



SV660N Series Servo Drive

Function Guide



Industrial
Automation



Intelligent
Elevator



New Energy
Vehicle



Industrial
Robot



Rail
Transit



Data code 19011434C00

Preface

Introduction

The SV660N series high performance AC servo drive provides a power range from 0.05 kW to 7.5 kW. It supports EtherCAT communication protocol and carries Ethernet communication interfaces to work with the host controller for a networked operation of multiple servo drives.

The SV660N series servo drive supports stiffness level setting, inertia auto-tuning and vibration suppression to simplify the operation process. It allows a quiet and stable operation together with an MS1 series high-response servo motor with low or medium inertia and a 23-bit single-turn or multi-turn absolute encoder.

The drive aims to implement fast and accurate control in automation equipment such as semi-conductor manufacturing equipment, chip mounters, PCB punching machines, handling machineries, food processing machineries, machine tools, and transmission machineries.

This guide presents product functions and parameters, including function overview, basic servo functions, adjustment and parameter list.

More documents

Name	Data Code	Description
SV660N Series Servo Drive Hardware Guide	19011432	This guide describes the installation and wiring of the drive, including pre-installation preparations, unpacking and transportation, mechanical installation, and electrical installation.
SV660N Series Servo Drive Selection Guide	19011431	Presents technical data and dimensions of the servo drive, and specifications and models of optional parts (installation accessories, cables, and periphery electrical parts).
SV660N Series Servo Drive Commissioning Guide	19011362	Presents servo commissioning, parameter descriptions, including the operating panel, commissioning software, commissioning procedure and a parameter list.
SV660N Series Servo Drive Function Guide	19011434	Presents functions and parameters, including function overview, basic servo functions, adjustment and parameter list.
SV660N Series Servo Drive Communication Guide	19011435	Presents functions and parameters of the servo drive, including EtherCAT communication configuration, parameter description, and communication application cases.

Name	Data Code	Description
SV660N Series Servo Drive Troubleshooting Guide	19011908	Introduces faults and fault levels, the troubleshooting process, warning codes and fault codes.
SV660N Series Servo Drive Safety Guide	19011883	Presents the safety function and related certifications and standards, wiring, commissioning process, troubleshooting, and functions.
SV660N Series Servo Drive Manual Package	PS00005512	Provides information on selection, installation, commissioning, function, troubleshooting and parameters of the equipment.

Revision History

Date	Version	Description
2023-04	C00	• Updated section Position Comparison. • Updated the information of bits of 6040h and 6041h. • Added information on the -NS model.
2023-01	B02	• Added warranty information in the preface. • Optimized the homing description of 6098h = -1 and -2. • Added hexadecimal parameters in parameter description.
2022-09	B01	• Added a section on homing. • Minor corrections.
2022-08	B00	• Modified the calculation procedure of the conversion factor. • Added application conditions for H18.04. • Deleted section Faults. • Updated the list of parameters and description of parameters.
November 2021	A02	• Minor corrections. • Added additional safety precautions in Safety Precautions. • Added H0d.20 after 200D.15h. • Changed the number of revolutions of the absolute encoder to 0–65535. • Changed E731.0 to 0x7305. • Changed power line breakage to a No. 2 recoverable fault. • Changed the data type of H0b.03 to 16-bit. • Modified the description of index 60B9h.
2021-02	A01	Minor corrections.
2020-10	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:

- Visit <http://www.inovance.com>, go to Support > Download, search by keyword, and then download the PDF file.
- 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

Preface	1
General Safety Instructions	8
1 Function Overview	15
2 Basic Functions of the Servo Drive	17
2.1 Conversion Factor Setting	18
2.2 Servo State	19
2.3 Setting and Display of the Operation Modes	23
2.4 Cyclic Synchronous Position (CSP) Mode	23
2.4.1 Configuration Block Diagram	24
2.4.2 Recommended Configuration	24
2.4.3 Function Block Diagram	24
2.4.4 Related Parameters	25
2.4.5 Related Functions	27
2.5 Cyclic synchronous velocity (CSV) mode	28
2.5.1 Configuration Block Diagram	28
2.5.2 Recommended Configuration	29
2.5.3 Function Block Diagram	29
2.5.4 Related Parameters	29
2.5.5 Related Functions	31
2.6 Cyclic synchronous torque (CST) mode	32
2.6.1 Configuration Block Diagram	32
2.6.2 Recommended Configuration	32
2.6.3 Function Block Diagram	33
2.6.4 Related Parameters	33
2.6.5 Related Functions	35
2.7 Profile position (PP)	37
2.7.1 Configuration Block Diagram	37
2.7.2 Recommended Configuration	40
2.7.3 Function Block Diagram	40
2.7.4 Related Parameters	41
2.7.5 Related Functions	43
2.8 Profile Velocity (PV) Mode	46
2.8.1 Configuration Block Diagram	46
2.8.2 Recommended Configuration	46
2.8.3 Function Block Diagram	47
2.8.4 Related Parameters	47
2.8.5 Related Functions	49
2.9 Profile torque (PT) mode	51
2.9.1 Configuration Block Diagram	51

2.9.2 Recommended Configuration	51
2.9.3 Function Block Diagram.	52
2.9.4 Related Parameters	52
2.9.5 Related Functions.	55
2.10 Homing Mode (HM)	58
2.10.1 Configuration Block Diagram	58
2.10.2 Recommended Configuration.	58
2.10.3 Function Block Diagram.	59
2.10.4 Related Parameters	59
2.10.5 Related Functions.	62
2.10.6 Description of Homing Modes.	64
2.10.7 Homing (for software version V52 × × ×)	105
2.11 Introduction to the Absolute Encoder System	128
2.11.1 Absolute Encoder System	128
2.11.2 Absolute position linear mode	130
2.11.3 Absolute position rotation mode	131
2.11.4 Single-turn Absolute Mode	134
2.11.5 Precautions for Using the Absolute System Battery Box	134
2.12 Auxiliary/Application Functions	135
2.12.1 Touch Probe Function	135
2.12.2 Software limit	138
2.12.3 Position Comparison	140
2.12.4 Forced EtherCAT DO.	149
3 STO	152
3.1 General	152
3.1.1 Terms and Abbreviations.	152
3.1.2 Safety Standards.	152
3.1.3 Precautions for Use	156
3.2 Safe Torque Off (STO)	159
3.2.1 Overview	159
3.2.2 Function Use and Monitoring	160
3.2.3 Fault Reset.	161
3.2.4 Safety Function Response Time	163
3.3 Acceptance	163
3.4 Troubleshooting.	166
4 Multi-Machine Recipe Management	167
5 Description of Parameters	170
5.1 H00 Servo Motor Parameters	170
5.2 H01 Servo Drive Parameters	172
5.3 H02 Basic Control Parameters	176
5.4 H03 Terminal Input Parameters	190

5.5 H04 Terminal Output Parameters	195
5.6 H05 Position Control Parameters.....	199
5.7 H06 Speed Control Parameters	205
5.8 H07 Torque Control Parameters.....	211
5.9 H08 Gain Parameters.....	217
5.10 H09 Auto-tuning Parameters.....	234
5.11 H0A Fault and Protection Parameters.....	247
5.12 H0b Monitoring Parameters	260
5.13 H0d Auxiliary Parameters.....	276
5.14 H0E Communication Function Parameters	281
5.15 H18 Position Comparison Output	292
5.16 H19 Target Position Parameters.....	295
5.17 H1F Software Tool Parameters.....	312
5.18 H30 Related Variables Read through Communication	313
5.19 1000h Object Dictionary.....	316
5.20 6000h Object Dictionary.....	333
6 Parameter List.....	374
6.1 Parameter Group H00.....	374
6.2 Parameter Group H01.....	374
6.3 Parameter Group H02.....	375
6.4 Parameter Group H03.....	379
6.5 Parameter Group H04.....	380
6.6 Parameter Group H05.....	381
6.7 Parameter Group H06.....	383
6.8 Parameter Group H07.....	384
6.9 Parameter Group H08.....	385
6.10 Parameter Group H09.....	390
6.11 Parameter Group H0A.....	394
6.12 Parameter Group H0b.....	397
6.13 Parameter Group H0d.....	401
6.14 Parameter Group H0E.....	402
6.15 Parameter Group H18.....	405
6.16 Parameter Group H19.....	406
6.17 Parameter Group H1F.....	410
6.18 Parameter Group H30.....	411

6.19 1000 Parameters 412

6.20 6000 Parameters 416

7 Appendix 425

7.1 Display of Monitoring Parameters 425

7.2 DIDO Function Assignment 433

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



Indicates that failure to comply with the notice will result in death or severe personal injuries.



Indicates that failure to comply with the notice may result in death or severe personal injuries.



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 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 Function Overview

Functions of the servo drive are listed below. See details in corresponding chapters.

Function	Description
Cyclic synchronous position mode	The host controller generates position references and sends the references cyclically through the bus. The servo drive performs positioning control.
Cyclic synchronous velocity mode	The host controller generates speed references and sends the references cyclically through the bus. The servo drive performs speed control.
Cyclic synchronous torque mode	The host controller generates torque references and sends the references cyclically through the bus. The servo drive performs torque control.
Profile position mode	The host controller sets parameters through the bus, and the servo drive generates position references and performs positioning control.
Profile velocity mode	The host controller sets parameters through the bus, and the servo drive generates speed references and performs speed control.
Profile torque mode	The host controller sets parameters through the bus, and the servo drive generates torque references and performs torque control.
Homing mode	The host controller selects the homing mode through parameters, and the drive performs homing automatically with the position feedback set to the preset value.
Touch Probe Function	The servo drive latches the position information when an external DI signal or motor Z signal changes.
High-resolution encoder	The servo drive is equipped with a high-performance encoder with resolution up to 223 (8388608) PPR.
Mechanical characteristics analysis	Used to analyze the resonance frequency and characteristics of the mechanical system through a PC installed with Inovance software tool.
Auto Gain Tuning	The servo drive generates gain parameters automatically to match present working conditions through just one parameter.
Gain switchover	Used to apply different gains to different status (operating or stop) of the motor. Gains can also be switched by external terminals during operation.
Torque disturbance observer	The servo drive estimates the disturbance torque suffered by the system to suppress vibration through compensation.
Resonance suppression	The servo drive sets filter characteristics automatically to suppress mechanical system vibration after detecting the resonance point.
Torque Reference Filter	Used to suppress the mechanical resonance that may be generated when the response speed is excessively high.

Function	Description
Position first-order low-pass filter	Used to achieve smooth acceleration and deceleration.
Torque limit	The servo drive limits the output torque of the servo motor.
Speed limit	The servo drive limits the servo motor speed.
External regenerative resistor	Used in case of insufficient braking capacity of the built-in regenerative resistor.
DI signal assignment	DI functions such as emergency stop can be assigned to corresponding pins.
Alarm history	The servo drive records the latest 10 ^[1] faults/warnings, which can also be cleared.
Status display	Used to display the drive status through the LED on the keypad.
External I/O display	Used to display ON/OFF status of external I/O signals.
Forced DO	Used to output signals not related to the drive status forcibly or used to check the wiring of output signals.
Trial run mode	Used to enable the motor through the keypad without a start signal.
Inovance servo commissioning software	Used to set parameters, perform trial run, and check status through a PC.
Warning code output	Used to output a four-bit warning code when a warning occurs.
Position Comparison	The servo drive outputs a DO signal with designated width after reaching the preset target position.
Black box	The servo drive captures the data before and after the designated condition and cooperates with the software tool to read the data for further analysis.

Note

[1]: For -NS models, 20 faults can be logged.

2 Basic Functions of the Servo Drive

The servo system consists of three major parts, the servo drive, servo motor, and feedback encoder.

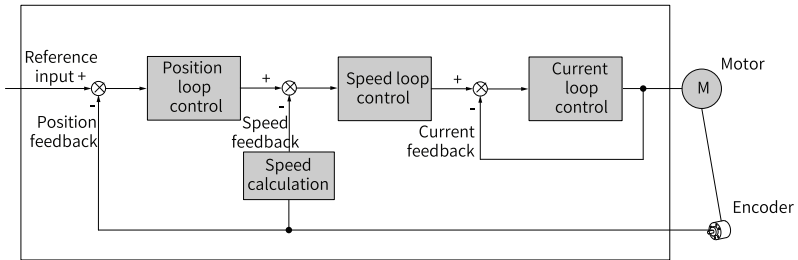


Figure 2-1 Structure of a basic servo system

As the control core of the servo system, the servo drive performs accurate position, speed, torque, or hybrid control on the servo motor by processing the input signals and feedback signals. Position control is the most important mode of a servo system.

Descriptions of the control modes are as follows:

- **Position control** In the position control mode, the target position of a motor is determined by the sum of position references, and the motor speed is determined by the position reference frequency. The servo drive performs quick and accurate position control and speed control through the feedback encoder installed on the motor. This control mode is applicable to scenarios requiring positioning control, such as mechanical arm, moulder, engraving and milling machine (pulse sequence reference), and computer numerical control (CNC) machine tool.
- **Speed control** In the speed control mode, the servo drive performs quick and accurate speed control through the speed reference sent through communication. The speed control mode mainly applies to application requiring speed control or where a host controller is used for position control or the commands sent from the host controller are used as the speed references for the servo drive, such as the engraving and milling machine.
- **Torque control** In the torque control mode, the motor current is in linear relation with the torque. Therefore, torque control is implemented through current control. The servo drive controls the motor output torque based on torque references. The torque reference can be set through communication. This control mode is mainly applicable to the winding and unwinding devices with strict tension requirements. In these scenarios, the torque always changes with the winding radius so that the tension will not change along with the change of the winding radius.

2.1 Conversion Factor Setting

Gear ratio refers to the motor displacement (encoder unit) corresponding to the load shaft displacement of one reference unit.

The gear ratio is comprised of the numerator 6091.01h and denominator 6091.02h. It determines the proportional relation between the load shaft displacement (reference unit) and the motor displacement (encoder unit), as shown below.

Motor displacement = Load shaft displacement x Gear ratio

The motor is connected to the load through the reducer and other mechanical transmission mechanism. Therefore, the gear ratio is related to the mechanical reduction ratio, mechanical dimensions and motor encoder resolution.

The calculation formula is as follows.

$$\text{Gear ratio} = \frac{\text{Encoder resolution}}{\text{Load shaft resolution}}$$

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
6091.01h	6091-01h	Motor resolution	1 to 4294967295	1	-	At stop	"6091_en.01h" on page 349
6091.02h	6091-02h	Shaft resolution	1 to 4294967295	1	-	At stop	"6091_en.02h" on page 349

Take the load ball screw as an example.

Minimum reference unit $f_c = 1 \text{ mm}$

Lead PB: 10 mm/r

Reduction ratio $n = 5:1$

Resolution of Inovance motor equipped with 23-bit serial-type encoder (P) = 8388608 PPR

The position factor is therefore calculated as follows:

Position factor:

$$\begin{aligned}\text{Position factor} &= \frac{\text{Motor resolution } P \times n}{P_b} \\ &= \frac{8388608 \times 5}{10} \\ &= \frac{41943040}{10} \\ &= 4194304\end{aligned}$$

Therefore, 6091.01h = 4194304; 6091.02h = 1. That means when the load shaft displacement is 1 mm, the motor displacement is 4194304.

Reduce the values of 6091.01h and 6091.02h to a point where there is no common divisor, and take the final value.

2.2 Servo State

Abide by the process stipulated in the CiA402 protocol when operating the drive. Otherwise, the servo drive cannot run in the designated status.

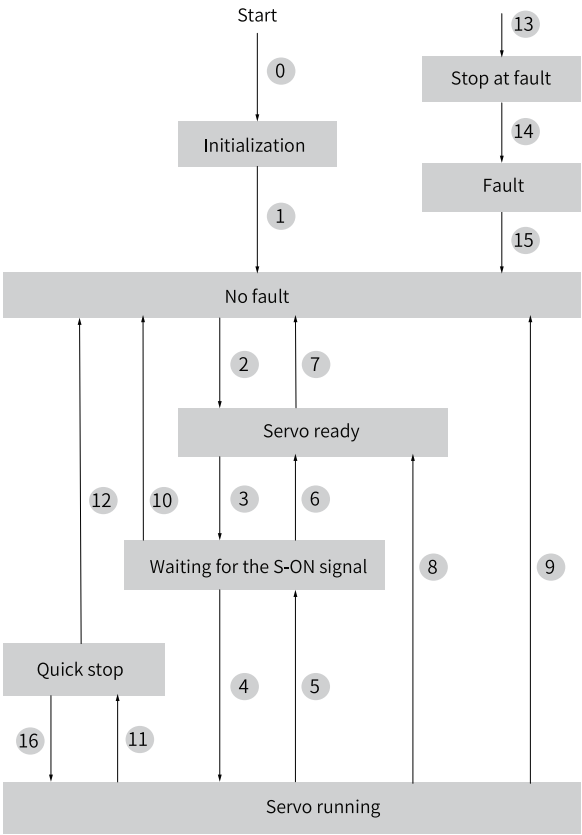


Figure 2-2 Switchover of CiA402 state machine

See the following table for descriptions of different status.

Initialization	Initialization of the servo drive and internal self-inspection are done. Parameters cannot be set. Drive functions cannot be executed.
No fault	No fault exists in the servo drive or the fault has been cleared. Parameters can be set.
Ready to switch on	The servo drive is ready to run. Parameters can be set.
Waiting for the S-ON signal	The servo drive is waiting for the S-ON signal. Parameters can be set.

Enable operation	The servo drive is running properly and a certain operation mode is enabled. The motor is energized and starts rotating when the speed reference is not 0. Only parameters whose "Setting Condition" is "During running" can be set.
Quick stop	Quick stop is activated and the servo drive is in the process of quick stop. Only parameters whose "Setting Condition" is "During running" can be set.
Fault reaction	A fault occurs and the servo drive is in the process of stop. Only parameters whose "Setting Condition" is "During running" can be set.
Fault	The stop process is done and all the drive functions are disabled. Parameters can be modified for troubleshooting purpose.

The following table describes the control commands and status switchover.

CiA402 Status Switchover		Control Word 6040h	bit0 to bit9[1] of status word 6041h
0	Power-on → Initialization	Natural transition, control command not required	0x0000
1	Initialization → No fault	Natural transition, control command not required If an error occurs during initialization, the servo drive directly enters status 13.	0x0250/0x270
2	No fault → Servo ready	0x0006	0x0231
3	Servo ready → Waiting for the S-ON signal	0x0007	0x0233
4	Waiting for the S-ON signal → Servo running	0x000F	0x0237
5	Servo running → Waiting for the S-ON signal	0x0007	0x0233
6	Waiting for the S-ON signal → Servo ready	0x0006	0x0231
7	Servo ready → No fault	0x0000	0x0250
8	Servo running → Servo ready	0x0006	0x0231
9	Servo running → No fault	0x0000	0x0250
10	Waiting for the S-ON signal → No fault	0x0000	0x0250

CiA402 Status Switchover		Control Word 6040h	bit0 to bit9[1] of status word 6041h
11	Servo running → Quick stop	0x0002	0x0217
12	Quick stop → No fault	Set 605A to a value between 0 and 3. Natural transition applies after stop and no control command is required.	0x0250
13	→ Stop at fault	If a fault occurs in any status other than "fault", the servo drive automatically switches to the stop-at-fault state, without the need for a control command.	0x021F
14	Stop at fault→Fault	Natural transition applies after stop and no control command is required.	0x0218
15	Fault→No fault	0x80 Bit 7 is rising edge-triggered. bit7 is maintained at 1, and other control commands are ineffective.	0x0250
16	Quick stop → Servo running	Set 605A to a value between 5 and 7. 0x0F will be sent after stop.	0x0237

Note

[1]: Bit 10 to bit 15 of 6041h are related to the operating state of the servo drive, and their values are represented as "0" in the preceding table. For details on the status of these bits, check the operation mode of the servo drive.

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
6040h	6040h	Control word	0 to 65535	0	-	Real-time	"6040h" on page 333
6041h	6041h	Status word	0 to 65535	0	-	Unchangeable	"6041h" on page 334

2.3 Setting and Display of the Operation Modes

Introduction to the operation modes

The SV660N series servo drive supports seven operation modes, as defined in 6502h.

The pre-operational mode of the servo drive can be set in 6060h. The present operation mode of the servo drive can be viewed in 6061h.

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
6502h	6502h	Supported drive mode	0 to 4294967295	941	-	Unchangeable	"6502h" on page 373
6060h	6060h	Servo drive mode	1: Profile position (PP) mode 3: Profile velocity (PV) mode 4: Profile torque (PT) mode 6: Homing (HM) mode 8: CSP mode 9: CSV mode 10: CST mode	0	-	Real-time	"6060h" on page 337
6061h	6061h	Operation mode display	1: Profile position (PP) mode 3: Profile velocity (PV) mode 4: Profile torque (PT) mode 6: Homing (HM) mode 8: CSP mode 9: CSV mode 10: CST mode	0	-	Unchangeable	"6061h" on page 338

Communication cycle supported by each mode

The SV660N series servo drive supports a synchronization cycle of 125 μ s or an integer multiple of 125 μ s.

2.4 Cyclic Synchronous Position (CSP) Mode

In CSP mode, the host controller generates the position references and sends the target position to the servo drive cyclically. The servo drive executes position control, speed control, and torque control.

2.4.1 Configuration Block Diagram

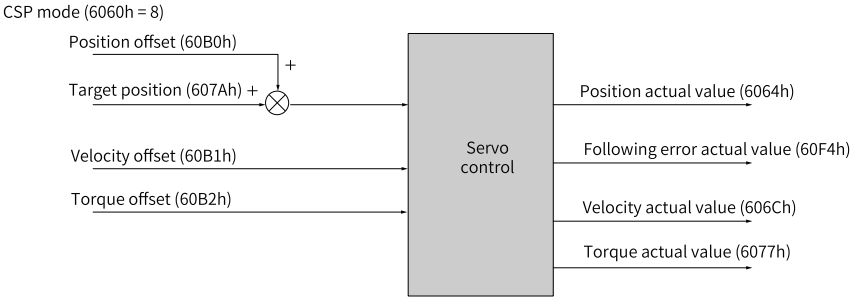
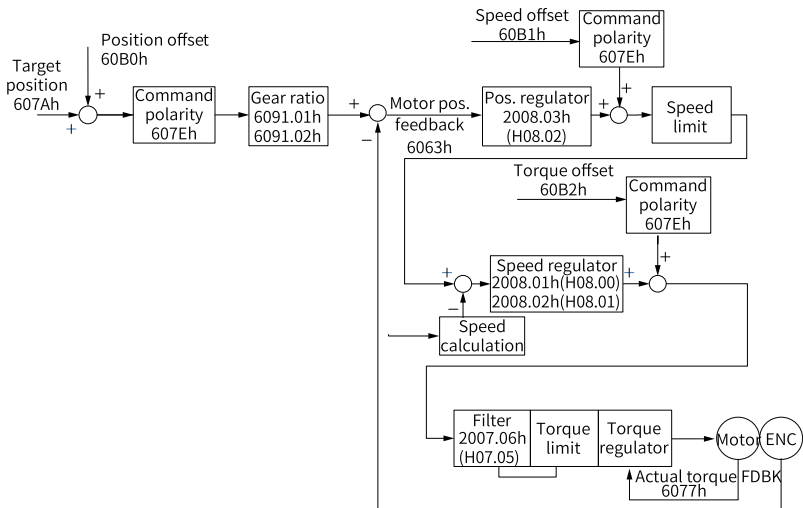


Figure 2-3 Cyclic synchronous position mode

2.4.2 Recommended Configuration

RPDO	TPDO	Remarks
6040h: control word	6041h: status word	Mandatory
607Ah: target position	6064h: position actual value	Mandatory
6060h: modes of operation	6061h: modes of operation display	Optional

2.4.3 Function Block Diagram



2.4.4 Related Parameters

6040h Control word

Address: -

Effective mode: Real time

Min.: 0

Unit: -

Max.: 65535

Data Type: UInt16

Default: 0

Change: Real-time

Value Range:

0 to 65535

Description

Defines the control command.

bit	Name		Description
0	Switch on	Switch on	1: Active, 0: Inactive
1	Enable voltage	Enable voltage	1: Active, 0: Inactive
2	Quick stop	Quick stop	0: Active, 1: Inactive
3	Enable operation	Enable operation	1: Active, 0: Inactive
The CSP mode only supports absolute position references.			

6041h Status word

Address: -

Effective mode: -

Min.: 0

Unit: -

Max.: 65535

Data Type: UInt16

Default: 0

Change: Unchangeable

Value Range:

0 to 65535

Description

Indicates the servo drive status.

Table 2-1 Description of each bit of 6041h

bit	Name		Description
0	Ready to switch on	Ready to switch on	1: Active, 0: Inactive
1	Switch on	Switch on	1: Active, 0: Inactive
2	Enable operation	Enable operation	1: Active, 0: Inactive
3	Fault	Fault	1: Active, 0: Inactive
4	Voltage enabled	Voltage enabled	1: Active, 0: Inactive
5	Quick stop	Quick stop	0: Active, 1: Inactive
6	Switch on disabled	Switch on disabled	1: Active, 0: Inactive
7	Warning	Warning	1: Active, 0: Inactive
8	Manufacturer specific	Manufacturer specific	Undefined

bit	Name		Description
9	Remote	Remote	1: Active, control word effective 0: Inactive
10	Target reach	Target reach	Not supported, always being 1
11	Internal limit active	Internal limit active	0: Position reference within the limit 1: Position reference beyond the limit
12	Drive follows the command value	Drive follows the command value	Not supported, always being 1
13	Following error	Following error	0: EB00.0 (Excessive position deviation) not reported 1: EB00.0 (Excessive position deviation) reported
14	Manufacturer specific	Manufacturer specific	Undefined
15	Home find	Home Find	0: Home not found 1: Home found

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
6040h	6040h	Control word	0 to 65535	0	-	Real-time	"6040h" on page 333
6041h	6041h	Status word	0 to 65535	0	-	Unchangeable	"6041h" on page 334
6060h	6060h	Servo drive mode	1: Profile position (PP) mode 3: Profile velocity (PV) mode 4: Profile torque (PT) mode 6: Homing (HM) mode 8: CSP mode 9: CSV mode 10: CST mode	0	-	Real-time	"6060h" on page 337
6061h	6061h	Operation mode display	1: Profile position (PP) mode 3: Profile velocity (PV) mode 4: Profile torque (PT) mode 6: Homing (HM) mode 8: CSP mode 9: CSV mode 10: CST mode	0	-	Unchangeable	"6061h" on page 338
6064h	6064h	Position actual value	-2147483648 to 2147483647	0	Reference unit	Unchangeable	"6064h" on page 339
6065h	6065h	Following error window	0 to 4294967295	27486951	Reference unit	Real-time	"6065h" on page 340

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
6066h	6066h	Defines the time lapse to trigger excessive position deviation (EB00.0).	0ms to 65535ms	0	ms	Real-time	"6066h" on page 340
606Ch	606Ch	Actual speed	-2147483648 to +2147483647	0	Refer ence unit/s	Unchange able	"606Ch" on page 341
6077h	6077h	Actual torque	-4000 to 4000	0	-	Unchange able	"6077h" on page 344
607Ah	607Ah	Target position	-2147483648 to 2147483647	0	Refer ence unit	Real-time	"607Ah" on page 344
607Eh	607Eh	Reference polarity	0 to 127	0	-	Real-time	"607Eh" on page 346
60B0h	60B0h	Position offset	-2147483648 to 2147483647	0	Refer ence unit	Real-time	"60B0h" on page 352
60B1h	60B1h	Velocity offset	-2147483648 to +2147483647	0	Refer ence unit/s	Real-time	"60B1h" on page 352
60B2h	60B2h	Torque offset	-4.000 to 4.000	0.000	-	Real-time	"60B2h" on page 352
60F4h	60F4h	Position deviation	-2147483648 to 2147483647	0	Refer ence unit	Unchange able	"60F4h" on page 370

2.4.5 Related Functions

Position deviation monitoring function

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
6065h	6065h	Following error window	0 to 4294967295	2748695 1	Refer ence unit	Real-time	<i>" 6065h" on page 340</i>
6066h	6066h	Defines the time lapse to trigger excessive position deviation (EB00.0).	0ms to 65535ms	0	ms	Real-time	<i>" 6066h" on page 340</i>

Position reference polarity

You can change the position reference direction through setting the position reference polarity.

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
607Eh	607Eh	Reference polarity	0 to 127	0	-	Real-time	<i>" 607Eh" on page 346</i>

2.5 Cyclic synchronous velocity (CSV) mode

In this mode, the host controller sends the target speed to the servo drive synchronously. Speed control and torque control are performed by the servo drive.

2.5.1 Configuration Block Diagram

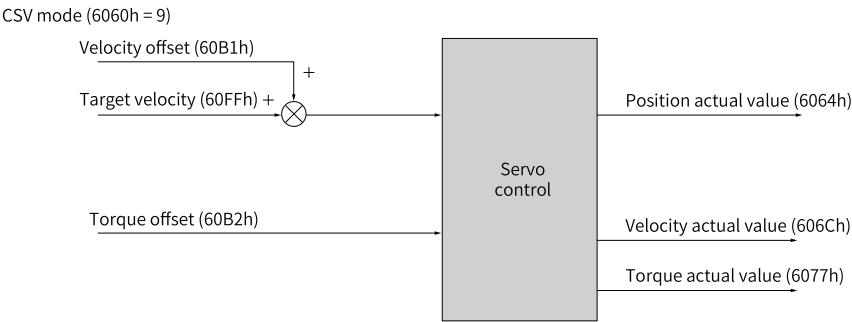


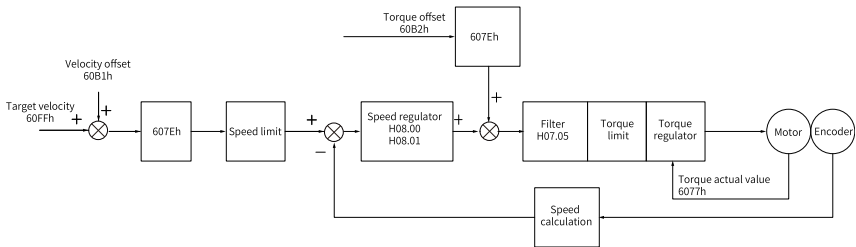
Figure 2-4 CSV mode

2.5.2 Recommended Configuration

The basic configuration for CSV mode is described in the following table.

RPDO	TPDO	Remarks
6040h: control word	6041h: status word	Mandatory
60FFh: Target velocity	-	Mandatory
-	6064h: position actual value	Optional
-	606Ch: Velocity actual value	Optional
6060h: modes of operation	6061h: modes of operation display	Optional

2.5.3 Function Block Diagram



2.5.4 Related Parameters

6040h Control word

Address: -

Min.: 0

Max.: 65535

Default: 0

Value Range:

0 to 65535

Description

Defines the control command.

