of H31.00 indicates the logic of VDI (n+1) is "1". "bit(n)=0" indicates the logic of VDI (n+1) is "0".

Use the VDI according to the following procedure:



H31.04 **DO state set through communication**

Hexadecimal:	2031-05h	Effective Time:	Real time
Min.:	0	Unit:	-
Max.:	31	Data Type:	UInt16
Default:	0	Change:	Immediately

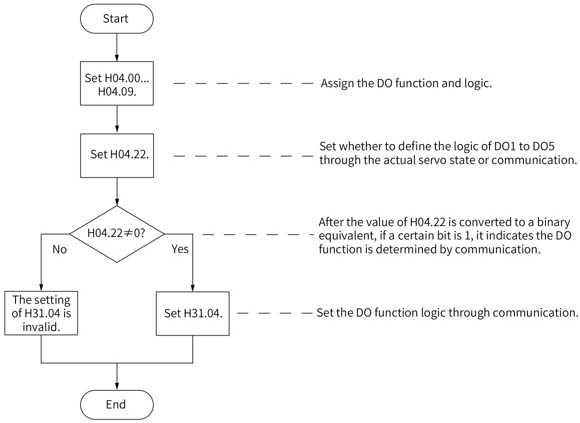
Value Range:

0 to 31

Description

Set H04.22 to define the DO state source by H31.04.

Use the DO according to the following procedure:



H31.09 Speed reference set through communication

Hexadecimal:	2031-0Ah	Effective Time:	Real time
Min.:	-6000.000	Unit:	rpm
Max.:	6000.000	Data Type:	Int32
Default:	0.000	Change:	Immediately

Value Range:

-6000.000rpm to 6000.000rpm

Description

Set H06.02 to 4 to define the speed reference in the speed control mode through H31.09 (unit: 0.001 rpm).

H31.11 Torque reference set through communication

Hexadecimal:	2031-0Ch	Effective Time:	Real time
Min.:	-100.000	Unit:	%
Max.:	100.000	Data Type:	Int32
Default:	0.000	Change:	Immediately

Value Range:

-100.000% to 100.000%

Description

Set H07.02 to 4 to define the torque reference in the torque control mode through H31.11 (unit: 0.001%). The setpoint 100.000% corresponds to the rated torque of the motor.

5 Parameter List

5.1 Parameter Group H00

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H00.00	2000-01h	Motor code	0–65535	14101	-	At stop	" H00_en.00" on page 131
H00.02	2000-03h	Customized No.	0.00–42949672.95	0.00	-	Unchangeable	" H00_en.02" on page 131
H00.04	2000-05h	Encoder version	0.0–6553.5	0.0	-	Unchangeable	" H00_en.04" on page 131
H00.05	2000-06h	Serial-type motor code	0–65535	0	-	Unchangeable	" H00_en.05" on page 131
H00.06	2000-07h	FPGA customized SN	0.00–10485.75	0.00	-	Unchangeable	" H00_en.06" on page 132
H00.08	2000-09h	Serial encoder type	0–65535	0	-	Immediately	" H00_en.08" on page 132
H00.09	2000-0Ah	Rated voltage	0: 220 V 1: 380 V	0	V	At stop	" H00_en.09" on page 132
H00.10	2000-0Bh	Rated power	0.01 kW–655.35 kW	0.01	kW	At stop	" H00_en.10" on page 133
H00.11	2000-0Ch	Rated current	0.01 A to 655.35 A	0.01	A	At stop	" H00_en.11" on page 133
H00.12	2000-0Dh	Rated torque	0.10N·m–655.35N·m	0.10	N·m	At stop	" H00_en.12" on page 133
H00.13	2000-0Eh	Max. torque	0.10N·m–655.35N·m	0.10	N·m	At stop	" H00_en.13" on page 133
H00.14	2000-0Fh	Rated speed	100rpm–9000rpm	100	rpm	At stop	" H00_en.14" on page 134
H00.15	2000-10h	Maximum speed	100rpm–9000rpm	100	rpm	At stop	" H00_en.15" on page 134
H00.16	2000-11h	Moment of inertia Jm	0.01 kgcm²–655.35 kgcm²	0.01	$kgcm^2$	At stop	" H00_en.16" on page 134
H00.17	2000-12h	Number of PMSM pole pairs	2–360	2	-	At stop	" H00_en.17" on page 135
H00.18	2000-13h	Stator resistance	0.001 Ω to 65.535 Ω	0.001	Ω	At stop	" H00_en.18" on page 135
H00.19	2000-14h	Stator inductance Lq	0.01 mH to 655.35 mH	0.01	mH	At stop	" H00_en.19" on page 135
H00.20	2000-15h	Stator inductance Ld	0.01 mH to 655.35 mH	0.01	mH	At stop	" H00_en.20" on page 135

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H00.21	2000-16h	Linear back EMF coefficient	0.01 mV/rpm to 655.35 mV/rpm	0.01	mV/rpm	At stop	" H00_en.21" on page 136
H00.22	2000-17h	Torque coefficient Kt	0.01 N·m/Arms to 655.35 N·m/Arms	0.01	N·m/Arms	At stop	" H00_en.22" on page 136
H00.23	2000-18h	Electrical constant Te	0.01 ms to 655.35 ms	0.01	ms	At stop	" H00_en.23" on page 136
H00.24	2000-19h	Mechanical constant Tm	0.01 ms to 655.35 ms	0.01	ms	At stop	" H00_en.24" on page 136
H00.27	2000-1Ch	Sine/Cosine number of serial encoder motor	0–65535	1	-	Immediately	" H00_en.27" on page 137
H00.28	2000-1Dh	Absolute encoder position offset	0P/Rev–1073741824P/Rev	0	PPR	At stop	" H00_en.28" on page 137
H00.30	2000-1Fh	Encoder selection (Hex)	0: Regular incremental encoder (UVW-ABZ) 1: Wire-saving encoder (ABZ[UVW]) 2: Regular incremental encoder (ABZ, without UVW) 16: TAMAGAWA encoder 18: Nikon encoder 19: Inovance encoder 48: Optical scale	19	-	At stop	" H00_en.30" on page 137
H00.31	2000-20h	Encoder PPR	1P/Rev–1073741824P/Rev	8388608	PPR	At stop	" H00_en.31" on page 138
H00.35	2000-24h	Motor code saved in the serial encoder	0–65535	0	-	At stop	" H00_en.35" on page 138
H00.37	2000-26h	Encoder function setting bit	0–255	0	-	Unchangeable	" H00_en.37" on page 138
H00.43	2000-2Ch	Maximum Current	0.00 A to 655.35 A	16.95	A	At stop	" H00_en.43" on page 139

5.2 Parameter Group H01

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H01.00	2001-01h	MCU software version	0.0–6553.5	0.0	-	Unchangeable	" H01_en.00" on page 139
H01.01	2001-02h	FPGA software version	0.0–6553.5	0.0	-	Unchangeable	" H01_en.01" on page 139
H01.02	2001-03h	Servo Drive Model	0–65535	0	-	At stop	" H01_en.02" on page 139
H01.04	2001-05h	Voltage class	0 V to 65535 V	220	V	Immediately	" H01_en.04" on page 140
H01.05	2001-06h	Rated power	0.01 kW–655.35 kW	75.00	kW	Immediately	" H01_en.05" on page 140
H01.06	2001-07h	Max. output power	0.01 kW–655.35 kW	75.00	kW	Immediately	" H01_en.06" on page 140
H01.07	2001-08h	Rated output current	0.01 A to 655.35 A	5.50	A	Immediately	" H01_en.07" on page 140
H01.08	2001-09h	Max. output current	0.01 A to 655.35 A	16.90	A	Immediately	" H01_en.08" on page 141
H01.10	2001-0Bh	Carrier frequency	4000–20000	8000	-	Immediately	" H01_en.10" on page 141
H01.11	2001-0Ch	Current loop modulation frequency	0: Carrier frequency 1: 2 × carrier frequency	1	-	At stop	" H01_en.11" on page 141
H01.12	2001-0Dh	Speed loop scheduling frequency-division coefficient	1: Current loop modulation frequency/1 2: Current loop modulation frequency/2 4: Current loop modulation frequency/4 8: Current loop modulation frequency/8 16: Current loop modulation frequency/16 32: Current loop modulation frequency/32	1	-	Immediately	" H01_en.12" on page 142

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H01.13	2001-0Eh	Position loop scheduling frequency-division coefficient	2: Current loop modulation frequency/2 4: Current loop modulation frequency/4 8: Current loop modulation frequency/8 16: Current loop modulation frequency/16 32: Current loop modulation frequency/32 64: Current loop modulation frequency/64 128: Current loop modulation frequency/128	4	-	Immediately	" H01_en.13" on page 142
H01.14	2001-0Fh	Dead zone time	0.01 us to 20.00 us	2.00	us	Immediately	" H01_en.14" on page 142
H01.15	2001-10h	DC bus overvoltage protection threshold	0 V to 2000 V	420	V	Immediately	" H01_en.15" on page 143
H01.16	2001-11h	DC bus voltage discharge threshold	0 V to 2000 V	380	V	Immediately	" H01_en.16" on page 143
H01.17	2001-12h	DC bus undervoltage threshold	0 V to 2000 V	200	V	Immediately	" H01_en.17" on page 143
H01.18	2001-13h	Servo drive overcurrent protection threshold	10%–100%	100	%	Immediately	" H01_en.18" on page 143
H01.19	2001-14h	Sampling coefficient of 7860	1–65535	3200	-	Immediately	" H01_en.19" on page 144
H01.20	2001-15h	Dead zone compensation	0.00us–20.00us	2.00	us	Immediately	" H01_en.20" on page 144
H01.21	2001-16h	Minimum switch-on time of bootstrap circuit	1.0us–20.0us	4.0	us	At stop	" H01_en.21" on page 144
H01.22	2001-17h	D-axis back EMF constant	0.0%–6553.5%	60.0	%	Immediately	" H01_en.22" on page 144
H01.23	2001-18h	Q-axis back EMF constant	0.0%–6553.5%	100.0	%	Immediately	" H01_en.23" on page 145
H01.24	2001-19h	D-axis current loop gain	1–65535	1000	-	Immediately	" H01_en.24" on page 145

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H01.25	2001-1Ah	D-axis current loop integral compensation factor	0–65535	200	-	Immediately	" H01_en.25" on page 145
H01.26	2001-1Bh	Sinc3 filter data extraction rate in current sampling	0: Extraction rate 32 1: Extraction rate 64 2: Extraction rate 128 3: Extraction rate 256	0	-	At stop	" H01_en.26" on page 146
H01.27	2001-1Ch	Q-axis current loop gain	1–65535	1000	-	Immediately	" H01_en.27" on page 146
H01.28	2001-1Dh	Q-axis current loop integral compensation factor	0–65535	100	-	Immediately	" H01_en.28" on page 146
H01.29	2001-1Eh	Control power voltage sampling coefficient	50.0–150.0	100.0	-	At stop	" H01_en.29" on page 146
H01.30	2001-1Fh	Bus voltage gain tuning	50.0%–150.0%	100.0	%	Immediately	" H01_en.30" on page 147
H01.31	2001-20h	FOC calculation time	1.00us–100.00us	2.60	us	Immediately	" H01_en.31" on page 147
H01.32	2001-21h	Relative gain of UV sampling	0–65535	0	-	Unchangeable	" H01_en.32" on page 147
H01.37	2001-26h	Model identification version	0–65535	0	-	Immediately	" H01_en.37" on page 148
H01.44	2001-2Dh	Sinc3 filter data extraction rate in 2nd group of current sampling	0: Extraction rate 32 1: Extraction rate 64 2: Extraction rate 128 3: Extraction rate 256	2	-	At stop	" H01_en.44" on page 148
H01.45	2001-2Eh	Phase U duty cycle obtained upon voltage injection	0–65535	0	-	Immediately	" H01_en.45" on page 148
H01.47	2001-30h	MCU current reference processing time	0.00us–60.00us	38.00	us	Immediately	" H01_en.47" on page 148
H01.48	2001-31h	AD sampling delay	0.00us–20.00us	1.00	us	Immediately	" H01_en.48" on page 149

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H01.49	2001-32h	Serial encoder data dissemination delay	0.00us–500.00us	61.00	us	Immediately	" H01_en.49" on page 149
H01.50	2001-33h	Interval version of DSP software	0.00–655.35	0.00	-	Immediately	" H01_en.50" on page 149
H01.52	2001-35h	D-axis proportional gain in performance priority mode	0–65535	2000	-	Immediately	" H01_en.52" on page 149
H01.53	2001-36h	D-axis integral gain in performance priority mode	0.00–655.35	2.00	-	Immediately	" H01_en.53" on page 150
H01.54	2001-37h	Q-axis proportional gain in performance priority mode	0–65535	2000	-	Immediately	" H01_en.54" on page 150
H01.55	2001-38h	Q-axis integral gain in performance priority mode	0.00–655.35	1.00	-	Immediately	" H01_en.55" on page 150
H01.56	2001-39h	2nd group of proportional gain coefficient in performance priority mode	0.0%–1000.0%	100.0	%	Immediately	" H01_en.56" on page 151
H01.57	2001-3Ah	3rd group of proportional gain coefficient in performance priority mode	0.0%–1000.0%	100.0	%	Immediately	" H01_en.57" on page 151
H01.58	2001-3Bh	1st gain switchover threshold in performance priority mode	0.0%–300.0%	1.0	%	Immediately	" H01_en.58" on page 151
H01.59	2001-3Ch	2nd gain switchover threshold in performance priority mode	0.0%–300.0%	2.0	%	Immediately	" H01_en.59" on page 151

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H01.60	2001-3Dh	3rd gain switchover threshold in performance priority mode	0.0%–300.0%	100.0	%	Immediately	" H01_en.60" on page 152
H01.61	2001-3Eh	4th gain switchover threshold in performance priority mode	0.0%–300.0%	200.0	%	Immediately	" H01_en.61" on page 152
H01.62	2001-3Fh	Phase U/V 7860 detection protection threshold	0–320	280	-	Unchangeable	" H01_en.62" on page 152
H01.63	2001-40h	Serial encoder data transmission compensation time	0.00–10.00	0.00	-	At stop	" H01_en.63" on page 153

5.3 Parameter Group H02

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H02.00	2002-01h	Control mode	0: Speed control mode 1: Position control mode 2: Torque control mode 3: Torque<->Speed control mode 4: Speed<->Position control mode 5: Torque<->Position control mode 6: Torque<->Speed<->Position compound mode	1	-	At stop	" H02_en.00" on page 153
H02.01	2002-02h	Absolute position detection system	0: Incremental position mode 1: Absolute position linear mode 2: Absolute position rotation mode	0	-	At stop	" H02_en.01" on page 154

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H02.02	2002-03h	Forward direction	0: Counterclockwise (CCW) as forward direction 1: Clockwise (CW) as forward direction	0	-	At stop	*" H02_en.02" on page 155*
H02.03	2002-04h	Output pulse phase	0: Phase A leads phase B 1: Phase A lags behind phase B	0	-	At stop	*" H02_en.03" on page 155*
H02.05	2002-06h	Stop mode at S-OFF	0: Coast to stop, keeping de-energized state 1: Stop at zero speed, keeping de-energized state 2: Stop at zero speed, keeping dynamic braking state 3: Dynamic braking stop, keeping dynamic braking state	0	-	At stop	*" H02_en.05" on page 156*
H02.06	2002-07h	Stop mode at No.2 fault	0: Coast to stop, keeping de-energized state 1: Stop at zero speed, keeping de-energized state 2: Stop at zero speed, keeping dynamic braking state 3: Dynamic braking stop, keeping DB state 4: DB stops, keeping operation state	2	-	At stop	*" H02_en.06" on page 156*
H02.07	2002-08h	Stop mode at overtravel	0: Coast to stop, keeping de-energized state 1: Stop at zero speed, keeping position lock state 2: Stop at zero speed, keeping de-energized state	1	-	At stop	*" H02_en.07" on page 157*
H02.08	2002-09h	Stop mode at No.1 fault	0: Coast to stop, keeping de-energized state 1: DB stop, keeping de-energized state 2: DB stop, keeping DB state	2	-	At stop	*" H02_en.08" on page 157*
H02.09	2002-0Ah	Delay from brake output ON to command received	0 ms to 500 ms	250	ms	Immediately	*" H02_en.09" on page 158*
H02.10	2002-0Bh	Delay from brake output OFF to motor de-energized in the standstill state	1 ms to 1000 ms	150	ms	Immediately	*" H02_en.10" on page 158*

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H02.11	2002-0Ch	Motor speed threshold at brake output OFF in rotation state	0 rpm to 3000 rpm	30	rpm	Immediately	" H02_en.11" on page 158
H02.12	2002-0Dh	Delay from S-ON OFF to brake output OFF in rotation state	1 ms to 1000 ms	500	ms	Immediately	" H02_en.12" on page 159
H02.14	2002-0Fh	Stop mode and state switching speed condition	10rpm–100rpm	10	rpm	At stop	" H02_en.14" on page 159
H02.15	2002-10h	Warning display on the keypad	0: Output warning information immediately 1: Not output warning information	0	-	At stop	" H02_en.15" on page 159
H02.17	2002-12h	Stop at zero speed upon main circuit power-off	0: Disabled 1: Enabled	1	-	At stop	" H02_en.17" on page 160
H02.18	2002-13h	S-ON filter time constant	0 ms to 64 ms	0	ms	At stop	" H02_en.18" on page 160
H02.19	2002-14h	S-ON brake open delay	0 ms to 1000 ms	0	ms	At stop	" H02_en.19" on page 160
H02.20	2002-15h	Dynamic brake relay coil ON delay	10 ms to 30000 ms	30	ms	Immediately	" H02_en.20" on page 160
H02.21	2002-16h	Min. permissible resistance of regenerative resistor	0 Ω to 65535 Ω	40	Ω	Unchangeable	" H02_en.21" on page 161
H02.22	2002-17h	Power of built-in regenerative resistor	0 W to 65535 W	40	W	Unchangeable	" H02_en.22" on page 161
H02.23	2002-18h	Resistance of built-in regenerative resistor	0 Ω to 65535 Ω	50	Ω	Unchangeable	" H02_en.23" on page 161
H02.24	2002-19h	Resistor heat dissipation coefficient	10–100	30	-	At stop	" H02_en.24" on page 162