Effective Real time

mode:

Unit: -

Data Type: UInt16

Change: Real-time

bit	Name		Description
0	Switch on	Switch on	1: Active, 0: Inactive
1	Enable voltage	Enable voltage	1: Active, 0: Inactive
2	Quick stop	Quick stop	0: Active, 1: Inactive
3	Enable operation	Enable operation	1: Active, 0: Inactive

6041h Status word

Address: -

Effective -

mode:

Min.: 0
 Max.: 65535
 Default: 0

Unit: -
 Data Type: UInt16
 Change: Unchangeable

Value Range:

0 to 65535

Description

Indicates the servo drive status.

Table 2–2 Description of each bit of 6041h

bit	Name		Description
0	Ready to switch on	Ready to switch on	1: Active, 0: Inactive
1	Switch on	Switch on	1: Active, 0: Inactive
2	Enable operation	Enable operation	1: Active, 0: Inactive
3	Fault	Fault	1: Active, 0: Inactive
4	Voltage enabled	Voltage enabled	1: Active, 0: Inactive
5	Quick stop	Quick stop	0: Active, 1: Inactive
6	Switch on disabled	Switch on disabled	1: Active, 0: Inactive
7	Warning	Warning	1: Active, 0: Inactive
8	Manufacturer specific	Manufacturer specific	Undefined
9	Remote	Remote	1: Active, control word effective 0: Inactive
10	Target reach	Target reach	Not supported, always being 1
11	Internal limit active	Internal limit active	0: Position reference within the limit 1: Position reference beyond the limit
12	Drive follows the command value	Drive follows the command value	Not supported, always being 1
13	-	N/A	N/A
14	Manufacturer specific	Manufacturer specific	Undefined
15	Homing is completed.	Home Find	0: Home not found 1: Home found

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
6040h	6040h	Control word	0 to 65535	0	-	Real-time	"6040h" on page 333
6041h	6041h	Status word	0 to 65535	0	-	Unchangeable	"6041h" on page 334

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
6060h	6060h	Servo drive mode	1: Profile position (PP) mode 3: Profile velocity (PV) mode 4: Profile torque (PT) mode 6: Homing (HM) mode 8: CSP mode 9: CSV mode 10: CST mode	0	-	Real-time	"6060h" on page 337
6061h	6061h	Operation mode display	1: Profile position (PP) mode 3: Profile velocity (PV) mode 4: Profile torque (PT) mode 6: Homing (HM) mode 8: CSP mode 9: CSV mode 10: CST mode	0	-	Unchangeable	"6061h" on page 338
6064h	6064h	Position actual value	-2147483648 to 2147483647	0	Reference unit	Unchangeable	"6064h" on page 339
606Ch	606Ch	Actual speed	-2147483648 to +2147483647	0	Reference unit/s	Unchangeable	"606Ch" on page 341
6077h	6077h	Actual torque	-4000 to 4000	0	-	Unchangeable	"6077h" on page 344
607Eh	607Eh	Reference polarity	0 to 127	0	-	Real-time	"607Eh" on page 346
60B1h	60B1h	Velocity offset	-2147483648 to +2147483647	0	Reference unit/s	Real-time	"60B1h" on page 352
60B2h	60B2h	Torque offset	-4.000 to 4.000	0.000	-	Real-time	"60B2h" on page 352
60FFh	60FFh	Target speed	-2147483648 to +2147483647	0	Reference unit/s	Real-time	"60FFh" on page 372

2.5.5 Related Functions

Velocity reference polarity

You can change the speed reference direction through setting the speed reference polarity.

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
607Eh	607Eh	Reference polarity	0 to 127	0	-	Real-time	"607Eh" on page 346

Velocity reference interpolation

You can enable velocity reference interpolation by setting the parameter.

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H06.14	2006-0Fh	CSV instruction interpolation	0: Disabled 1: Enabled	0	-	At stop	"H06_en.14" on page 209

2.6 Cyclic synchronous torque (CST) mode

In this mode, the host controller sends the target torque to the servo drive using cyclic synchronization. Torque control is performed by the servo drive.

2.6.1 Configuration Block Diagram

CST mode (6060h = 10)

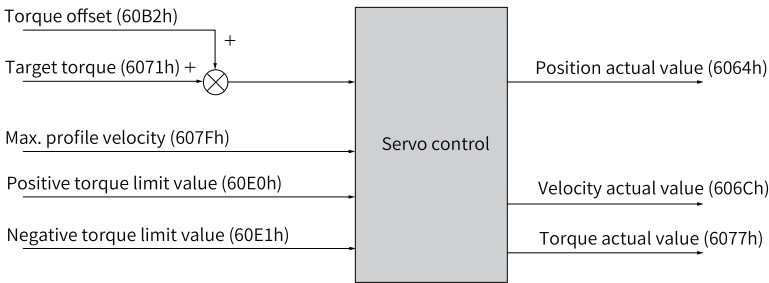


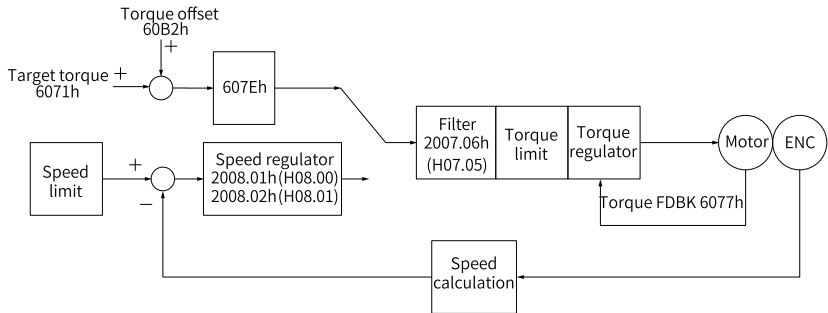
Figure 2-5 CST mode

2.6.2 Recommended Configuration

The basic configuration for the CST mode is described in the following table.

RPDO	TPDO	Remarks
6040h: control word	6041h: status word	Mandatory
6071h: Target torque	-	Mandatory
-	6064h: position actual value	Optional
-	606Ch: Velocity actual value	Optional
-	6077h: Torque actual value	Optional
6060h: modes of operation	6061h: modes of operation display	Optional

2.6.3 Function Block Diagram



2.6.4 Related Parameters

6040h Control word

Address: -

Min.: 0

Max.: 65535

Default: 0

Value Range:

0 to 65535

Description

Defines the control command.

Effective Real time

mode:

Unit: -

Data Type: UInt16

Change: Real-time

bit	Name		Description
0	Switch on	Switch on	1: Active, 0: Inactive
1	Enable voltage	Enable voltage	1: Active, 0: Inactive
2	Quick stop	Quick stop	0: Active, 1: Inactive
3	Enable operation	Enable operation	1: Active, 0: Inactive

6041h Status word

Address: -

Min.: 0

Max.: 65535

Default: 0

Value Range:

0 to 65535

Description

Indicates the servo drive status.

Effective -

mode:

Unit: -

Data Type: UInt16

Change: Unchangeable

Table 2-3 Description of each bit of 6041h

bit	Name		Description
0	Ready to switch on	Ready to switch on	1: Active, 0: Inactive
1	Switch on	Switch on	1: Active, 0: Inactive
2	Enable operation	Enable operation	1: Active, 0: Inactive
3	Fault	Fault	1: Active, 0: Inactive
4	Voltage enabled	Voltage enabled	1: Active, 0: Inactive
5	Quick stop	Quick stop	0: Active, 1: Inactive
6	Switch on disabled	Switch on disabled	1: Active, 0: Inactive
7	Warning	Warning	1: Active, 0: Inactive
8	Manufacturer specific	Manufacturer specific	Undefined
9	Remote	Remote	1: Active, control word effective 0: Inactive
10	Target reach	Target reach	Not supported, always being 1
11	Internal limit active	Internal limit active	0: Position reference within the limit 1: Position reference beyond the limit
12	Drive follows the command value	Drive follows the command value	Not supported, always being 1
13	-	N/A	N/A
14	Manufacturer specific	Manufacturer specific	Undefined
15	Homing is completed.	Home Find	0: Home not found 1: Home found

☆ Related parameters:

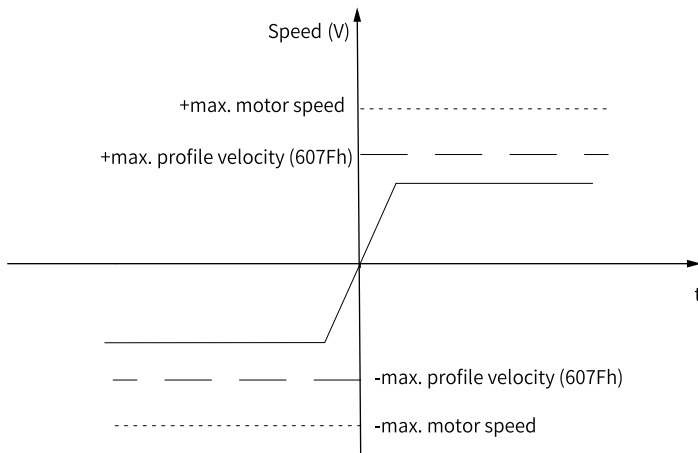
Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
6040h	6040h	Control word	0 to 65535	0	-	Real-time	"6040h" on page 333
6041h	6041h	Status word	0 to 65535	0	-	Unchangeable	"6041h" on page 334
6060h	6060h	Servo drive mode	1: Profile position (PP) mode 3: Profile velocity (PV) mode 4: Profile torque (PT) mode 6: Homing (HM) mode 8: CSP mode 9: CSV mode 10: CST mode	0	-	Real-time	"6060h" on page 337
6061h	6061h	Operation mode display	1: Profile position (PP) mode 3: Profile velocity (PV) mode 4: Profile torque (PT) mode 6: Homing (HM) mode 8: CSP mode 9: CSV mode 10: CST mode	0	-	Unchangeable	"6061h" on page 338

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
6071h	6071h	Target torque	-4000 to 4000	0	-	Real-time	"6071h" on page 343
6072h	6072h	Max. torque reference	0 to 4000	3500	-	Real-time	"6072h" on page 343
6074h	6074h	Torque reference	-4000 to 4000	0	-	Unchangeable	"6074h" on page 343
6077h	6077h	Actual torque	-4000 to 4000	0	-	Unchangeable	"6077h" on page 344
607Eh	607Eh	Reference polarity	0 to 127	0	-	Real-time	"607Eh" on page 346
607Fh	607Fh	Max. speed	0 to 4294967295	838860800	Reference unit/s	Real-time	"607Fh" on page 346
60B2h	60B2h	Torque offset	-4.000 to 4.000	0.000	-	Real-time	"60B2h" on page 352
60E0h	60E0h	Positive torque limit	0.000 to 4.000	3.500	-	Real-time	"60E0h" on page 359
60E1h	60E1h	Negative torque limit	0.000 to 4.000	3.500	-	Real-time	"60E1h" on page 360

2.6.5 Related Functions

Speed limit in the torque control mode

In the torque mode, 607Fh can be used to limit the maximum speed in forward/reverse operation. Note that the maximum operating speed allowed by the motor cannot be exceeded.

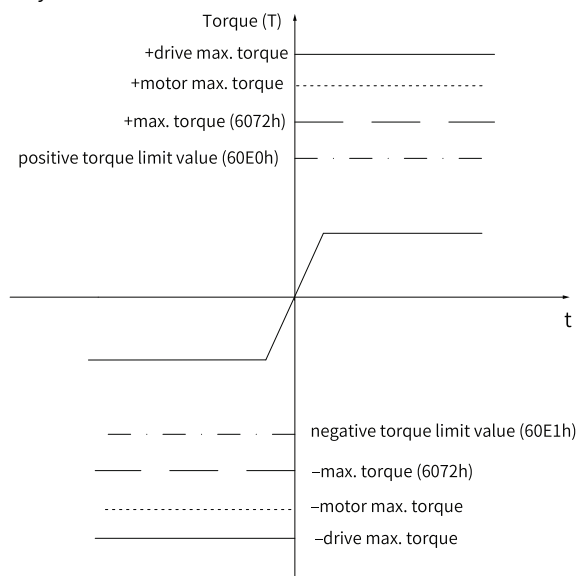


☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
607Fh	607Fh	Max. speed	0 to 4294967295	838860800	Reference unit/s	Real-time	"607Fh" on page 346

Torque limit

To protect mechanical devices, you can limit the torque reference in the position, speed, and torque control modes by setting 6072h (Maximum torque), 60E0h (Positive torque limit value), and 60E1h (Negative torque limit value). Note that the maximum torque allowed by the servo drive cannot be exceeded.



☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
6072h	6072h	Max. torque reference	0 to 4000	3500	-	Real-time	"6072h" on page 343
60E0h	60E0h	Positive torque limit	0.000 to 4.000	3.500	-	Real-time	"60E0h" on page 359
60E1h	60E1h	Negative torque limit	0.000 to 4.000	3.500	-	Real-time	"60E1h" on page 360

Torque reference polarity

You can change the torque reference direction through setting the torque reference polarity.

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
607Eh	607Eh	Reference polarity	0 to 127	0	-	Real-time	"607Eh" on page 346

2.7 Profile position (PP)

The PP mode mainly applies to point-to-point positioning. In PP mode, the host controller sets the target position, operating speed, acceleration rate, and deceleration rate. The position profile generator inside the servo drive generates position profiles based on preceding settings, and the servo drive executes position control, speed control, and torque control.

2.7.1 Configuration Block Diagram

PP mode (6060h = 1)

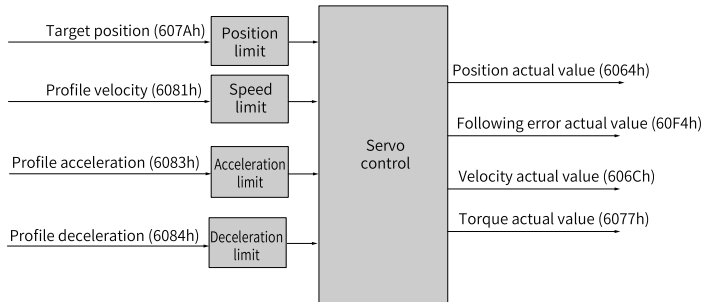


Figure 2-6 PP mode

In PP mode, the target position is triggered and activated based on the time sequence of the new set-point (bit4 of the control word) and set-point acknowledge (bit12 of the status word).

The controller sets the New set-point bit (bit4 of the control word) to 1 to inform the servo drive of the new target position. The servo drive, after receiving the new target position, sets the Set-point acknowledge bit (bit12 of the status word) to 1. After the controller sets the New set-point (bit4 of the control word) to 0, if the servo drive can receive the new target position, the Set-point acknowledge bit (bit12 of the status word) will be set to 0. Otherwise, it is kept to 1.

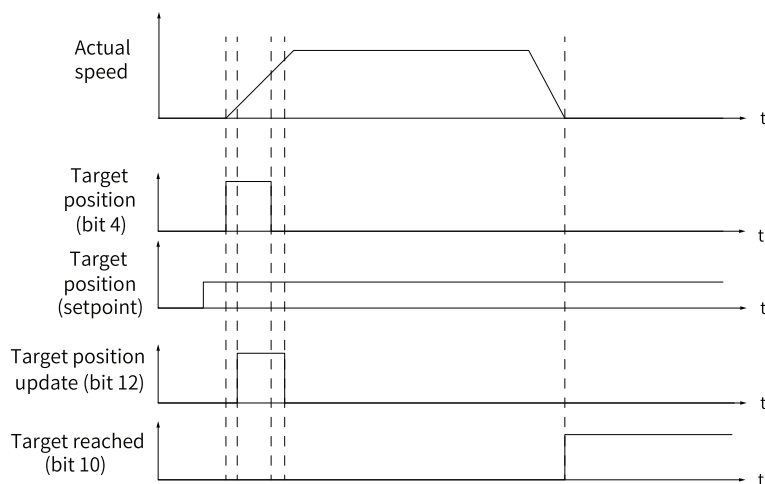


Figure 2-7 Sequence in sequential mode

The linkage mode of position references is determined by bit5 (Change set immediately) of the control word. When bit5 is set to 1 (Sequential mode), sequential linkage applies between position references, which is called sequential mode. When bit5 is set to 0 (Single-point mode), zero-cross linkage applies to position references, which is called single-point mode.

Sequential mode:

The target position of present segment is in the process of positioning. After the new target position is generated, the controller sets the New set-point bit to 1, and the servo drive performs positioning towards the new target position.

In the sequential mode, the sequence of bit4 (New set-point) of the control word and bit12 (Set-point acknowledge) of the status word is as shown in ["Figure 2-7 " on page 38](#).

Single-point mode:

The target position of current segment is in the process of positioning. After the new target position is generated, the controller sets the New set-point bit to 1, and the servo drive performs positioning towards the new target position after the position reference of current segment is done transmitting.

The time sequence diagram of the new set-point (bit4 of the control word) and the set-point acknowledge (bit12 of the status word) is as follows.

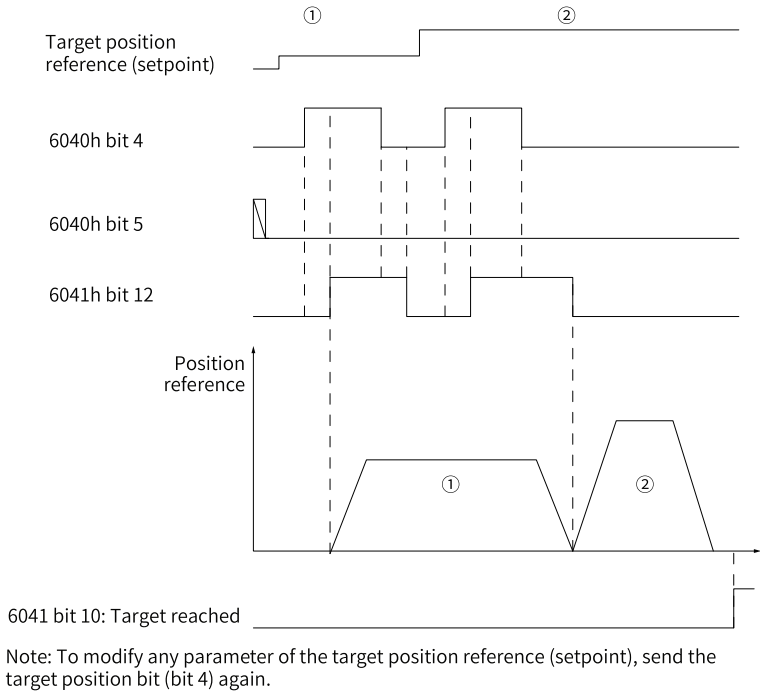
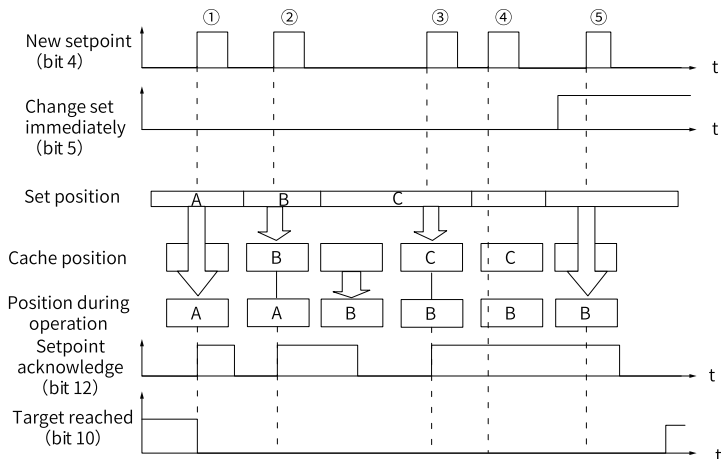


Figure 2-8 Sequence in the single-point mode

In the single-point mode, the servo drive caches one target position, which is to cache a new segment of target position when current target position is under execution. The sequence diagram is as follows.



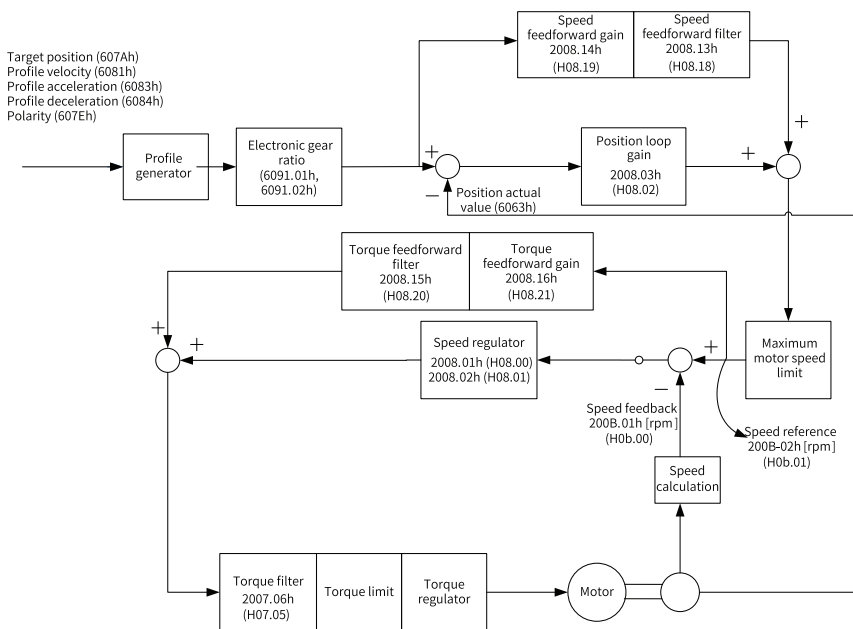
- ① If the cache position is empty, the set position will be executed immediately.
- ②③ If a position reference is under execution currently, the new position setpoint will be saved in the cache. After current position reference is done transmitting, the cached setpoint will be executed, after which a new setpoint can be received.
- ④⑤ The new setpoints cannot be received if the cache is full. In this case, you can set the attribute bit (Change set immediately) of the setpoint to 1 to activate the setpoint.

2.7.2 Recommended Configuration

The basic configuration for the PP mode is described in the following table.

RPDO	TPDO	Remarks
6040h: control word	6041h: status word	Mandatory
607Ah: target position	6064h: position actual value	Mandatory
6081h: profile velocity	-	Mandatory
6083h: profile acceleration	-	Optional
6084h: profile deceleration	-	Optional
6060h: modes of operation	6061h: modes of operation display	Optional

2.7.3 Function Block Diagram



2.7.4 Related Parameters

6040h Control word

Address: -

Effective mode: Real time

Min.: 0

Unit: -

Max.: 65535

Data Type: UInt16

Default: 0

Change: Real-time

Value Range:

0 to 65535

Description

Defines the control command.

bit	Name		Description
0	Switch on	Switch on	1: Active, 0: Inactive
1	Enable voltage	Enable voltage	1: Active, 0: Inactive
2	Quick stop	Quick stop	0: Active, 1: Inactive
3	Enable operation	Enable operation	1: Active, 0: Inactive
4	New set-point	New set-point	0→1: Invalid Trigger new target position 1 → 0: Clear bit12 of the status word
5	Change set immediately	Change set immediately	0: Not immediately 1: Immediately
6	abs/rel	abs/rel	0: abs 1: rel
7	Halt	Halt	0: Keep present operating state 1: Halt

6041h Status word

Address: -

Effective mode: -

Min.: 0

Unit: -

Max.: 65535

Data Type: UInt16

Default: 0

Change: Unchangeable

Value Range:

0 to 65535

Description

Indicates the servo drive status.

Table 2–4 Description of each bit of 6041h

bit	Name		Description
0	Ready to switch on	Ready to switch on	1: Active, 0: Inactive
1	Switch on	Switch on	1: Active, 0: Inactive
2	Enable operation	Enable operation	1: Active, 0: Inactive
3	Fault	Fault	1: Active, 0: Inactive

bit	Name		Description
4	Voltage enabled	Voltage enabled	1: Active, 0: Inactive
5	Quick stop	Quick stop	0: Active, 1: Inactive
6	Switch on disabled	Switch on disabled	1: Active, 0: Inactive
7	Warning	Warning	1: Active, 0: Inactive
8	Manufacturer specific	Manufacturer specific	Undefined
9	Remote	Remote	1: Active, control word effective 0: Inactive
10	Target reach	Target reach	Not supported, always being 1
11	Internal limit active	Internal limit active	0: Position reference within the limit 1: Position reference beyond the limit
12	Set-point acknowledge	Set-point acknowledge	0: Acknowledged 1: Not acknowledged
13	Following error	Following error	0: EB00.0 (Excessive position deviation) not reported 1: EB00.0 (Excessive position deviation) reported
14	Manufacturer specific	Manufacturer specific	Undefined
15	Home find	Home Find	0: Home not found 1: Home found

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
6040h	6040h	Control word	0 to 65535	0	-	Real-time	"6040h" on page 333
6041h	6041h	Status word	0 to 65535	0	-	Unchangeable	"6041h" on page 334
6060h	6060h	Servo drive mode	1: Profile position (PP) mode 3: Profile velocity (PV) mode 4: Profile torque (PT) mode 6: Homing (HM) mode 8: CSP mode 9: CSV mode 10: CST mode	0	-	Real-time	"6060h" on page 337
6061h	6061h	Operation mode display	1: Profile position (PP) mode 3: Profile velocity (PV) mode 4: Profile torque (PT) mode 6: Homing (HM) mode 8: CSP mode 9: CSV mode 10: CST mode	0	-	Unchangeable	"6061h" on page 338
6064h	6064h	Position actual value	-2147483648 to 2147483647	0	Reference unit	Unchangeable	"6064h" on page 339

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
6065h	6065h	Following error window	0 to 4294967295	27486951	Reference unit	Real-time	"6065h" on page 340
6066h	6066h	Defines the time lapse to trigger excessive position deviation (EB00.0).	0ms to 65535ms	0	ms	Real-time	"6066h" on page 340
6067h	6067h	Position window	0 to 4294967295	5872	Reference unit	Real-time	"6067h" on page 340
6068h	6068h	Position window time	0ms to 65535ms	0	ms	Real-time	"6068h" on page 341
607Ah	607Ah	Target position	-2147483648 to 2147483647	0	Reference unit	Real-time	"607Ah" on page 344
607Eh	607Eh	Reference polarity	0 to 127	0	-	Real-time	"607Eh" on page 346
607Fh	607Fh	Max. speed	0 to 4294967295	838860800	Reference unit/s	Real-time	"607Fh" on page 346
6081h	6081h	Profile velocity	0 to 4294967295	13981013	Reference unit/s	Real-time	"6081h" on page 347
6083h	6083h	Profile acceleration	0 to 4294967295	1398101333	Reference unit/s ²	Real-time	"6083h" on page 347
6084h	6084h	Profile deceleration	0 to 4294967295	1398101333	Reference unit/s ²	Real-time	"6084h" on page 347

2.7.5 Related Functions

Positioning completed

Positioning completed: When position deviation fulfills the set condition, the positioning process is done. In this case, the servo drive sets bit10 of the status word, and the host controller, once receives the signal, acknowledges that positioning is done.

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
6067h	6067h	Position window	0 to 4294967295	5872	Reference unit	Real-time	"6067h" on page 340
6068h	6068h	Position window time	0ms to 65535ms	0	ms	Real-time	"6068h" on page 341

Note

6067h only reflects the threshold of absolute position deviation when positioning is done. It is not related to the positioning accuracy.

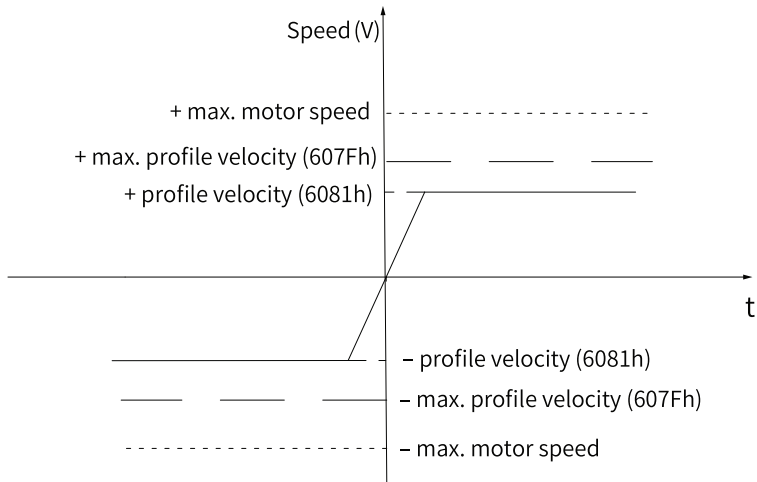
Position deviation monitoring function

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
6065h	6065h	Following error window	0 to 4294967295	2748695 1	Reference unit	Real-time	"6065h" on page 340
6066h	6066h	Defines the time lapse to trigger excessive position deviation (EB00.0).	0ms to 65535ms	0	ms	Real-time	"6066h" on page 340

Speed limit

In PP mode, 607Fh can be used to limit the maximum speed in forward/reverse operation. Note that the maximum operating speed of the motor cannot be exceeded.



☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
607Fh	607Fh	Max. speed	0 to 4294967295	838860800	Reference unit/s	Real-time	"607Fh" on page 346

Acceleration and deceleration limits

In PP mode, the change rate of position references can be limited through the acceleration and deceleration limits.

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
60C5h	60C5h	Max. acceleration	0 to 4294967295	4294967295	Reference unit/s ²	Real-time	"60C5h" on page 358
60C6h	60C6h	Max. deceleration	0 to 4294967295	4294967295	Reference unit/s ²	Real-time	"60C6h" on page 358

Reference polarity

You can change the position reference direction through setting the position reference polarity.

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
607Eh	607Eh	Reference polarity	0 to 127	0	-	Real-time	"607Eh" on page 346

2.8 Profile Velocity (PV) Mode

In PV mode, the host controller sends the target speed, acceleration rate, and deceleration rate to the servo drive. The servo drive generates speed reference profiles and executes speed control and torque control.

2.8.1 Configuration Block Diagram

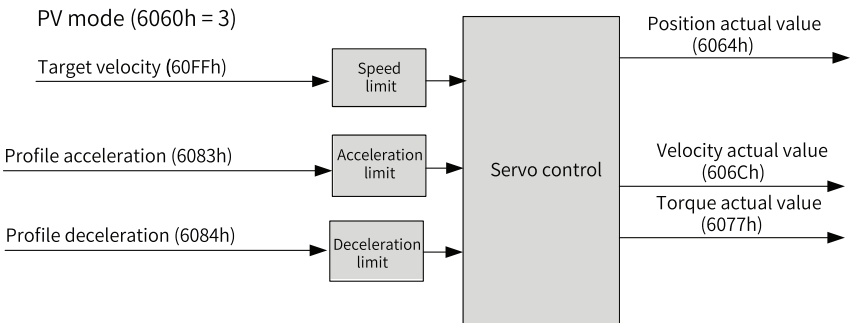


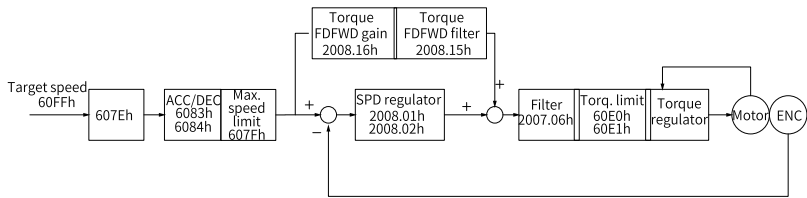
Figure 2-9 PV mode

2.8.2 Recommended Configuration

The basic configuration for the PV mode is described in the following table.

RPDO	TPDO	Remarks
6040h: control word	6041h: status word	Mandatory
60FFh: Target velocity	-	Mandatory
-	6064h: position actual value	Optional
-	606Ch: Velocity actual value	Optional
6083h: profile acceleration	-	Optional
6084h: profile deceleration	-	Optional
6060h: modes of operation	6061h: modes of operation display	Optional

2.8.3 Function Block Diagram



2.8.4 Related Parameters

6040h Control word

Address: -

Min.: 0

Max.: 65535

Default: 0

Value Range:

0 to 65535

Description

Defines the control command.

Effective mode:

Unit: -

Data Type: UInt16

Change: Real-time

bit	Name		Description
0	Switch on	Switch on	1: Active, 0: Inactive
1	Enable voltage	Enable voltage	1: Active, 0: Inactive
2	Quick stop	Quick stop	0: Active, 1: Inactive
3	Enable operation	Enable operation	1: Active, 0: Inactive
8	Halt	Halt	0: Keep present operating state 1: Halt

6041h Status word

Address: -

Min.: 0

Max.: 65535

Default: 0

Value Range:

0 to 65535

Description

Indicates the servo drive status.

Effective mode:

Unit: -

Data Type: UInt16

Change: Unchangeable

Table 2-5 Description of each bit of 6041h

bit	Name		Description
0	Ready to switch on	Ready to switch on	1: Active, 0: Inactive
1	Switch on	Switch on	1: Active, 0: Inactive
2	Enable operation	Enable operation	1: Active, 0: Inactive
3	Fault	Fault	1: Active, 0: Inactive
4	Voltage enabled	Voltage enabled	1: Active, 0: Inactive
5	Quick stop	Quick stop	0: Active, 1: Inactive
6	Switch on disabled	Switch on disabled	1: Active, 0: Inactive
7	Warning	Warning	1: Active, 0: Inactive
8	Manufacturer specific	Manufacturer specific	Undefined
9	Remote	Remote	1: Active, control word effective 0: Inactive
10	Target reach	Target reach	1: Active, 0: Inactive
11	Internal limit active	Internal limit active	1: Active, 0: Inactive
12	Speed	Speed	0: Speed not being 0 1: Speed being 0
13	-	N/A	N/A
14	Manufacturer specific	Manufacturer specific	Undefined
15	Homing is completed.	Home Find	0: Home not found 1: Home found

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
6040h	6040h	Control word	0 to 65535	0	-	Real-time	"6040h" on page 333
6041h	6041h	Status word	0 to 65535	0	-	Unchangeable	"6041h" on page 334
6060h	6060h	Servo drive mode	1: Profile position (PP) mode 3: Profile velocity (PV) mode 4: Profile torque (PT) mode 6: Homing (HM) mode 8: CSP mode 9: CSV mode 10: CST mode	0	-	Real-time	"6060h" on page 337
6061h	6061h	Operation mode display	1: Profile position (PP) mode 3: Profile velocity (PV) mode 4: Profile torque (PT) mode 6: Homing (HM) mode 8: CSP mode 9: CSV mode 10: CST mode	0	-	Unchangeable	"6061h" on page 338

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
606Ch	606Ch	Actual speed	-2147483648 to +2147483647	0	Reference unit/s	Unchangeable	"606Ch" on page 341
606Dh	606Dh	Velocity window	0 RPM to 65535 RPM	10	RPM	Real-time	"606Dh" on page 341
606Eh	606Eh	Velocity window time	0ms to 65535ms	0	ms	Real-time	"606Eh" on page 342
606Fh	606Fh	Zero speed signal threshold	0 RPM to 65535 RPM	10	RPM	Real-time	"606Fh" on page 342
6070h	6070h	Velocity threshold time	0ms to 65535ms	0	ms	Real-time	"6070h" on page 342
607Eh	607Eh	Reference polarity	0 to 127	0	-	Real-time	"607Eh" on page 346
607Fh	607Fh	Max. speed	0 to 4294967295	838860800	Reference unit/s	Real-time	"607Fh" on page 346
6083h	6083h	Profile acceleration	0 to 4294967295	1398101333	Reference unit/s ²	Real-time	"6083h" on page 347
6084h	6084h	Profile deceleration	0 to 4294967295	1398101333	Reference unit/s ²	Real-time	"6084h" on page 347
60FFh	60FFh	Target speed	-2147483648 to +2147483647	0	Reference unit/s	Real-time	"60FFh" on page 372

2.8.5 Related Functions

Monitoring on speed reach status

It is used to check whether the speed reference of the servo drive is consistent with the motor speed feedback.

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
606Dh	606Dh	Velocity window	0 RPM to 65535 RPM	10	RPM	Real-time	"606Dh" on page 341
606Eh	606Eh	Velocity window time	0ms to 65535ms	0	ms	Real-time	"606Eh" on page 342

Monitoring on zero speed

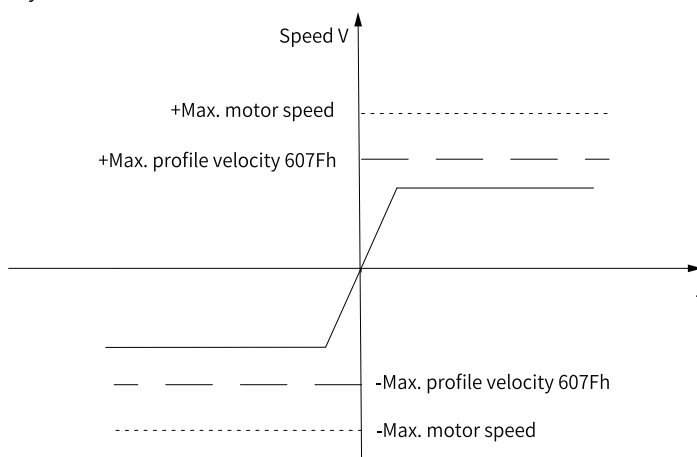
It is used to check whether the absolute value of motor speed feedback is lower than the set threshold. If yes, the motor is close to a standstill (zero speed) and bit12 of the status word is set to 1.

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
606Fh	606Fh	Zero speed signal threshold	0 RPM to 65535 RPM	10	RPM	Real-time	"606Fh" on page 342
6070h	6070h	Velocity threshold time	0ms to 65535ms	0	ms	Real-time	"6070h" on page 342

Speed limit

In PP mode, 607Fh can be used to limit the maximum speed in forward/reverse operation. Note that the maximum speed cannot exceed the maximum running speed allowed by the motor.



☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
607Fh	607Fh	Max. speed	0 to 4294967295	838860800	Reference unit/s	Real-time	"607Fh" on page 346

Acceleration and deceleration limits

In PV mode, the change rate of speed references can be limited through acceleration and deceleration limits.

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
60C5h	60C5h	Max. acceleration	0 to 4294967295	4294967295	Reference unit/s ²	Real-time	"60C5h" on page 358
60C6h	60C6h	Max. deceleration	0 to 4294967295	4294967295	Reference unit/s ²	Real-time	"60C6h" on page 358

Reference polarity

You can change the speed reference direction through setting the speed reference polarity.

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
607Eh	607Eh	Reference polarity	0 to 127	0	-	Real-time	"607Eh" on page 346

2.9 Profile torque (PT) mode

In PT mode, the host controller sends the target torque (6071h) and the torque slope (6087h) to the servo drive. The servo drive generates torque reference profiles and executes torque control.

2.9.1 Configuration Block Diagram

PT mode (6060h = 4)

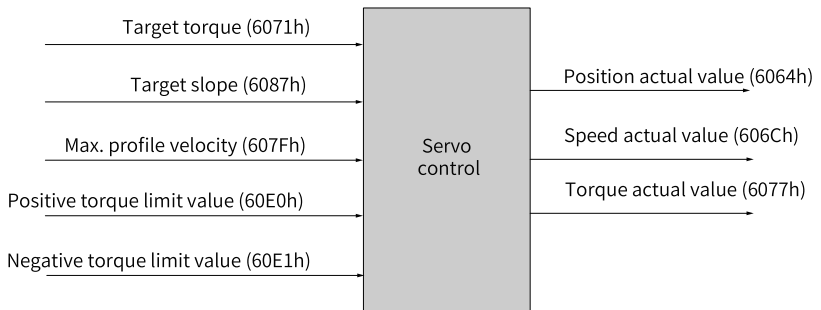


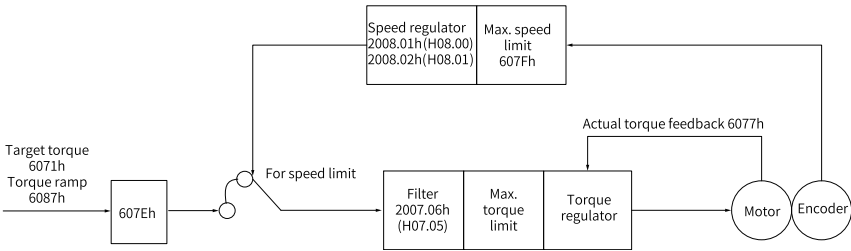
Figure 2-10 PT mode

2.9.2 Recommended Configuration

The basic configuration for the PT mode is described in the following table.

RPDO	TPDO	Remarks
6040h: control word	6041h: status word	Mandatory
6071h: Target torque	-	Mandatory
6087h: Torque slope	-	Optional
-	6064h: position actual value	Optional
-	606Ch: Velocity actual value	Optional
-	6077h: Torque actual value	Optional
6060h: modes of operation	6061h: modes of operation display	Optional

2.9.3 Function Block Diagram



2.9.4 Related Parameters

6040h Control word

Address: -

Min.: 0

Max.: 65535

Default: 0

Value Range:

0 to 65535

Description

Defines the control command.

Effective mode:
Unit: -
Data Type: UInt16
Change: Real-time

bit	Name	Description
0	Switch on	Switch on 1: Active, 0: Inactive
1	Enable voltage	Enable voltage 1: Active, 0: Inactive
2	Quick stop	Quick stop 0: Active, 1: Inactive
3	Enable operation	Enable operation 1: Active, 0: Inactive
8	Halt	Halt 0: Keep present operating state 1: Halt

6041h Status word

Address: -

Effective -

mode:

Min.: 0

Unit: -

Max.: 65535

Data Type: UInt16

Default: 0

Change: Unchangeable

Value Range:

0 to 65535

Description

Indicates the servo drive status.

Table 2-6 Description of each bit of 6041h

bit	Name		Description
0	Ready to switch on	Ready to switch on	1: Active, 0: Inactive
1	Switch on	Switch on	1: Active, 0: Inactive
2	Enable operation	Enable operation	1: Active, 0: Inactive
3	Fault	Fault	1: Active, 0: Inactive
4	Voltage enabled	Voltage enabled	1: Active, 0: Inactive
5	Quick stop	Quick stop	0: Active, 1: Inactive
6	Switch on disabled	Switch on disabled	1: Active, 0: Inactive
7	Warning	Warning	1: Active, 0: Inactive
8	Manufacturer specific	Manufacturer specific	Undefined
9	Remote	Remote	1: Active, control word effective 0: Inactive
10	Target reach	Target reach	0: Target velocity not reached 1: Target velocity reached
11	Internal limit active	Internal limit active	0: Position feedback within the limit 1: Position feedback beyond the limit
12 to 14	No assignment	N/A	No assignment, always being 0
15	Homing is completed.	Home Find	0: Home not found 1: Home found

☆ Related parameters:

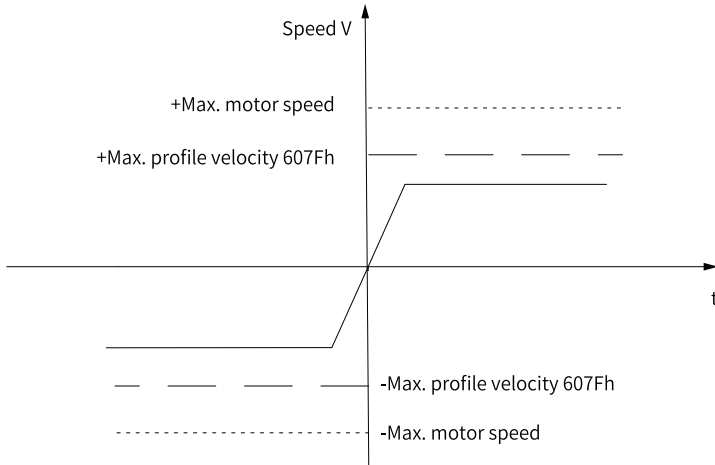
Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
6040h	6040h	Control word	0 to 65535	0	-	Real-time	"6040h" on page 333
6041h	6041h	Status word	0 to 65535	0	-	Unchangeable	"6041h" on page 334

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
6060h	6060h	Servo drive mode	1: Profile position (PP) mode 3: Profile velocity (PV) mode 4: Profile torque (PT) mode 6: Homing (HM) mode 8: CSP mode 9: CSV mode 10: CST mode	0	-	Real-time	"6060h" on page 337
6061h	6061h	Operation mode display	1: Profile position (PP) mode 3: Profile velocity (PV) mode 4: Profile torque (PT) mode 6: Homing (HM) mode 8: CSP mode 9: CSV mode 10: CST mode	0	-	Unchangeable	"6061h" on page 338
6071h	6071h	Target torque	-4000 to 4000	0	-	Real-time	"6071h" on page 343
6072h	6072h	Max. torque reference	0 to 4000	3500	-	Real-time	"6072h" on page 343
6074h	6074h	Torque reference	-4000 to 4000	0	-	Unchangeable	"6074h" on page 343
6077h	6077h	Actual torque	-4000 to 4000	0	-	Unchangeable	"6077h" on page 344
6087h	6087h	Torque slope	0.0%/S to 429496729.5%/s	429496729.5	%/s	Real-time	"6087h" on page 348
607Eh	607Eh	Reference polarity	0 to 127	0	-	Real-time	"607Eh" on page 346
607Fh	607Fh	Max. speed	0 to 4294967295	838860800	Reference unit/s	Real-time	"607Fh" on page 346
60E0h	60E0h	Positive torque limit	0.000 to 4.000	3.500	-	Real-time	"60E0h" on page 359
60E1h	60E1h	Negative torque limit	0.000 to 4.000	3.500	-	Real-time	"60E1h" on page 360
H07.21	2007-16h	Torque reach base value	0.0% to 400.0%	0.0	%	Real-time	"H07_en.21" on page 213
H07.22	2007-17h	Output torque upon torque reach and DO signal activation	0.0% to 400.0%	20.0	%	Real-time	"H07_en.22" on page 213
H07.23	2007-18h	Output torque upon torque reach and DO signal deactivation	0.0% to 400.0%	10.0	%	Real-time	"H07_en.23" on page 214

2.9.5 Related Functions

Speed limit in the torque control mode

In the torque mode, 607Fh can be used to limit the maximum speed in forward/reverse operation. Note that the maximum operating speed of the motor cannot be exceeded.

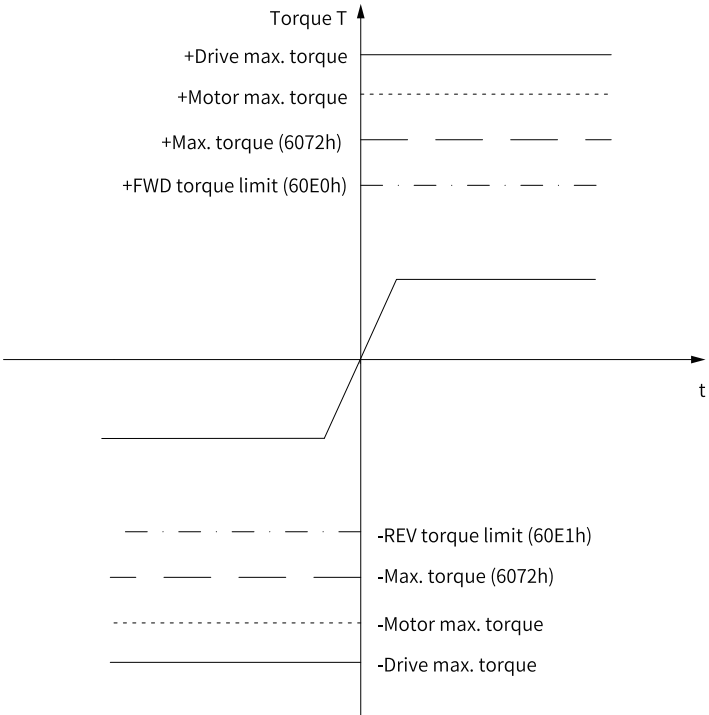


☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
607Fh	607Fh	Max. speed	0 to 4294967295	838860800	Reference unit/s	Real-time	"607Fh" on page 346

Torque limit

To protect mechanical devices, you can limit the torque reference in the position, speed, and torque control modes by setting 6072h (Maximum torque), 60E0h (Positive torque limit value), and 60E1h (Negative torque limit value). Note that the maximum torque allowed by the servo drive cannot be exceeded.



☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
6072h	6072h	Max. torque reference	0 to 4000	3500	-	Real-time	"6072h" on page 343
60E0h	60E0h	Positive torque limit	0.000 to 4.000	3.500	-	Real-time	"60E0h" on page 359
60E1h	60E1h	Negative torque limit	0.000 to 4.000	3.500	-	Real-time	"60E1h" on page 360

Torque reference polarity

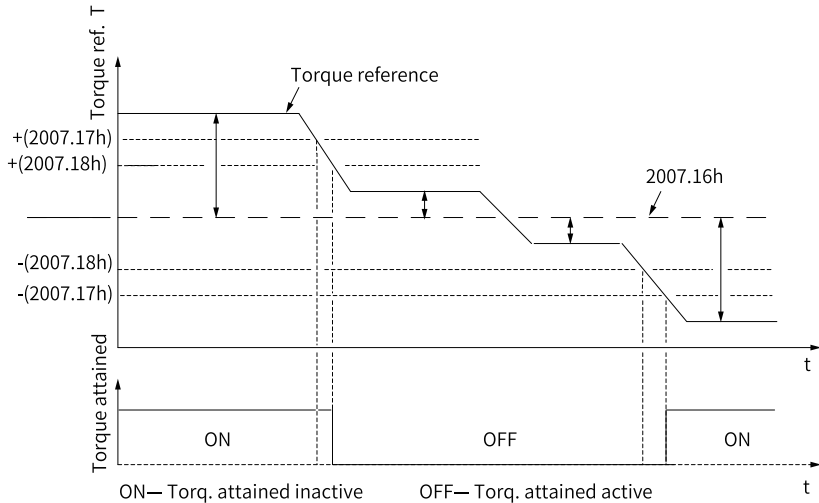
You can change the torque reference direction through setting the torque reference polarity.

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
607Eh	607Eh	Reference polarity	0 to 127	0	-	Real-time	"607Eh" on page 346

Monitoring on torque reach

It is used to determine whether the torque reference value reaches the set torque base value. If yes, a corresponding torque reach signal will be output to the host controller.



If the absolute difference between the torque reference and 2007.16h (Base value for torque reach) is higher than 2007.17h (Threshold for valid torque reach), the torque reach signal is active. Otherwise, the original status applies.

If the absolute difference between the torque reference and 2007.16h (Base value for torque reach) is lower than 2007.18h (Threshold for invalid torque reach), the torque reach signal is inactive. Otherwise, the original status applies.

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H07.21	2007-16h	Torque reach base value	0.0% to 400.0%	0.0	%	Real-time	"H07_en.21" on page 213
H07.22	2007-17h	Output torque upon torque reach and DO signal activation	0.0% to 400.0%	20.0	%	Real-time	"H07_en.22" on page 213
H07.23	2007-18h	Output torque upon torque reach and DO signal deactivation	0.0% to 400.0%	10.0	%	Real-time	"H07_en.23" on page 214

2.10 Homing Mode (HM)

The homing mode is used to search for the mechanical home and determine the position relation between the mechanical home and mechanical zero.

- Mechanical home: A fixed position on the machine, which can correspond to a certain home switch or motor Z signal.
- Mechanical zero: absolute zero point on the machine

After homing is done, the motor stops at the mechanical home. The relation between the mechanical home and mechanical zero can be set in 607Ch.

Mechanical home = Mechanical zero + 607Ch (Home offset)

When 607Ch = 0, the mechanical home coincide with the mechanical zero.

2.10.1 Configuration Block Diagram

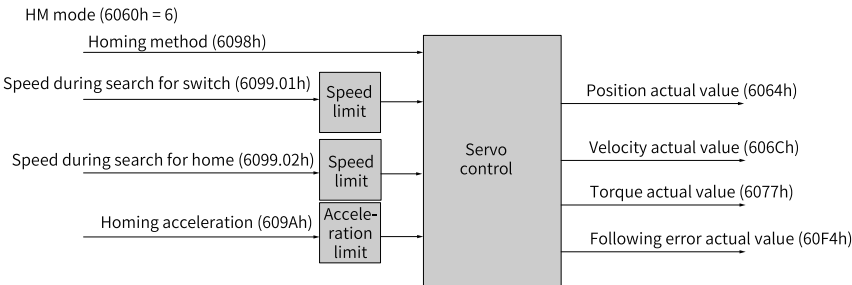


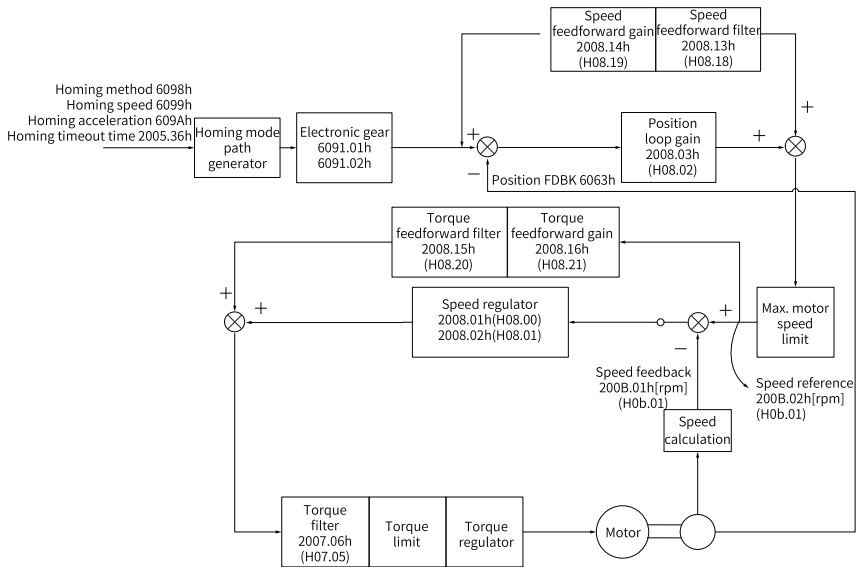
Figure 2-11 HM mode

2.10.2 Recommended Configuration

The basic configuration for the homing mode is shown in the following table.

RPDO	TPDO	Remarks
6040h: control word	6041h: status word	Mandatory
6098h: homing method	-	Optional
6099.01h: speed during search for switch	-	Optional
6099.02h: speed during search for zero	-	Optional
609Ah: homing acceleration	-	Optional
-	6064h: position actual value	Optional
6060h: modes of operation	6061h: modes of operation display	Optional

2.10.3 Function Block Diagram



2.10.4 Related Parameters

6040h Control word

Address: -

Min.: 0

Max.: 65535

Default: 0

Value Range:

0 to 65535

Description

Defines the control command.

Effective mode:

Unit: -

Data Type: UInt16

Change: Real-time

bit	Name		Description
0	Switch on	Switch on	1: Active, 0: Inactive
1	Enable voltage	Enable voltage	1: Active, 0: Inactive
2	Quick stop	Quick stop	0: Active, 1: Inactive
3	Enable operation	Enable operation	1: Active, 0: Inactive
8	Halt	Halt	0: Keep present operating state 1: Halt

6041h Status word

Address: -

Effective -

mode:

Min.: 0

Unit: -

Max.: 65535

Data Type: UInt16

Default: 0

Change: Unchangeable

Value Range:

0 to 65535

Description

Indicates the servo drive status.

Table 2-7 Description of each bit of 6041h

bit	Name		Description
0	Ready to switch on	Ready to switch on	1: Active, 0: Inactive
1	Switch on	Switch on	1: Active, 0: Inactive
2	Enable operation	Enable operation	1: Active, 0: Inactive
3	Fault	Fault	1: Active, 0: Inactive
4	Voltage enabled	Voltage enabled	1: Active, 0: Inactive
5	Quick stop	Quick stop	0: Active, 1: Inactive
6	Switch on disabled	Switch on disabled	1: Active, 0: Inactive
7	Warning	Warning	1: Active, 0: Inactive
8	Manufacturer specific	Manufacturer specific	Undefined
9	Remote	Remote	1: Active, control word effective 0: Inactive
10	Target reach	Target reach	1: Home located or homing interrupted
12	Homing attained	Homing attained	0: Home signal not found 1: Home signal found
13	Homing error	Homing error	0: Homing error not occurred 1: Homing error occurred
15	Homing is completed.	Home Find	0: Home not found 1: Home found

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
6040h	6040h	Control word	0 to 65535	0	-	Real-time	"6040h" on page 333
6041h	6041h	Status word	0 to 65535	0	-	Unchangeable	"6041h" on page 334

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
6060h	6060h	Servo drive mode	1: Profile position (PP) mode 3: Profile velocity (PV) mode 4: Profile torque (PT) mode 6: Homing (HM) mode 8: CSP mode 9: CSV mode 10: CST mode	0	-	Real-time	"6060h" on page 337
6061h	6061h	Operation mode display	1: Profile position (PP) mode 3: Profile velocity (PV) mode 4: Profile torque (PT) mode 6: Homing (HM) mode 8: CSP mode 9: CSV mode 10: CST mode	0	-	Unchangeable	"6061h" on page 338
6065h	6065h	Following error window	0 to 4294967295	27486951	Reference unit	Real-time	"6065h" on page 340
6066h	6066h	Defines the time lapse to trigger excessive position deviation (EB00.0).	0ms to 65535ms	0	ms	Real-time	"6066h" on page 340
607Ch	607Ch	Home offset	-2147483648 to 2147483647	0	Reference unit	Real-time	"607Ch" on page 344
607Fh	607Fh	Max. speed	0 to 4294967295	838860800	Reference unit/s	Real-time	"607Fh" on page 346
6098h	6098h	Homing method	-3 to 35	1	-	Real-time	"6098h" on page 349
6099.01h	6099-01h	Speed during search for switch	0 to 4294967295	13981013	Reference unit/s	At stop	"6099_en.01h" on page 351
6099.02h	6099-02h	Speed during search for zero	0 to 4294967295	1398101	Reference unit/s	At stop	"6099_en.02h" on page 351
609Ah	609Ah	Homing acceleration	0 to 4294967295	1398101333	Reference unit/s ²	Real-time	"609Ah" on page 351
60E6h	60E6h	Actual position calculation method	0 to 1	0	-	Real-time	"60E6h" on page 369

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
60C5h	60C5h	Max. acceleration	0 to 4294967295	4294967295	Reference unit/s ²	Real-time	"60C5h" on page 358
H05.35	2005-24h	Home search time limit	0.0s to 6553.5s	5000.0	-	Real-time	"H05_en.35" on page 202

2.10.5 Related Functions

Homing timeout

When the homing duration exceeds the value defined by 2005.24h (H05.35 Homing time limit), the servo drive reports E601.0 (Homing timeout).

E601.0 can be used to determine whether the homing speed, the acceleration setpoint are proper and whether the deceleration point signal and home signal are connected properly.

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H05.35	2005-24h	Home search time limit	0.0s to 6553.5s	5000.0	-	Real-time	"H05_en.35" on page 202

Actual position calculation method

After homing, the calculation method for current mechanical position can be set in 60E6h.

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
607Ch	607Ch	Home offset	-2147483648 to 2147483647	0	Reference unit	Real-time	"607Ch" on page 344
60E6h	60E6h	Actual position calculation method	0 to 1	0	-	Real-time	"60E6h" on page 369

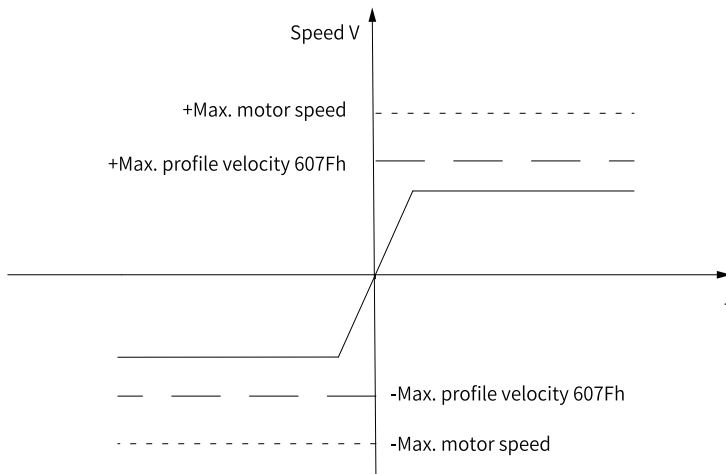
Position deviation monitoring function

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
6065h	6065h	Following error window	0 to 4294967295	2748695 1	Refer ence unit	Real-time	"6065h" on page 340
6066h	6066h	Defines the time lapse to trigger excessive position deviation (EB00.0).	0ms to 65535ms	0	ms	Real-time	"6066h" on page 340

Speed limit

In the HM mode, 607Fh can be used to limit the maximum speed in forward/reverse operation. Note that the maximum operating speed of the motor cannot be exceeded.



☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
607Fh	607Fh	Max. speed	0 to 4294967295	8388608 00	Refer ence unit/s	Real-time	"607Fh" on page 346

Acceleration limit

In the homing mode, the change rate of position references can be limited through the acceleration limit.

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
60C5h	60C5h	Max. acceleration	0 to 4294967295	4294967295	Reference unit/s ²	Real-time	"60C5h" on page 358

2.10.6Description of Homing Modes

6098h = 1

Mechanical home: Z signal

Deceleration point: negative limit switch (N-OT)

- N-OT signal inactive at start

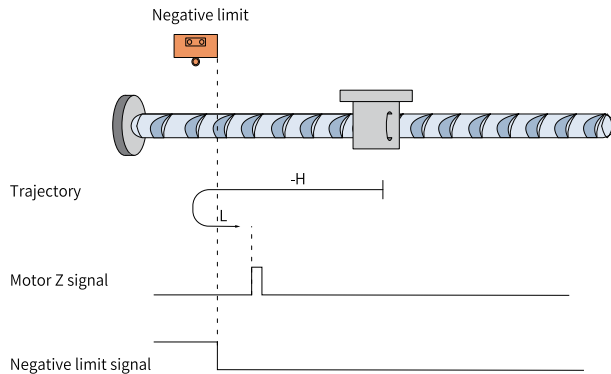


Figure 2-12 N-OT signal inactive at start

Note

Note: In the figure, "H" represents 6099.01h, and "L" represents 6099.02h.

The N-OT signal is inactive at start, and the motor starts homing in the reverse direction at high speed. After reaching the rising edge of the N-OT signal, the motor decelerates and changes to run in the forward direction at low speed until it stops at the first Z signal after reaching the falling edge of the N-OT signal.