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H02.25	2002-1Ah	Regenerative resistor type	0: Built-in 1: External, natural ventilated 2: External, forced air cooling 3: Not needed	0	-	At stop	" H02_en.25" on page 163
H02.26	2002-1Bh	Power capacity of external regenerative resistor	1 W–65535 W	40	W	At stop	" H02_en.26" on page 163
H02.27	2002-1Ch	Resistance of external regenerative resistor	1 Ω to 1000 Ω	50	Ω	At stop	" H02_en.27" on page 164
H02.28	2002-1Dh	220 V min. bus voltage	190 V to 260 V	235	V	At stop	" H02_en.28" on page 164
H02.30	2002-1Fh	User password	0–65535	0	-	At stop	" H02_en.30" on page 164
H02.31	2002-20h	System parameter initialization	0: No operation 1: Restore default settings 2: Clear fault records	0	-	At stop	" H02_en.31" on page 165
H02.32	2002-21h	Default keypad display	0–99	50	-	Immediately	" H02_en.32" on page 165
H02.34	2002-23h	CAN software version	0.00–655.35	0.00	-	Unchangeable	" H02_en.34" on page 165
H02.35	2002-24h	Keypad display refresh frequency	0 Hz–29 Hz	0	Hz	Immediately	" H02_en.35" on page 166
H02.41	2002-2Ah	Manufacturer password	0–65535	0	-	At stop	" H02_en.41" on page 166

5.4 Parameter Group H03

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H03.00	2003-01h	DI function allocation 1 (activated upon power-on)	0: Corresponding to null 1: Corresponding to FunIN.1 2: Corresponding to FunIN.2 4: Corresponding to FunIN.3 8: Corresponding to FunIN.4 16: Corresponding to FunIN.5 32: Corresponding to FunIN.6 64: Corresponding to FunIN.7 128: Corresponding to FunIN.8 256: Corresponding to FunIN.9 512: Corresponding to FunIN.10 1024: Corresponding to FunIN.11 2048: Corresponding to FunIN.12 4096: Corresponding to FunIN.13 8192: Corresponding to FunIN.14 16384: Corresponding to FunIN.15	0	-	Immediately	*" H03_en.00" on page 166*

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H03.01	2003-02h	DI function allocation 2 (activated upon power-on)	0: Corresponding to null 1: Corresponding to FunIN.17 2: Corresponding to FunIN.18 4: Corresponding to FunIN.19 8: Corresponding to FunIN.20 16: Corresponding to FunIN.21 32: Corresponding to FunIN.22 64: Corresponding to FunIN.23 128: Corresponding to FunIN.24 256: Corresponding to FunIN.25 512: Corresponding to FunIN.26 1024: Corresponding to FunIN.27 2048: Corresponding to FunIN.28 4096: Corresponding to FunIN.29 8192: Corresponding to FunIN.30 16384: Corresponding to FunIN.31	0	-	Immediately	" H03_en.01" on page 167
H03.02	2003-03h	DI1 function selection	See " H03_en.02" on page 168 for details.	14	-	Immediately	" H03_en.02" on page 168
H03.03	2003-04h	DI1 logic selection	0: Active low 1: Active high	0	-	Immediately	" H03_en.03" on page 169
H03.04	2003-05h	DI2 function	See H03.02.	15	-	Immediately	" H03_en.04" on page 170
H03.05	2003-06h	DI2 logic selection	0: Active low 1: Active high	0	-	Immediately	" H03_en.05" on page 170
H03.06	2003-07h	DI3 function	See H03.02.	13	-	Immediately	" H03_en.06" on page 171
H03.07	2003-08h	DI3 logic selection	0: Active low 1: Active high	0	-	Immediately	" H03_en.07" on page 171
H03.08	2003-09h	DI4 function selection	See H03.02.	2	-	Immediately	" H03_en.08" on page 171
H03.09	2003-0Ah	DI4 logic selection	0: Active low 1: Active high	0	-	Immediately	" H03_en.09" on page 171
H03.10	2003-0Bh	DI5 function selection	See H03.02.	1	-	Immediately	" H03_en.10" on page 172
H03.11	2003-0Ch	DI5 logic selection	0: Active low 1: Active high	0	-	Immediately	" H03_en.11" on page 172

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H03.16	2003-11h	DI8 function selection	See H03.02.	31	-	Immediately	" H03_en.16" on page 172
H03.17	2003-12h	DI8 logic selection	0: Active low 1: Active high	0	-	Immediately	" H03_en.17" on page 173
H03.18	2003-13h	DI9 function selection	See H03.02.	0	-	Immediately	" H03_en.18" on page 173
H03.19	2003-14h	DI9 logic selection	0: Active low 1: Active high	0	-	Immediately	" H03_en.19" on page 173
H03.34	2003-23h	DI function allocation 3 (activated upon power-on)	0: 0x0: Corresponding to null 1: 0x1: Corresponding to FunIN.33 2: 0x2: Corresponding to FunIN.34 4: 0x4: Corresponding to FunIN.35 8: 0x8: Corresponding to FunIN.36 16: 0x10: Corresponding to FunIN.37 32: 0x20: Corresponding to FunIN.38 64: 0x40: Corresponding to FunIN.39 128: 0x80: Corresponding to FunIN.40 256: 0x100: Corresponding to FunIN.41 512: 0x200: Corresponding to FunIN.42 1024: 0x400: Corresponding to FunIN.43 2048: 0x800: Corresponding to FunIN.44 4096: 0x1000: Corresponding to FunIN.45 8192: 0x2000: Corresponding to FunIN.46 16384: 0x4000: Corresponding to FunIN.47	0	-	Immediately	" H03_en.34" on page 174

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H03.35	2003-24h	DI function allocation 4 (activated upon power-on)	0: 0x0: Corresponding to null 1: 0x1: Corresponding to FunIN.49 2: 0x2: Corresponding to FunIN.50 4: 0x4: Corresponding to FunIN.51 8: 0x8: Corresponding to FunIN.52 16: 0x10: Corresponding to FunIN.53 32: 0x20: Corresponding to FunIN.54 64: 0x40: Corresponding to FunIN.55 128: 0x80: Corresponding to FunIN.56 256: 0x100: Corresponding to FunIN.57 512: 0x200: Corresponding to FunIN.58 1024: 0x400: Corresponding to FunIN.59 2048: 0x800: Corresponding to FunIN.60 4096: 0x1000: Corresponding to FunIN.61 8192: 0x2000: Corresponding to FunIN.62 16384: 0x4000: Corresponding to FunIN.63	0	-	Immediately	" H03_en.35" on page 174
H03.60	2003-3Dh	DI1 filter	0.00 ms to 500.00 ms	3.00	ms	Immediately	" H03_en.60" on page 175
H03.61	2003-3Eh	DI2 filter	0.00 ms to 500.00 ms	3.00	ms	Immediately	" H03_en.61" on page 175
H03.62	2003-3Fh	DI3 filter	0.00 ms to 500.00 ms	3.00	ms	Immediately	" H03_en.62" on page 176
H03.63	2003-40h	DI4 filter	0.00 ms to 500.00 ms	3.00	ms	Immediately	" H03_en.63" on page 176
H03.64	2003-41h	DI5 filter	0.00 ms to 500.00 ms	3.00	ms	Immediately	" H03_en.64" on page 176
H03.65	2003-42h	DI8 filter 1	0.00 ms to 500.00 ms	0.00	ms	Immediately	" H03_en.65" on page 177
H03.66	2003-43h	DI9 filter 1	0.00 ms to 500.00 ms	0.00	ms	Immediately	" H03_en.66" on page 177

5.5 Parameter Group H04

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H04.00	2004-01h	DO1 function selection	See " H04_en.00" on page 177 for details.	1	-	Immediately	" H04_en.00" on page 177
H04.01	2004-02h	DO1 logic level	0: Output low (L) level when active (optocoupler ON) 1: Output high (H) level when active (optocoupler OFF)	0	-	Immediately	" H04_en.01" on page 178
H04.02	2004-03h	DO2 function selection	See H04.00.	5	-	Immediately	" H04_en.02" on page 179
H04.03	2004-04h	DO2 logic level	0: Output low (L) level when active (optocoupler ON) 1: Output high (H) level when active (optocoupler OFF)	0	-	Immediately	" H04_en.03" on page 179
H04.04	2004-05h	DO3 function	See H04.00.	9	-	Immediately	" H04_en.04" on page 180
H04.05	2004-06h	DO3 logic level	0: Output low (L) level when active (optocoupler ON) 1: Output high (H) level when active (optocoupler OFF)	0	-	Immediately	" H04_en.05" on page 180
H04.06	2004-07h	DO4 function	See H04.00.	11	-	Immediately	" H04_en.06" on page 180
H04.07	2004-08h	DO4 logic level	0: Output low (L) level when active (optocoupler ON) 1: Output high (H) level when active (optocoupler OFF)	0	-	Immediately	" H04_en.07" on page 180
H04.08	2004-09h	DO5 function selection	See H04.00.	16	-	Immediately	" H04_en.08" on page 181
H04.09	2004-0Ah	DO5 logic level	0: Output low (L) level when active (optocoupler ON) 1: Output high (H) level when active (optocoupler OFF)	0	-	Immediately	" H04_en.09" on page 181
H04.22	2004-17h	DO source selection	0–31	0	-	At stop	" H04_en.22" on page 181

5.6 Parameter Group H05

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H05.00	2005-01h	Main position reference source	0: Pulse reference 1: Step reference 2: Multi-position reference	0	-	At stop	" H05_en.00" on page 182
H05.01	2005-02h	Position pulse reference input terminal	0: Low speed 1: High speed	0	-	At stop	" H05_en.01" on page 183
H05.02	2005-03h	Pulses per revolution	0P/Rev–1048576P/Rev	0	PPR	At stop	" H05_en.02" on page 185
H05.04	2005-05h	First-order low-pass filter time constant	0.0 ms to 6553.5 ms	0.0	ms	At stop	" H05_en.04" on page 185
H05.05	2005-06h	Step reference	-9999 to +9999	50	Reference unit	At stop	" H05_en.05" on page 186
H05.06	2005-07h	Moving average filtering time constant	0.0 ms to 128.0 ms	0.0	ms	At stop	" H05_en.06" on page 187
H05.07	2005-08h	Electronic gear ratio 1 (numerator)	1–1073741824	8388608	-	Immediately	" H05_en.07" on page 187
H05.09	2005-0Ah	Electronic gear ratio 1 (denominator)	1–1073741824	10000	-	Immediately	" H05_en.09" on page 187
H05.11	2005-0Ch	Electronic gear ratio 2 (numerator)	1–1073741824	8388608	-	Immediately	" H05_en.11" on page 188
H05.13	2005-0Eh	Electronic gear ratio 2 (denominator)	1–1073741824	10000	-	Immediately	" H05_en.13" on page 188
H05.15	2005-10h	Pulse reference form	0: Direction + Pulse, positive logic 1: Direction + Pulse, negative logic 2: Phase A + phase B quadrature pulse, quadrupled frequency 3: CW + CCW	0	-	At stop	" H05_en.15" on page 188

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H05.16	2005-11h	Clear action	0: Clear position deviation upon S-OFF and fault 1: Clear position deviation pulses upon S-OFF and fault 2: Clear position deviation by ClrPosErr signal input from DI	0	-	At stop	" H05_en.16" on page 190
H05.17	2005-12h	Number of encoder frequency-division pulses	35P/Rev–32767P/Rev	2500	PPR	At stop	" H05_en.17" on page 191
H05.19	2005-14h	Speed feedforward control	0: No speed feedforward 1: Internal speed feedforward	1	-	At stop	" H05_en.19" on page 192
H05.20	2005-15h	Condition for positioning completed signal output	0: Absolute position deviation lower than the setpoint of H05.-21 1: Absolute position deviation lower than the setpoint of H05.-21 and the filtered position reference is 0 2: Absolute position deviation lower than the setpoint of H05.-21 and the unfiltered position reference is 0 3: Absolute position deviation kept lower than the setpoint of H05.-21 within the time defined by H05.-60 and the unfiltered position reference is 0	0	-	Immediately	" H05_en.20" on page 192
H05.21	2005-16h	Threshold of positioning completed	1 to 65535	5872	Encoder unit	Immediately	" H05_en.21" on page 193
H05.22	2005-17h	Proximity threshold	1 to 65535	65535	Encoder unit	Immediately	" H05_en.22" on page 194
H05.23	2005-18h	Interrupt positioning selection	0: Disable 1: Enabled	0	-	At stop	" H05_en.23" on page 194
H05.24	2005-19h	Displacement of interrupt positioning	0 to 1073741824	10000	Reference unit	Immediately	" H05_en.24" on page 195

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H05.26	2005-1Bh	Constant operating speed in interrupt positioning	0 rpm to 6000 rpm	200	rpm	Immediately	*" H05_en.26" on page 195*
H05.27	2005-1Ch	Acceleration/ Deceleration time of interrupt positioning	0 ms to 1000 ms	10	ms	Immediately	*" H05_en.27" on page 196*
H05.29	2005-1Eh	Interrupt positioning cancel signal	0: Disabled 1: Enabled	1	-	Immediately	*" H05_en.29" on page 196*
H05.30	2005-1Fh	Homing selection	0: Disabled 1: Homing enabled through the HomingStart signal input from DI 2: Electrical homing enabled through the HomingStart signal input from DI 3: Homing started immediately upon power-on 4: Homing executed immediately 5: Electrical homing started 6: Current position as home 8: D-triggered position as home	0	-	Immediately	*" H05_en.30" on page 197*

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H05.31	2005-20h	Homing mode	0: Forward, home switch as deceleration point and home 1: Reverse, home switch as deceleration point and home 2: Forward, Z signal as deceleration point and home 3: Reverse, motor Z signal as deceleration point and home 4: Forward, home switch as deceleration point and Z signal as home 5: Reverse, home switch as deceleration point and Z signal as home 6: Forward, positive limit switch as deceleration point and home 7: Reverse, negative limit switch as deceleration point and home 8: Forward, positive limit switch as deceleration point and Z signal as home 9: Reverse, negative limit switch as deceleration point and Z signal as home 10: Forward, mechanical limit position as deceleration point and home 11: Reverse, mechanical limit position as deceleration point and home 12: Forward, mechanical limit position as deceleration point and Z signal as home 13: Reverse, mechanical limit position as deceleration point and Z signal as home 14: Forward single-turn homing 15: Reverse single-turn homing 16: Nearby single-turn homing	0	-	Immediately	*" H05_en.31" on page 198*

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H05.32	2005-21h	Speed in high-speed searching for the home switch signal	0 rpm to 3000 rpm	100	rpm	Immediately	" H05_en.32" on page 199
H05.33	2005-22h	Speed in low-speed searching for the home switch signal	0 rpm to 1000 rpm	10	rpm	Immediately	" H05_en.33" on page 199
H05.34	2005-23h	Acceleration/ Deceleration time during homing	0 ms to 1000 ms	1000	ms	Immediately	" H05_en.34" on page 200
H05.35	2005-24h	Home search time limit	0 ms to 65535 ms	10000	ms	Immediately	" H05_en.35" on page 200
H05.36	2005-25h	Mechanical home offset	-1073741824 to 1073741824	0	Reference unit	Immediately	" H05_en.36" on page 200
H05.38	2005-27h	Servo pulse output source	0: Encoder frequency division output 1: Pulse reference synchronous output 2: Frequency division or synchronous output inhibited	0	-	At stop	" H05_en.38" on page 201
H05.39	2005-28h	Electronic gear ratio switchover condition	0: Switchover after position reference is kept 0 for 2.5 ms 1: Switched in real time	0	-	At stop	" H05_en.39" on page 202
H05.40	2005-29h	Mechanical home offset and action upon overtravel	0: H05.36 as the coordinate after homing, reverse homing applied after homing triggered again upon overtravel 1: H05.36 as the relative offset after homing, reverse homing applied after homing triggered again upon overtravel 2: H05.36 as the coordinate after homing, reverse homing applied automatically upon overtravel 3: H05.36 as the relative offset after homing, reverse homing applied automatically upon overtravel	0	-	At stop	" H05_en.40" on page 202