- HW signal active at start

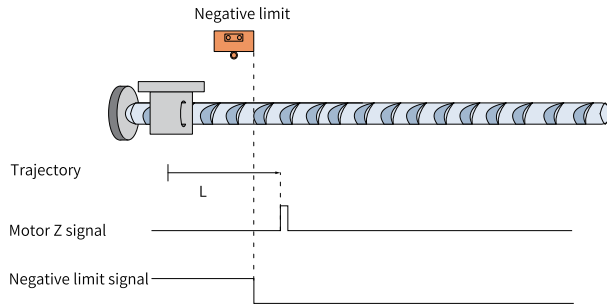


Figure 2-13 HW signal active at start

The N-OT signal is active at start and homing starts in the forward direction at low speed. After reaching the falling edge of the N-OT signal, the motor stops at the first motor Z signal.

6098h = 2

Home: Z signal

Deceleration point: positive limit switch (P-OT)

- N-OT signal inactive at start

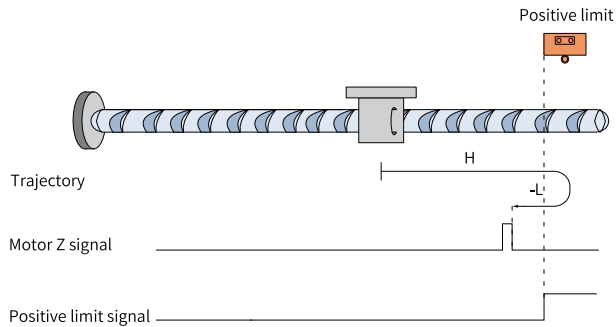


Figure 2-14 N-OT signal inactive at start

The P-OT signal is inactive at start and homing starts in the forward direction at high speed. After reaching the rising edge of the P-OT signal, the motor decelerates and changes to run in the reverse direction at low speed until it stops at the first Z signal after reaching the falling edge of the P-OT signal.

- HW signal active at start

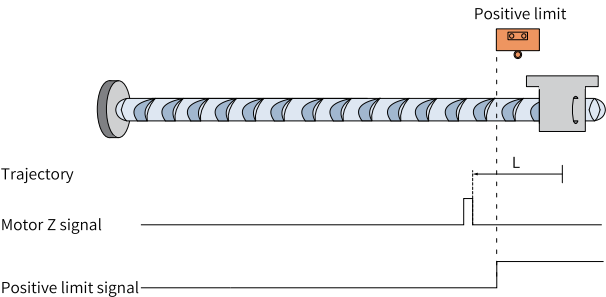


Figure 2-15 HW signal active at start

The P-OT signal is active at start, and the motor starts homing in the reverse direction at low speed. After reaching the falling edge of the P-OT signal, the motor stops at the first Z signal.

6098h = 3

Home: Z signal

Deceleration point: home switch (HW)

- N-OT signal inactive at start

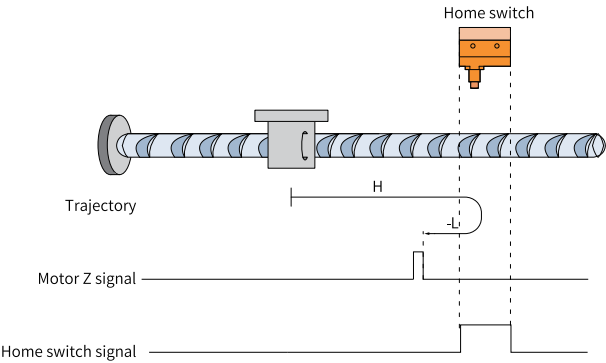


Figure 2-16 N-OT signal inactive at start

The HW signal is inactive at start, and the motor starts homing in the forward direction at high speed. After reaching the rising edge of the HW signal, the motor decelerates and changes to run in the reverse direction at low speed until it stops at the first Z signal after reaching the falling edge of the HW signal.

- HW signal active at start

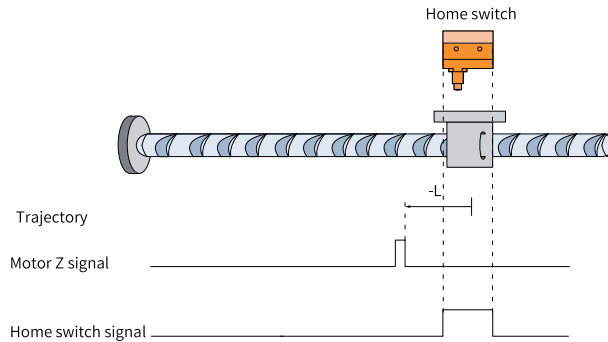


Figure 2-17 HW signal active at start

The HW signal is active at start, and the motor starts homing in the reverse direction at low speed. After reaching the falling edge of the HW signal, the motor stops at the first Z signal.

6098h = 4

Home: Z signal

Deceleration point: home switch (HW)

- N-OT signal inactive at start

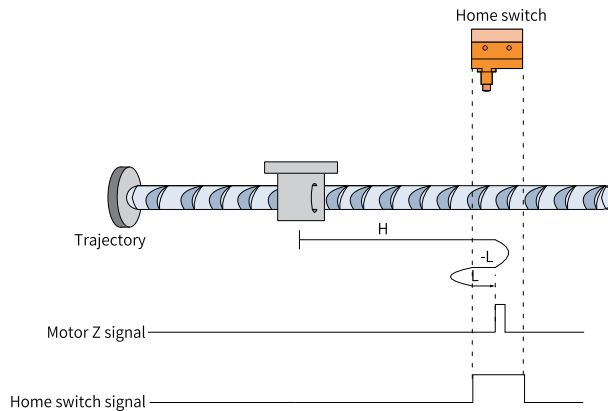


Figure 2-18 N-OT signal inactive at start

The HW signal is inactive at start and homing starts in the forward direction at high speed. After reaching the rising edge of the HW signal, the motor decelerates and changes to run in the reverse direction at low speed. Then, after reaching the falling edge of the HW signal, the motor decelerates and changes to run in the

forward direction until it stops at the first Z signal after reaching the rising edge of the HW signal.

- HW signal active at start

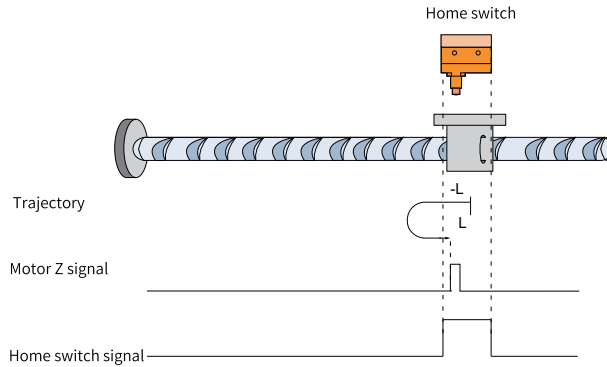


Figure 2-19 HW signal active at start

The HW signal is active at start, and the motor starts homing in the reverse direction at low speed. After reaching the falling edge of the HW signal, the motor decelerates and changes to run in the forward direction until it stops at the first Z signal after reaching the rising edge of the HW signal.

6098h = 5

Home: Z signal

Deceleration point: home switch (HW)

- N-OT signal inactive at start

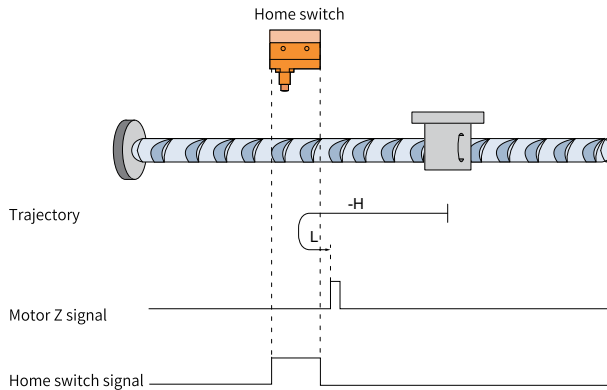


Figure 2-20 HW signal active at start

The HW signal is inactive at start, and the motor starts homing in the reverse direction at high speed. After reaching the rising edge of the HW signal, the motor decelerates and changes to run in the forward direction at low speed until it stops at the first Z signal after reaching the falling edge of the HW signal.

- HW signal active at start

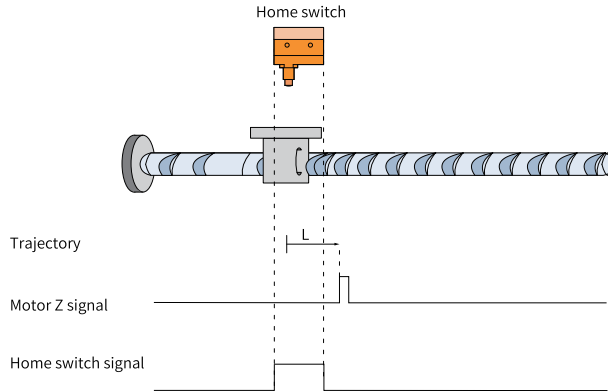


Figure 2-21 HW signal active at start

The HW signal is active at start, and the motor starts homing in the forward direction at low speed. After reaching the falling edge of the HW signal, the motor stops at the first Z signal.

6098h = 6

Home: Z signal

Deceleration point: home switch (HW)

- N-OT signal inactive at start

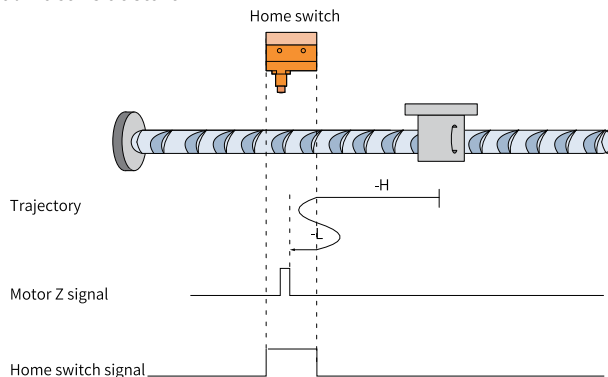


Figure 2-22 N-OT signal inactive at start

The HW signal is inactive at start, and the motor starts homing in the reverse direction at high speed. After reaching the rising edge of the HW signal, the motor decelerates and changes to run in the forward direction at low speed. Then, after reaching the falling edge of the HW signal, the motor changes to run in the reverse direction at low speed until it stops at the first Z signal after reaching the rising edge of the HW signal.

- HW signal active at start

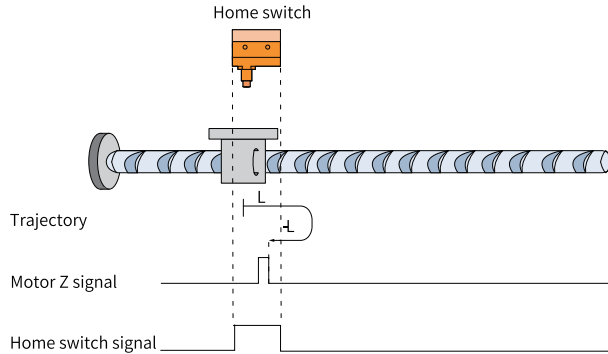


Figure 2-23 HW signal active at start

The HW signal is active at start, and the motor starts homing in the forward direction at low speed. After reaching the falling edge of the HW signal, the motor decelerates and changes to run in the reverse direction at low speed until it stops at the first Z signal after reaching the rising edge of HW signal.

6098h = 7

Home: Z signal

Deceleration point: home switch (HW)

- HW signal inactive at start, positive limit switch not hit

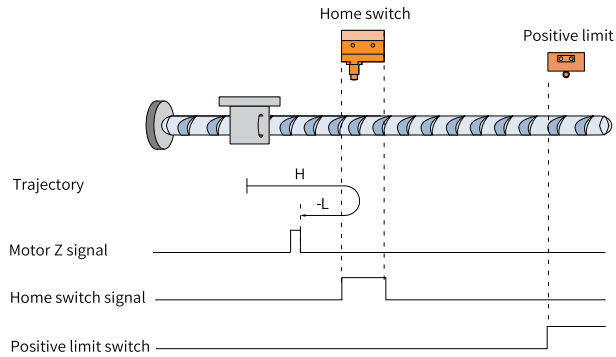


Figure 2-24 HW signal inactive at start, positive limit switch not hit

The HW signal is inactive at start, and the motor starts homing in the forward direction at high speed. If the axis does not hit the limit switch, the motor decelerates and changes to run in the reverse direction at low speed after reaching the rising edge of the HW signal. Then, after reaching the falling edge of the HW signal, the motor stops at the first Z signal.

- HW signal inactive at start, positive limit switch being hit

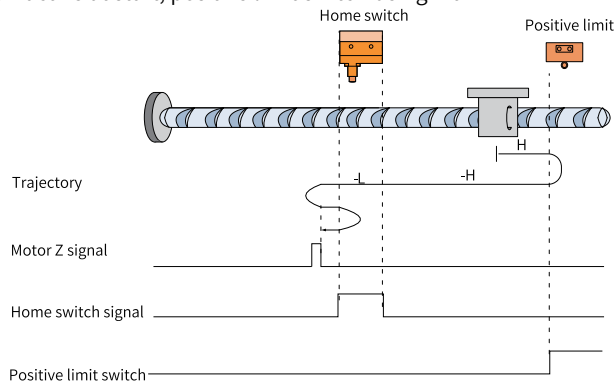


Figure 2-25 HW signal inactive at start, positive limit switch being hit

The HW signal is inactive at start, and the motor starts homing in the forward direction at high speed. If the axis hits the limit switch, the motor changes to run in the reverse direction at high speed. After reaching the rising edge of the HW signal, the motor decelerates and runs in the reverse direction at low speed. Then, after reaching the falling edge of the HW signal, the motor decelerates and changes to run in the forward direction at low speed until it reaches the rising edge of HW signal. After that it changes to run in the reverse direction at low

speed. Finally, the motor stops at the first Z signal after reaching the falling edge of the HW signal.

- HW signal active at start

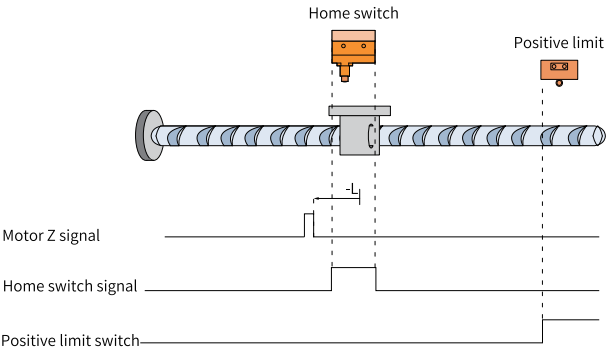


Figure 2-26 HW signal active at start

The HW signal is active at start, and the motor starts homing in the reverse direction at low speed. After reaching the falling edge of the HW signal, the motor stops at the first Z signal.

6098h = 8

Home: Z signal

Deceleration point: home switch (HW)

- HW signal inactive at start, positive limit switch not hit

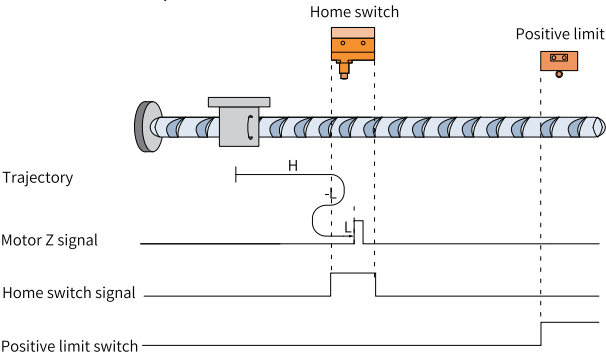


Figure 2-27 HW signal inactive at start, positive limit switch not hit

The HW signal is inactive at start, and the motor starts homing in the forward direction at high speed. If the axis does not hit the limit switch, the motor decelerates and changes to run in the reverse direction at low speed after reaching

the rising edge of the HW signal. Then, after reaching the falling edge of the HW signal, the motor changes to run in the forward direction at low speed until it stops at the first Z signal after reaching the rising edge of the HW signal.

- HW signal inactive at start, positive limit switch being hit

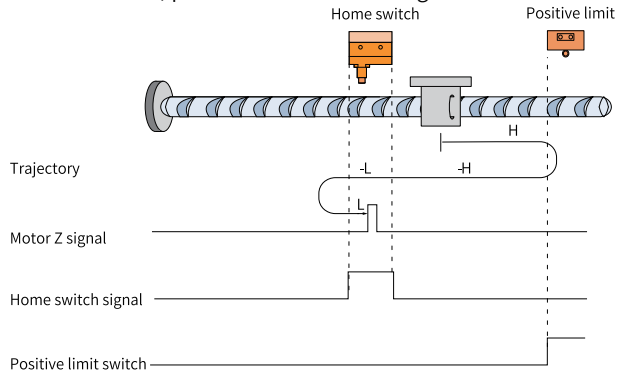


Figure 2-28 HW signal inactive at start, positive limit switch being hit

The HW signal is inactive at start, and the motor starts homing in the forward direction at high speed. If the axis hits the limit switch, the motor changes to run in the reverse direction at high speed. After reaching the rising edge of HW signal, the motor decelerates and continues running in the reverse direction at low speed. Then, after reaching the falling edge of the HW signal, the motor changes to run in the forward direction at low speed until it stops at the first motor Z signal after reaching the rising edge of the HW signal.

- HW signal active at start

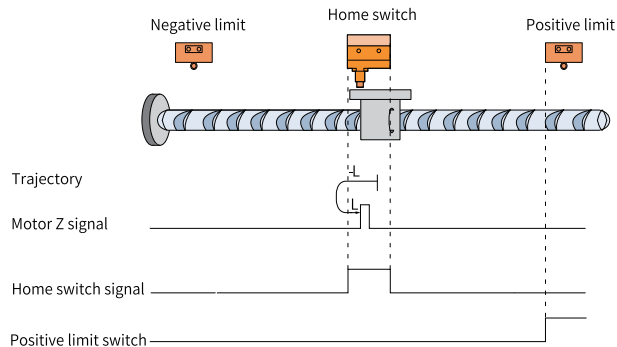


Figure 2-29 HW signal active at start

The HW signal is active at start, and the motor starts homing in the reverse direction at low speed. After reaching the falling edge of HW signal, the motor changes to run in the forward direction at low speed until it stops at the first Z signal after reaching the rising edge of HW signal.

6098h = 9

Home: Z signal

Deceleration point: home switch (HW)

- HW signal inactive at start, positive limit switch not hit

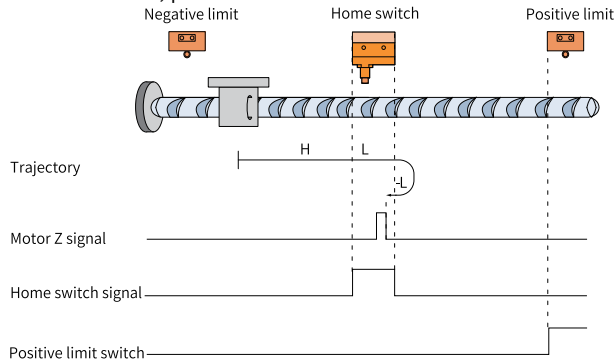


Figure 2-30 HW signal inactive at start, positive limit switch not hit

The HW signal is inactive at start, and the motor starts homing in the forward direction at high speed. If the axis does not hit the limit switch, the motor decelerates and runs in the forward direction at low speed after reaching the rising edge of the HW signal. Then, after reaching the falling edge of the HW signal, the motor changes to run in the reverse direction at low speed until it stops at the first Z signal after reaching the rising edge of the HW signal.

- HW signal inactive at start, positive limit switch being hit

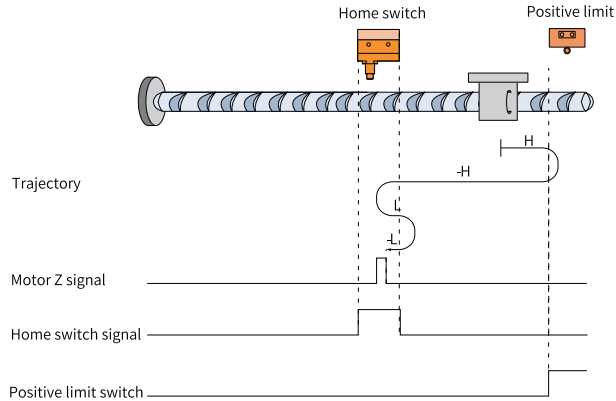


Figure 2-31 HW signal inactive at start, positive limit switch being hit

The HW signal is inactive at start, and the motor starts homing in the forward direction at high speed. If the axis hits the limit switch, the motor changes to run in the reverse direction. After reaching the rising edge of the HW signal, the motor decelerates and changes to run in the forward direction at low speed. Then after reaching the falling edge of the HW signal, the motor changes to run in the reverse direction at low speed. Finally, the motor stops at the first Z signal after reaching the rising edge of HW signal.

- HW signal active at start

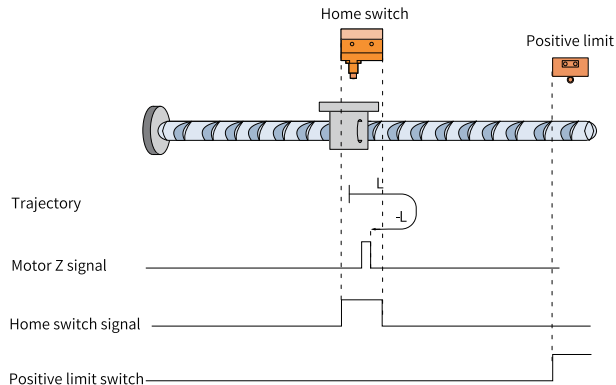


Figure 2-32 HW signal active at start

The HW signal is active at start and homing starts in the forward direction at low speed. After reaching the falling edge of the HW signal, the motor changes to run in the reverse direction until it stops at the first Z signal after reaching the rising edge of the HW signal.

6098h = 10

Home: Z signal

Deceleration point: home switch (HW)

- HW signal inactive at start, positive limit switch not hit

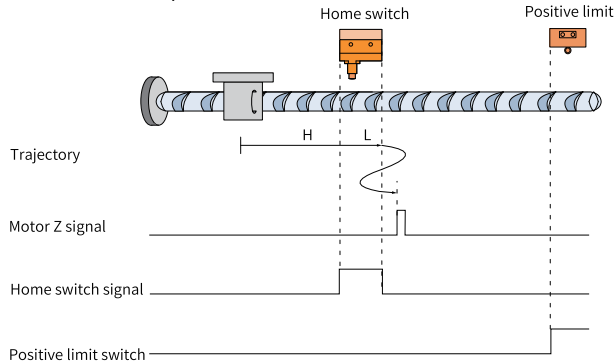


Figure 2-33 HW signal inactive at start, positive limit switch not hit

The HW signal is inactive at start, and the motor starts homing in the forward direction at high speed. If the axis does not hit the limit switch, the motor decelerates and runs in the forward direction at low speed after reaching the rising edge of HW signal. After reaching the falling edge of the HW signal, the motor decelerates and changes to run in the reverse direction at low speed until it reaches the rising edge of the HW signal. After that, it changes to run in the forward direction at low speed. Finally, it stops at the first Z signal after reaching the falling edge of the HW signal.

- HW signal inactive at start, positive limit switch being hit

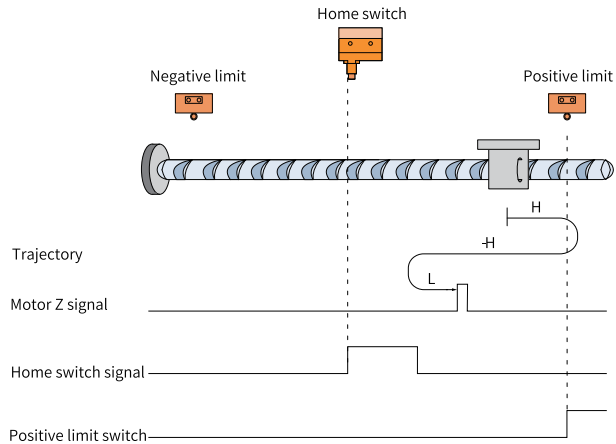


Figure 2-34 HW signal inactive at start, positive limit switch being hit

The HW signal is inactive at start, and the motor starts homing in the forward direction at high speed. If the axis hits the limit switch, the motor changes to run in the reverse direction. After reaching the rising edge of the HW signal, the motor decelerates and changes to run in the forward direction at low speed until it stops at the first Z signal after reaching the falling edge of the HW signal.

- HW signal active at start

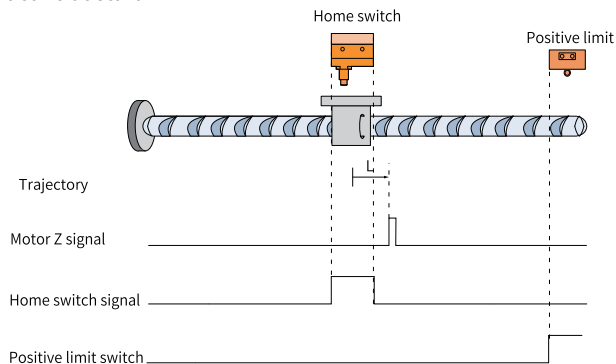


Figure 2-35 HW signal active at start

The HW signal is active at start, and the motor starts homing in the forward direction at low speed. After reaching the falling edge of the HW signal, the motor stops at the first Z signal.

6098h = 11

Home: Z signal

Deceleration point: home switch (HW)

- Deceleration point signal inactive at start, not hitting the negative limit switch

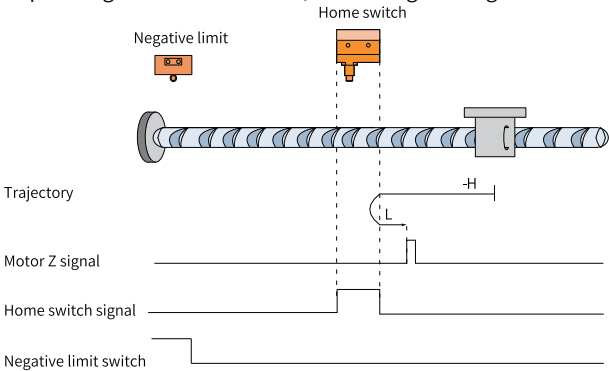


Figure 2-36 Deceleration point signal inactive at start, not hitting the negative limit switch

The HW signal is inactive at start, and the motor starts homing in the reverse direction at high speed. If the axis does not hit the limit switch, the motor decelerates and changes to run in the forward direction at low speed after reaching the rising edge of the HW signal. Then, after reaching the falling edge of the HW signal, the motor stops at the first Z signal.

- Deceleration point signal inactive at start, negative limit switch not hit

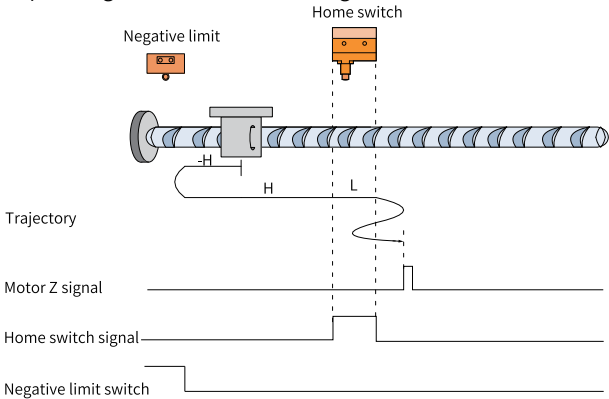


Figure 2-37 Deceleration point signal inactive at start, negative limit switch not hit

The HW signal is inactive at start, and the motor starts homing in the reverse direction at high speed. If the axis hits the limit switch, the motor changes to run in the forward direction. After reaching the rising edge of the HW signal, the motor decelerates and runs in the forward direction at low speed. Then, after reaching the falling edge of the HW signal, the motor decelerates and changes to run in the reverse direction at low speed until reaching the rising edge of the HW signal where it decelerates and changes to run in the forward direction at low speed. Finally, the motor stops at the first Z signal after reaching the falling edge of the HW signal.

- HW signal active at start

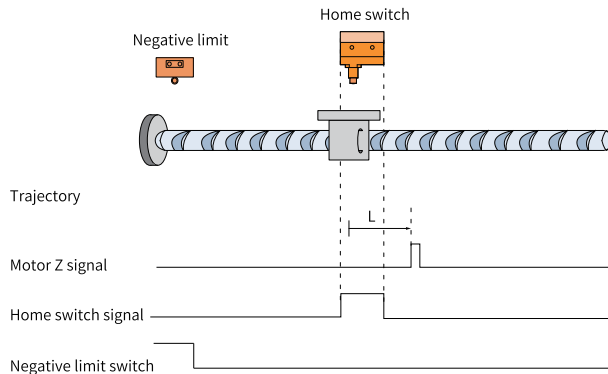


Figure 2-38 HW signal active at start

The HW signal is active at start, and the motor starts homing in the forward direction at low speed. After reaching the falling edge of the HW signal, the motor stops at the first Z signal.

6098h = 12

Home: Z signal

Deceleration point: home switch (HW)

- Deceleration point signal inactive at start, not hitting the negative limit switch

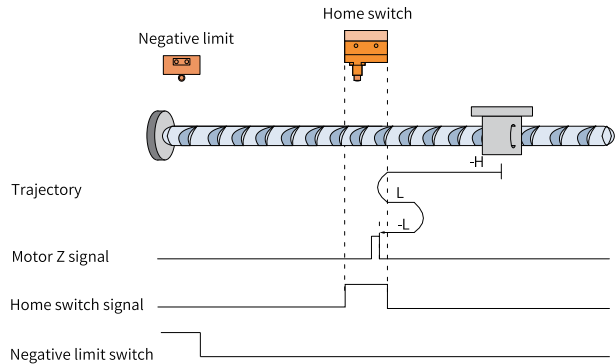


Figure 2-39 Deceleration point signal inactive at start, not hitting the negative limit switch

The HW signal is inactive at start, and the motor starts homing in the reverse direction at high speed. If the axis does not hit the limit switch, the motor decelerates and changes to run in the forward direction at low speed after reaching the rising edge of the HW signal. Then, after reaching the falling edge of HW signal, the motor changes to run in the reverse direction at low speed until it stops at the first Z signal after reaching the rising edge of the HW signal.

- HW signal inactive at start, positive limit switch being hit

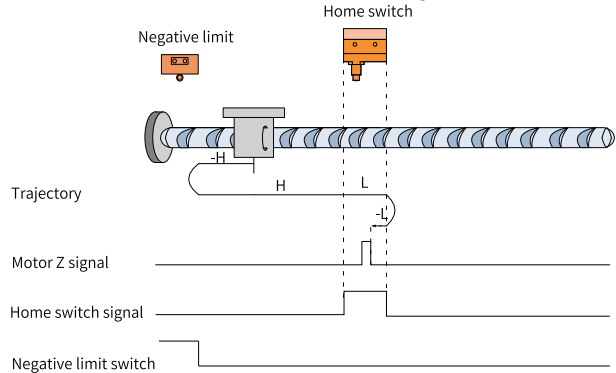


Figure 2-40 HW signal inactive at start, positive limit switch being hit

The HW signal is inactive at start, and the motor starts homing in the reverse direction at high speed. If the axis hits the limit switch, the motor changes to run in the forward direction at high speed. After reaching the rising edge of HW signal, the motor decelerates and runs in the forward direction at low speed. Then, after reaching the falling edge of HW signal, the motor changes to run in the reverse

direction at low speed until it stops at the first Z signal after reaching the rising edge of the HW signal.

- HW signal active at start

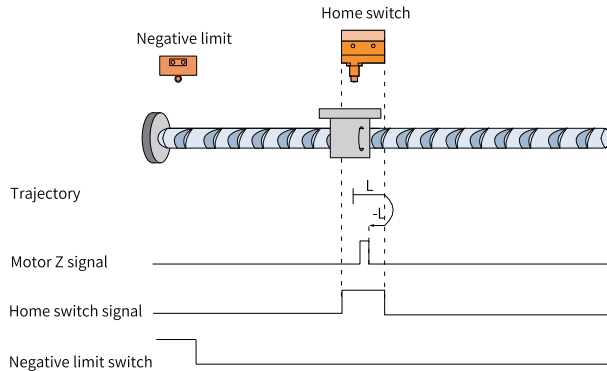


Figure 2-41 HW signal active at start

The HW signal is active at start, and the motor starts homing in the forward direction at low speed. After reaching the falling edge of the HW signal, the motor changes to run in the reverse direction at low speed until it stops at the first Z signal after reaching the rising edge of the HW signal.

6098h = 13

Home: Z signal

Deceleration point: home switch (HW)

- Deceleration point signal inactive at start, not hitting the negative limit switch

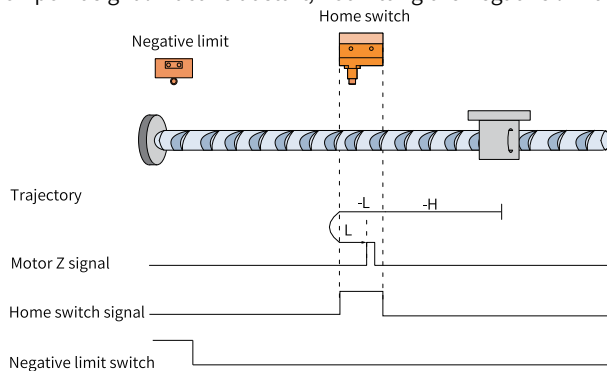


Figure 2-42 Deceleration point signal inactive at start, not hitting the negative limit switch

The HW signal is inactive at start, and the motor starts homing in the reverse direction at high speed. If the axis does not hit the limit switch, the motor decelerates and changes to run in the reverse direction at low speed after reaching the rising edge of the HW signal. Then, after reaching the falling edge of the HW signal, the motor changes to run in the forward direction at low speed until it stops at the first Z signal after reaching the rising edge of the HW signal.

- Deceleration point signal inactive at start, negative limit switch not hit

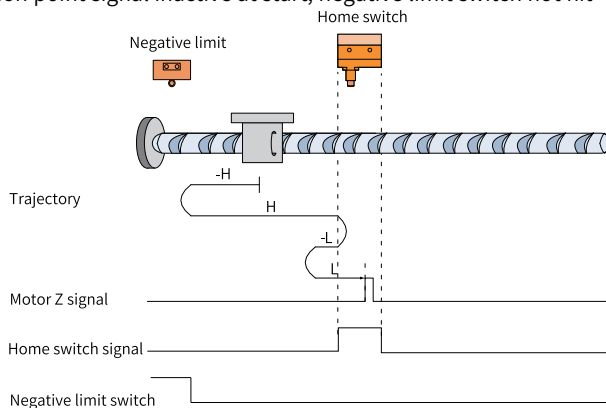


Figure 2-43 Deceleration point signal inactive at start, negative limit switch not hit

The HW signal is inactive at start, and the motor starts homing in the reverse direction at high speed. If the axis hits the limit switch, the motor changes to run in the forward direction at high speed. After reaching the rising edge of the HW signal, the motor decelerates and changes to run in the reverse direction at low speed. Then, after reaching the falling edge of the HW signal, the motor changes to run in the forward direction at low speed until it stops at the first Z signal after reaching the rising edge of the HW signal.

- HW signal active at start

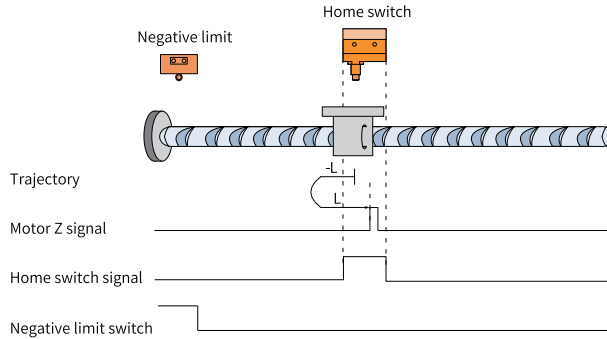


Figure 2-44 HW signal active at start

The HW signal is active at start, and the motor starts homing in the reverse direction at low speed. After reaching the falling edge of the HW signal, the motor changes to run in the forward direction at low speed until it stops at the first Z signal after reaching the rising edge of the HW signal.

6098h = 14

Home: Z signal

Deceleration point: home switch (HW)

- Deceleration point signal inactive at start, not hitting the negative limit switch

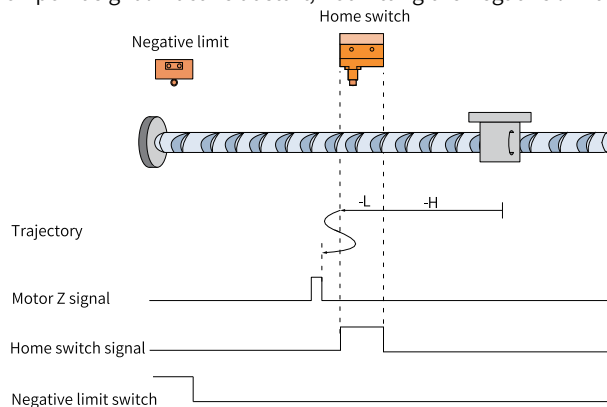


Figure 2-45 Deceleration point signal inactive at start, not hitting the negative limit switch

The HW signal is inactive at start, and the motor starts homing in the reverse direction at high speed. If the axis does not hit the limit switch, the motor decelerates and runs in the reverse direction at low speed after reaching the rising edge of the HW signal.

edge of HW signal. Then, after reaching the falling edge of HW signal, the motor decelerates and changes to run in the forward direction at low speed until reaching the rising edge of the HW signal where it decelerates and changes to run in the reverse direction at low speed. Finally, the motor stops at the first Z signal after reaching the falling edge of the HW signal.

- Deceleration point signal inactive at start, negative limit switch not hit

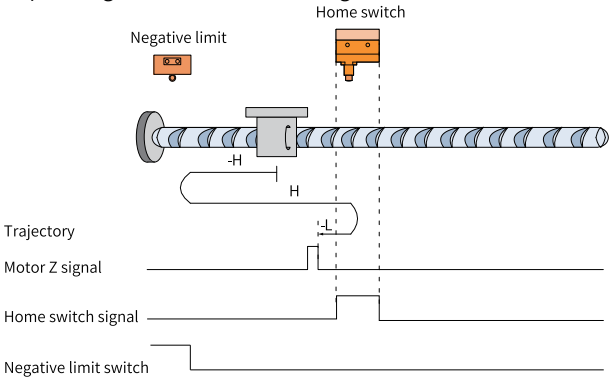


Figure 2-46 Deceleration point signal inactive at start, negative limit switch not hit

The HW signal is inactive at start, and the motor starts homing in the reverse direction at high speed. If the axis hits the limit switch, the motor changes to run in the forward direction at high speed. After reaching the rising edge of the HW signal, the motor decelerates and changes to run in the reverse direction at low speed until it stops at the first Z signal after reaching the falling edge of the HW signal.

- HW signal active at start

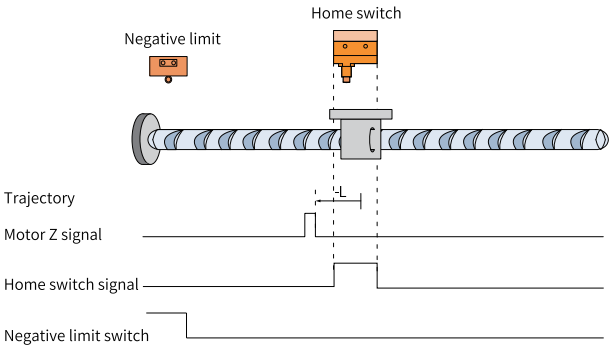


Figure 2-47 HW signal active at start

The HW signal is active at start, and the motor starts homing in the reverse direction at low speed. After reaching the falling edge of the HW signal, the motor stops at the first Z signal.

6098h = 17

Home: negative limit switch

Deceleration point: negative limit switch

- N-OT signal inactive at start

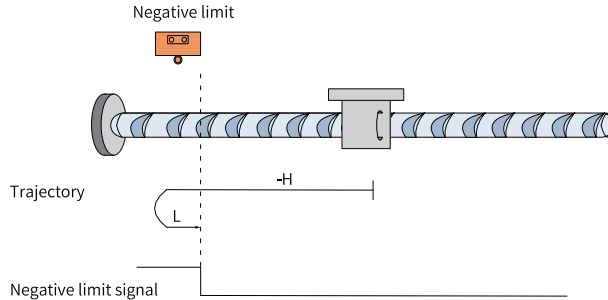


Figure 2-48 N-OT signal inactive at start

The N-OT signal is inactive at start and homing starts in the reverse direction at high speed. After reaching the rising edge of the N-OT signal, the motor decelerates and changes to run in the forward direction at low speed until it stops after reaching the falling edge of the N-OT signal.

- HW signal active at start

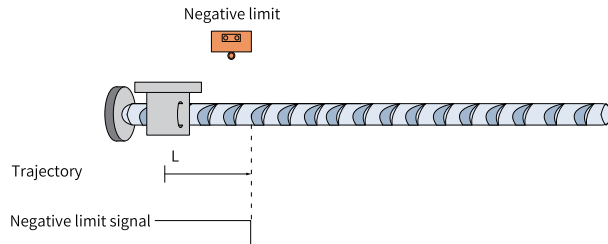


Figure 2-49 HW signal active at start

The N-OT signal is active at start, and the motor starts homing in the forward direction at low speed. After reaching the falling edge of the N-OT signal, the motor stops.

6098h = 18

Home: positive limit switch

Deceleration point: positive limit switch

- N-OT signal inactive at start

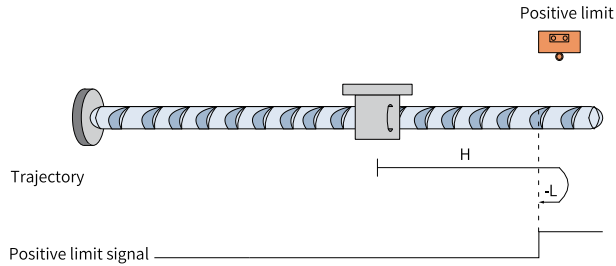


Figure 2-50 N-OT signal inactive at start

The P-OT signal is inactive at start, and the motor starts homing in the forward direction at high speed. After reaching the rising edge of the P-OT signal, the motor decelerates and changes to run in the reverse direction at low speed until it stops after reaching the falling edge of the P-OT signal.

- HW signal active at start

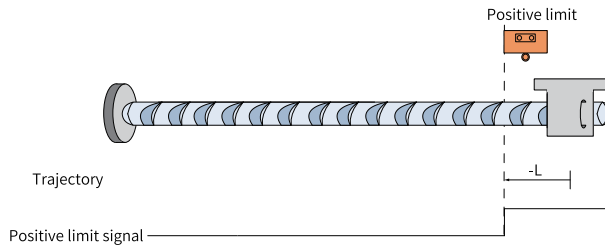


Figure 2-51 HW signal active at start

The P-OT signal is active at start, and the motor starts homing in the reverse direction at low speed. After reaching the falling edge of the P-OT signal, the motor stops.

6098h = 19

Home: home switch (HW)

Deceleration point: home switch (HW)

- N-OT signal inactive at start

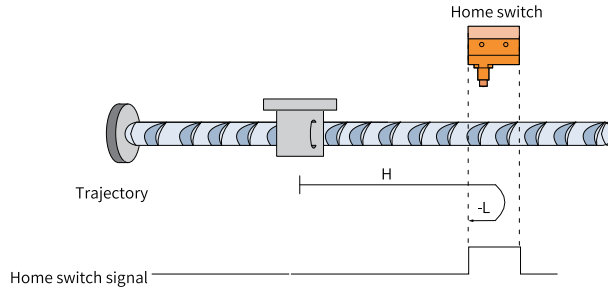


Figure 2-52 N-OT signal inactive at start

The HW signal is inactive at start, and the motor starts homing in the forward direction at high speed. After reaching the rising edge of the HW signal, the motor decelerates and changes to run in the reverse direction at low speed until it stops after reaching the falling edge of the HW signal.

- HW signal active at start

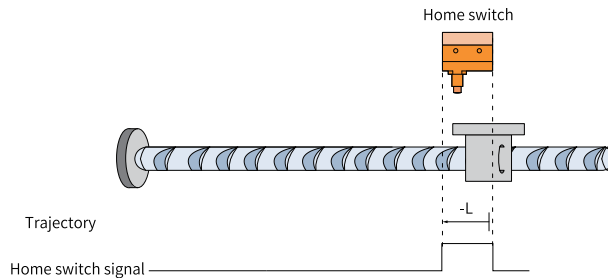


Figure 2-53 HW signal active at start

The HW signal is active at start, and the motor starts homing in the reverse direction at low speed. After reaching the falling edge of the HW signal, the motor stops.

6098h = 20

Home: home switch (HW)

Deceleration point: home switch (HW)

- N-OT signal inactive at start

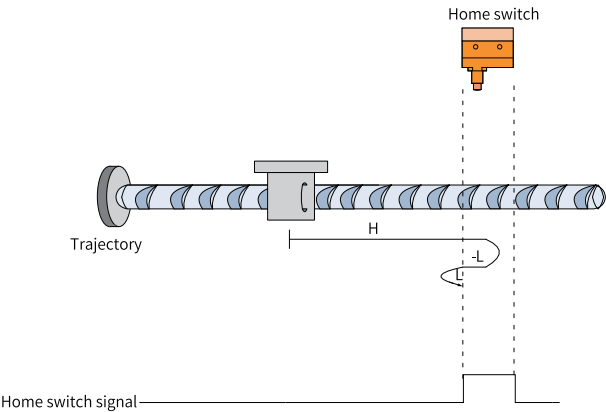


Figure 2-54 N-OT signal inactive at start

The HW signal is inactive at start, and the motor starts homing in the forward direction at high speed. After reaching the rising edge of the HW signal, the motor decelerates and changes to run in the reverse direction at low speed. Then, after reaching the falling edge of the HW signal, the motor decelerates and changes to run in the forward direction at low speed until it stops after reaching the rising edge of the HW signal.

- HW signal active at start

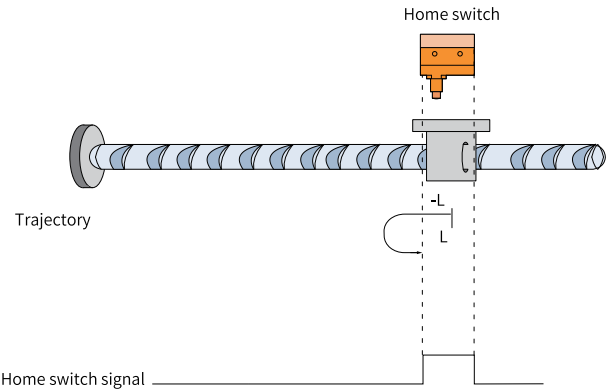


Figure 2-55 HW signal active at start

The HW signal is active at start, and the motor starts homing in the reverse direction at low speed. After reaching the falling edge of the HW signal, the motor decelerates and changes to run in the forward direction at low speed until it stops after reaching the rising edge of the HW signal.

6098h = 21

Home: home switch (HW)

Deceleration point: home switch (HW)

- N-OT signal inactive at start

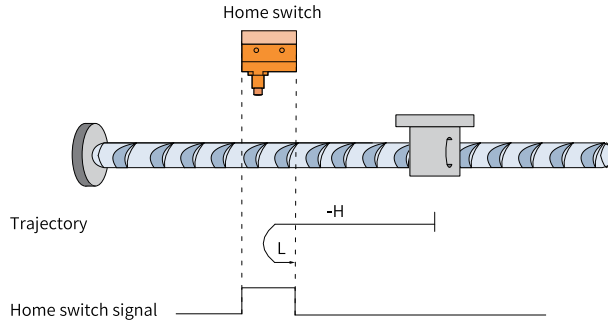


Figure 2-56 N-OT signal inactive at start

The HW signal is inactive at start, and the motor starts homing in the reverse direction at high speed. After reaching the rising edge of the HW signal, the motor decelerates and changes to run in the forward direction at low speed until it stops after reaching the falling edge of the HW signal.

- HW signal active at start

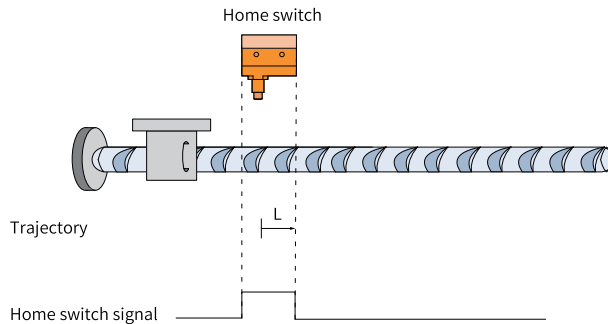


Figure 2-57 HW signal active at start

The HW signal is active at start, and the motor starts homing in the forward direction at low speed. After reaching the falling edge of the HW signal, the motor stops.

6098h = 22

Home: home switch (HW)

Deceleration point: home switch (HW)

- N-OT signal inactive at start

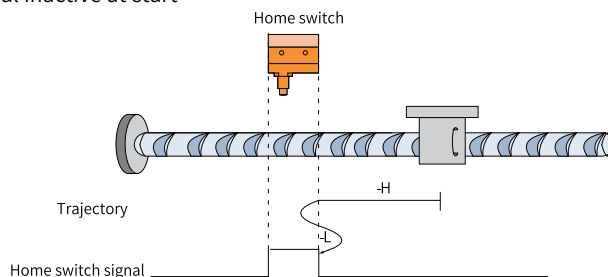


Figure 2-58 N-OT signal inactive at start

The HW signal is inactive at start, and the motor starts homing in the reverse direction at high speed. After reaching the rising edge of the HW signal, the motor decelerates and changes to run in the forward direction at low speed. Then, after reaching the falling edge of the HW signal, the motor changes to run in the reverse direction at low speed until it stops at the first Z signal after reaching the rising edge of the HW signal.

- HW signal active at start

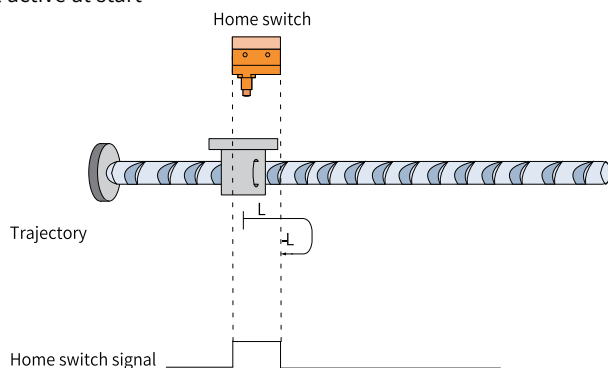


Figure 2-59 HW signal active at start

The HW signal is active at start, and the motor starts homing in the forward direction at low speed. After reaching the falling edge of the HW signal, the motor decelerates and changes to run in the reverse direction at low speed until it stops after reaching the rising edge of the HW signal.

6098h = 23

Home: home switch (HW)

Deceleration point: home switch (HW)

- HW signal inactive at start, positive limit switch not hit

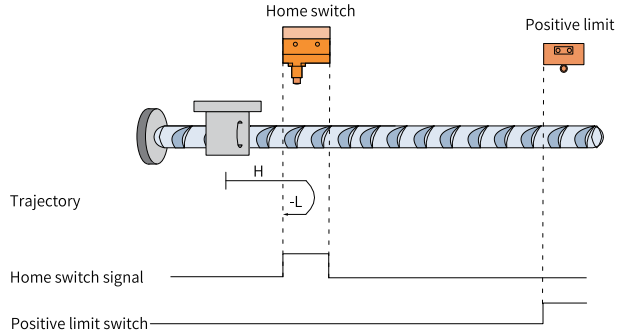


Figure 2-60 HW signal inactive at start, positive limit switch not hit

The HW signal is inactive at start, and the motor starts homing in the forward direction at high speed. If the axis does not hit the limit switch, the motor decelerates and changes to run in the reverse direction at low speed after reaching the rising edge of the HW signal. Then, after reaching the falling edge of the HW signal, the motor stops.

- HW signal inactive at start, positive limit switch being hit

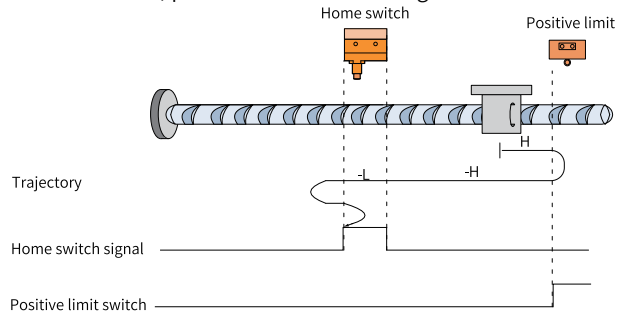


Figure 2-61 HW signal inactive at start, positive limit switch being hit

The HW signal is inactive at start, and the motor starts homing in the forward direction at high speed. If the axis hits the limit switch, the motor changes to run in the reverse direction at high speed until it reaches the rising edge of the HW signal, where it decelerates to run in the reverse direction at low speed. Then, after reaching the falling edge of the HW signal, it decelerates and changes to run in the forward direction at low speed until it reaches the rising edge of the HW signal. After that, it decelerates and changes to run in the reverse direction at low speed. Finally, the motor stops after reaching the falling edge of the HW signal.

- HW signal active at start

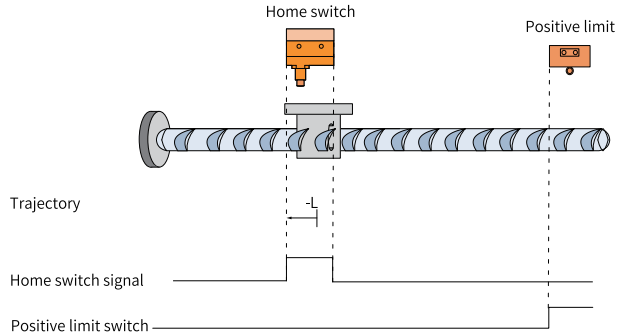


Figure 2-62 HW signal active at start

The HW signal is active at start, and the motor starts homing in the reverse direction at low speed and stops after reaching the falling edge of the HW signal.

6098h = 24

Home: home switch (HW)

Deceleration point: home switch (HW)

- HW signal inactive at start, positive limit switch not hit

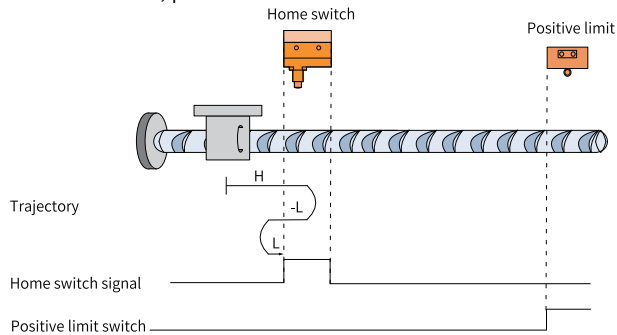


Figure 2-63 HW signal inactive at start, positive limit switch not hit

The HW signal is inactive at start, and the motor starts homing in the forward direction at high speed. If the axis does not hit the limit switch, the motor decelerates and changes to run in the reverse direction at low speed after reaching the rising edge of the HW signal. Then, after reaching the falling edge of the HW signal, the motor changes to run in the forward direction at low speed until it stops after reaching the rising edge of the HW signal.

- HW signal inactive at start, positive limit switch being hit

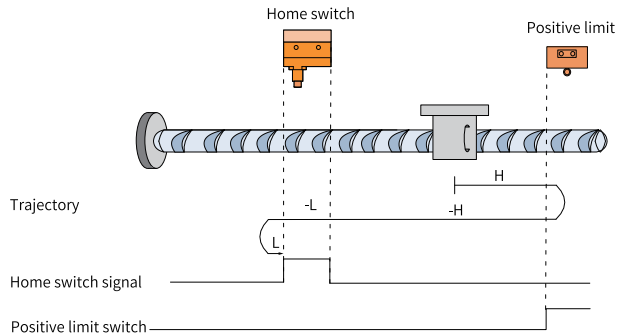


Figure 2-64 HW signal inactive at start, positive limit switch being hit

The HW signal is inactive at start, and the motor starts homing in the forward direction at high speed. If the axis hits the limit switch, the motor changes to run in the reverse direction at high speed until it decelerates after reaching the rising edge of the HW signal. Then, after reaching the falling edge of the HW signal, the motor changes to run in the forward direction at low speed. Finally, the motor stops after reaching the rising edge of the HW signal.

- HW signal active at start

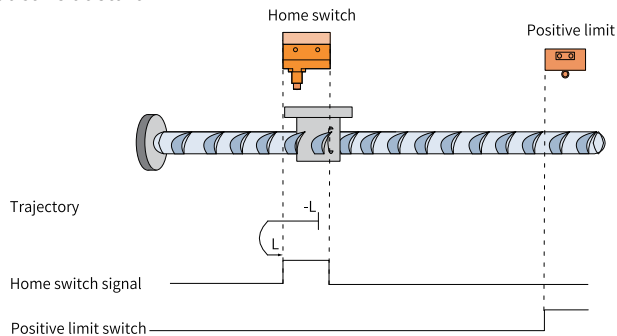


Figure 2-65 HW signal active at start

The HW signal is active at start, and the motor starts homing in the reverse direction at low speed. After reaching the falling edge of the HW signal, the motor changes to run in the forward direction at low speed until it stops after reaching the rising edge of the HW signal.

6098h = 25

Home: home switch (HW)

Deceleration point: home switch (HW)

- HW signal inactive at start, positive limit switch not hit

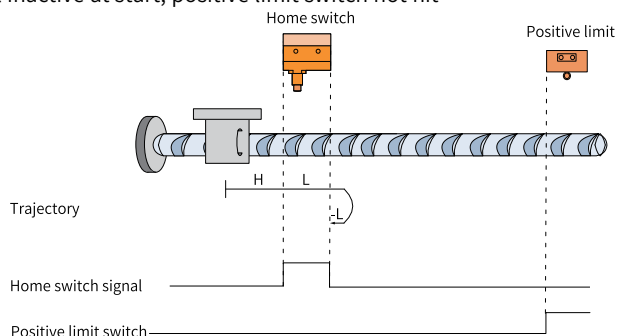


Figure 2-66 HW signal inactive at start, positive limit switch not hit

The HW signal is inactive at start, and the motor starts homing in the forward direction at high speed. If the axis does not hit the limit switch, the motor decelerates and runs in the forward direction at low speed after reaching the rising edge of the HW signal. Then, after reaching the falling edge of the HW signal, the motor changes to run in the reverse direction at low speed until it stops after reaching the rising edge of the HW signal.

- HW signal inactive at start, positive limit switch being hit

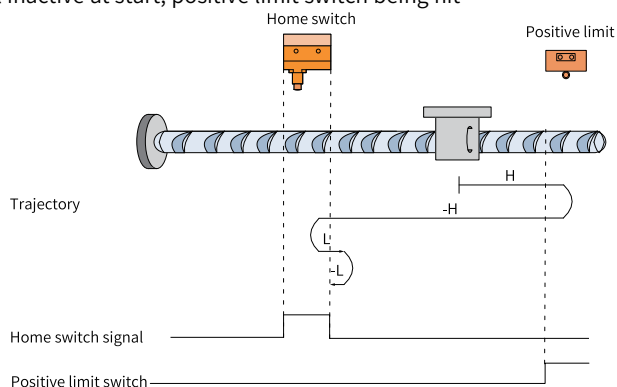


Figure 2-67 HW signal inactive at start, positive limit switch being hit

The HW signal is inactive at start, and the motor starts homing in the forward direction at high speed. If the axis hits the limit switch, the motor changes to run in the reverse direction at high speed. After reaching the rising edge of the HW signal, the motor decelerates and changes to run in the forward direction at low speed until reaching the falling edge of the HW signal where it changes to run in

the reverse direction at low speed. Finally, the motor stops after reaching the rising edge of the HW signal.

- HW signal active at start

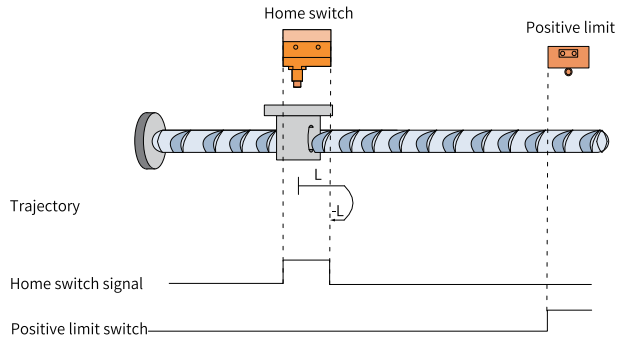


Figure 2-68 HW signal active at start

The HW signal is active at start, and the motor starts homing in the forward direction at low speed. After reaching the falling edge of the HW signal, the motor changes to run in the reverse direction at low speed until it stops after reaching the rising edge of the HW signal.

6098h = 26

Home: home switch (HW)

Deceleration point: home switch (HW)

- HW signal inactive at start, positive limit switch not hit

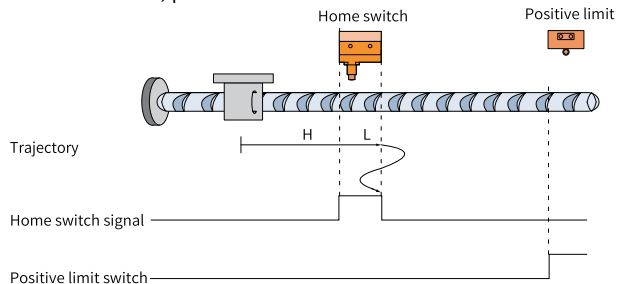


Figure 2-69 HW signal inactive at start, positive limit switch not hit

The HW signal is inactive at start, and the motor starts homing in the forward direction at high speed. If the axis does not hit the limit switch, the motor decelerates and runs in the forward direction at low speed after reaching the rising edge of the HW signal. Then, after reaching the falling edge of the HW signal, the

motor decelerates and changes to run in the reverse direction at low speed until reaching the rising edge of the HW signal where it decelerates and changes to run in the forward direction at low speed. Finally, the motor stops after reaching the falling edge of the HW signal.