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H05.41	2005-2Ah	Z pulse output polarity	0: Negative (Z pulse active low) 1: Positive (Z pulse active high)	1	-	At stop	" H05_en.41" on page 203
H05.43	2005-2Ch	Position pulse edge	0: Falling edge-triggered 1: Rising edge-triggered	1	-	Immediately	" H05_en.43" on page 205
H05.44	2005-2Dh	Encoder multi-turn data offset	0–65535	0	-	Immediately	" H05_en.44" on page 205
H05.46	2005-2Fh	Position offset in absolute position linear mode (low 32 bits)	-2147483648 to 2147483647	0	Encoder unit	At stop	" H05_en.46" on page 205
H05.48	2005-31h	Position offset in absolute position linear mode (high 32 bits)	-2147483648 to 2147483647	0	Encoder unit	At stop	" H05_en.48" on page 206
H05.50	2005-33h	Mechanical gear ratio in absolute position rotation mode (numerator)	1–65535	1	-	At stop	" H05_en.50" on page 206
H05.51	2005-34h	Mechanical gear ratio in absolute position rotation mode (denominator)	1–65535	1	-	At stop	" H05_en.51" on page 206
H05.52	2005-35h	Pulses per revolution of the load in absolute position rotation mode (low 32 bits)	0 to 2147483647	0	Encoder unit	At stop	" H05_en.52" on page 206
H05.54	2005-37h	Pulses per revolution of the load in absolute position rotation mode (high 32 bits)	0 to 127	0	Encoder unit	At stop	" H05_en.54" on page 207

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H05.56	2005-39h	Speed threshold in homing upon hit-and-stop	0 rpm to 1000 rpm	2	rpm	Immediately	*" H05_en.56" on page 207*
H05.57	2005-3Ah	Mechanical limit times threshold	0–65535	20	-	Immediately	*" H05_en.57" on page 207*
H05.58	2005-3Bh	Torque threshold in homing upon hit-and-stop	0.0%–300.0%	100.0	%	Immediately	*" H05_en.58" on page 208*
H05.59	2005-3Ch	Positioning window time	0 ms to 30000 ms	0	ms	Immediately	*" H05_en.59" on page 208*
H05.60	2005-3Dh	Hold time of positioning completed	0 ms to 30000 ms	0	ms	Immediately	*" H05_en.60" on page 208*
H05.61	2005-3Eh	Encoder frequency-division pulse output (32-bit)	0P/Rev–262143P/Rev	0	PPR	At stop	*" H05_en.61" on page 208*
H05.63	2005-40h	Real time update of position reference source	0–1	0	-	At stop	*" H05_en.63" on page 209*
H05.66	2005-43h	Homing time unit	0: 1 ms 1: 10 ms 2: 100 ms	0	-	At stop	*" H05_en.66" on page 209*
H05.67	2005-44h	Offset between zero point and single-turn absolute position	0–2147483648	0	-	At stop	*" H05_en.67" on page 209*
H05.69	2005-46h	Auxiliary homing function	0: Disabled 1: Enable single-turn homing 2: Record deviation position 3: Start a new search for the Z signal (homing) 4: Clear the position deviation	0	-	At stop	*" H05_en.69" on page 210*

5.7 Parameter Group H06

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H06.00	2006-01h	Source of main speed reference A	0: Digital setting (H06.03)	0	-	At stop	" H06_en.00" on page 210
H06.01	2006-02h	Source of auxiliary speed reference B	0: Digital setting (H06.03) 5: Multi-speed reference	5	-	At stop	" H06_en.01" on page 211
H06.02	2006-03h	Speed reference source	0: Source of main speed reference A 1: Source of auxiliary speed reference B 2: A+B 3: Switched between A and B 4: Communication	0	-	At stop	" H06_en.02" on page 211
H06.03	2006-04h	Speed reference set through keypad	–6000 rpm to 6000 rpm	200	rpm	Immediately	" H06_en.03" on page 212
H06.04	2006-05h	Jog speed setpoint	0 rpm to 6000 rpm	100	rpm	Immediately	" H06_en.04" on page 212
H06.05	2006-06h	Acceleration ramp time constant of speed reference	0 ms to 65535 ms	0	ms	Immediately	" H06_en.05" on page 213
H06.06	2006-07h	Deceleration ramp time constant of speed reference	0 ms to 65535 ms	0	ms	Immediately	" H06_en.06" on page 213
H06.07	2006-08h	Maximum speed limit	0 rpm to 6000 rpm	6000	rpm	Immediately	" H06_en.07" on page 214
H06.08	2006-09h	Forward speed limit	0 rpm to 6000 rpm	6000	rpm	Immediately	" H06_en.08" on page 214
H06.09	2006-0Ah	Reverse speed limit	0 rpm to 6000 rpm	6000	rpm	Immediately	" H06_en.09" on page 215
H06.11	2006-0Ch	Torque feedforward control	0: No torque feedforward 1: Internal torque feedforward	1	-	Immediately	" H06_en.11" on page 216
H06.13	2006-0Eh	Speed smoothing time	0us–20000us	0	us	At stop	" H06_en.13" on page 217
H06.15	2006-10h	Zero clamp speed threshold	0 rpm to 6000 rpm	10	rpm	Immediately	" H06_en.15" on page 218

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H06.16	2006-11h	Threshold of TGON (motor rotation) signal	0 rpm to 1000 rpm	20	rpm	Immediately	" H06_en.16" on page 218
H06.17	2006-12h	Threshold of V-Cmp (speed matching) signal	0 rpm to 100 rpm	10	rpm	Immediately	" H06_en.17" on page 219
H06.18	2006-13h	Threshold of speed reach signal	10rpm–6000rpm	1000	rpm	Immediately	" H06_en.18" on page 220
H06.19	2006-14h	Threshold of zero speed output signal	1 rpm to 6000 rpm	10	rpm	Immediately	" H06_en.19" on page 221
H06.28	2006-1Dh	Cogging torque ripple compensation	0 to 1	1	-	Immediately	" H06_en.28" on page 222
H06.31	2006-20h	Sine frequency	0 to 16000	50	-	Immediately	" H06_en.31" on page 222
H06.32	2006-21h	Sine amplitude	0 to 30000	30	-	Immediately	" H06_en.32" on page 223
H06.33	2006-22h	Sine amplitude	0: Disabled 1: Position reference sine 2: Speed reference sine 3: Torque reference sine	30	-	Immediately	" H06_en.33" on page 223
H06.35	2006-24h	Sine offset	-9900 to 9900	0	-	Immediately	" H06_en.35" on page 223

5.8 Parameter Group H07

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H07.00	2007-01h	Source of main torque reference A	0: Keypad (H07.03)	0	-	At stop	" H07_en.00" on page 224
H07.01	2007-02h	Source of auxiliary torque reference B	0: Keypad (H07.03)	0	-	At stop	" H07_en.01" on page 224

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H07.02	2007-03h	Torque reference source	0: Source of main torque reference A 1: Source of auxiliary torque reference B 2: Source of A+B 3: Switched between A and B 4: Communication	0	-	At stop	" H07_en.02" on page 224
H07.03	2007-04h	Torque reference set through keypad	-400.0%–400.0%	0.0	%	Immediately	" H07_en.03" on page 225
H07.05	2007-06h	Torque reference filter time constant	0.00 ms to 30.00 ms	0.50	ms	Immediately	" H07_en.05" on page 225
H07.06	2007-07h	2nd torque reference filter time constant	0.00 ms to 30.00 ms	0.27	ms	Immediately	" H07_en.06" on page 226
H07.07	2007-08h	Torque limit source	0: Forward/Reverse internal torque limit (default) 1: Forward/Reverse external torque limit (selected through P-CL and N-CL)	0	-	At stop	" H07_en.07" on page 227
H07.09	2007-0Ah	Positive internal torque limit	0.0%–400.0%	350.0	%	Immediately	" H07_en.09" on page 228
H07.10	2007-0Bh	Negative internal torque limit	0.0%–400.0%	350.0	%	Immediately	" H07_en.10" on page 228
H07.11	2007-0Ch	Positive external torque limit	0.0%–400.0%	350.0	%	Immediately	" H07_en.11" on page 228
H07.12	2007-0Dh	Negative external torque limit	0.0%–400.0%	350.0	%	Immediately	" H07_en.12" on page 229
H07.15	2007-10h	Emergency-stop torque	0.0%–300.0%	100.0	%	At stop	" H07_en.15" on page 229
H07.17	2007-12h	Speed limit source	0: Internal speed limit (in torque control) 1: 0 (no action) 2: 1st or 2nd speed limit input selected by FunIN.36	0	-	Immediately	" H07_en.17" on page 229
H07.19	2007-14h	Forward speed limit/1st speed limit in torque control	0 rpm to 6000 rpm	3000	rpm	Immediately	" H07_en.19" on page 230

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H07.20	2007-15h	Reverse speed limit/2nd speed limit in torque control	0 rpm to 6000 rpm	3000	rpm	Immediately	" H07_en.20" on page 230
H07.21	2007-16h	Base value for torque reach	0.0%–300.0%	0.0	%	Immediately	" H07_en.21" on page 230
H07.22	2007-17h	Torque reach valid value	0.0%–300.0%	20.0	%	Immediately	" H07_en.22" on page 230
H07.23	2007-18h	Torque reach invalid value	0.0%–300.0%	10.0	%	Immediately	" H07_en.23" on page 231
H07.24	2007-19h	Field weakening depth	60%–120%	115	%	Immediately	" H07_en.24" on page 232
H07.25	2007-1Ah	Max. permissible demagnetizing current	0%–200%	100	%	Immediately	" H07_en.25" on page 232
H07.26	2007-1Bh	Field weakening selection	0–1	1	-	Immediately	" H07_en.26" on page 232
H07.27	2007-1Ch	Flux weakening gain	1 Hz–1000 Hz	30	Hz	Immediately	" H07_en.27" on page 232
H07.40	2007-29h	Speed limit window in the torque control mode	0.5 ms to 30.0 ms	1.0	ms	Immediately	" H07_en.40" on page 233

5.9 Parameter Group H08

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H08.00	2008-01h	Speed loop gain	0.1 Hz–2000.0 Hz	40.0	Hz	Immediately	" H08_en.00" on page 234
H08.01	2008-02h	Speed loop integral time constant	0.15 ms to 512.00 ms	19.89	ms	Immediately	" H08_en.01" on page 234
H08.02	2008-03h	Position loop gain	0.0 Hz–2000.0 Hz	64.0	Hz	Immediately	" H08_en.02" on page 234
H08.03	2008-04h	2nd speed loop gain	0.1 Hz–2000.0 Hz	75.0	Hz	Immediately	" H08_en.03" on page 235

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H08.04	2008-05h	2nd speed loop integral time constant	0.15 ms to 512.00 ms	10.61	ms	Immediately	" H08_en.04" on page 235
H08.05	2008-06h	2nd position loop gain	0.0 Hz–2000.0 Hz	120.0	Hz	Immediately	" H08_en.05" on page 235
H08.08	2008-09h	2nd gain mode setting	0: Fixed to the 1st group of gains, P/PI switched through external DI1:Switched between the 1st and 2nd group of gains as defined by H08.09	1	-	Immediately	" H08_en.08" on page 236
H08.09	2008-0Ah	Gain switchover condition	0: Fixed to the 1st gain set (PS) 1: Switch with external DI (PS) 2: Torque reference too large (PS) 3: Speed reference too large (PS) 4: Speed reference change rate too large (PS) 5: Speed reference low/high speed threshold (PS) 6: Position deviation too large (P) 7: Position reference available (P) 8: Positioning unfinished (P) 9: Actual speed (P) 10: Position reference + Actual speed (P)	0	-	Immediately	" H08_en.09" on page 236
H08.10	2008-0Bh	Gain switchover delay	0.0 ms to 1000.0 ms	5.0	ms	At stop	" H08_en.10" on page 238
H08.11	2008-0Ch	Gain switchover level	0–20000	50	-	Immediately	" H08_en.11" on page 238
H08.12	2008-0Dh	Gain switchover dead time	0–20000	30	-	At stop	" H08_en.12" on page 239
H08.13	2008-0Eh	Position gain switchover time	0.0 ms to 1000.0 ms	3.0	ms	At stop	" H08_en.13" on page 239
H08.14	2008-0Fh	Auto-tuned inertia value	0.00–200.00	0.00	-	Unchangeable	" H08_en.14" on page 240
H08.15	2008-10h	Load moment of inertia ratio	0.00–120.00	2.00	-	Immediately	" H08_en.15" on page 240

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H08.18	2008-13h	Speed feedforward filter time constant	0.00 ms to 64.00 ms	0.50	ms	Immediately	*" H08_en.18" on page 241*
H08.19	2008-14h	Speed feedforward gain	0.0%–100.0%	0.0	%	Immediately	*" H08_en.19" on page 241*
H08.20	2008-15h	Torque feedforward filter time constant	0.00 ms to 64.00 ms	0.50	ms	Immediately	*" H08_en.20" on page 242*
H08.21	2008-16h	Torque feedforward gain	0.0%–200.0%	0.0	%	Immediately	*" H08_en.21" on page 242*
H08.22	2008-17h	Speed feedback filtering option	0: Inhibited 1: 2 times 2: 4 times 3: 8 times 4: 16 times	0	-	At stop	*" H08_en.22" on page 242*
H08.23	2008-18h	Cutoff frequency of speed feedback low-pass filter	100 Hz–4000 Hz	4000	Hz	Immediately	*" H08_en.23" on page 243*
H08.24	2008-19h	PDFF control coefficient	0.0%–1000.0%	100.0	%	Immediately	*" H08_en.24" on page 243*
H08.27	2008-1Ch	Cutoff frequency of speed observer	10 Hz–2000 Hz	170	Hz	Immediately	*" H08_en.27" on page 244*
H08.28	2008-1Dh	Speed inertia correction coefficient	10%–10000%	100	%	Immediately	*" H08_en.28" on page 244*
H08.29	2008-1Eh	Speed observer filter time	0.02 ms to 20.00 ms	0.80	ms	Immediately	*" H08_en.29" on page 244*
H08.31	2008-20h	Disturbance observer cutoff frequency	1 Hz–1700 Hz	600	Hz	Immediately	*" H08_en.31" on page 245*
H08.32	2008-21h	Disturbance observer compensation coefficient	0%–100%	0	%	Immediately	*" H08_en.32" on page 245*
H08.33	2008-22h	Disturbance inertia correction coefficient	1%–10000%	100	%	Immediately	*" H08_en.33" on page 245*

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H08.34	2008-23h	Medium- and high-frequency jitter suppression phase modulation 1	0%–1600%	0	%	Immediately	" H08_en.34" on page 246
H08.35	2008-24h	Medium- and high-frequency jitter suppression frequency 1	0 Hz–1000 Hz	0	Hz	Immediately	" H08_en.35" on page 246
H08.36	2008-25h	Medium- and high-frequency jitter suppression compensation 1	0%–200%	0	%	Immediately	" H08_en.36" on page 246
H08.37	2008-26h	Phase modulation for medium-frequency jitter suppression 2	-90–90	0	-	Immediately	" H08_en.37" on page 246
H08.38	2008-27h	Frequency of medium-frequency jitter suppression 2	0 Hz–1000 Hz	0	Hz	Immediately	" H08_en.38" on page 247
H08.39	2008-28h	Compensation gain of medium-frequency jitter suppression 2	0%–300%	0	%	Immediately	" H08_en.39" on page 247
H08.40	2008-29h	Speed observer selection	0–1	0	-	At stop	" H08_en.40" on page 247
H08.42	2008-2Bh	Model control selection	0–1	0	-	At stop	" H08_en.42" on page 247
H08.43	2008-2Ch	Model gain	0.0–2000.0	40.0	-	Immediately	" H08_en.43" on page 248
H08.45	2008-2Eh	Feedforward position	0–1	0	-	Immediately	" H08_en.45" on page 248
H08.46	2008-2Fh	Model feedforward	0.0–102.4	95.0	-	Immediately	" H08_en.46" on page 248
H08.51	2008-34h	Model filtering time 2	0.00 ms to 20.00 ms	0.00	ms	Immediately	" H08_en.51" on page 249

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H08.53	2008-36h	Medium- and low-frequency jitter suppression frequency 3	0.0 Hz–600.0 Hz	0.0	Hz	Immediately	" H08_en.53" on page 249
H08.54	2008-37h	Medium- and low-frequency jitter suppression compensation 3	0%–200%	0	%	Immediately	" H08_en.54" on page 249
H08.56	2008-39h	Medium- and low-frequency jitter suppression phase modulation 3	0–1600	100	-	Immediately	" H08_en.56" on page 249
H08.58	2008-3Bh	Er.660 (Vibration too strong) switch	0–2	0	-	Immediately	" H08_en.58" on page 250
H08.59	2008-3Ch	Medium- and low-frequency jitter suppression frequency 4	0.0 Hz–600.0 Hz	0.0	Hz	Immediately	" H08_en.59" on page 250
H08.60	2008-3Dh	Medium- and low-frequency jitter suppression compensation 4	0%–200%	0	%	Immediately	" H08_en.60" on page 250
H08.61	2008-3Eh	Medium- and low-frequency jitter suppression phase modulation 4	0–1600	100	-	Immediately	" H08_en.61" on page 250
H08.62	2008-3Fh	Position loop integral time constant	0.15 ms to 512.00 ms	512.00	ms	Immediately	" H08_en.62" on page 251
H08.63	2008-40h	2nd position loop integral time constant	0.15 ms to 512.00 ms	512.00	ms	Immediately	" H08_en.63" on page 251
H08.64	2008-41h	Speed observer feedback selection	0–1	0	-	Immediately	" H08_en.64" on page 251

5.10 Parameter Group H09

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H09.00	2009-01h	Gain auto-tuning mode	0: Disabled, manual gain tuning required 1: Enabled, gain parameters generated automatically based on the stiffness level 2: Positioning mode, gain parameters generated automatically based on the stiffness level 3: Interpolation mode+Inertia auto-tuning 4: Standard mode+Inertia auto-tuning 6: Quick positioning mode+Inertia auto-tuning	0	-	Immediately	*" H09_en.00" on page 252*
H09.01	2009-02h	Stiffness level	0–41	15	-	Immediately	*" H09_en.01" on page 253*
H09.02	2009-03h	Adaptive notch mode	0: Adaptive notch no longer updated; 1: One adaptive notch activated (3rd notch) 2: Two adaptive notches activated (3rd and 4th notches) 3: Resonance point tested only (displayed in H09.24) 4: Adaptive notch cleared, values of 3rd and 4th notches restored to default	0	-	Immediately	*" H09_en.02" on page 254*
H09.03	2009-04h	Online inertia auto-tuning mode	0: Disabled 1: Enabled, changing slowly 2: Enabled, changing normally 3: Enabled, changing quickly	0	-	Immediately	*" H09_en.03" on page 254*
H09.04	2009-05h	Low-frequency resonance suppression mode	0: Set vibration frequency manually 1: Identify vibration frequency	0	-	Immediately	*" H09_en.04" on page 255*

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H09.05	2009-06h	Offline inertia auto-tuning mode	0: Positive/Negative triangular wave mode 1: JOG mode 2: Bidirectional auto-tuning mode 3: Unidirectional auto-tuning mode	0	-	At stop	" H09_en.05" on page 255
H09.06	2009-07h	Max. speed of inertia auto-tuning	100 rpm to 1000 rpm	500	rpm	At stop	" H09_en.06" on page 256
H09.07	2009-08h	Time constant for accelerating to max. speed during inertia auto-tuning	20 ms to 800 ms	125	ms	At stop	" H09_en.07" on page 256
H09.08	2009-09h	Interval time after an individual inertia auto-tuning	50 ms to 10000 ms	800	ms	At stop	" H09_en.08" on page 257
H09.09	2009-0Ah	Motor revolutions per inertia auto-tuning	0.00–100.00	1.00	-	Immediately	" H09_en.09" on page 257
H09.11	2009-0Ch	Vibration threshold	0.0%–100.0%	5.0	%	Immediately	" H09_en.11" on page 257
H09.12	2009-0Dh	Frequency of the 1st notch	50 Hz–4000 Hz	4000	Hz	Immediately	" H09_en.12" on page 258
H09.13	2009-0Eh	Width level of the 1st notch	0–40	2	-	Immediately	" H09_en.13" on page 258
H09.14	2009-0Fh	Depth level of the 1st notch	0–99	0	-	Immediately	" H09_en.14" on page 258
H09.15	2009-10h	Frequency of the 2nd notch	50 Hz–4000 Hz	4000	Hz	Immediately	" H09_en.15" on page 259
H09.16	2009-11h	Width level of the 2nd notch	0–20	2	-	Immediately	" H09_en.16" on page 259
H09.17	2009-12h	Depth level of the 2nd notch	0–99	0	-	Immediately	" H09_en.17" on page 259
H09.18	2009-13h	Frequency of the 3rd notch	50 Hz–4000 Hz	4000	Hz	Immediately	" H09_en.18" on page 259
H09.19	2009-14h	Width level of the 3rd notch	0–20	2	-	Immediately	" H09_en.19" on page 260

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H09.20	2009-15h	Depth level of the 3rd notch	0–99	0	-	Immediately	" H09_en.20" on page 260
H09.21	2009-16h	Frequency of the 4th notch	50 Hz–4000 Hz	4000	Hz	Immediately	" H09_en.21" on page 260
H09.22	2009-17h	Width level of the 4th notch	0–20	2	-	Immediately	" H09_en.22" on page 261
H09.23	2009-18h	Depth level of the 4th notch	0–99	0	-	Immediately	" H09_en.23" on page 261
H09.24	2009-19h	Auto-tuned resonance frequency	0–2000	0	-	Unchangeable	" H09_en.24" on page 261
H09.30	2009-1Fh	Torque disturbance compensation gain	-100.0%–100.0%	0.0	%	Immediately	" H09_en.30" on page 261
H09.31	2009-20h	Filter time constant of torque disturbance observer	0.00 ms to 25.00 ms	0.50	ms	Immediately	" H09_en.31" on page 262
H09.32	2009-21h	Gravity compensation value	-100.0–100.0	0.0	-	Immediately	" H09_en.32" on page 262
H09.33	2009-22h	Positive friction compensation	-100.0%–100.0%	0.0	%	Immediately	" H09_en.33" on page 262
H09.34	2009-23h	Negative friction compensation	-100.0%–100.0%	0.0	%	Immediately	" H09_en.34" on page 262
H09.35	2009-24h	Friction compensation speed threshold	0.1rpm–30.0rpm	2.0	rpm	Immediately	" H09_en.35" on page 263
H09.36	2009-25h	Friction compensation speed	0: Speed reference 1: Model tracking speed 2: Speed feedback	0	-	Immediately	" H09_en.36" on page 263
H09.38	2009-27h	Low-frequency resonance suppression frequency at the mechanical end	1.0 Hz–100.0 Hz	100.0	Hz	At stop	" H09_en.38" on page 263

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H09.39	2009-28h	Low-frequency resonance suppression at the mechanical end	0–3	2	-	At stop	" H09_en.39" on page 264
H09.41	2009-2Ah	Frequency of the 5th notch	50 Hz–8000 Hz	4000	Hz	At stop	" H09_en.41" on page 264
H09.42	2009-2Bh	Width level of the 5th notch	0–20	2	-	Immediately	" H09_en.42" on page 264
H09.43	2009-2Ch	Depth level of the 5th notch	0–99	0	-	Immediately	" H09_en.43" on page 264
H09.44	2009-2Dh	Frequency of low-frequency resonance suppression 1 at mechanical load end	0.0 Hz–200.0 Hz	0.0	Hz	Immediately	" H09_en.44" on page 265
H09.45	2009-2Eh	Responsiveness of low-frequency resonance suppression 1 at mechanical load end	0.01–10.00	1.00	-	Immediately	" H09_en.45" on page 265
H09.47	2009-30h	Width of low-frequency resonance suppression 1 at mechanical load end	0.00–2.00	1.00	-	Immediately	" H09_en.47" on page 265
H09.49	2009-32h	Frequency of low-frequency resonance suppression 2 at mechanical load end	0.0 Hz–200.0 Hz	0.0	Hz	Immediately	" H09_en.49" on page 265
H09.50	2009-33h	Responsiveness of low-frequency resonance suppression 2 at mechanical load end	0.01–10.00	1.00	-	Immediately	" H09_en.50" on page 266

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H09.52	2009-35h	Width of low-frequency resonance suppression 2 at mechanical load end	0.00–2.00	1.00	-	Immediately	" H09_en.52" on page 266
H09.57	2009-3Ah	STune resonance suppression switchover frequency	0 Hz–4000 Hz	850	Hz	Immediately	" H09_en.57" on page 266
H09.58	2009-3Bh	STune resonance suppression reset selection	0: Disable 1: Enable	0	-	Immediately	" H09_en.58" on page 267

5.11 Parameter Group H0A

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H0A.00	200A-01h	Power input phase loss protection	0: Enable phase loss fault and inhibit phase loss warning 1: Enable phase loss fault and warning 2: Disable phase loss fault and warning	0	-	Immediately	" H0A_en.00" on page 267
H0A.02	200A-03h	Vibration alarm switch	0: On 1: Off	0	-	Immediately	" H0A_en.02" on page 268
H0A.03	200A-04h	Power-off memory	0: Disabled 1: Enabled	0	-	Immediately	" H0A_en.03" on page 268
H0A.04	200A-05h	Motor overload protection gain	50%–300%	100	%	At stop	" H0A_en.04" on page 269
H0A.08	200A-09h	Overspeed threshold	0 rpm to 10000 rpm	0	rpm	Immediately	" H0A_en.08" on page 269
H0A.09	200A-0Ah	Maximum position pulse frequency	100 kHz–4000 kHz	4000	kHz	At stop	" H0A_en.09" on page 270
H0A.10	200A-0Bh	Threshold of excessive position deviation	1 to 1073741824	27486951	Encoder unit	Immediately	" H0A_en.10" on page 270

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H0A.12	200A-0Dh	Runaway protection	0: Disabled 1: Enabled	1	-	Immediately	" H0A_en.12" on page 271
H0A.16	200A-11h	Threshold of low-frequency resonance position deviation	1–1000	5	-	Immediately	" H0A_en.16" on page 271
H0A.17	200A-12h	Reference/ Pulse selection	0: Pulse unit 1: Reference unit	0	-	At stop	" H0A_en.17" on page 271
H0A.19	200A-14h	DI8 filter time constant	0–255	80	-	At stop	" H0A_en.19" on page 272
H0A.20	200A-15h	DI9 filter time constant	0–255	80	-	At stop	" H0A_en.20" on page 272
H0A.22	200A-17h	Sigma_Delta filter time	0–3	0	-	At stop	" H0A_en.22" on page 272
H0A.23	200A-18h	Tz signal filter time	0–31	15	-	At stop	" H0A_en.23" on page 272
H0A.24	200A-19h	Filter time constant of low-speed pulse input pin	0–255	30	-	At stop	" H0A_en.24" on page 273
H0A.25	200A-1Ah	Filter time constant of speed feedback display value	0 ms to 5000 ms	200	ms	At stop	" H0A_en.25" on page 273
H0A.26	200A-1Bh	Motor overload detection	0: Show motor overload warning (E909.0) and fault (E620.0) 1: Hide motor overload warning (E909.0) and fault (E620.0) 2: No meaning 3: Enabled for new motors	3	-	At stop	" H0A_en.26" on page 273
H0A.27	200A-1Ch	Speed DO filter time constant	0 ms to 5000 ms	10	ms	At stop	" H0A_en.27" on page 274
H0A.28	200A-1Dh	Quadrature encoder filter time constant	0 ns to 255 ns	30	ns	At stop	" H0A_en.28" on page 274
H0A.30	200A-1Fh	Filter time constant of high-speed pulse input pin	0 ns to 255 ns	2	ns	At stop	" H0A_en.30" on page 275

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H0A.32	200A-21h	Motor stall over-temperature protection time window	10 ms to 65535 ms	200	ms	Immediately	" H0A_en.32" on page 275
H0A.33	200A-22h	Motor stall over-temperature detection	0: Disabled 1: Enable 2: Enabled for new over-temperature	1	-	Immediately	" H0A_en.33" on page 275
H0A.35	200A-24h	Inhibit reading encoder EEPRROM on power-on (for third-party encoders)	0: Allow 1: Inhibit	0	-	Immediately	" H0A_en.35" on page 276
H0A.36	200A-25h	Encoder multi-turn overflow fault	0: Not hide 1: Hide	0	-	At stop	" H0A_en.36" on page 276
H0A.38	200A-27h	IGBT over-temperature threshold	0°C to 175°C	135	°C	At stop	" H0A_en.38" on page 277
H0A.39	200A-28h	IGBT over-temperature protection switch	0: Disabled 1: Enabled	0	-	At stop	" H0A_en.39" on page 277
H0A.40	200A-29h	Software limit selection	0: No operation 1: Activated immediately 2: Activated after homing is done	0	-	At stop	" H0A_en.40" on page 277
H0A.41	200A-2Ah	Forward position of software limit	-2147483648–2147483647	2147483647	-	At stop	" H0A_en.41" on page 278
H0A.43	200A-2Ch	Reverse position of software limit	-2147483648–2147483647	-2147483648	-	At stop	" H0A_en.43" on page 278
H0A.47	200A-30h	Brake protection	0–1	0	-	Immediately	" H0A_en.47" on page 278
H0A.48	200A-31h	Gravity load	0–3000	300	-	Immediately	" H0A_en.48" on page 278
H0A.49	200A-32h	Regenerative wafer over-temperature threshold	0°C to 175°C	115	°C	At stop	" H0A_en.49" on page 279

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H0A.50	200A-33h	Torque reference display filter time	0 ms to 5000 ms	200	ms	At stop	" H0A_en.50" on page 279
H0A.51	200A-34h	Encoder fault tolerance count	0–31	31	-	Immediately	" H0A_en.51" on page 279
H0A.52	200A-35h	Defines the temperature threshold for encoder overtemperature protection.	0° to 175°	105	°	Immediately	" H0A_en.52" on page 280
H0A.55	200A-38h	Runaway current threshold	100.0%–400.0%	200.0	%	Immediately	" H0A_en.55" on page 280
H0A.57	200A-3Ah	Runaway speed threshold	1 rpm to 1000 rpm	10	rpm	Immediately	" H0A_en.57" on page 280
H0A.58	200A-3Bh	Speed feedback filtering time	0.1 ms to 100.0 ms	2.0	ms	Immediately	" H0A_en.58" on page 280
H0A.59	200A-3Ch	Runaway protection detection time	10 ms to 1000 ms	30	ms	Immediately	" H0A_en.59" on page 281
H0A.61	200A-3Eh	Phase loss detection time threshold	30 ms to 65535 ms	50	ms	Immediately	" H0A_en.61" on page 281
H0A.85	200A-56h	Wire breakage detection torque threshold	4.0%–400.0%	5.0	%	At stop	" H0A_en.85" on page 281
H0A.86	200A-57h	Wire breakage detection filter time	5 ms to 1000 ms	30	ms	At stop	" H0A_en.86" on page 282

5.12 Parameter Group H0b

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H0b.00	200b-01h	Motor speed actual value	-9999rpm to 9999rpm	0	rpm	Unchangeable	" H0b_en.00" on page 282
H0b.01	200b-02h	Speed reference	-9999rpm to 9999rpm	0	rpm	Unchangeable	" H0b_en.01" on page 282
H0b.02	200b-03h	Internal torque reference	-300.0%–300.0%	0.0	%	Unchangeable	" H0b_en.02" on page 282
H0b.03	200b-04h	Monitored DI status	0–65535	0	-	Unchangeable	" H0b_en.03" on page 283
H0b.05	200b-06h	Monitored DO status	0–65535	0	-	Unchangeable	" H0b_en.05" on page 283
H0b.07	200b-08h	Absolute position counter	-2147483648 to 2147483647	0	Reference unit	Unchangeable	" H0b_en.07" on page 284
H0b.09	200b-0Ah	Mechanical angle	0–65535	0	-	Unchangeable	" H0b_en.09" on page 284
H0b.10	200b-0Bh	Electrical angle	0.0° to 360.0°	0.0	°	Unchangeable	" H0b_en.10" on page 285
H0b.11	200b-0Ch	Speed corresponding to the input position reference	-9999rpm to 9999rpm	0	rpm	Unchangeable	" H0b_en.11" on page 285
H0b.12	200b-0Dh	Average load rate	0.0%–6553.5%	0.0	%	Unchangeable	" H0b_en.12" on page 285
H0b.13	200b-0Eh	Input position reference counter	-2147483648 to 2147483647	0	Reference unit	Unchangeable	" H0b_en.13" on page 286
H0b.15	200b-10h	Encoder position deviation counter	-2147483648 to 2147483647	0	Encoder unit	Unchangeable	" H0b_en.15" on page 286
H0b.17	200b-12h	Feedback pulse counter	-2147483648 to 2147483647	0	Encoder unit	Unchangeable	" H0b_en.17" on page 286
H0b.19	200b-14h	Total power-on time	0.0s–214748364.7s	0.0	s	Unchangeable	" H0b_en.19" on page 287
H0b.24	200b-19h	RMS value of phase current	0.00 A to 655.35 A	0.00	A	Unchangeable	" H0b_en.24" on page 287
H0b.26	200b-1Bh	Bus voltage	0.0 V to 6553.5 V	0.0	V	Unchangeable	" H0b_en.26" on page 287
H0b.27	200b-1Ch	Module temperature	0°C to 65535°C	0	°C	Unchangeable	" H0b_en.27" on page 287

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H0b.28	200b-1Dh	Absolute encoder fault information given by FPGA	0–65535	0	-	Unchangeable	" H0b_en.28" on page 288
H0b.29	200b-1Eh	System status information given by FPGA	0–65535	0	-	Unchangeable	" H0b_en.29" on page 288
H0b.30	200b-1Fh	System fault information given by FPGA	0–65535	0	-	Unchangeable	" H0b_en.30" on page 288
H0b.33	200b-22h	Fault log	0: Present fault 1: Last fault 2: 2nd to last fault 3: 3rd to last fault 4: 4th to last fault 5: 5th to last fault 6: 6th to last fault 7: 7th to last fault 8: 8th to last fault 9: 9th to last fault 10: 10th to last fault 11: 11th to last fault 12: 12th to last fault 13: 13th to last fault 14: 14th to last fault 15: 15th to last fault 16: 16th to last fault 17: 17th to last fault 18: 18th to last fault 19: 19th to last fault	0	-	Immediately	" H0b_en.33" on page 289
H0b.34	200b-23h	Fault code of the selected fault	0–65535	0	-	Unchangeable	" H0b_en.34" on page 289
H0b.35	200b-24h	Time stamp upon occurrence of the selected fault	0.0s–214748364.7s	0.0	s	Unchangeable	" H0b_en.35" on page 289
H0b.37	200b-26h	Motor speed upon occurrence of the selected fault	-32767 rpm to +32767 rpm	0	rpm	Unchangeable	" H0b_en.37" on page 289