- HW signal inactive at start, positive limit switch being hit

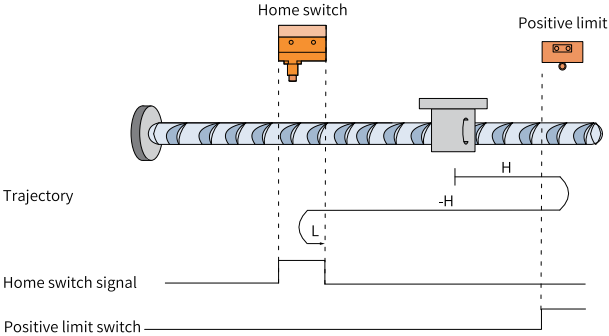


Figure 2-70 HW signal inactive at start, positive limit switch being hit

The HW signal is inactive at start, and the motor starts homing in the forward direction at high speed. If the axis hits the limit switch, the motor changes to run in the reverse direction at high speed. After reaching the rising edge of the HW signal, the motor decelerates and changes to run in the forward direction at low speed until it stops after reaching the falling edge of the HW signal.

- HW signal active at start

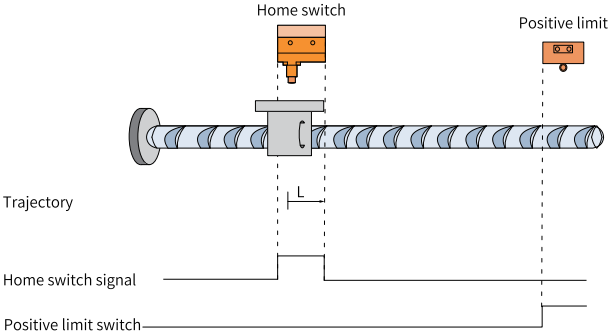


Figure 2-71 HW signal active at start

The HW signal is active at start, and the motor starts homing in the forward direction at low speed. After reaching the falling edge of the HW signal, the motor stops.

6098h = 27

Home: home switch (HW)

Deceleration point: home switch (HW)

- Deceleration point signal inactive at start, not hitting the negative limit switch

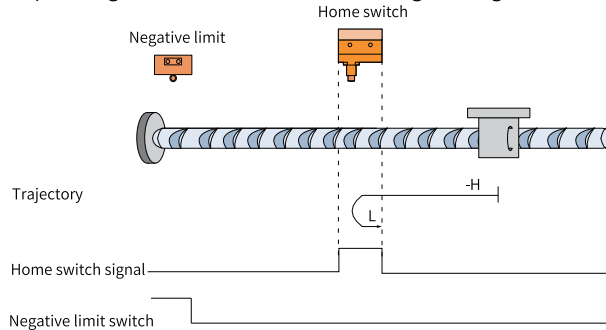


Figure 2-72 Deceleration point signal inactive at start, not hitting the negative limit switch

The HW signal is inactive at start. The motor starts homing in the reverse direction at high speed. If the axis does not hit the limit switch, the motor decelerates and changes to run in the forward direction at low speed after reaching the rising edge of the HW signal. Then, the motor stops after reaching the falling edge of the HW signal.

- Deceleration point signal inactive at start, negative limit switch not hit

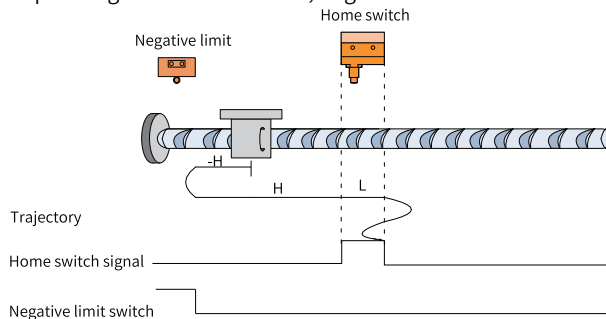


Figure 2-73 Deceleration point signal inactive at start, negative limit switch not hit

The HW signal is inactive at start, and the motor starts homing in the reverse direction at high speed. If the axis hits the limit switch, the motor changes to run in the forward direction at low speed. After reaching the rising edge of the HW signal, the motor decelerates and keeps running in the forward direction at low

speed until reaching the falling edge of the HW signal where it decelerates and changes to run in the reverse direction at low speed. Then, after reaching the rising edge of the HW signal, the motor decelerates and changes to run in the forward direction at low speed until it stops after reaching the falling edge of the HW signal.

- HW signal active at start

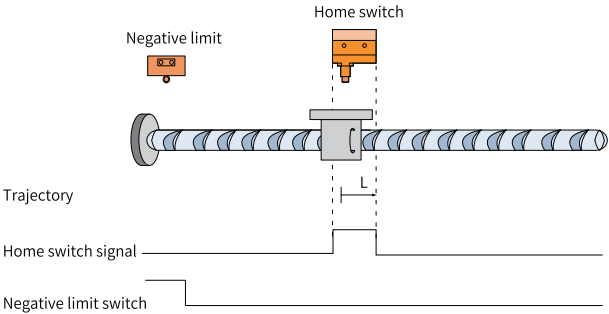


Figure 2-74 HW signal active at start

The HW signal is active at start, and the motor starts homing in the forward direction at low speed. After reaching the falling edge of the HW signal, the motor stops.

6098h = 28

Home: home switch (HW)

Deceleration point: home switch (HW)

- Deceleration point signal inactive at start, not hitting the negative limit switch

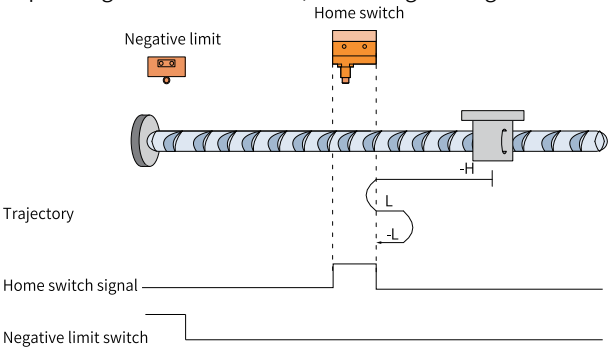


Figure 2-75 Deceleration point signal inactive at start, not hitting the negative limit switch

The HW signal is inactive at start, and the motor starts homing in the reverse direction at high speed. If the axis does not hit the limit switch, the motor decelerates and changes to run in the forward direction at low speed after reaching the rising edge of the HW signal. Then, after reaching the falling edge of the HW signal, the motor changes to run in the reverse direction at low speed until it stops after reaching the rising edge of the HW signal.

- Deceleration point signal inactive at start, negative limit switch not hit

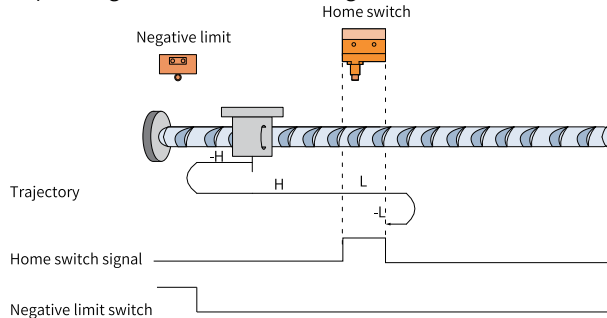


Figure 2-76 Deceleration point signal inactive at start, negative limit switch not hit

The HW signal is active at start, and the motor starts homing in the reverse direction at high speed. If the axis hits the limit switch, the motor changes to run in the forward direction at high speed until it decelerates after reaching the rising edge of the HW signal. Then, after reaching the falling edge of HW signal, the motor decelerates and changes to run in the reverse direction at low speed. Finally, the motor stops after reaching the rising edge of the HW signal.

- HW signal active at start

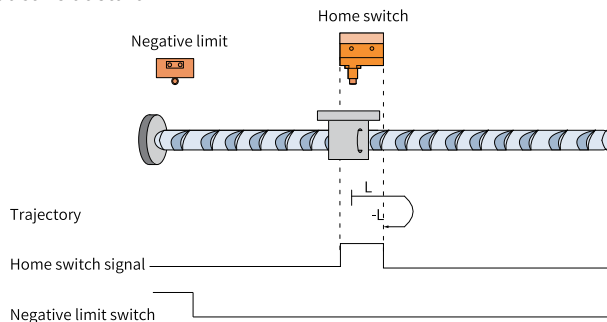


Figure 2-77 HW signal active at start

The HW signal is active at start, and the motor starts homing in the forward direction at low speed. After reaching the falling edge of the HW signal, the motor

changes to run in the reverse direction at low speed until it stops after reaching the rising edge of the HW signal.

6098h = 29

Home: home switch (HW)

Deceleration point: home switch (HW)

- Deceleration point signal inactive at start, not hitting the negative limit switch

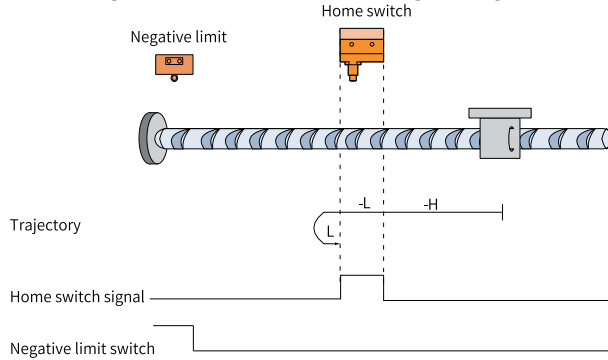


Figure 2-78 Deceleration point signal inactive at start, not hitting the negative limit switch

The HW signal is inactive at start, and the motor starts homing in the reverse direction at high speed. If the axis does not hit the limit switch, the motor decelerates and runs in the reverse direction at low speed after reaching the rising edge of the HW signal. Then, after reaching the falling edge of the HW signal, the motor changes to run in the forward direction at low speed until it stops after reaching the rising edge of the HW signal.

- Deceleration point signal inactive at start, negative limit switch not hit

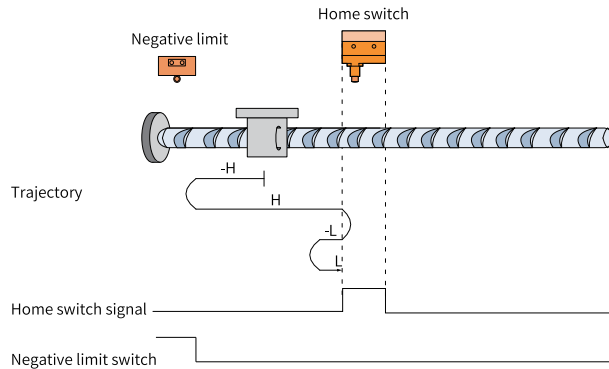


Figure 2-79 Deceleration point signal inactive at start, negative limit switch not hit

The HW signal is inactive at start, and the motor starts homing in the reverse direction at high speed. If the axis hits the limit switch, the motor changes to run in the forward direction at high speed. After reaching the rising edge of the HW signal, the motor decelerates and changes to run in the reverse direction at low speed until it reaches the falling edge of the HW signal, where it changes to run in the forward direction at low speed. Finally, the motor stops after reaching the rising edge of the HW signal.

- HW signal active at start

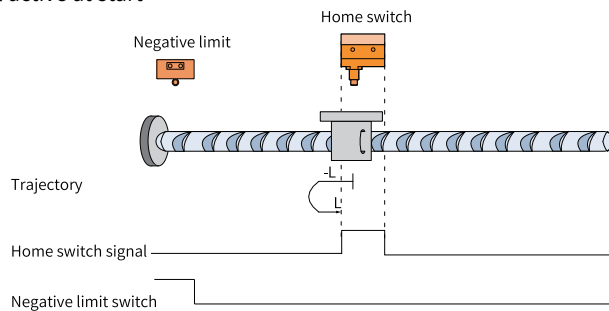


Figure 2-80 HW signal active at start

The HW signal is active at start and homing starts in the reverse direction at low speed. After reaching the falling edge of the HW signal, the motor changes to run in the forward direction at low speed until it stops after reaching the rising edge of the HW signal.

6098h = 30

Home: home switch (HW)

Deceleration point: home switch (HW)

- Deceleration point signal inactive at start, not hitting the negative limit switch

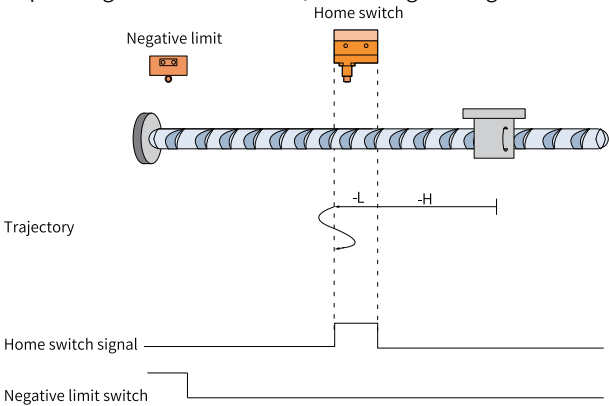


Figure 2-81 Deceleration point signal inactive at start, not hitting the negative limit switch

The HW signal is inactive at start, and the motor starts homing in the reverse direction at high speed. If the axis does not hit the limit switch, the motor decelerates and keeps running in the reverse direction at low speed after reaching the rising edge of the HW signal. Then, after reaching the falling edge of the HW signal, the motor decelerates and changes to run in the forward direction at low speed until reaching the rising edge of the HW signal where it changes to run in the reverse direction at low speed. Finally, the motor stops after reaching the falling edge of the HW signal.

- Deceleration point signal inactive at start, negative limit switch not hit

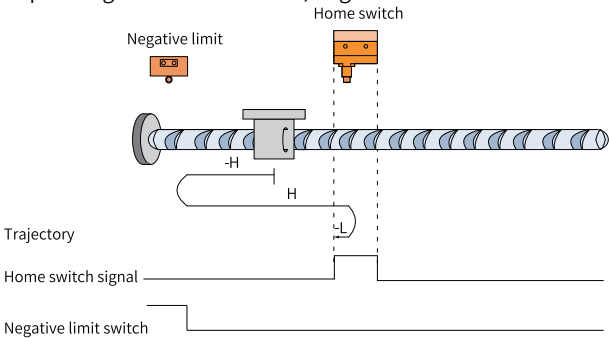


Figure 2-82 Deceleration point signal inactive at start, negative limit switch not hit

The HW signal is inactive at start, and the motor starts homing in the reverse direction at high speed. If the axis hits the limit switch, the motor changes to run in the forward direction at high speed. After reaching the rising edge of the HW signal, the motor decelerates and changes to run in the reverse direction at low speed until it stops after reaching the falling edge of the HW signal.

- HW signal active at start

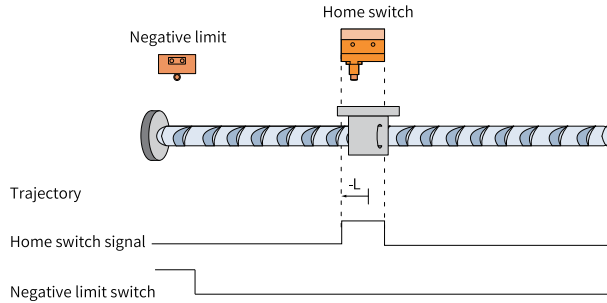


Figure 2-83 HW signal active at start

The HW signal is active at start, and the motor starts homing in the reverse direction at low speed and stops after reaching the falling edge of the HW signal.

6098h = 31-32

This mode is not defined in the CiA402 protocol. It can be used for extension purpose.

6098h = 33, 34 and -3

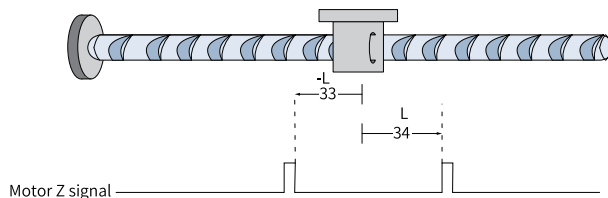
Home: Z signal

Deceleration point: None

Homing mode 33: The motor runs in the reverse direction at low speed and stops at the first Z signal.

Homing mode 34: The motor runs in the forward direction at low speed and stops at the first Z signal.

Homing mode -3: The initial direction is automatically determined, and the stop occurs at the nearest Z signal.



6098h = 35

Homing mode 35: The present position is taken as the mechanical home. After homing is triggered (control word 6040: 0x0F → 0x1F):

60E6h = 0 (Absolute homing)

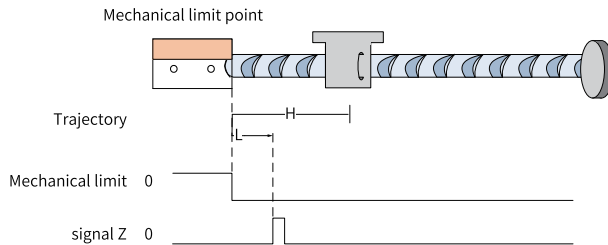
6064h (Position actual value) is equal to 607Ch (Home offset) after homing is done.

60E6h = 1 (Relative homing)

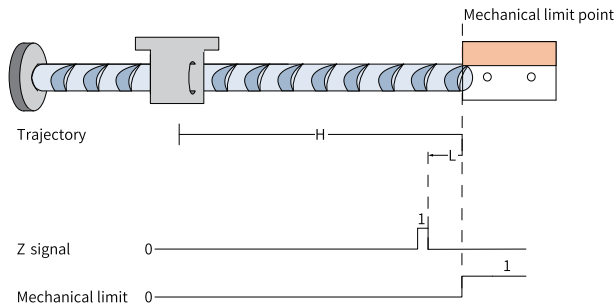
6064h is the sum of the original value plus 607Ch (Home offset) after homing is done.

6098h = -1

The motor runs in the reverse direction at high speed first. If the status where the torque reaches the limit and the speed is near zero after the axis hits the mechanical limit persists, it indicates the axis has reached the mechanical limit position. In this case, the motor runs in the forward direction at low speed and stops after reaching the rising edge of the Z signal for the first time.

**6098h = -2**

The servo motor runs in the forward direction at a high speed first. If the torque reaches the limit set by H05.59 and the speed is near zero when the motor hits the mechanical limit, and such status persists, it indicates the motor reaches the mechanical limit position. In this case, the motor runs in the reverse direction at a low speed and stops at the first Z signal after reaching the rising edge.





Danger

Keep sufficient distance between the limit switch and the positive/negative limit switch and set a proper acceleration value. Failure to comply may cause collision.

In absolute value mode, after power-off, bit 15 of the completion flag 6041 is saved, and when powered on again, this bit is 1.

The flag is cleared when the following situations occur:

- Position is lost because of an encoder fault.
- Switch to absolute mode (H02.01).
- Start homing again. Homing not completed.

2.10.7Homing (for software version V52×××)

6098h = 1

Mechanical home: Z signal

Deceleration point: negative limit switch

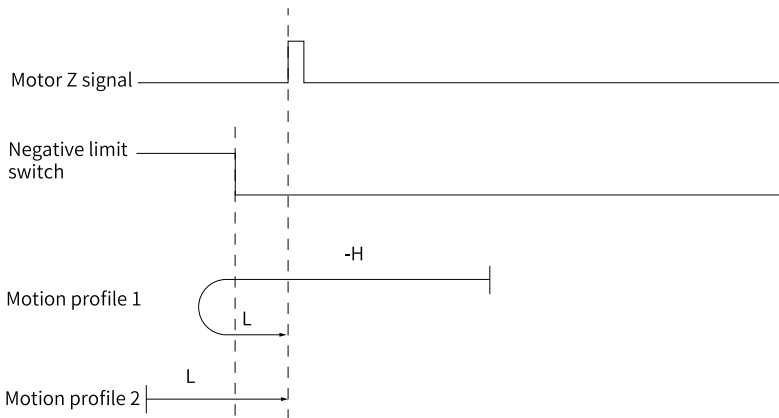


Figure 2-84 Motor running curve and speed in mode 1

- Motion profile 1: Deceleration point signal inactive at start.
- Motion profile 2: Deceleration point signal active at start.

Note

Note: In the figure, "H" represents high speed 6099.01h, and "L" represents low speed 6099.02h, and "-" indicates reverse run.

6098h = 2

Home: Z signal

Deceleration point: positive limit switch

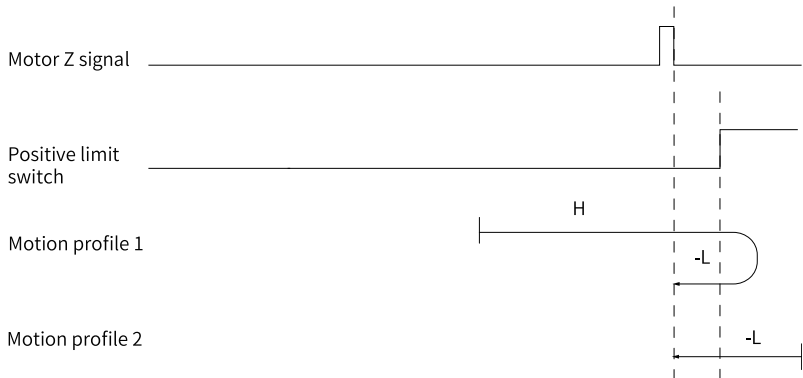


Figure 2-85 Motor running curve and speed in mode 2

- Motion profile 1: Deceleration point signal inactive at start.
- Motion profile 2: Deceleration point signal active at start.

6098h = 3

Home: Z signal

Deceleration point: home switch (HW)

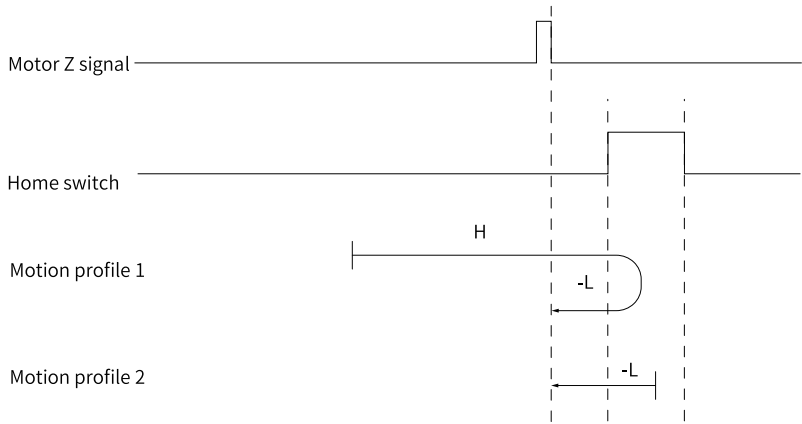


Figure 2-86 Motor running curve and speed in mode 3

- Motion profile 1: Deceleration point signal inactive at start.
- Motion profile 2: Deceleration point signal active at start.

6098h = 4

Home: Z signal

Deceleration point: home switch (HW)

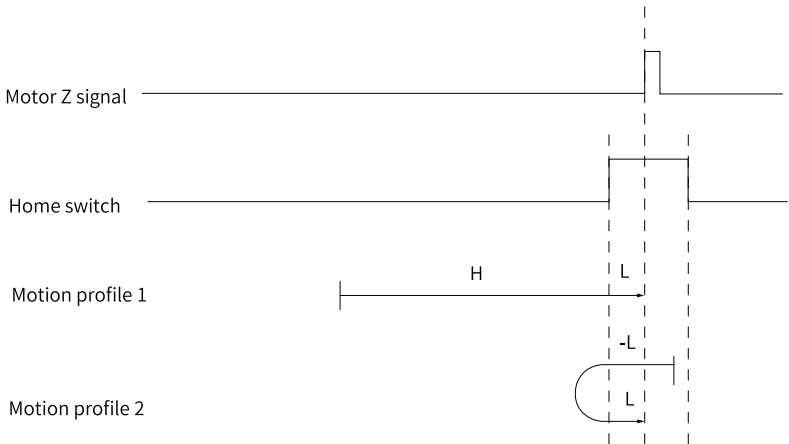


Figure 2-87 Motor running curve and speed in mode 4

- Motion profile 1: Deceleration point signal inactive at start.
- Motion profile 2: Deceleration point signal active at start.

6098h = 5

Home: Z signal

Deceleration point: home switch (HW)

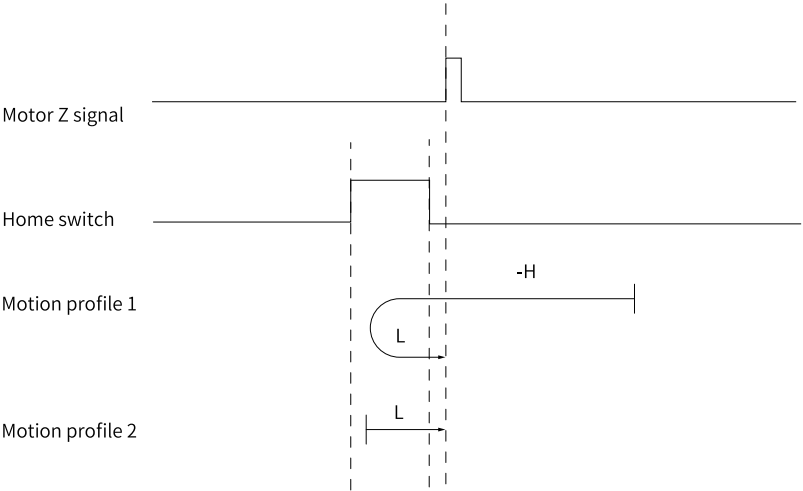


Figure 2-88 Motor running curve and speed in mode 5

- Motion profile 1: Deceleration point signal inactive at start.
- Motion profile 2: Deceleration point signal active at start.

6098h = 6

Home: Z signal

Deceleration point: home switch (HW)

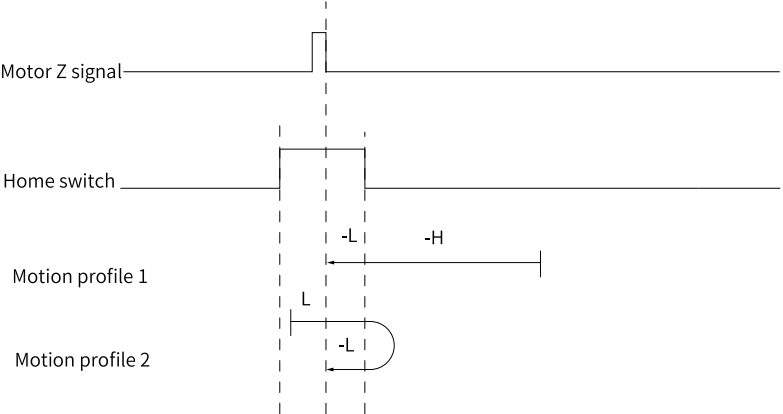


Figure 2-89 Motor running curve and speed in mode 6

- Motion profile 1: Deceleration point signal inactive at start.
- Motion profile 2: Deceleration point signal active at start.

6098h = 7

Home: Z signal

Deceleration point: home switch (HW)

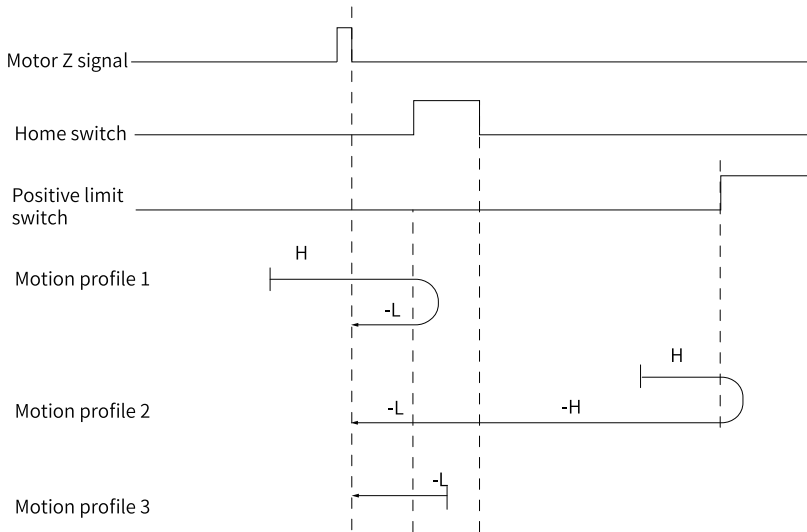


Figure 2-90 Motor running curve and speed in mode 7

- Motion profile 1: Deceleration point signal inactive at start, not hitting the positive limit switch.
- Motion profile 2: HW signal inactive at start, hitting the positive limit switch.
- Motion profile 3: Deceleration point signal active at start.

6098h = 8

Home: Z signal

Deceleration point: home switch (HW)

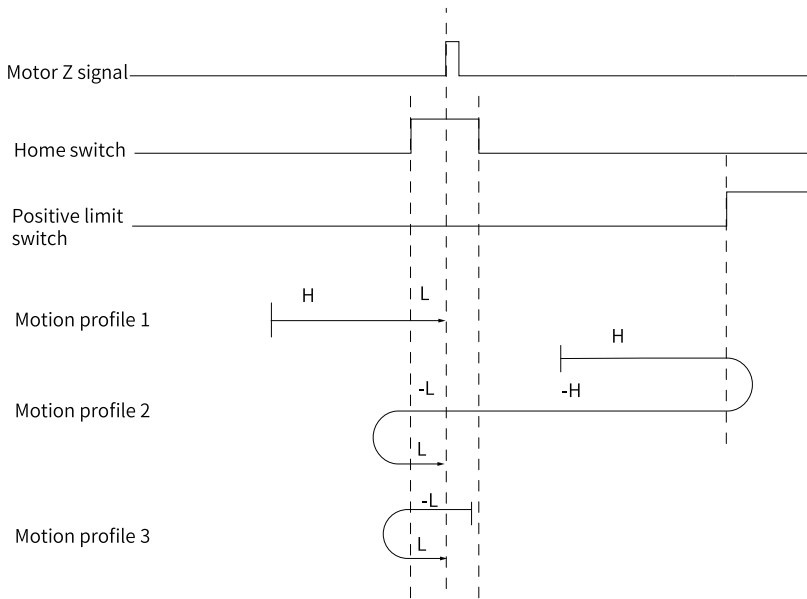


Figure 2-91 Motor running curve and speed in mode 8

- Motion profile 1: Deceleration point signal inactive at start, not hitting the positive limit switch.
- Motion profile 2: HW signal inactive at start, hitting the positive limit switch.
- Motion profile 3: Deceleration point signal active at start.