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H0b.38	200b-27h	Motor phase U current upon occurrence of the selected fault	-327.67 A to 327.67 A	0.00	A	Unchangeable	" H0b_en.38" on page 290
H0b.39	200b-28h	Motor phase V current upon occurrence of the selected fault	-327.67 A to 327.67 A	0.00	A	Unchangeable	" H0b_en.39" on page 290
H0b.40	200b-29h	Bus voltage upon occurrence of the selected fault	0.0 V to 6553.5 V	0.0	V	Unchangeable	" H0b_en.40" on page 290
H0b.41	200b-2Ah	DI status upon occurrence of the selected fault	0–65535	0	-	Unchangeable	" H0b_en.41" on page 291
H0b.42	200b-2Bh	DO status upon occurrence of the selected fault	0–65535	0	-	Unchangeable	" H0b_en.42" on page 291
H0b.43	200b-2Ch	Group No. of the abnormal parameter	0–65535	0	-	Unchangeable	" H0b_en.43" on page 291
H0b.44	200b-2Dh	Offset of the abnormal parameter within the parameter group	0–65535	0	-	Unchangeable	" H0b_en.44" on page 291
H0b.45	200b-2Eh	Internal fault code	0–65535	0	-	Unchangeable	" H0b_en.45" on page 292
H0b.46	200b-2Fh	Absolute encoder fault information given by FPGA upon occurrence of the selected fault	0–65535	0	-	Unchangeable	" H0b_en.46" on page 292

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H0b.47	200b-30h	System status information given by FPGA upon occurrence of the selected fault	0–65535	0	-	Unchangeable	" H0b_en.47" on page 292
H0b.48	200b-31h	System fault information given by FPGA upon occurrence of the selected fault	0–65535	0	-	Unchangeable	" H0b_en.48" on page 292
H0b.51	200b-34h	Internal fault code upon occurrence of the selected fault	0–65535	0	-	Unchangeable	" H0b_en.51" on page 293
H0b.52	200b-35h	Timeout fault flat bit given by FPGA upon occurrence of the selected fault	0–65535	0	-	Unchangeable	" H0b_en.52" on page 293
H0b.53	200b-36h	Position deviation counter	-2147483648 to 2147483647	0	Reference unit	Unchangeable	" H0b_en.53" on page 293
H0b.55	200b-38h	Motor speed actual value	-6000.0rpm to 6000.0rpm	0.0	rpm	Unchangeable	" H0b_en.55" on page 294
H0b.57	200b-3Ah	Bus voltage of the control circuit	0.0 V to 65535.0 V	0.0	V	Unchangeable	" H0b_en.57" on page 294
H0b.58	200b-3Bh	Mechanical absolute position (low 32 bits)	-2147483647 to 2147483647	0	Encoder unit	Unchangeable	" H0b_en.58" on page 294
H0b.60	200b-3Dh	Mechanical absolute position (high 32 bits)	-2147483647 to 2147483647	0	Encoder unit	Unchangeable	" H0b_en.60" on page 294

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H0b.63	200b-40h	NotRdy state	1: Control circuit error 2: Main circuit power input error 3: Bus undervoltage 4: Soft start failed 5: Encoder initialization undone 6: Short circuit to ground failed 7: Others	0	-	Unchangeable	*" H0b_en.63" on page 295*
H0b.64	200b-41h	Real-time input position reference counter	-2147483648 to 2147483647	0	Reference unit	Unchangeable	*" H0b_en.64" on page 295*
H0b.66	200b-43h	Encoder temperature	-32768°C to 32767°C	0	°C	Unchangeable	*" H0b_en.66" on page 295*
H0b.70	200b-47h	Number of revolutions recorded in the absolute encoder	0 Rev to 65535 Rev	0	Rev	Unchangeable	*" H0b_en.70" on page 296*
H0b.71	200b-48h	Single-turn position fed back by the absolute encoder	0 to 2147483647	0	Encoder unit	Unchangeable	*" H0b_en.71" on page 296*
H0b.73	200b-4Ah	Single-turn offset position of absolute encoder	0 to 2147483647	0	Encoder unit	Unchangeable	*" H0b_en.73" on page 296*
H0b.75	200b-4Ch	Load inertia ratio in online inertia auto-tuning	0.00–655.35	0.00	-	Unchangeable	*" H0b_en.75" on page 296*
H0b.76	200b-4Dh	External load in online inertia auto-tuning	0.0–6553.5	0.0	-	Unchangeable	*" H0b_en.76" on page 297*
H0b.77	200b-4Eh	Absolute position fed back by the absolute encoder (low 32 bits)	-2147483647 to 2147483647	0	Encoder unit	Unchangeable	*" H0b_en.77" on page 297*

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H0b.79	200b-50h	Absolute position fed back by the absolute encoder (high 32 bits)	-2147483647 to 2147483647	0	Encoder unit	Unchangeable	" H0b_en.79" on page 297
H0b.81	200b-52h	Load position within one turn in absolute position rotation mode (low 32 bits)	-2147483647 to 2147483647	0	Encoder unit	Unchangeable	" H0b_en.81" on page 298
H0b.83	200b-54h	Load position within one turn in absolute position rotation mode (high 32 bits)	-2147483647 to 2147483647	0	Encoder unit	Unchangeable	" H0b_en.83" on page 298
H0b.85	200b-56h	Load position within one turn in absolute position rotation mode	-2147483647 to 2147483647	0	Reference unit	Unchangeable	" H0b_en.85" on page 298

5.13 Parameter Group H0C

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H0C.00	200C-01h	Drive axis address	0–247	1	-	Immediately	" H0C_en.00" on page 298
H0C.02	200C-03h	Serial baud rate	0: 2400bps 1: 4800bps 2: 9600bps 3: 19200bps 4: 38400bps 5: 57600bps 6: 115200bps	5	-	Immediately	" H0C_en.02" on page 299
H0C.03	200C-04h	Modbus data format	0: No parity, 2 stop bits 1: Even parity, 1 stop bit 2: Odd parity, 1 stop bit 3: No parity, 1 stop bit	0	-	Immediately	" H0C_en.03" on page 299

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H0C.08	200C-09h	CAN communication rate	0: 20K 1: 50K 2: 100K 3: 125K 4: 250K 5: 500K 6: 1M 7: 1M	5	-	Immediately	*" H0C_en.08" on page 300*
H0C.09	200C-0Ah	Communication VDI	0: Disabled 1: Enabled	0	-	At stop	*" H0C_en.09" on page 301*
H0C.10	200C-0Bh	VDI default value upon power-on	0–65535	0	-	Immediately	*" H0C_en.10" on page 301*
H0C.11	200C-0Ch	Communication VDO	0: Disabled 1: Enabled	0	-	At stop	*" H0C_en.11" on page 302*
H0C.12	200C-0Dh	Default level of the VDO allocated with function 0	0–65535	0	-	At stop	*" H0C_en.12" on page 303*
H0C.13	200C-0Eh	Update parameter values written through communication to EEPROM	0: Not update EEPROM 1: Update EEPROM	1	-	Immediately	*" H0C_en.13" on page 304*
H0C.14	200C-0Fh	Modbus error code	0: N/A 1: Illegal parameter (command code) 2: Command code data address 3: Illegal data 4: Slave device fault	2	-	Unchangeable	*" H0C_en.14" on page 304*
H0C.16	200C-11h	Update parameter values written through CAN communication to EEPROM	0: Not update EEPROM 1: Update EEPROM	0	-	Immediately	*" H0C_en.16" on page 305*
H0C.25	200C-1Ah	Modbus command response delay	0 ms to 20 ms	0	ms	Immediately	*" H0C_en.25" on page 305*
H0C.26	200C-1Bh	Modbus communication data sequence	0: High 16 bits before low 16 bits 1: Low 16 bits before high 16 bits	1	-	Immediately	*" H0C_en.26" on page 305*

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H0C.30	200C-1Fh	Modbus error frame format	0: Old protocol 1: New protocol (standard)	1	-	Immediately	" H0C_en.30" on page 306
H0C.31	200C-20h	Modbus receiving selection	0: Receiving interrupt enabled 1: Current loop interrupt inquiry	0	-	Immediately	" H0C_en.31" on page 306

5.14 Parameter Group H0d

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H0d.00	200d-01h	Software Reset	0: No operation 1: Enable	0	-	At stop	" H0d_en.00" on page 306
H0d.01	200d-02h	Fault Reset	0: No operation 1: Enable	0	-	At stop	" H0d_en.01" on page 307
H0d.02	200d-03h	Inertia auto-tuning selection	0–65	0	-	At stop	" H0d_en.02" on page 307
H0d.03	200d-04h	Initial angle auto-tuning	0: No operation 1: Enabled	0	-	At stop	" H0d_en.03" on page 308
H0d.04	200d-05h	Read/write in encoder ROM	0: No operation 1: Write ROM 2: Read ROM	0	-	At stop	" H0d_en.04" on page 308
H0d.05	200d-06h	Emergency stop	0: No operation 1: Emergency stop	0	-	Immediately	" H0d_en.05" on page 308
H0d.06	200d-07h	Current loop parameter auto-tuning	0: No operation 1: Save parameters 2: Do not save parameters	0	-	At stop	" H0d_en.06" on page 309
H0d.12	200d-0Dh	Phase U/V current balance correction	0–1	0	-	Unchangeable	" H0d_en.12" on page 309
H0d.17	200d-12h	Forced DI/DO selection	0: No operation 1: Forced DI enabled, forced DO disabled 2: Forced DO enabled, forced DI disabled 3: Forced DI and DO enabled	0	-	Immediately	" H0d_en.17" on page 309
H0d.18	200d-13h	Forced DI setting	0–511	511	-	Immediately	" H0d_en.18" on page 309

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H0d.19	200d-14h	Forced DO setting	0–31	0	-	Immediately	" H0d_en.19" on page 310
H0d.20	200d-15h	Multi-turn absolute encoder reset	0: No operation 1 Reset 2: Reset the fault and multi-turn data	0	-	At stop	" H0d_en.20" on page 311

5.15 Parameter Group H11

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H11.00	2011-01h	Multi-position operation mode	0: Single run (number of displacements selected in H11.01) 1: Cyclic operation (number of displacement selected in H11.01) 2: DI-based operation (selected by DI) 3: Sequential operation 5: Axis-controlled continuous operation	1	-	At stop	" H11_en.00" on page 312
H11.01	2011-02h	Number of displacement references in multi-position mode	1–16	1	-	At stop	" H11_en.01" on page 315
H11.02	2011-03h	Starting displacement No. after pause	0: Continue to execute the unexecuted displacements 1: Start from displacement 1	0	-	At stop	" H11_en.02" on page 315
H11.03	2011-04h	Interval time unit	0: ms 1: s	0	-	At stop	" H11_en.03" on page 316
H11.04	2011-05h	Displacement reference type	0: Relative displacement reference 1: Absolute displacement reference	0	-	Immediately	" H11_en.04" on page 317
H11.05	2011-06h	Starting displacement No. in sequential operation	0–16	0	-	At stop	" H11_en.05" on page 318

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H11.09	2011-0Ah	Deceleration upon axis control OFF	0 ms to 65535 ms	65535	ms	Immediately	" H11_en.09" on page 319
H11.10	2011-0Bh	Start speed of the 1st displacement	0 rpm to 6000 rpm	0	rpm	Immediately	" H11_en.10" on page 319
H11.11	2011-0Ch	Stop speed of the 1st displacement	0 rpm to 6000 rpm	0	rpm	Immediately	" H11_en.11" on page 320
H11.12	2011-0Dh	Displacement 1	-1073741824 to 1073741824	10000	Reference unit	Immediately	" H11_en.12" on page 320
H11.14	2011-0Fh	Max. speed of displacement 1	1 rpm to 6000 rpm	200	rpm	Immediately	" H11_en.14" on page 320
H11.15	2011-10h	Acc/Dec time of displacement 1	0 ms to 65535 ms	10	ms	Immediately	" H11_en.15" on page 320
H11.16	2011-11h	Interval time after displacement 1	0 ms (s)–10000 ms (s)	10	ms (s)	Immediately	" H11_en.16" on page 321
H11.17	2011-12h	Displacement 2	-1073741824 to 1073741824	10000	Reference unit	Immediately	" H11_en.17" on page 321
H11.19	2011-14h	Max. speed of displacement 2	1 rpm to 6000 rpm	200	rpm	Immediately	" H11_en.19" on page 322
H11.20	2011-15h	Acc/Dec time of displacement 2	0 ms to 65535 ms	10	ms	Immediately	" H11_en.20" on page 322
H11.21	2011-16h	Interval time after displacement 2	0 ms (s)–10000 ms (s)	10	ms (s)	Immediately	" H11_en.21" on page 322
H11.22	2011-17h	Displacement 3	-1073741824 to 1073741824	10000	Reference unit	Immediately	" H11_en.22" on page 322
H11.24	2011-19h	Max. speed of displacement 3	1 rpm to 6000 rpm	200	rpm	Immediately	" H11_en.24" on page 323
H11.25	2011-1Ah	Acc/Dec time of displacement 3	0 ms to 65535 ms	10	ms	Immediately	" H11_en.25" on page 323
H11.26	2011-1Bh	Interval time after displacement 3	0 ms (s)–10000 ms (s)	10	ms (s)	Immediately	" H11_en.26" on page 323
H11.27	2011-1Ch	Displacement 4	-1073741824 to 1073741824	10000	Reference unit	Immediately	" H11_en.27" on page 324
H11.29	2011-1Eh	Max. speed of displacement 4	1 rpm to 6000 rpm	200	rpm	Immediately	" H11_en.29" on page 324

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H11.30	2011-1Fh	Acc/Dec time of displacement 4	0 ms to 65535 ms	10	ms	Immediately	" H11_en.30" on page 324
H11.31	2011-20h	Interval time after displacement 4	0 ms (s)–10000 ms (s)	10	ms (s)	Immediately	" H11_en.31" on page 324
H11.32	2011-21h	Displacement 5	-1073741824 to 1073741824	10000	Reference unit	Immediately	" H11_en.32" on page 325
H11.34	2011-23h	Max. speed of displacement 5	1 rpm to 6000 rpm	200	rpm	Immediately	" H11_en.34" on page 325
H11.35	2011-24h	Acc/Dec time of displacement 5	0 ms to 65535 ms	10	ms	Immediately	" H11_en.35" on page 325
H11.36	2011-25h	Interval time after displacement 5	0 ms (s)–10000 ms (s)	10	ms (s)	Immediately	" H11_en.36" on page 325
H11.37	2011-26h	Displacement 6	-1073741824 to 1073741824	10000	Reference unit	Immediately	" H11_en.37" on page 326
H11.39	2011-28h	Max. speed of displacement 6	1 rpm to 6000 rpm	200	rpm	Immediately	" H11_en.39" on page 326
H11.40	2011-29h	Acc/Dec time of displacement 6	0 ms to 65535 ms	10	ms	Immediately	" H11_en.40" on page 326
H11.41	2011-2Ah	Interval time after displacement 6	0 ms (s)–10000 ms (s)	10	ms (s)	Immediately	" H11_en.41" on page 326
H11.42	2011-2Bh	Displacement 7	-1073741824 to 1073741824	10000	Reference unit	Immediately	" H11_en.42" on page 327
H11.44	2011-2Dh	Max. speed of displacement 7	1 rpm to 6000 rpm	200	rpm	Immediately	" H11_en.44" on page 327
H11.45	2011-2Eh	Acc/Dec time of displacement 7	0 ms to 65535 ms	10	ms	Immediately	" H11_en.45" on page 327
H11.46	2011-2Fh	Interval time after displacement 7	0 ms (s)–10000 ms (s)	10	ms (s)	Immediately	" H11_en.46" on page 328
H11.47	2011-30h	Displacement 8	-1073741824 to 1073741824	10000	Reference unit	Immediately	" H11_en.47" on page 328
H11.49	2011-32h	Max. speed of displacement 8	1 rpm to 6000 rpm	200	rpm	Immediately	" H11_en.49" on page 328
H11.50	2011-33h	Acc/Dec time of displacement 8	0 ms to 65535 ms	10	ms	Immediately	" H11_en.50" on page 328

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H11.51	2011-34h	Interval time after displacement 8	0 ms (s)–10000 ms (s)	10	ms (s)	Immediately	" H11_en.51" on page 329
H11.52	2011-35h	Displacement 9	-1073741824 to 1073741824	10000	Reference unit	Immediately	" H11_en.52" on page 329
H11.54	2011-37h	Max. speed of displacement 9	1 rpm to 6000 rpm	200	rpm	Immediately	" H11_en.54" on page 329
H11.55	2011-38h	Acc/Dec time of displacement 9	0 ms to 65535 ms	10	ms	Immediately	" H11_en.55" on page 329
H11.56	2011-39h	Interval time after displacement 9	0 ms (s)–10000 ms (s)	10	ms (s)	Immediately	" H11_en.56" on page 330
H11.57	2011-3Ah	Displacement 10	-1073741824 to 1073741824	10000	Reference unit	Immediately	" H11_en.57" on page 330
H11.59	2011-3Ch	Max. speed of displacement 10	1 rpm to 6000 rpm	200	rpm	Immediately	" H11_en.59" on page 330
H11.60	2011-3Dh	Acc/Dec time of displacement 10	0 ms to 65535 ms	10	ms	Immediately	" H11_en.60" on page 331
H11.61	2011-3Eh	Interval time after displacement 10	0 ms (s)–10000 ms (s)	10	ms (s)	Immediately	" H11_en.61" on page 331
H11.62	2011-3Fh	Displacement 11	-1073741824 to 1073741824	10000	Reference unit	Immediately	" H11_en.62" on page 331
H11.64	2011-41h	Max. speed of displacement 11	1 rpm to 6000 rpm	200	rpm	Immediately	" H11_en.64" on page 331
H11.65	2011-42h	Acc/Dec time of displacement 11	0 ms to 65535 ms	10	ms	Immediately	" H11_en.65" on page 332
H11.66	2011-43h	Interval time after displacement 11	0 ms (s)–10000 ms (s)	10	ms (s)	Immediately	" H11_en.66" on page 332
H11.67	2011-44h	Displacement 12	-1073741824 to 1073741824	10000	Reference unit	Immediately	" H11_en.67" on page 332
H11.69	2011-46h	Max. speed of displacement 12	1 rpm to 6000 rpm	200	rpm	Immediately	" H11_en.69" on page 332

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H11.70	2011-47h	Acc/Dec time of displacement 12	0 ms to 65535 ms	10	ms	Immediately	" H11_en.70" on page 333
H11.71	2011-48h	Interval time after displacement 12	0 ms (s)–10000 ms (s)	10	ms (s)	Immediately	" H11_en.71" on page 333
H11.72	2011-49h	Displacement 13	-1073741824 to 1073741824	10000	Reference unit	Immediately	" H11_en.72" on page 333
H11.74	2011-4Bh	Max. speed of displacement 13	1 rpm to 6000 rpm	200	rpm	Immediately	" H11_en.74" on page 334
H11.75	2011-4Ch	Acc/Dec time of displacement 13	0 ms to 65535 ms	10	ms	Immediately	" H11_en.75" on page 334
H11.76	2011-4Dh	Interval time after displacement 13	0 ms (s)–10000 ms (s)	10	ms (s)	Immediately	" H11_en.76" on page 334
H11.77	2011-4Eh	Displacement 14	-1073741824 to 1073741824	10000	Reference unit	Immediately	" H11_en.77" on page 334
H11.79	2011-50h	Max. speed of displacement 14	1 rpm to 6000 rpm	200	rpm	Immediately	" H11_en.79" on page 335
H11.80	2011-51h	Acc/Dec time of displacement 14	0 ms to 65535 ms	10	ms	Immediately	" H11_en.80" on page 335
H11.81	2011-52h	Interval time after displacement 14	0 ms (s)–10000 ms (s)	10	ms (s)	Immediately	" H11_en.81" on page 335
H11.82	2011-53h	Displacement 15	-1073741824 to 1073741824	10000	Reference unit	Immediately	" H11_en.82" on page 335
H11.84	2011-55h	Max. speed of displacement 15	1 rpm to 6000 rpm	200	rpm	Immediately	" H11_en.84" on page 336
H11.85	2011-56h	Acc/Dec time of displacement 15	0 ms to 65535 ms	10	ms	Immediately	" H11_en.85" on page 336
H11.86	2011-57h	Interval time after displacement 15	0 ms (s)–10000 ms (s)	10	ms (s)	Immediately	" H11_en.86" on page 336

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H11.87	2011-58h	Displacement 16	-1073741824 to 1073741824	10000	Reference unit	Immediately	" H11_en.87" on page 337
H11.89	2011-5Ah	Max. speed of displacement 16	1 rpm to 6000 rpm	200	rpm	Immediately	" H11_en.89" on page 337
H11.90	2011-5Bh	Acc/Dec time of displacement 16	0 ms to 65535 ms	10	ms	Immediately	" H11_en.90" on page 337
H11.91	2011-5Ch	Interval time after displacement 16	0 ms (s)–10000 ms (s)	10	ms (s)	Immediately	" H11_en.91" on page 337

5.16 Parameter Group H12

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H12.00	2012-01h	Multi-speed operation mode	0: Individual operation (number of speeds selected in H12.01) 1: Cyclic operation (number of speeds selected in H12.01) 2: DI-based operation	1	-	At stop	" H12_en.00" on page 338
H12.01	2012-02h	Number of speed references in multi-speed mode	1–16	16	-	At stop	" H12_en.01" on page 340
H12.02	2012-03h	Operating time unit	0: sec 1: min	0	-	At stop	" H12_en.02" on page 340
H12.03	2012-04h	Acceleration time 1	0 ms to 65535 ms	10	ms	Immediately	" H12_en.03" on page 341
H12.04	2012-05h	Deceleration time 1	0 ms to 65535 ms	10	ms	Immediately	" H12_en.04" on page 341
H12.05	2012-06h	Acceleration time 2	0 ms to 65535 ms	50	ms	Immediately	" H12_en.05" on page 341
H12.06	2012-07h	Deceleration time 2	0 ms to 65535 ms	50	ms	Immediately	" H12_en.06" on page 342
H12.07	2012-08h	Acceleration time 3	0 ms to 65535 ms	100	ms	Immediately	" H12_en.07" on page 342

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H12.08	2012-09h	Deceleration time 3	0 ms to 65535 ms	100	ms	Immediately	" H12_en.08" on page 342
H12.09	2012-0Ah	Acceleration time 4	0 ms to 65535 ms	150	ms	Immediately	" H12_en.09" on page 343
H12.10	2012-0Bh	Deceleration time 4	0 ms to 65535 ms	150	ms	Immediately	" H12_en.10" on page 343
H12.20	2012-15h	Speed reference 1	–6000 rpm to 6000 rpm	0	rpm	Immediately	" H12_en.20" on page 343
H12.21	2012-16h	Operating time of speed 1	0.0s(m) to 6553.5s(m)	5.0	s (m)	Immediately	" H12_en.21" on page 343
H12.22	2012-17h	Acceleration/ Deceleration time of speed 1	0: Zero acceleration/ deceleration time 1: Acceleration/Deceleration time 1 2: Acceleration/Deceleration time 2 3: Acceleration/Deceleration time 3 4: Acceleration/Deceleration time 4	0	-	Immediately	" H12_en.22" on page 344
H12.23	2012-18h	Reference 2	–6000 rpm to 6000 rpm	100	rpm	Immediately	" H12_en.23" on page 345
H12.24	2012-19h	Operating time of speed 2	0.0s(m) to 6553.5s(m)	5.0	s (m)	Immediately	" H12_en.24" on page 346
H12.25	2012-1Ah	Acceleration/ Deceleration time of speed 2	See H12.22.	0	-	Immediately	" H12_en.25" on page 346
H12.26	2012-1Bh	Reference 3	–6000 rpm to 6000 rpm	300	rpm	Immediately	" H12_en.26" on page 346
H12.27	2012-1Ch	Operating time of speed 3	0.0s(m) to 6553.5s(m)	5.0	s (m)	Immediately	" H12_en.27" on page 347
H12.28	2012-1Dh	Acceleration/ Deceleration time of speed 3	See H12.22.	0	-	Immediately	" H12_en.28" on page 347
H12.29	2012-1Eh	Reference 4	–6000 rpm to 6000 rpm	500	rpm	Immediately	" H12_en.29" on page 347
H12.30	2012-1Fh	Operating time of speed 4	0.0s(m) to 6553.5s(m)	5.0	s (m)	Immediately	" H12_en.30" on page 347
H12.31	2012-20h	Acceleration/ Deceleration time of speed 4	See H12.22.	0	-	Immediately	" H12_en.31" on page 348
H12.32	2012-21h	Reference 5	–6000 rpm to 6000 rpm	700	rpm	Immediately	" H12_en.32" on page 348

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H12.33	2012-22h	Operating time of speed 5	0.0s(m) to 6553.5s(m)	5.0	s (m)	Immediately	" H12_en.33" on page 348
H12.34	2012-23h	Acceleration/ Deceleration time of speed 5	See H12.22.	0	-	Immediately	" H12_en.34" on page 348
H12.35	2012-24h	Reference 6	–6000 rpm to 6000 rpm	900	rpm	Immediately	" H12_en.35" on page 349
H12.36	2012-25h	Operating time of speed 6	0.0s(m) to 6553.5s(m)	5.0	s (m)	Immediately	" H12_en.36" on page 349
H12.37	2012-26h	Acc./dec. time of speed 6	See H12.22.	0	-	Immediately	" H12_en.37" on page 349
H12.38	2012-27h	Reference 7	–6000 rpm to 6000 rpm	600	rpm	Immediately	" H12_en.38" on page 349
H12.39	2012-28h	Operating time of speed 7	0.0s(m) to 6553.5s(m)	5.0	s (m)	Immediately	" H12_en.39" on page 350
H12.40	2012-29h	Acc./dec. time of speed 7	See H12.22.	0	-	Immediately	" H12_en.40" on page 350
H12.41	2012-2Ah	Reference 8	–6000 rpm to 6000 rpm	300	rpm	Immediately	" H12_en.41" on page 350
H12.42	2012-2Bh	Operating time of speed 8	0.0s(m) to 6553.5s(m)	5.0	s (m)	Immediately	" H12_en.42" on page 351
H12.43	2012-2Ch	Acc./dec. time of speed 8	See H12.22.	0	-	Immediately	" H12_en.43" on page 351
H12.44	2012-2Dh	Reference 9	–6000 rpm to 6000 rpm	100	rpm	Immediately	" H12_en.44" on page 351
H12.45	2012-2Eh	Operating time of speed 9	0.0s(m) to 6553.5s(m)	5.0	s (m)	Immediately	" H12_en.45" on page 351
H12.46	2012-2Fh	Acc./dec. time of speed 9	See H12.22.	0	-	Immediately	" H12_en.46" on page 352
H12.47	2012-30h	Reference 10	–6000 rpm to 6000 rpm	-100	rpm	Immediately	" H12_en.47" on page 352
H12.48	2012-31h	Operating time of speed 10	0.0s(m) to 6553.5s(m)	5.0	s (m)	Immediately	" H12_en.48" on page 352
H12.49	2012-32h	Acc./dec. time of speed 10	See H12.22.	0	-	Immediately	" H12_en.49" on page 352
H12.50	2012-33h	Reference 11	–6000 rpm to 6000 rpm	-300	rpm	Immediately	" H12_en.50" on page 353
H12.51	2012-34h	Operating time of speed 11	0.0s(m) to 6553.5s(m)	5.0	s (m)	Immediately	" H12_en.51" on page 353
H12.52	2012-35h	Acc./dec. time of speed 11	See H12.22.	0	-	Immediately	" H12_en.52" on page 353

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H12.53	2012-36h	Reference 12	–6000 rpm to 6000 rpm	-500	rpm	Immediately	" H12_en.53" on page 353
H12.54	2012-37h	Operating time of speed 12	0.0s(m) to 6553.5s(m)	5.0	s (m)	Immediately	" H12_en.54" on page 354
H12.55	2012-38h	Acc./dec. time of speed 12	See H12.22.	0	-	Immediately	" H12_en.55" on page 354
H12.56	2012-39h	Reference 13	–6000 rpm to 6000 rpm	-700	rpm	Immediately	" H12_en.56" on page 354
H12.57	2012-3Ah	Operating time of speed 13	0.0s(m) to 6553.5s(m)	5.0	s (m)	Immediately	" H12_en.57" on page 355
H12.58	2012-3Bh	Acc./dec. time of speed 13	See H12.22.	0	-	Immediately	" H12_en.58" on page 355
H12.59	2012-3Ch	Reference 14	–6000 rpm to 6000 rpm	-900	rpm	Immediately	" H12_en.59" on page 355
H12.60	2012-3Dh	Operating time of speed 14	0.0s(m) to 6553.5s(m)	5.0	s (m)	Immediately	" H12_en.60" on page 355
H12.61	2012-3Eh	Acc./dec. time of speed 14	See H12.22.	0	-	Immediately	" H12_en.61" on page 356
H12.62	2012-3Fh	Reference 15	–6000 rpm to 6000 rpm	-600	rpm	Immediately	" H12_en.62" on page 356
H12.63	2012-40h	Operating time of speed 15	0.0s(m) to 6553.5s(m)	5.0	s (m)	Immediately	" H12_en.63" on page 356
H12.64	2012-41h	Acc./dec. time of speed 15	See H12.22.	0	-	Immediately	" H12_en.64" on page 356
H12.65	2012-42h	Reference 16	–6000 rpm to 6000 rpm	-300	rpm	Immediately	" H12_en.65" on page 357
H12.66	2012-43h	Operating time of speed 16	0.0s(m) to 6553.5s(m)	5.0	s (m)	Immediately	" H12_en.66" on page 357
H12.67	2012-44h	Acc./dec. time of speed 16	See H12.22.	0	-	Immediately	" H12_en.67" on page 357

5.17 Parameter Group H17

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H17.00	2017-01h	VDI1 function selection	See " H17_en.00" on page 358 for details.	0	-	Immediately	" H17_en.00" on page 358
H17.01	2017-02h	VDI1 logic selection	0: Active when the written value is 1 1: Active when the written value changes from 0 to 1	0	-	At stop	" H17_en.01" on page 359
H17.02	2017-03h	VDI2 function selection	See H17.00.	0	-	Immediately	" H17_en.02" on page 359
H17.03	2017-04h	VDI2 logic selection	0: Active when the written value is 1 1: Active when the written value changes from 0 to 1	0	-	At stop	" H17_en.03" on page 360
H17.04	2017-05h	VDI3 function	See H17.00.	0	-	Immediately	" H17_en.04" on page 360
H17.05	2017-06h	VDI3 logic selection	0: Active when the written value is 1 1: Active when the written value changes from 0 to 1	0	-	At stop	" H17_en.05" on page 360
H17.06	2017-07h	VDI4 function	See H17.00.	0	-	Immediately	" H17_en.06" on page 361
H17.07	2017-08h	VDI4 logic selection	0: Active when the written value is 1 1: Active when the written value changes from 0 to 1	0	-	At stop	" H17_en.07" on page 361
H17.08	2017-09h	VDI5 function selection	See H17.00.	0	-	Immediately	" H17_en.08" on page 361
H17.09	2017-0Ah	VDI5 logic selection	0: Active when the written value is 1 1: Active when the written value changes from 0 to 1	0	-	At stop	" H17_en.09" on page 361
H17.10	2017-0Bh	VDI6 function selection	See H17.00.	0	-	Immediately	" H17_en.10" on page 362
H17.11	2017-0Ch	VDI6 logic selection	0: Active when the written value is 1 1: Active when the written value changes from 0 to 1	0	-	At stop	" H17_en.11" on page 362
H17.12	2017-0Dh	VDI7 function selection	See H17.00.	0	-	Immediately	" H17_en.12" on page 362

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H17.13	2017-0Eh	VDI7 logic	0: Active when the written value is 1 1: Active when the written value changes from 0 to 1	0	-	At stop	*" H17_en.13" on page 362*
H17.14	2017-0Fh	VDI8 function	See H17.00.	0	-	Immediately	*" H17_en.14" on page 363*
H17.15	2017-10h	VDI8 logic selection	0: Active when the written value is 1 1: Active when the written value changes from 0 to 1	0	-	At stop	*" H17_en.15" on page 363*
H17.16	2017-11h	VDI9 function	See H17.00.	0	-	Immediately	*" H17_en.16" on page 363*
H17.17	2017-12h	VDI9 logic	0: Active when the written value is 1 1: Active when the written value changes from 0 to 1	0	-	At stop	*" H17_en.17" on page 364*
H17.18	2017-13h	VDI10 function	See H17.00.	0	-	Immediately	*" H17_en.18" on page 364*
H17.19	2017-14h	VDI10 logic selection	0: Active when the written value is 1 1: Active when the written value changes from 0 to 1	0	-	At stop	*" H17_en.19" on page 364*
H17.20	2017-15h	VDI11 function selection	See H17.00.	0	-	Immediately	*" H17_en.20" on page 364*
H17.21	2017-16h	VDI11 logic selection	0: Active when the written value is 1 1: Active when the written value changes from 0 to 1	0	-	At stop	*" H17_en.21" on page 365*
H17.22	2017-17h	VDI12 function	See H17.00.	0	-	Immediately	*" H17_en.22" on page 365*
H17.23	2017-18h	VDI12 logic selection	0: Active when the written value is 1 1: Active when the written value changes from 0 to 1	0	-	At stop	*" H17_en.23" on page 365*
H17.24	2017-19h	VDI13 function	See H17.00.	0	-	Immediately	*" H17_en.24" on page 365*
H17.25	2017-1Ah	VDI13 logic selection	0: Active when the written value is 1 1: Active when the written value changes from 0 to 1	0	-	At stop	*" H17_en.25" on page 366*
H17.26	2017-1Bh	VDI14 function	See H17.00.	0	-	Immediately	*" H17_en.26" on page 366*

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H17.27	2017-1Ch	VDI14 logic selection	0: Active when the written value is 1 1: Active when the written value changes from 0 to 1	0	-	At stop	" H17_en.27" on page 366
H17.28	2017-1Dh	VDI15 function	See H17.00.	0	-	Immediately	" H17_en.28" on page 367
H17.29	2017-1Eh	VDI15 logic selection	0: Active when the written value is 1 1: Active when the written value changes from 0 to 1	0	-	At stop	" H17_en.29" on page 367
H17.30	2017-1Fh	VDI16 function	See H17.00.	0	-	Immediately	" H17_en.30" on page 367
H17.31	2017-20h	VDI16 logic selection	0: Active when the written value is 1 1: Active when the written value changes from 0 to 1	0	-	At stop	" H17_en.31" on page 367
H17.32	2017-21h	VDO virtual level	0–65535	0	-	Unchangeable	" H17_en.32" on page 368
H17.33	2017-22h	VDO1 function	0: No assignment 1: Servo ready 2: Motor rotation 3: Zero speed 4: Speed matching 5: Positioning completed 6: Proximity 7: Torque limited 8: Speed limited 9: Brake 10: Warning 11: Fault 12: Output 3-bit warning code 13: Output 3-bit warning code 14: Output 3-bit warning code 15: Interrupt positioning completed 16: Homing completed 17: Electrical homing completed 18: Torque reach 19: Speed reach 22: Internal command completed 23: Writing next command allowed 24: Internal motion completed	0	-	At stop	" H17_en.33" on page 368