6098h = 9

Home: Z signal

Deceleration point: home switch (HW)

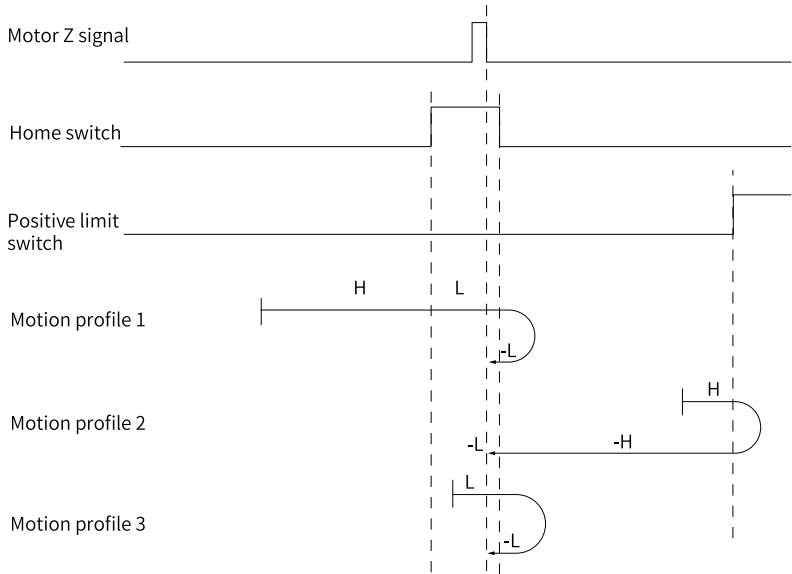


Figure 2-92 Motor running curve and speed in mode 9

- Motion profile 1: Deceleration point signal inactive at start, not hitting the positive limit switch.
- Motion profile 2: HW signal inactive at start, hitting the positive limit switch.
- Motion profile 3: Deceleration point signal active at start.

6098h = 10

Home: Z signal

Deceleration point: home switch (HW)

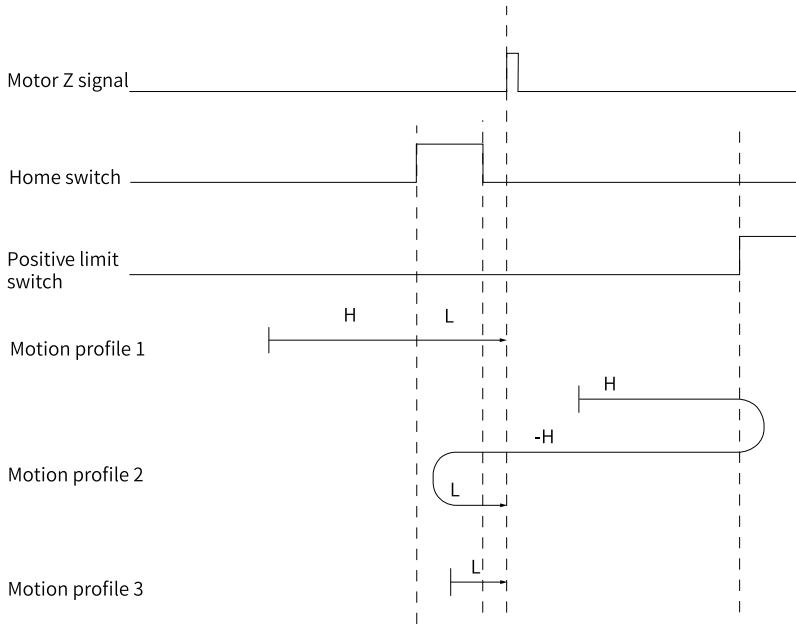


Figure 2-93 Motor running curve and speed in mode 10

- Motion profile 1: Deceleration point signal inactive at start, not hitting the positive limit switch.
- Motion profile 2: HW signal inactive at start, hitting the positive limit switch.
- Motion profile 3: Deceleration point signal active at start.

6098h = 11

Home: Z signal

Deceleration point: home switch (HW)

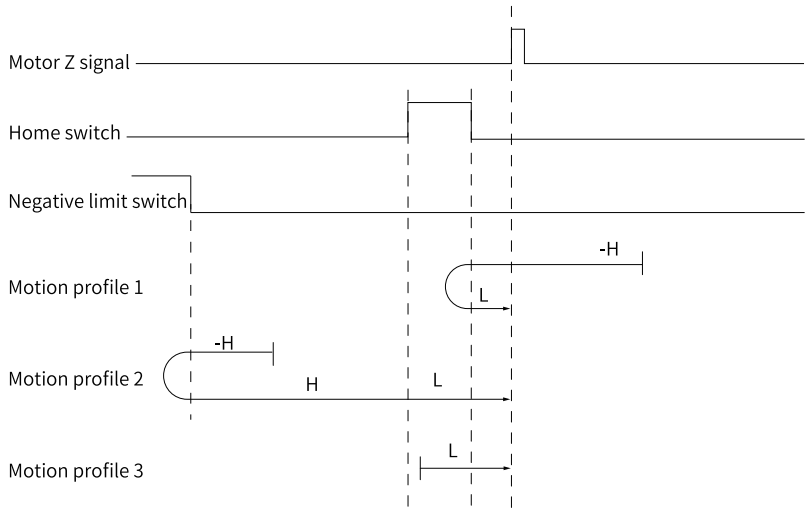


Figure 2-94 Motor running curve and speed in mode 11

- Motion profile 1: Deceleration point signal inactive at start, not hitting the reverse limit switch.
- Motion profile 2: HW signal inactive at start, hitting the reverse limit switch.
- Motion profile 3: Deceleration point signal active at start.

6098h = 12

Home: Z signal

Deceleration point: home switch (HW)

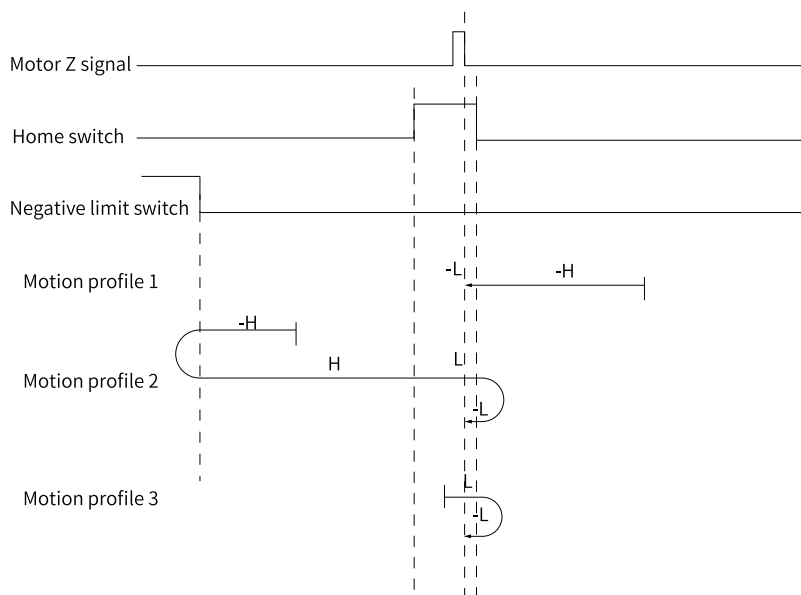


Figure 2-95 Motor running curve and speed in mode 12

- Motion profile 1: Deceleration point signal inactive at start, not hitting the reverse limit switch.
- Motion profile 2: HW signal inactive at start, hitting the reverse limit switch.
- Motion profile 3: Deceleration point signal active at start.

6098h = 13

Home: Z signal

Deceleration point: home switch (HW)

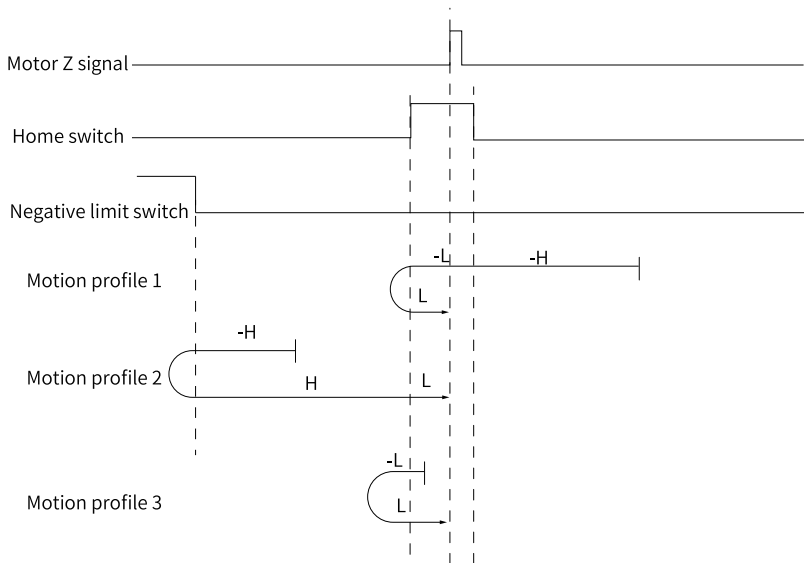


Figure 2-96 Motor running curve and speed in mode 13

- Motion profile 1: Deceleration point signal inactive at start, not hitting the reverse limit switch.
- Motion profile 2: HW signal inactive at start, hitting the reverse limit switch.
- Motion profile 3: Deceleration point signal active at start.

6098h = 14

Home: Z signal

Deceleration point: home switch (HW)

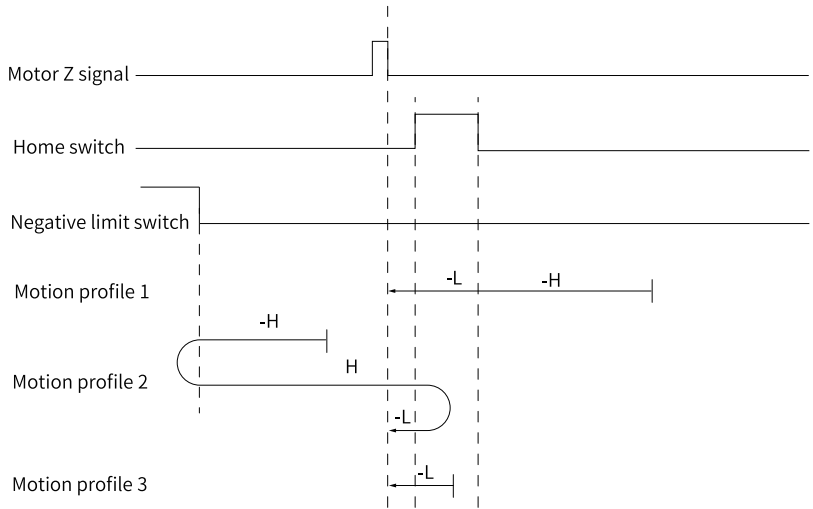


Figure 2-97 Motor running curve and speed in mode 14

- Motion profile 1: Deceleration point signal inactive at start, not hitting the reverse limit switch.
- Motion profile 2: HW signal inactive at start, hitting the reverse limit switch.
- Motion profile 3: Deceleration point signal active at start.

6098h = 17

Home: negative limit switch

Deceleration point: negative limit switch

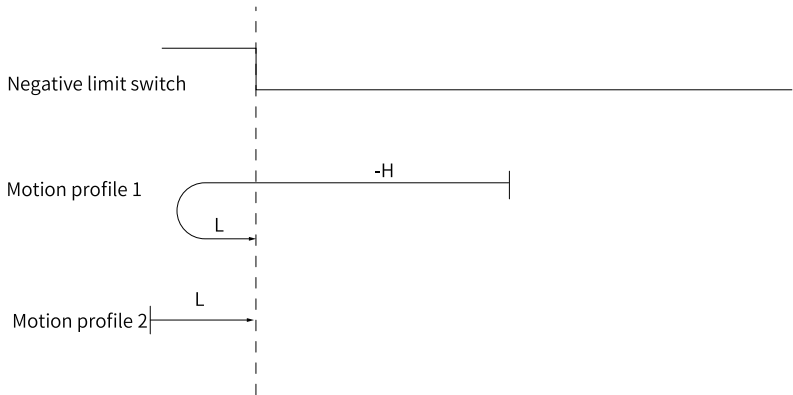


Figure 2-98 Motor running curve and speed in mode 17

- Motion profile 1: Deceleration point signal inactive at start.
- Motion profile 2: Deceleration point signal active at start.

6098h = 18

Home: positive limit switch

Deceleration point: positive limit switch

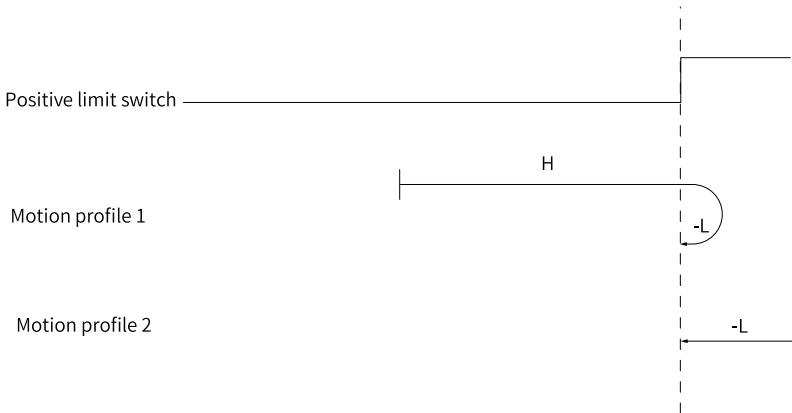


Figure 2-99 Motor running curve and speed in mode 18

- Motion profile 1: Deceleration point signal inactive at start.
- Motion profile 2: Deceleration point signal active at start.

6098h = 19

Home: home switch (HW)

Deceleration point: home switch (HW)

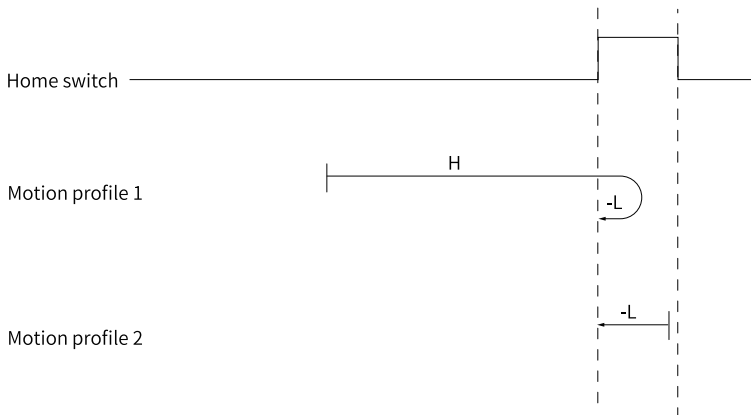


Figure 2-100 Motor running curve and speed in mode 19

- Motion profile 1: Deceleration point signal inactive at start.
- Motion profile 2: Deceleration point signal active at start.

6098h = 20

Home: home switch (HW)

Deceleration point: home switch (HW)

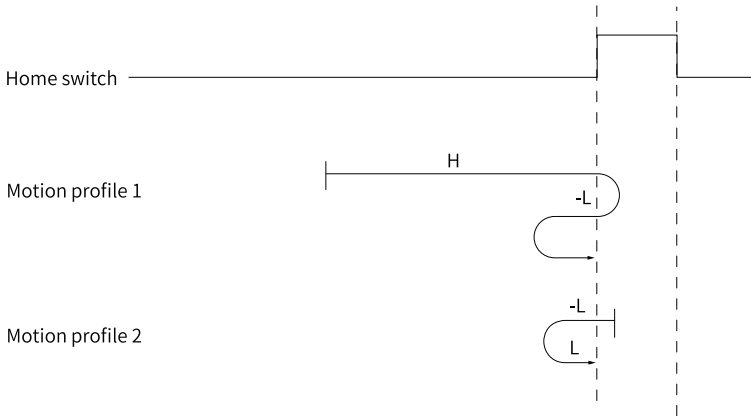


Figure 2-101 Motor running curve and speed in mode 20

- Motion profile 1: Deceleration point signal inactive at start.
- Motion profile 2: Deceleration point signal active at start.

6098h = 21

Home: home switch (HW)

Deceleration point: home switch (HW)

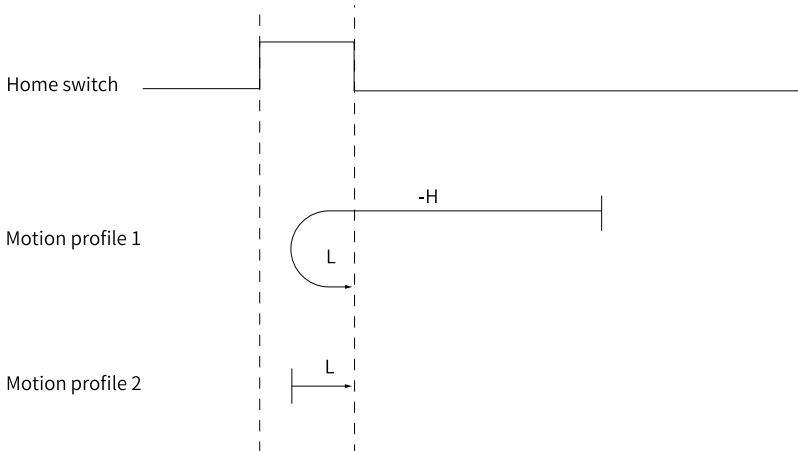


Figure 2-102 Motor running curve and speed in mode 21

- Motion profile 1: Deceleration point signal inactive at start.

- Motion profile 2: Deceleration point signal active at start.

6098h = 22

Home: home switch (HW)

Deceleration point: home switch (HW)

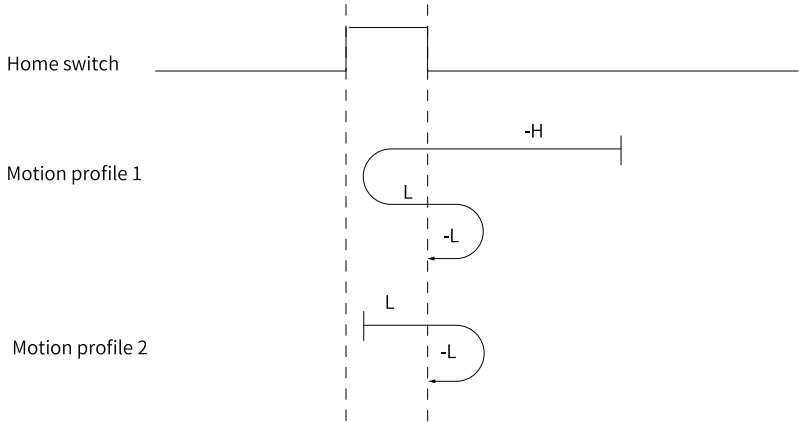


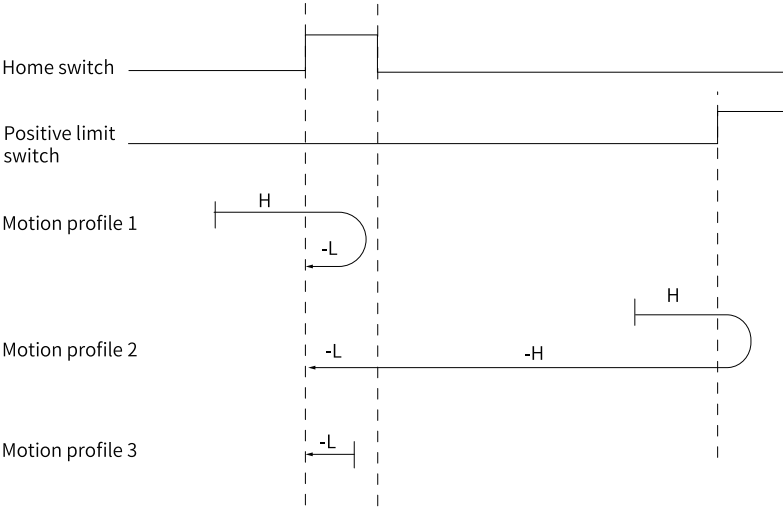
Figure 2-103 Motor running curve and speed in mode 20

- Motion profile 1: Deceleration point signal inactive at start.
- Motion profile 2: Deceleration point signal active at start.

6098h = 23

Home: home switch (HW)

Deceleration point: home switch (HW)

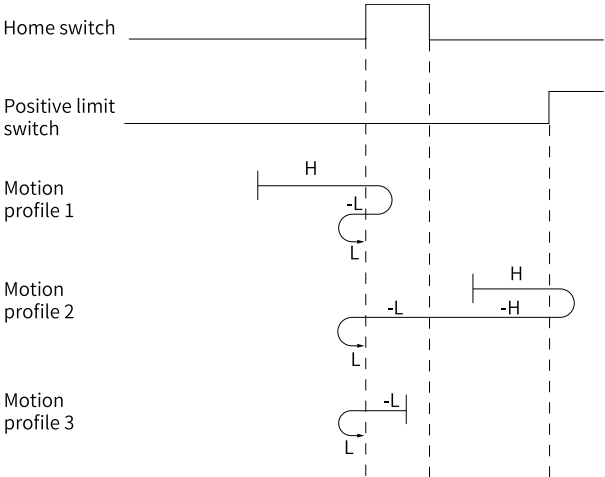


- Motion profile 1: Deceleration point signal inactive at start, not hitting the positive limit switch.
- Motion profile 2: HW signal inactive at start, hitting the positive limit switch.
- Motion profile 3: Deceleration point signal active at start.

6098h = 24

Home: home switch (HW)

Deceleration point: home switch (HW)



- Motion profile 1: Deceleration point signal inactive at start, not hitting the positive limit switch.
- Motion profile 2: HW signal inactive at start, hitting the positive limit switch.
- Motion profile 3: Deceleration point signal active at start.

6098h = 25

Home: home switch (HW)

Deceleration point: home switch (HW)

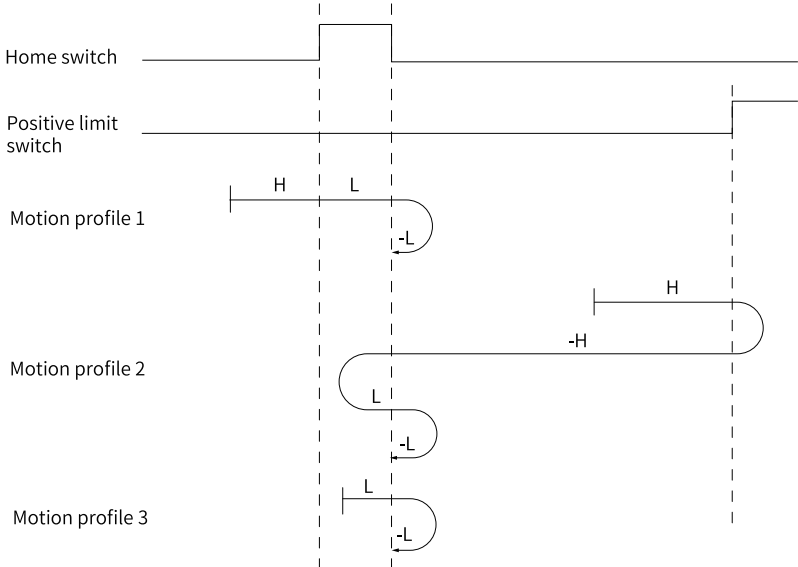


Figure 2-106 Motor running curve and speed in mode 25

- Motion profile 1: Deceleration point signal inactive at start, not hitting the positive limit switch.
- Motion profile 2: HW signal inactive at start, hitting the positive limit switch.
- Motion profile 3: Deceleration point signal active at start.

6098h = 26

Home: home switch (HW)

Deceleration point: home switch (HW)

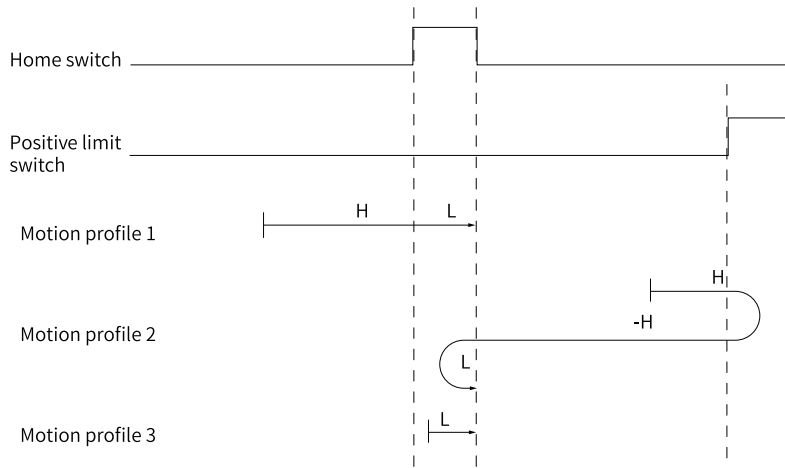


Figure 2-107 Motor running curve and speed in mode 26

- Motion profile 1: Deceleration point signal inactive at start, not hitting the positive limit switch.
- Motion profile 2: HW signal inactive at start, hitting the positive limit switch.
- Motion profile 3: Deceleration point signal active at start.

6098h = 27

Home: home switch (HW)

Deceleration point: home switch (HW)

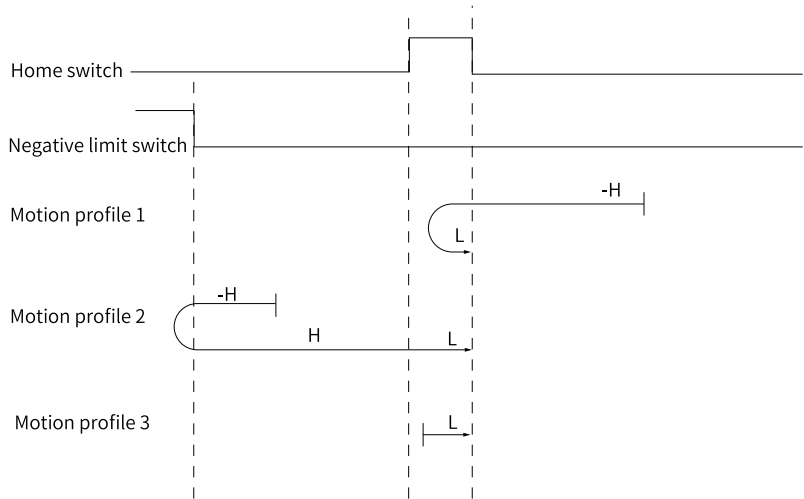


Figure 2-108 Motor running curve and speed in mode 27

- Motion profile 1: Deceleration point signal inactive at start, not hitting the reverse limit switch.
- Motion profile 2: HW signal inactive at start, hitting the reverse limit switch.
- Motion profile 3: Deceleration point signal active at start.

6098h = 28

Home: home switch (HW)

Deceleration point: home switch (HW)

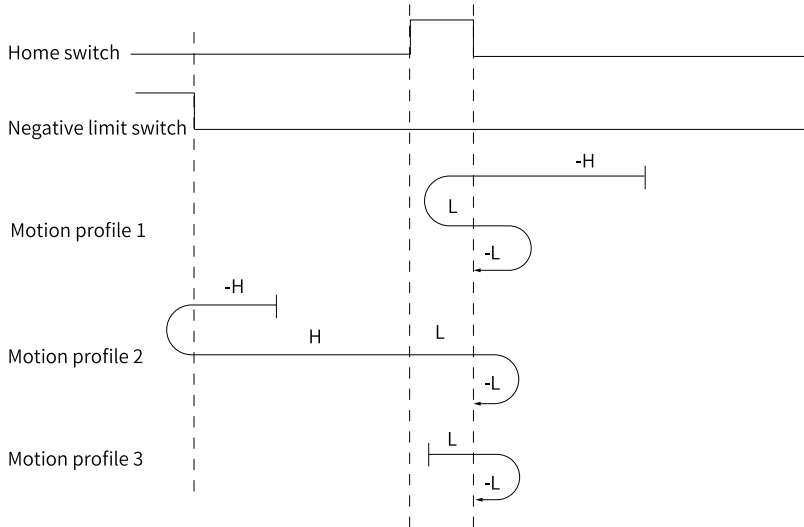


Figure 2-109 Motor running curve and speed in mode 28

- Motion profile 1: Deceleration point signal inactive at start, not hitting the reverse limit switch.
- Motion profile 2: HW signal inactive at start, hitting the reverse limit switch.
- Motion profile 3: Deceleration point signal active at start.

6098h = 29

Home: home switch (HW)

Deceleration point: home switch (HW)

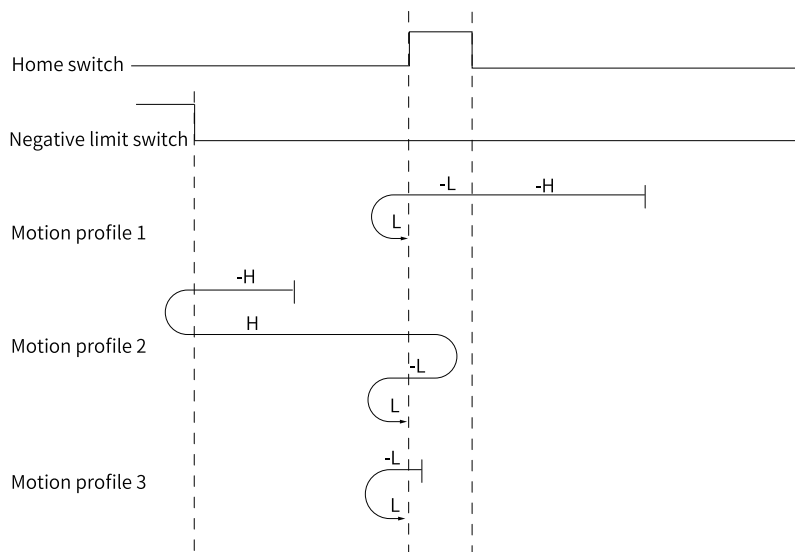


Figure 2-110 Motor running curve and speed in mode 29

- Motion profile 1: Deceleration point signal inactive at start, not hitting the reverse limit switch.
- Motion profile 2: HW signal inactive at start, hitting the reverse limit switch.
- Motion profile 3: Deceleration point signal active at start.

6098h = 30

Home: home switch (HW)

Deceleration point: home switch (HW)

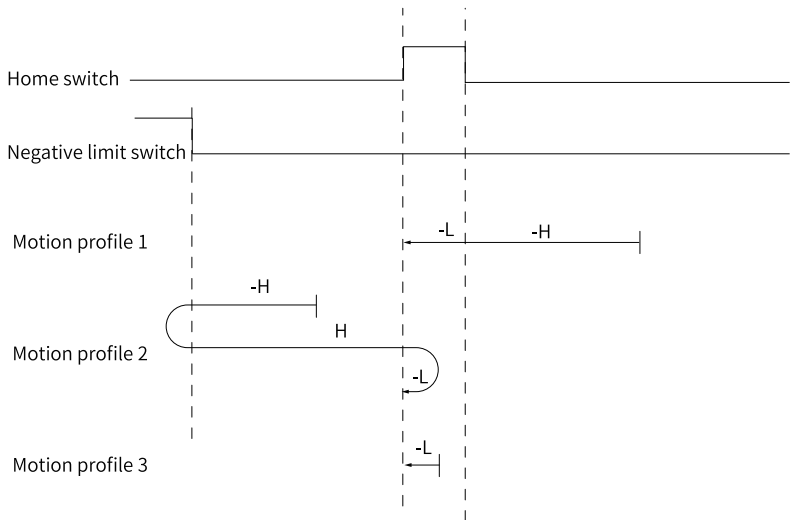


Figure 2-111 Motor running curve and speed in mode 30

- Motion profile 1: Deceleration point signal inactive at start, not hitting the reverse limit switch.
- Motion profile 2: HW signal inactive at start, hitting the reverse limit switch.
- Motion profile 3: Deceleration point signal active at start.