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H17.34	2017-23h	VDO1 logic level	0: Output 1 upon active logic 1: Output 0 upon active logic	0	-	At stop	" H17_en.34" on page 369
H17.35	2017-24h	VDO2 function selection	See H17.33.	0	-	At stop	" H17_en.35" on page 370
H17.36	2017-25h	VDO2 logic level	0: Output 1 upon active logic 1: Output 0 upon active logic	0	-	At stop	" H17_en.36" on page 370
H17.37	2017-26h	VDO3 function	See H17.33.	0	-	At stop	" H17_en.37" on page 370
H17.38	2017-27h	VDO3 logic level	0: Output 1 upon active logic 1: Output 0 upon active logic	0	-	At stop	" H17_en.38" on page 371
H17.39	2017-28h	VDO4 function	See H17.33.	0	-	At stop	" H17_en.39" on page 371
H17.40	2017-29h	VDO4 logic level	0: Output 1 upon active logic 1: Output 0 upon active logic	0	-	At stop	" H17_en.40" on page 371
H17.41	2017-2Ah	VDO5 function	See H17.33.	0	-	At stop	" H17_en.41" on page 372
H17.42	2017-2Bh	VDO5 logic level	0: Output 1 upon active logic 1: Output 0 upon active logic	0	-	At stop	" H17_en.42" on page 372
H17.43	2017-2Ch	VDO6 function	See H17.33.	0	-	At stop	" H17_en.43" on page 372
H17.44	2017-2Dh	VDO6 logic level	0: Output 1 upon active logic 1: Output 0 upon active logic	0	-	At stop	" H17_en.44" on page 372
H17.45	2017-2Eh	VDO7 function	See H17.33.	0	-	At stop	" H17_en.45" on page 373
H17.46	2017-2Fh	VDO7 logic level	0: Output 1 upon active logic 1: Output 0 upon active logic	0	-	At stop	" H17_en.46" on page 373
H17.47	2017-30h	VDO8 function	See H17.33.	0	-	At stop	" H17_en.47" on page 373
H17.48	2017-31h	VDO8 logic level	0: Output 1 upon active logic 1: Output 0 upon active logic	0	-	At stop	" H17_en.48" on page 373
H17.49	2017-32h	VDO9 function	See H17.33.	0	-	At stop	" H17_en.49" on page 374
H17.50	2017-33h	VDO9 logic level	0: Output 1 upon active logic 1: Output 0 upon active logic	0	-	At stop	" H17_en.50" on page 374
H17.51	2017-34h	VDO10 function selection	See H17.33.	0	-	At stop	" H17_en.51" on page 374
H17.52	2017-35h	VDO10 logic level	0: Output 1 upon active logic 1: Output 0 upon active logic	0	-	At stop	" H17_en.52" on page 375
H17.53	2017-36h	VDO11 function	See H17.33.	0	-	At stop	" H17_en.53" on page 375
H17.54	2017-37h	VDO11 logic level	0: Output 1 upon active logic 1: Output 0 upon active logic	0	-	At stop	" H17_en.54" on page 375

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H17.55	2017-38h	VDO12 function	See H17.33.	0	-	At stop	"H17_en.55" on page 375
H17.56	2017-39h	VDO12 logic level	0: Output 1 upon active logic 1: Output 0 upon active logic	0	-	At stop	"H17_en.56" on page 376
H17.57	2017-3Ah	VDO13 function	See H17.33.	0	-	At stop	"H17_en.57" on page 376
H17.58	2017-3Bh	VDO13 logic level	0: Output 1 upon active logic 1: Output 0 upon active logic	0	-	At stop	"H17_en.58" on page 376
H17.59	2017-3Ch	VDO14 function	See H17.33.	0	-	At stop	"H17_en.59" on page 376
H17.60	2017-3Dh	VDO14 logic level	0: Output 1 upon active logic 1: Output 0 upon active logic	0	-	At stop	"H17_en.60" on page 377
H17.61	2017-3Eh	VDO15 function	See H17.33.	0	-	At stop	"H17_en.61" on page 377
H17.62	2017-3Fh	VDO15 logic level	0: Output 1 upon active logic 1: Output 0 upon active logic	0	-	At stop	"H17_en.62" on page 377
H17.63	2017-40h	VDO16 function	See H17.33.	0	-	At stop	"H17_en.63" on page 378
H17.64	2017-41h	VDO16 logic level	0: Output 1 upon active logic 1: Output 0 upon active logic	0	-	At stop	"H17_en.64" on page 378

5.18 Parameter Group H1B

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H1B.14	201B-0Fh	Bit01 of motor SN code	0–65535	0	-	At stop	"H1B_en.14" on page 378
H1B.15	201B-10h	Bit23 of motor SN code	0–65535	0	-	At stop	"H1B_en.15" on page 378
H1B.16	201B-11h	Bit45 of motor SN code	0–65535	0	-	At stop	"H1B_en.16" on page 379
H1B.17	201B-12h	Bit67 of motor SN code	0–65535	0	-	At stop	"H1B_en.17" on page 379
H1B.18	201B-13h	Bit89 of motor SN code	0–65535	0	-	At stop	"H1B_en.18" on page 379
H1B.19	201B-14h	Bit11 of motor SN code	0–65535	0	-	At stop	"H1B_en.19" on page 379
H1B.20	201B-15h	Bit13 of motor SN code	0–65535	0	-	At stop	"H1B_en.20" on page 380

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H1B.21	201B-16h	Bit15 of motor SN code	0–65535	0	-	At stop	" H1B_en.21" on page 380
H1B.47	201B-30h	Motor storage property shield word 1	0–65535	0	-	At stop	" H1B_en.47" on page 380
H1B.48	201B-31h	Motor storage property shield word 2	0–65535	0	-	At stop	" H1B_en.48" on page 381

5.19 Parameter Group H30

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H30.00	2030-01h	Servo status read through communication	0–65535	0	-	Unchangeable	" H30_en.00" on page 381
H30.01	2030-02h	DO function state 1 read through communication	0–65535	0	-	Unchangeable	" H30_en.01" on page 382
H30.02	2030-03h	DO function state 2 read through communication	0–65535	0	-	Unchangeable	" H30_en.02" on page 383
H30.03	2030-04h	Input pulse reference sampling value read through communication	0–65535	0	-	Unchangeable	" H30_en.03" on page 383
H30.04	2030-05h	DI status read through communication	0–65535	0	-	Unchangeable	" H30_en.04" on page 383

5.20 Parameter Group H31

Parameter	Hexadecimal Parameters	Name	Setpoint	Default	Unit	Change Method	Page
H31.00	2031-01h	VDI virtual level set through communication	0–65535	0	-	Immediately	" H31_en.00" on page 384
H31.04	2031-05h	DO state set through communication	0–31	0	-	Immediately	" H31_en.04" on page 385
H31.09	2031-0Ah	Speed reference set through communication	-6000.000rpm to 6000.000rpm	0.000	rpm	Immediately	" H31_en.09" on page 386
H31.11	2031-0Ch	Torque reference set through communication	-100.000%–100.000%	0.000	%	Immediately	" H31_en.11" on page 386

6 Appendix

6.1 CANlink Enhanced Axis Control Parameters

Table 6–1 List of default parameters for enhanced axis control

Parameter	Description	Default
H11.00	Multi-position operation mode	5: Axis-controlled continuous operation
H11.04	Displacement reference type	1: Absolute displacement reference
H11.05	Starting displacement No. in sequential operation	1
H11.16	Interval time after displacement 1	0
H05.00	Main position reference source	2: Multi-position reference
H05.02	Pulses per revolution	10000
H05.30	Homing selection	1: Homing enabled by signal input from DI
H05.31	Homing mode	1: Reverse homing, home switch as the deceleration point and the home
H05.32	Speed in high-speed searching for the home switch signal	200 RPM
H05.33	Speed in low-speed searching for the home switch signal	20 RPM
H05.35	Home search time limit	30000 ms
H05.40	Mechanical home offset and action upon overtravel	3: H05.36 (Mechanical home offset) used as the relative offset after homing, reverse homing applied automatically upon overtravel
H09.00	Gain auto-tuning mode	1: Standard stiffness level mode
H09.02	Adaptive notch mode	1: Only one adaptive notch (3rd notch) activated
H0C.09	Communication VDI	1: Enable
H0C.11	Communication VDO	1: Enable
H04.00	DO1 function selection	0-No assignment
H04.02	DO2 function selection	0-No assignment
H04.04	DO3 function selection	9: Brake
H04.06	DO4 function selection	0-No assignment
H04.08	DO5 function selection	0-No assignment
H03.06	DI3 function selection	0-No assignment
H03.08	DI4 function selection	0-No assignment

Parameter	Description	Default
H03.10	DI5 function selection	0-No assignment
H17.00	VDI1 function selection	1: Servo ON
H17.02	VDI2 function selection	18: Forward jog
H17.04	VDI3 function selection	19: Reverse jog
H17.06	VDI4 function selection	28: Multi-position reference selection
H17.08	VDI5 function selection	32: Homing enable
H17.10	VDI6 function selection	34: Emergency stop
H17.12	VDI7 function selection	2: Fault and warning reset signal
H17.14	VDI8 function selection	38: Command-write interrupted
H17.15	VDI8 logic selection	1: Active when the written value changes from 0 to 1
H17.16	VDI9 function selection	Active: Command-write not interrupted
H17.17	VDI9 logic selection	1: Active when the written value changes from 0 to 1
H17.18	VDI10 function selection	40: Positioning and reference completed signal cleared

Note

See the following for how to use CANlink enhanced axis control function:

1. Set H02.31 to 1 to restore parameters to default values.
2. Set H11.00 to 5. If the previous value of H11-00 is not 5, setting it to 5 enables enhanced axis control function. Parameter involved will be correlated automatically. See the detailed setpoints in the preceding table.
3. If the previous value of H11.00 is 5, setting it to a value other than 5 restores all the parameters listed in the preceding table to default values.

6.2 DI/DO Function Definitions

No.	Name	Function Name	Description	Remarks
Description of DI Signals				
FunIN.1	S-ON	Servo ON	Disabled: Servo motor disabled Enabled: Servo motor enabled	The corresponding terminal logic must be level-triggered. The change of the corresponding DI/VDI or terminal logic is activated at next power-on.

No.	Name	Function Name	Description	Remarks
FunIN.2	ALM-RST	Fault and warning reset	Inactive: Disabled Active: Enabled	Edge-triggered will be applied even if level-triggered is selected. To reset No. 1 and NO.2 resettable faults, switch off the S-ON signal first. The servo drive may, depending on the alarm type, continue running after reset.
FunIN.3	GAIN-SEL	Gain Switchover	• H08.09 = 1: • Inactive: Speed control loop being PI control • Active: Speed control loop being P control • H08.09 = 2: • Inactive: Fixed to the 1st group of gains • Active: Fixed to the 2nd group of gains	The corresponding terminal logic is recommended to be level-triggered.
FunIN.4	CMD-SEL	Main/Auxiliary reference switchover	Inactive: Current reference being A Active: Current reference being B	The corresponding terminal logic is recommended to be level-triggered.
FunIN.5	DIR-SEL	Direction switchover through DI in multi-speed mode	Inactive: Reference direction by default Active: Reverse to reference direction.	The corresponding terminal logic is recommended to be level-triggered.
FunIN.6	CMD1	Multi-reference switchover 1	Used to select a reference from 16 references.	The corresponding terminal logic is recommended to be level-triggered.
FunIN.7	CMD2	Multi-reference switchover 2	Used to select a reference from 16 references.	The corresponding terminal logic is recommended to be level-triggered.
FunIN.8	CMD3	Multi-reference switchover 3	Used to select a reference from 16 references.	The corresponding terminal logic is recommended to be level-triggered.
FunIN.9	CMD4	Multi-reference switchover 4	Used to select a reference from 16 references.	The corresponding terminal logic is recommended to be level-triggered.
FunIN.10	M1-SEL	Mode switchover 1	Used to switch among speed control, position control, and torque control based on the selected control mode (H02-00 = 3/4/5).	The corresponding terminal logic is recommended to be level-triggered.
FunIN.11	M2-SEL	Mode switchover 2	Used to switch among speed control, position control, and torque control based on the selected control mode (H02-00 = 6).	The corresponding terminal logic is recommended to be level-triggered.

No.	Name	Function Name	Description	Remarks
FunIN.12	ZCLAMP	Zero clamp	Active: Zero clamp enabled Inactive: Zero clamp disabled	The corresponding terminal logic is recommended to be level-triggered.
FunIN.13	INHIBIT	Position reference inhibited	Active: Pulse reference input inhibited Inactive: Pulse reference input allowed	It is originally pulse inhibit. The position references include internal and external position references. The corresponding terminal logic must be level-triggered.
FunIN.14	P-OT	Positive limit switch	Enabled: Forward drive inhibited Disabled: Forward drive permitted	Overtravel prevention applies when the machine moves beyond the limit. It is recommended that the corresponding terminal logic is level-triggered.
FunIN.15	N-OT	Negative limit switch	Overtravel prevention applies when the load moves beyond the limit. Active: Reverse drive inhibited Inactive: Reverse drive allowed	The corresponding terminal logic is recommended to be level-triggered.
FunIN.16	P-CL	Positive external torque limit	The torque limit source is switched based on H07.07 (Torque limit source). H07.07 = 1: Active: Positive external torque limit activated Inactive: Positive internal torque limit activated	The corresponding terminal logic is recommended to be level-triggered.
FunIN.17	N-CL	Negative external torque limit	The torque limit source is switched based on H07.07 (Torque limit source). H07.07 = 1: Active: Negative external torque limit activated Inactive: Negative internal torque limit activated	The corresponding terminal logic is recommended to be level-triggered.
FunIN.18	JOGCMD+	Forward jog	Active: Input based on command Inactive: Command input stopped	The corresponding terminal logic is recommended to be level-triggered.
FunIN.19	JOGCMD–	Reverse jog	Active: Input in reverse to the command Inactive: Command input stopped	The corresponding terminal logic is recommended to be level-triggered.
FunIN.20	POSSTEP	Step selection	Active: Execute step reference set in H05-05, servo motor running Inactive: Servo motor in locked state	The corresponding terminal logic is recommended to be level-triggered.

No.	Name	Function Name	Description	Remarks
FunIN.21	HX1	Hand wheel override signal 1	HX1 active, HX2 inactive: X10. HX1 inactive, HX2 active: x 100. Other: X1.	The corresponding terminal logic is recommended to be level-triggered.
FunIN.22	HX2	Hand wheel override signal 2		
FunIN.23	HX_EN	Hand wheel enable signal	Inactive: Execute position control as defined by H05-00. Active: Execute position control based on handwheel signal in position mode	The corresponding terminal logic is recommended to be level-triggered.
FunIN.24	GEAR_SEL	Electronic gear ratio switchover	Inactive: Electronic gear ratio 1 Active: Electronic gear ratio 2	The corresponding terminal logic is recommended to be level-triggered.
FunIN.25	TOQDirSel	Torque reference direction	Inactive: Forward. Active: Reverse	The corresponding terminal logic is recommended to be level-triggered.
FunIN.26	SPDDirSel	Speed reference direction	Inactive: Forward. Active: Reverse.	The corresponding terminal logic is recommended to be level-triggered.
FunIN.27	POSDirSel	Position reference direction	Inactive: Actual position reference direction same as the set direction Active: Actual position reference direction opposite to the set direction	The corresponding terminal logic is recommended to be level-triggered.
FunIN.28	PosInSen	Multi-position reference enable	Disabled: The reference is ineffective. Enabled: The reference is enabled.	The corresponding terminal logic is recommended to be level-triggered.
FunIN.29	XintFree	Interrupt positioning clear	Inactive: Disabled Active: Enabled	-
FunIN.31	HomeSwitch	Home switch	Disabled: The switch is not triggered. Enabled: The switch is triggered.	The corresponding terminal logic must be level-triggered. It is recommended to assign this function to a high-speed DI terminal. If the logic is set to 2 (rising edge active), the servo drive forcibly changes it to 1 (active high). If the logic is set to 3 (falling edge active), the servo drive forcibly changes it to 0 (active low). If the logic is set to 4 (both rising edge and falling edge active), the servo drive forcibly changes it to 0 (low level active).
FunIN.32	HomingStart	Homing enable	Inactive: Disabled Active: Enabled	-

No.	Name	Function Name	Description	Remarks
FunIN.33	XintInhibit	Interrupt positioning inhibited	Active: Interrupt positioning inhibited. Inactive: Interrupt positioning allowed.	The corresponding terminal logic must be level-triggered. ● If the logic is set to 2 (rising edge active), the servo drive forcibly changes it to 1 (active high). ● If the logic is set to 3 (falling edge active), the servo drive forcibly changes it to 0 (active low). ● If the logic is set to 4 (both rising edge and falling edge active), the servo drive forcibly changes it to 0 (low level active).
FunIN.34	Emergence Stop	Emergency stop	Enabled: Position lock is applied after stop at zero speed. Disabled: Current operating state is unaffected.	The corresponding terminal logic is recommended to be level-triggered.
FunIN.35	ClrPosErr	Position deviation clear	Active: Clear the position deviation Inactive: Do not clear the position deviation	It is recommended to assign this function to DI8 or DI9.
FunIN.36	V_LmtSel	Internal speed limit source	Inactive: H07.19 used as positive/negative internal speed limit Active: H07.20 used as positive/negative internal speed limit	The corresponding terminal logic is recommended to be level-triggered.
FunIN.37	PulseInhibit	Pulse reference inhibited	When the position reference source is pulse reference (H05.00 = 0) in the position control mode: Inactive: Respond to pulse references Active: Not respond to pulse references	The corresponding terminal logic is recommended to be level-triggered.
FunIN.38	MultiBlockTrig	Axis control command write interrupted	When the position reference source is multi-position reference (H05.00 = 2) in the position control mode: Inactive: Not write commands Active: Write command and generate interrupt	The corresponding terminal logic is recommended to be level-triggered.

No.	Name	Function Name	Description	Remarks
FunIN.39	MultiBlockWr	Axis control command written uninterrupted	When the position reference source is multi-position reference (H05.00 = 2) in the position control mode: Inactive: Not write commands Active: Command written and interrupt not generated	The corresponding terminal logic is recommended to be level-triggered
FunIN.40	ClrCmdOkAndArrOk	Command cleared and positioning completed	Inactive: Command not cleared and positioning completed Active: Command cleared and positioning completed	The corresponding terminal logic is recommended to be level-triggered
FunIN.41	HomeRecord	Present position as the home	Inactive: The switch is not triggered Active: Triggered	The corresponding terminal logic is recommended to be level-triggered
Description of DO Signals				
FunOUT.1	S-RDY	Servo ready	The servo drive is ready to receive the S-ON signal. Enabled: The servo drive is ready. Disabled: The servo drive not ready.	-
FunOUT.2	TGON	Motor rotation output	Inactive: Absolute value of filtered motor speed lower than H06.16 (Threshold of TGON signal) Active: Absolute value of filtered motor speed reaching H06.16 (Threshold of TGON signal)	-
FunOUT.3	ZERO	Zero speed	Inactive: Difference between motor speed feedback and reference value larger than H06.19 (Threshold of zero speed output signal) Active: Difference between motor speed feedback and reference value less than or equal to H06.19 (Threshold of zero speed output signal)	-
FunOUT.4	V-CMP	Speed matching	Active when the absolute value of the difference between the motor speed and the speed reference lower than H06.17 (Threshold of V-Cmp signal) in the speed control mode	-
FunOUT.5	COIN	Positioning completed	Active when position deviation pulses reaching H05.21 (Threshold of positioning completion) in the position control mode	-

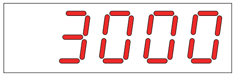
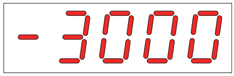
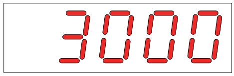
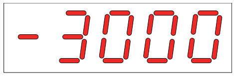
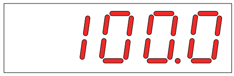
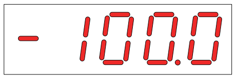
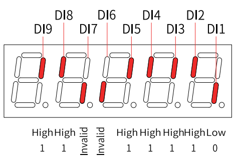
No.	Name	Function Name	Description	Remarks
FunOUT.6	NEAR	Proximity	Active when position deviation pulses reaching H05.22 (Threshold of proximity) in the position control mode	-
FunOUT.7	C-LT	Torque limit	Torque limit acknowledge signal: Active: Servo drive torque reference reaching the torque limit value and restricted to this value Inactive: Servo drive torque reference not reaching the torque limit value	-
FunOUT.8	V-LT	Speed limit	Speed limit acknowledge signal in the torque control mode: Active: Motor speed limited Inactive: Motor speed unlimited	-
FunOUT.9	BK	Brake output	Brake signal output: Active: Brake released Active: The power is off, the brake is released, and the motor can rotate.	-
FunOUT.10	WARN	Warning output	The warning output is active (conducted). (ON)	-
FunOUT.11	ALM	Fault output	Active upon fault event	-
FunOUT.12	ALMO1	Output 3-digit warning code	Output 3-digit warning code	-
FunOUT.13	ALMO2	Output 3-digit warning code	Output 3-digit warning code	-
FunOUT.14	ALMO3	Output 3-digit warning code	Output 3-digit warning code	-
FunOUT.15	Xintcoin	Interrupt positioning completed	Active: Interrupt positioning completed Inactive: Interrupt positioning not completed	-
FunOUT.16	HomeAttain	Homing completed	Homing state: Active: Homing completed in the position control mode Inactive: Homing not completed	-
FunOUT.17	ElecHome Attain	Electrical homing output	Electrical homing state: Active: Electrical homing completed Inactive: Electrical homing not completed	-

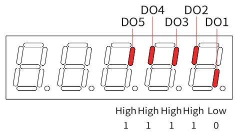
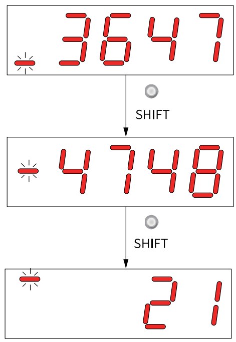
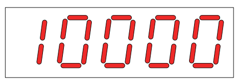
No.	Name	Function Name	Description	Remarks
FunOUT.18	ToqReach	Torque Reach Output	Active: Absolute value of torque reference reached setting value Inactive: Absolute value of torque reference smaller than setting value	-
FunOUT.19	V-Arr	Speed reaches output	Active: Speed feedback reaches setting value Inactive: Speed feedback smaller than setting value	-
FunOUT.20	AngIntRdy	Angle auto-tuning output	Active: Angle auto-tuning completed Inactive: Angle auto-tuning not completed	-
FunOUT.21	DB	Dynamic braking output	Active: Dynamic brake relay opened Inactive: Dynamic braking relay closed	-
FunOUT.22	CmdOk	Internal reference output	Active: Internal reference completed Inactive: Internal reference not completed	-
FunOUT.23	WrNextBlockEn	Write next block enabled	Active: Writing the next segment allowed. Inactive: Writing the next segment inhibited.	-
FunOUT.24	McOk	Motion control output	Active: Motion control done Inactive: Motion control not done	-

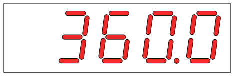
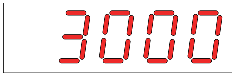
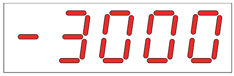
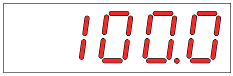
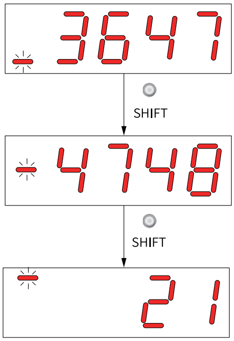
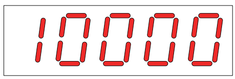
6.3 Display of Monitoring Parameters

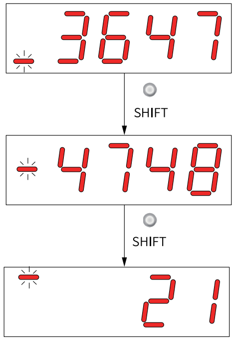
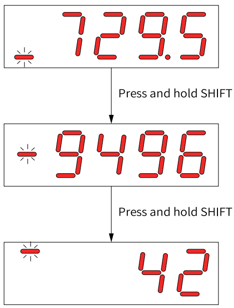
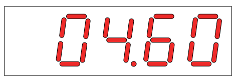
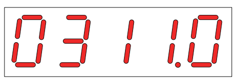
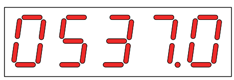
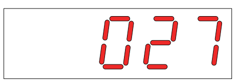
- Group H0b: Displays parameters used to monitor the operating state of the servo drive.
- Set H02.32 (Default keypad display) properly. After the motor operates normally, the keypad switches from status display to parameter display. The parameter group number is H0b and the offset within the group is the setpoint of H02.32.
- For example, if H02.32 is set to 00 and the motor speed is not 0 rpm, the keypad displays the value of H0b.00.

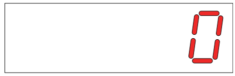
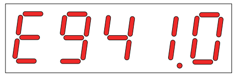
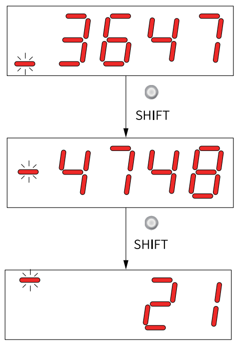
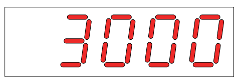
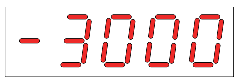
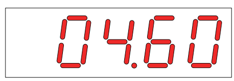
The following table describes the monitoring parameters in group H0b.

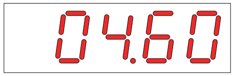
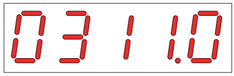
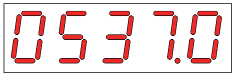
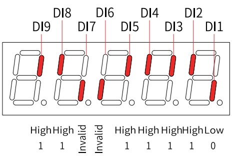
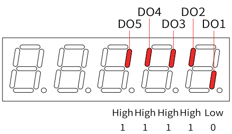
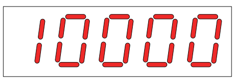
Parameter	Name	Unit	Meaning	Example of Display
H0b.00	Motor speed actual value	rpm	Displays the actual value of the motor speed after round-off, which can be accurate to 1 rpm.	Display of 3000 rpm:  -3000 rpm: 
H0b.01	Speed reference	rpm	Displays the present speed reference of the servo drive.	Display of 3000 rpm:  -3000 rpm: 
H0b.02	Internal torque reference	0.10%	Displays the ratio of actual torque output of the motor to the rated torque of the motor.	Display of 100.0%:  Display of -100.0%: 
H0b.03	Monitored DI status	-	Displays the optocoupler status of DI1 to DI9: Upper LED segments turned on: The optocoupler is switched off (indicated by "1"). Lower LED segments turned on: The optocoupler is switched on (indicated by "0"). The value of H0b.03 read in the software tool is a decimal.	For example, if DI1 is low level and DI2 to DI9 are high level, The corresponding binary value is "110011110", and the value of H0b.03 read in the software tool is 414. The keypad displays as follows: 

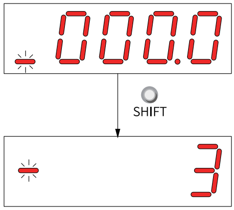
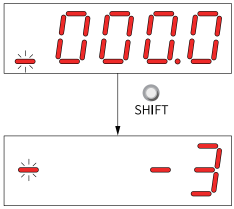
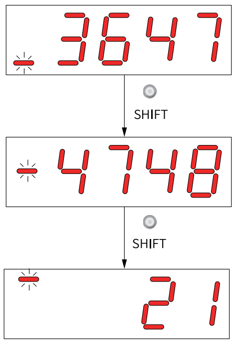
Parameter	Name	Unit	Meaning	Example of Display
H0b.05	Monitored DO status	-	Displays the optocoupler status of DO1 to DO5: Upper LED segments turned on: The optocoupler is switched off (indicated by "1"). Lower LED segments turned on: The optocoupler is switched on (indicated by "0"). The value of H0b.05 read in the software tool is a decimal.	For example, if DO1 is low level and DO2 to DO5 are high level: then, the binary value is "11110". and the value of H0b.05 read in the software tool is 30. The keypad displays as follows: 
H0b.07	Absolute position counter (32-bit decimal)	Reference unit	Displays current absolute position of the motor (reference unit).	Display of 1073741824 in reference unit: 
H0b.09	Mechanical angle (pulses starting from the home)	p	Indicates the current mechanical angle (p) of the motor. The value 0 indicates that the mechanical angle is 0°. Maximum value of H0b.09 for an incremental encoder: Number of encoder pulses per revolution x 4 - 1. For example, the maximum value of H0b.09 for a 2500-PPR incremental encoder is 9999. Maximum value of H0b.09 for an absolute encoder is 65535. The actual mechanical angle is calculated using the following formula: $\text{Actual mechanical angle} = \frac{\text{H0B-09}}{\text{Max. H0B-09+1}} \times 360.0°$	Display of 10000 p: 

Parameter	Name	Unit	Meaning	Example of Display
H0b.10	Rotation angle (electrical angle)	0.1°	Displays current electrical angle of the motor.	Display of 360.0°: 
H0b.11	Speed corresponding to the input position reference	rpm	Displays the speed corresponding to the position reference per control cycle of the servo drive.	Display of 3000 rpm:  -3000 rpm: 
H0b.12	Average load rate	0.10%	Displays the ratio of the average load torque to the rated torque of the motor.	Display of 100.0%: 
H0b.13	Input position reference counter (32-bit decimal)	Reference unit	Counts and displays the number of input position references.	Display of 1073741824 in reference unit: 
H0b.15	Encoder position deviation counter (32-bit decimal)	Encoder unit	Encoder position deviation = Sum of input position references (encoder unit) – Sum of pulses fed back by the encoder (encoder unit)	Display of 10000 in encoder unit: 

Parameter	Name	Unit	Meaning	Example of Display
H0b.17	Feedback pulse counter (32-bit decimal)	Encoder unit	Counts and displays the number of pulses fed back by the encoder (encoder unit).	Display of 1073741824 in encoder unit: 
H0b.19	Total power-on time (32-bit decimal)	0.1s	Counts and displays the total power-on time of the servo drive.	Display of 429496729.5s: 
H0b.24	RMS value of phase current	0.01 A	Displays the RMS value of the phase current of the servo motor.	Display of 4.60 A: 
H0b.26	Bus voltage	0.1 V	Displays the DC bus voltage of the main circuit.	Display of 311.0 V rectified from 220 VAC:  Display of 537.0 V rectified from 380 VAC: 
H0b.27	Module temperature	°C	Displays the temperature of the power module inside the servo drive.	Display of 27°C: 

Parameter	Name	Unit	Meaning	Example of Display
H0b.33	Fault log	-	Used to select the previous fault to be viewed. 0: Present fault 1: Last fault 2: 2nd to last fault ... 9: 9th to last fault	0: Display of present fault: 
H0b.34	Fault code of the selected fault	-	Displays the code of the fault selected in H0b.33. When no fault occurs, the displayed value of H0b.34 is E000.0.	If H0b.33 is 0, and H0b.34 is E941.0, the current fault code is 941. Corresponding display: 
H0b.35	Time stamp upon occurrence of the selected fault	s	Displays the total operating time of the servo drive when the fault displayed in H0b.34 occurred. When no fault occurs, the value of H0b.35 is 0.	If H0b.34 is E941.0 and H0b.35 is 107374182.4, the current fault code is 941 and the total operating time of the servo drive is 107374182.4s when the fault occurs. 
H0b.37	Motor speed upon occurrence of the selected fault	rpm	Displays the servo motor speed when the fault displayed in H0b.34 occurred. When no fault occurs, the value of H0b.37 is 0.	Display of 3000 rpm:  -3000 rpm: 
H0b.38	Motor phase U current upon occurrence of the selected fault	0.01 A	Displays the RMS value of motor phase U winding current when the fault displayed in H0b.34 occurred. When no fault occurs, the value of H0b.38 is 0.	Display of 4.60 A: 

Parameter	Name	Unit	Meaning	Example of Display
H0b.39	Motor phase V current upon occurrence of the selected fault	0.01 A	Displays the RMS value of motor phase V winding current when the fault displayed in H0b.34 occurred. When no fault occurs, the value of H0b.39 is 0.	Display of 4.60 A: 
H0b.40	Bus voltage upon occurrence of the selected fault	V	Displays the DC bus voltage of the main circuit when the fault displayed in H0b.34 occurred. When no fault occurs, the value of H0b.40 is 0.	Display of 311.0 V rectified from 220 VAC:  Display of 537.0 V rectified from 380 VAC: 
H0b.41	DI status upon occurrence of the selected fault	-	Displays the high/low level status of DI1 to DI9 when the fault displayed in H0b.34 occurs. The method for determining the DI level status is the same as that of H0b.03. When no fault occurs, all DIs are displayed as low level in H0b.41 (indicated by the decimal value 0).	Display of H0b.41 = 414: 
H0b.42	DO status upon occurrence of the selected fault	-	Displays the high/low level status of DO1 to DO5 when the fault displayed in H0b.34 occurred. The method for determining the DO level status is the same as that of H0b.05. When no fault occurs, all DOs are displayed as low level in H0b.42 (indicated by the decimal value 0).	Display of H0b.42 = 15: 
H0b.53	Position deviation counter (32-bit decimal)	Reference unit	Position deviation = Sum of input position references (reference unit) - Sum of pulses fed back by the encoder (reference unit)	Display of 10000 in reference unit: 

Parameter	Name	Unit	Meaning	Example of Display
H0b.55	Motor speed actual value	0.1 rpm	Displays the actual value of the motor speed, which can be accurate to 0.1 RPM.	Display of 3000.0rpm:  Display of –3000.0 RPM: 
H0b.64	Real-time input position reference counter	Reference unit	Displays the value of the position reference counter before being divided or multiplied by the electronic gear ratio. This value is independent of the servo drive status and the control mode.	Display of 1073741824 in reference unit: 

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