6098h = 31 and 32

This mode is not defined in the CiA402 protocol. It can be used for extension purpose.

6098h = 33/34

Home: Z signal

Deceleration point: None

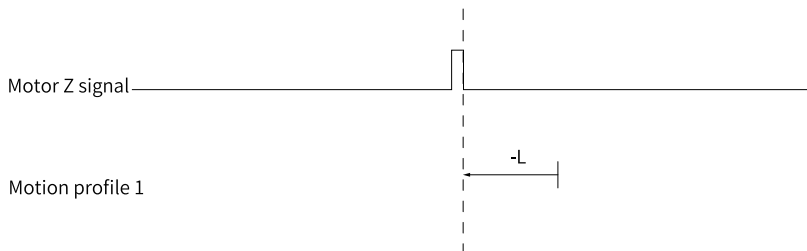


Figure 2-112 Motor running curve and speed in mode 33

- Motion profile 1: The motor runs in the reverse direction at low speed and stops at the first Z signal..

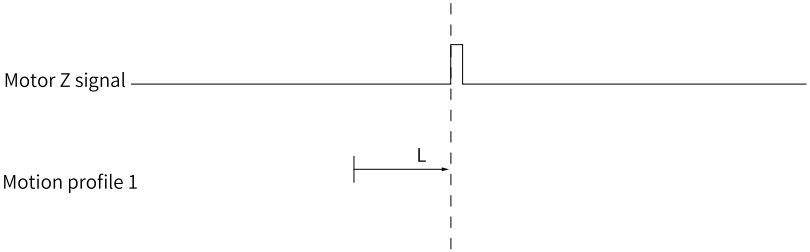


Figure 2-113 Motor running curve and speed in mode 34

- Motion profile 1: The motor runs in the forward direction at low speed and stops at the first Z signal..

6098h = 35

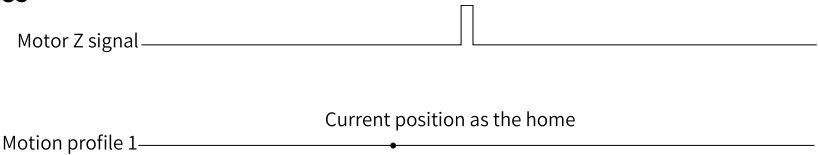


Figure 2-114 Motor running curve and speed in mode 35

Homing mode 35: The present position is taken as the mechanical home. After homing is triggered (control word 6040h: 0x0F → 0x1F).

60E6h = 0 (Absolute homing):

6064h (Position actual value) is equal to 607Ch (Home offset) after homing is done.

60E6h = 1 (Relative homing):

6064h is the sum of the original value plus 607Ch (Home offset) after homing is done.

6098h = -1

The motor runs in the reverse direction at high speed first. If the status where the torque reaches the limit set by H05.58 and the speed is near zero after the axis hits the mechanical limit persists, it indicates the axis has reached the mechanical limit position. In this case, the motor runs in the forward direction at low speed and stops after reaching the rising edge of the Z signal for the first time.

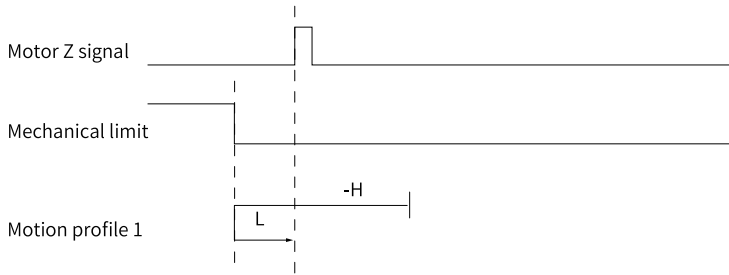


Figure 2-115 Motor running curve and speed in mode -1

6098h = -2

The servo motor runs in the forward direction at a high speed first. If the torque reaches the limit set by H05.58 and the speed is near zero when the motor hits the mechanical limit, and such status persists, it indicates the motor reaches the mechanical limit position. In this case, the motor runs in the reverse direction at a low speed and stops at the first Z signal after reaching the rising edge.

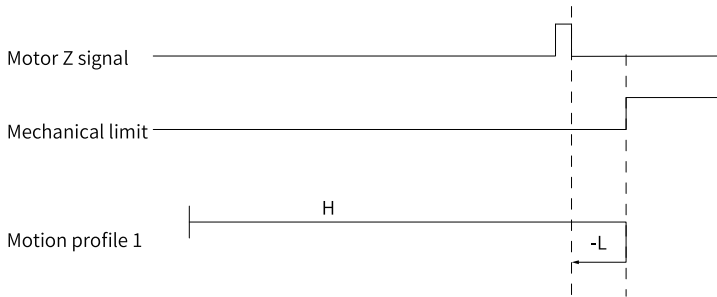


Figure 2-116 Motor running curve and speed in mode -2

6098h = -3

Home: Z signal

Deceleration point: None

- If the single-turn position is close to the reverse home, the homing profile is motion profile 1.
- If the single-turn position is close to the forward home, the homing profile is motion profile 2.

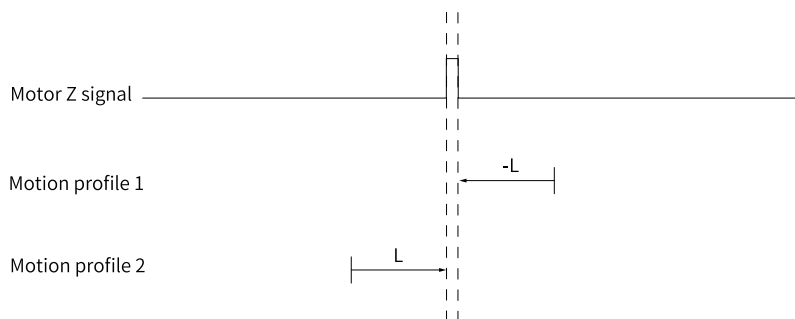


Figure 2-117 Motor running curve and speed in mode -3

- Motion profile 1: The motor runs in the reverse direction at low speed and stops at the first Z signal.
- Motion profile 2: The motor runs in the forward direction at low speed and stops at the first Z signal.

Evaluation condition for torque homing: After the motor reaches the hard limit, and the torque feedback reaches the limit value defined in H05.58 (mechanical torque limit, in 0.1%), the first Z signal in the reverse direction is searched for and regarded as the home after the motor stops.

2.11 Introduction to the Absolute Encoder System

For wiring and installation of the absolute encoder battery box, see section "Connecting the Servo Drive and Motor Encoder Cable" in the Hardware Guide.

2.11.1 Absolute Encoder System

Overview

The absolute encoder, which carries a resolution of 8388608 (223) PPR, detects the motor position within one revolution and counts the number of revolutions, with 16-bit multi-turn data recorded. The absolute encoder system works in the position control, speed control, and torque control modes. When the servo drive is powered off, the encoder records data with the power supplied by the battery. The servo drive therefore can calculate the absolute mechanical position through the encoder after power-on, removing the need for homing.

To match the absolute encoder with the SV660N series servo drives, 2000.01h (H00.00 Motor code) to 14101 (Inovance 23-bit absolute encoder). Then set 2002.02h (H02.01 Absolute system selection) based on actual conditions. E731.0 will be reported when the battery is connected for the first time. In the case, set 200D.15h (H0d.20) to 1 to reset the encoder fault, and then perform homing.

Note

When the value of 2002.03h (H02.02 Direction of rotation), 200D.15h (H02.04 Absolute encoder reset selection), or the mechanical gear ratio is modified, the mechanical position will change abruptly, requiring a homing operation. After homing is done, the deviation between the mechanical absolute position and that recorded in the encoder will be calculated automatically and saved in the EEPROM of the servo drive.

Absolute system settings

Set 2000.01h (H00.00) to 14101 to select Inovance motor equipped with 23-bit absolute encoder, and select the absolute position mode in 2002.02h (H02.01).

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H00.00	2000-01h	Motor SN	0 to 65535	14101	-	At stop	"H00_en.00" on page 170
H02.01	2002-02h	Absolute system selection	0: Incremental mode 1: Absolute position linear mode 2: Absolute position rotation mode 3: Absolute position linear mode (without encoder overflow warning) 4: Absolute position single-turn mode	0	-	At stop	"H02_en.01" on page 177

Encoder feedback data

The feedback data of an absolute encoder includes the number of revolutions and the motor position within one revolution. In the incremental position mode, the number of revolutions will not be recorded.

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H0b.70	200b-47h	Number of absolute encoder revolutions	0Rev to 65535Rev	0	Rev	Unchangeable	"H0b_en.70" on page 273
H0b.71	200b-48h	Single-turn position feedback by the absolute encoder	0 to 2147483647	0	Encoder unit	Unchangeable	"H0b_en.71" on page 274

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H0b.77	200b-4Eh	Encoder position (low 32 bits)	-2147483648 to 2147483647	0	Encoder unit	Unchangeable	"H0b_en.77" on page 274
H0b.79	200b-50h	Encoder position (high 32 bits)	-2147483648 to 2147483647	0	Encoder unit	Unchangeable	"H0b_en.79" on page 274

2.11.2 Absolute position linear mode

This mode applies to applications where the axis travel range is fixed without multi-turn data overflow.

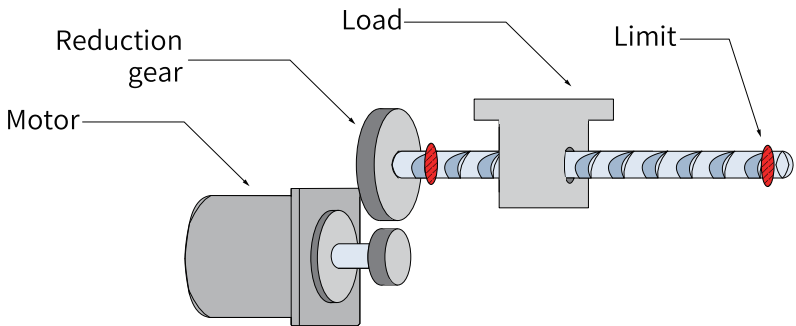


Figure 2-118 Application of the linear mode

Assume the absolute mechanical position 200B.3Bh (H0b.58) and 200B.3Dh (H0b.60) is PM, the encoder absolute position is PE, the position offset in the absolute position linear mode 2005.2Fh (H05.46) and 2005.31h (H05.48) is P_O, their relation will be as follows: $P_M = P_E - P_O$.

Assume the electronic gear ratio is B/A, and the mechanical absolute position (reference unit) is 200B.08h (H0b.07), then the following formula applies: $200B.08h (H0b.07) = P_M / (B/A)$.

The multi-turn data range in the absolute position linear mode is 0 to 65535. If the number of forward revolutions is higher than 65535 or reverse rotation occurs, E735.0 (Encoder multi-turn counting overflow) will occur. In this case, set 200D.15h (H0d.20) to 2 to reset the multi-turn data, and then perform homing again. In special occasions, you can set 200A.25h (H0A.36) to 1 to hide E735.0 or use absolute position linear mode where the encoder overflow fault will not be reported.

Note

Position offset in the absolute position linear mode (H05.46 and H05.48) is 0 by default. After homing is done, The servo drive calculates the deviation between the absolute position of the machine and that fed back by the encoder, assigns the value to H05.46 and H05.48, and saves the deviation in EEPROM.

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H0b.07	200b-08h	Absolute position counter	-2147483648 to 2147483647	0	Encoder unit	Unchangeable	"H0b_en.07" on page 262
H0b.58	200b-3Bh	Mechanical absolute position (low 32 bits)	-2147483648 to 2147483647	0	Encoder unit	Unchangeable	"H0b_en.58" on page 272
H0b.60	200b-3Dh	Mechanical absolute position (high 32 bits)	-2147483648 to 2147483647	0	Encoder unit	Unchangeable	"H0b_en.60" on page 272
6063h	6063h	Position actual value	-2147483648 to 2147483647	0	Encoder unit	Unchangeable	"6063h" on page 339
6064h	6064h	Position actual value	-2147483648 to 2147483647	0	Reference unit	Unchangeable	"6064h" on page 339
H0A.36	200A-25h	Encoder multi-turn overflow fault selection	0: Not hide 1: Hide	0	-	Real-time	"H0A_en.36" on page 253

2.11.3 Absolute position rotation mode

This mode applies in cases where the load travel range is unlimited and the number of unidirectional revolutions is lower than 32767 upon power failure, as shown in the following figure.

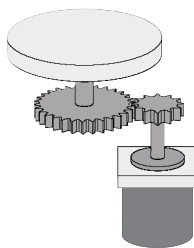
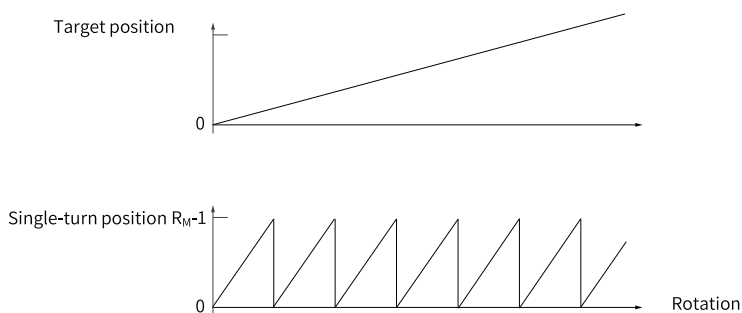
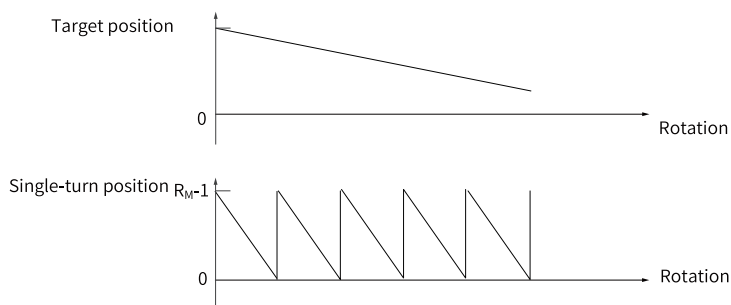


Figure 2-119 Rotating load

The single-turn position range of the rotating load is 0 to $(R_M - 1)$ (R_M : Encoder pulses per load revolution). When the gear ratio is 1:1, the variation law of the target position and the single-turn position of the rotating load during forward operation is shown as follows.



The variation law of the target position and the single-turn position of the rotary load during reverse operation is shown as follows.



When the motor works in the absolute position rotation mode while the servo drive works in the HM mode, the home offset setting range is 0 to $(R_M - 1)$. If the home offset is set to a value outside this range, the servo drive reports EE09.1 (Home setting error).

The multi-turn data range is unlimited in the absolute position rotation mode. Therefore, E735.0 (Encoder multi-turn counting overflow) is hidden automatically.

Note

The servo drive calculates the upper limit of the mechanical absolute position using 2005.35h (H05.52) and 2005.37h (H05.54) first. If 2005.35h (H05.52) and 2005.37h (H05.54) are both set to 0, the servo drive employs 2005.33h (H05.50) and 2005.34h (H05.51) for calculation.

Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H05.50	2005-33h	Mechanical gear ratio (numerator)	1 to 65535	1	-	At stop	"H05_en.50" on page 203
H05.51	2005-34h	Denominator of mechanical gear ratio	1 to 65535	1	-	At stop	"H05_en.51" on page 203
H05.52	2005-35h	Pulses per load revolution in absolute position rotation mode (low 32 bits)	0 to 4294967295	0	Encoder unit	At stop	"H05_en.52" on page 203
H05.54	2005-37h	Pulses per load revolution in absolute position rotation mode (high 32 bits)	0 to 4294967295	0	Encoder unit	At stop	"H05_en.54" on page 203
H0b.81	200b-52h	Single-turn position of the rotary load (low 32 bits)	-2147483648 to 2147483647	0	Encoder unit	Unchangeable	"H0b_en.81" on page 275
H0b.83	200b-54h	Single-turn position of the rotary load (high 32 bits)	-2147483648 to 2147483647	0	Encoder unit	Unchangeable	"H0b_en.83" on page 275
H0b.85	200b-56h	Single-turn position of the rotary load (reference unit)	-2147483648 to 2147483647	0	Encoder unit	Unchangeable	"H0b_en.85" on page 275

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
6063h	6063h	Position actual value	-2147483648 to 2147483647	0	Encoder unit	Unchangeable	"6063h" on page 339
6064h	6064h	Position actual value	-2147483648 to 2147483647	0	Reference unit	Unchangeable	"6064h" on page 339

2.11.4 Single-turn Absolute Mode

This mode does not require a battery and does not record the number of motor revolutions. The target position input range of the EtherCAT host controller is -2^{31} to $2^{31}-1$. The encoder resolution does not need to be modeled. The feedback initial position of each power-on is the absolute position within a single-turn. For 23-bit encoders, the value of 6064 is 0 to $2^{23}-1$ after each power-on. If H02.01 keeps at "4-Single-turn absolute mode" and after homing (6060 = 6), the absolute position of the encoder and 607C-Home offset are saved. After power-on, the current position feedback 6064 is calculated by the coordinate system after the previous homing operation.

The single-turn absolute mode 60E6h is ineffective, and position feedback 6064 after homing = 607C (home offset).

☆ Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
6063h	6063h	Position actual value	-2147483648 to 2147483647	0	Encoder unit	Unchangeable	"6063h" on page 339
6064h	6064h	Position actual value	-2147483648 to 2147483647	0	Reference unit	Unchangeable	"6064h" on page 339

2.11.5 Precautions for Using the Absolute System Battery Box

E731.0 (Encoder battery fault) will be reported when the battery is connected for the first time. In this case, set 200D.15h (H0d.20) to 1 to reset the fault before further operations.

When the battery voltage detected is lower than 3.0 V, E730.0 (Encoder battery warning) will be reported. In this case, replace the battery based on the following steps:

1. Power on the servo drive and make it stay in the non-operational state.
2. Replace the battery.
3. After the servo drive resets E730.0 automatically. If no other warning occurs, continue to operate the servo drive.

If you replace the battery after power-off, E731.0 (Encoder battery fault) will be reported, with the multi-turn data changed abruptly. In this case, set 200D.15h (H0d.20) to 1 to reset the fault, and then perform homing again.

Ensure the maximum motor speed does not exceed 6000 rpm upon power-down of the servo drive. This is to enable the encoder to record the position accurately.

Keep the battery in environments within the required ambient temperature range and ensure the battery is in reliable contact and carries sufficient power capacity. Otherwise, encoder data loss may occur.

Note

The absolute position recorded by the encoder changes abruptly after multi-turn data reset. In this case, perform mechanical homing.

Related parameters:

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H0d.20	200d-15h	Absolute encoder reset	0: No operation 1: Reset 2: Reset the fault and multi-turn data	0	-	At stop	"H0d_en.20" on page 281

2.12 Auxiliary/Application Functions

The drive provides the following auxiliary functions:

- Touch Probe Function
- Software position limit
- Position Comparison
- EtherCAT-forced DO

2.12.1 Touch Probe Function

Function

The touch probe function is the same as the position latch function. The latch function latches the position actual value (reference unit) when a DI signal or the motor's phase-Z signal changes. The SV660N series servo drive offers two touch probes to record position values corresponding to the rising edge and falling edge of each touch probe signal, which means a total of four position values can be latched simultaneously.

Note

- No specific DI logic is required when a DI is used to trigger the touch probe.
- You can set the filter window for the touch probe signal in 200A.14h (H0A.19) and 200A.15h (H0A.20) when a DI is used to trigger the touch probe.

Related parameters

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
60B8h	60B8h	Touch probe function	0 to 65535	0	-	Real-time	"60B8h" on page 352
60B9h	60B9h	Touch probe status	0 to 65535	0	-	Unchangeable	"60B9h" on page 355
60BAh	60BAh	Touch probe 1 positive edge	-2147483648 to 2147483647	0	Reference unit	Unchangeable	"60BAh" on page 357
60BBh	60BBh	Touch probe 1 negative edge	-2147483648 to 2147483647	0	Reference unit	Unchangeable	"60BBh" on page 357
60BCh	60BCh	Touch probe 2 positive edge	-2147483648 to 2147483647	0	Reference unit	Unchangeable	"60BCh" on page 357
60BDh	60BDh	Touch probe 2 negative edge	-2147483648 to 2147483647	0	Reference unit	Unchangeable	"60BDh" on page 357
60D5h	60D5h	Touch probe 1 positive edge counter	0 to 65535	0	-	Unchangeable	"60D5h" on page 358
60D6h	60D6h	Touch probe 1 negative edge counter	0 to 65535	0	-	Unchangeable	"60D6h" on page 359
60D7h	60D7h	Touch probe 2 positive edge counter	0 to 65535	0	-	Unchangeable	"60D7h" on page 359
60D8h	60D8h	Touch probe 2 negative edge counter	0 to 65535	0	-	Unchangeable	"60D8h" on page 359

Steps

Observe the following procedure when using DI5 to trigger the touch probe.

Background: touch probe 1 positive edge, continuous latching

1. Set 2003.0Bh (H03.10 DI5 function) to 38.
2. Set the touch probe function in 60B8h.

Assignment of each bit of the touch probe function (60B8h) is shown in the following table.

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
60B8h	60B8h	Touch probe function	0 to 65535	0	-	Real-time	"60B8h" on page 352

Set 60B8h to 0013h in this example.

3. Read the touch probe status in 60B9h.

Assignment of each bit of 60B9h is shown in the following table.

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
60B9h	60B9h	Touch probe status	0 to 65535	0	-	Unchangeable	"60B9h" on page 355

In this example, you can read bit1 of 60B9h to check whether the touch probe 1 positive edge value is latched.

4. Read the latch position of the touch probe. The four position values of the touch probe are saved to 60BAh–60Bdh.

In this example, if the function of position latch at positive edge of touch probe 1 is executed, you can read the position value in 60BAh (Touch probe 1 positive edge, reference unit). The latching times can be read in 60D5h.

Illustration

The following figure shows the sequence of the touch probe function setting and status feedback in the preceding example, with DI5 used as the trigger signal and latching at positive edge enabled.

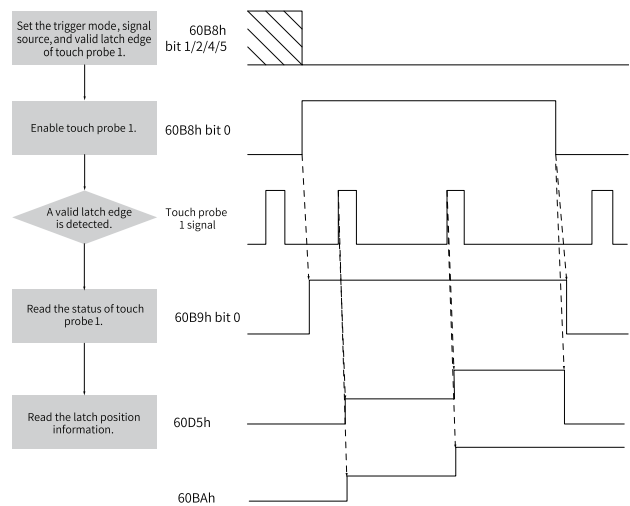


Figure 2-120 Procedure for use of the touch probe

2.12.2 Software limit

Function

In conventional drives, position limits are defined by external sensor signals connected to CN1, which is known as hardware position limits.

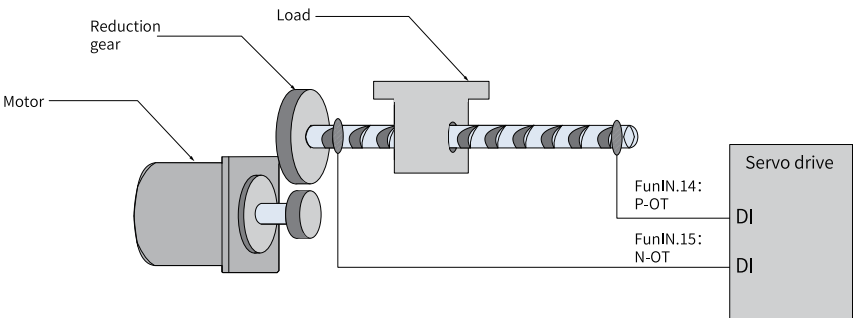


Figure 2-121 Installation of limit switches

Table 2-8 Comparison between the hardware position limit and software position limit

Hardware Position Limit		Software position limit	
1	Restricted to linear movement and single-turn rotating movement.	1	Applicable to both the linear motion and the rotational motion.
2	Requires an external mechanical limit switch.	2	Removes the need for hardware wiring, preventing malfunction due to poor cable contact.
3	Cannot judge mechanical slip	3	Preventing mechanical slip and abnormal action with internal position comparison
4	Unable to sense or detect an overtravel fault after power-off.		

The software position limit works by comparing the set limit with the internal feedback value. If the latter exceeds the former, a warning will be reported and the servo drive stops. Software position limit is available both in the absolute position mode and the incremental position mode. To use the software position limit in the incremental position mode, set 200A.02h (Software position limit) to 2 (Enabled after homing) first, and then perform homing upon power-on before applying software position limit.

Related parameters

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
HOA.10	200A-0Bh	Threshold of excessive local position deviation	0 to 4294967295	2748695 1	-	Real-time	"HOA_en.10" on page 249
607D.01h	607D-01h	Min. position limit	-2147483648 to 2147483647	-2147483 648	Refer ence unit	Real-time	"607D_en.01h" on page 345
607D.02h	607D-02h	Max. position limit	-2147483648 to 2147483647	2147483 647	Refer ence unit	Real-time	"607D_en.02h" on page 345



Caution

- Ensure the value of 607D.01 is lower than or equal to 607D.02. If 607D.01 is set to a value higher than 607D.02, EE09.0 (Software position limit setting error) will occur.
- In the absolute rotation mode or single-turn mode, ensure 607D.01 and 607D.02 are within the mechanical position limit. Otherwise, the servo drive reports EE09.0.
- Ensure the value of 607Ch (Home offset) is within the software position limit. Otherwise, the servo drive reports EE09.1.

2.12.3 Position Comparison

Function

Position comparison works by comparing the instantaneous position feedback with the value pre-saved in the data array and, once available, outputting a DO signal with pulse width settable for future use in subsequent motion control.

Position comparison is applicable to high-speed motion axes as comparison actions are implemented by FPGA, removing the risk of software communication delay between processors.

For position comparison, you can select "active high" or "active low" for DOs. When "active high" is selected, the corresponding DO is activated when it is connected to the common terminal and deactivated when it is disconnected from the common terminal. When "active low" is selected, the corresponding DO is deactivated when it is connected to the common terminal and activated when it is disconnected from the common terminal. There are three DOs for SV660N series servo drives.

Note

Position comparison is available only when the following conditions are fulfilled.

Conditions for position comparison	
Control mode	All the control modes
Others	Motor rotating normally with critical parameters (those besides control parameters) being set properly

Related objects

When position comparison is enabled, you can assign DO function 25 (Position comparison) to any one of the three DOs, and the DO you select will be used as the position comparison output signal.

Position comparison output parameters:

Param.	Name	Description
H18: Position comparison output		
H18.00	Position comparison switch	1: Enable
H18.02	Position comparison resolution	Defines the number of pulses per revolution. For example, if H18.02 is set to 1, the number of pulses per revolution is 223. 0: 24-bit 1: 23-bit 2: 22-bit 3: 21-bit 4: 20-bit 5: 19bit 6: 18bit 7: 17bit
H18.03	Position comparison mode	0: Individual comparison 1: Cyclic comparison
H18.04	Current position as zero	1: Enable (rising edge-triggered) Note: This function needs to be used when the comparison state is inactive, otherwise the comparison logic may malfunction.
H18.05	Position comparison pulse output width	Defines the active pulse width of the DO when the comparison point is reached. The value range is 0.1 to 204.7 (in ms).
H18.07	Start point of position comparison	Activated when H18.00 is set to 1 again.
H18.08	End point of position comparison	Activated when H18.00 is set to 1 again.
H18.09	Current state of position comparison	0: No comparison; n: Waiting for the comparison point N
H18.10	Real-time position of position comparison	Displays the current comparison position value Value range: -2^{31} to $(2^{31} - 1)$
H18.12	Zero offset of position comparison	Defines the offset value after current position is taken as the zero point Value range: -231 to +231 - 1

Param.	Name	Description
H19: Target position parameters		
H19.00	Target value of position comparison 1	Defines the target value of position comparison 1. Value range: -2^{31} to $2^{31} - 1$
H19.02	Attribute value of position comparison 1	Defines the attribute value of position comparison 1. Bit 0-Enables passing through the point in the forward direction. Bit 1-Enables passing through the point in the reverse direction. - When bit0 = 0 and bit1 = 0, the comparison logic skips the point. - When bit0=1 and bit1=0, DO active signal is output if current position changes from "less than" to "more than" the comparison point. - When bit0=0 and bit1=1, DO active signal is output if current position changes from "more than" to "less than" the comparison point. - When bit0=1 and bit1=1, DO active signal is output in both situations. bit2 to bit6: N/A Bit7 and bit8^[1] are used to configure which DO outputs the pulse signal when the position comparison is valid. - When bit7 = 0 and bit8 = 0, the original design method is retained and the DO serial number of position comparison is selected from group H04. - When bit7 = 1 and bit8 = 0, the pulse signal is output from DO1 when the position comparison is valid. - When bit7 = 0 and bit8 = 1, the pulse signal is output from DO2 when the position comparison is valid. - When bit7 = 1 and bit8 = 1, the pulse signal is output from DO3 when the position comparison is valid.
H19.03	Target value of position comparison 2	Defines the target value of position comparison 2. Value range: -2^{31} to $2^{31} - 1$
H19.05	Attribute value of position comparison 2	Defines the attribute value of position comparison 2 as for H19.02.
...		
H19.87	Target value of position comparison 30	Defines the target value of position comparison 30. Value range: -2^{31} to $2^{31} - 1$
H19.89	Attribute value of position comparison 30	Defines the attribute value of position comparison 30. Value range: Same as above

Note

[1]: For the -NS model, there is no bit7 or bit8.

Function operation

1. Description

Position comparison works by comparing the instantaneous position feedback with the value pre-saved in the data array and, once available, outputting a DO signal with pulse width settable for future use in subsequent motion control. Position comparison is applicable to high-speed motion axes as comparison actions are

implemented by FPGA, removing the risk of software communication delay between processors.

- Position comparison switch:

When the value of H18.00 (Position comparison switch) changes from 0 to 1, position comparison starts and the value of H18.09 (Current state of position comparison) is updated to the start point of position comparison. When the value of H18.00 changes to 0, position comparison stops and the current comparison state will be cleared.

- Position comparison resolution

The comparison resolution defines the number of pulses per revolution. Given the maximum and minimum limits on the target position (defined by group H19), you can reset the resolution when data overflow occurs on the comparison value. For example, when H18.02 is set to 7 (17-bit), the maximum value of the target position is $2^{31} - 1$, and the motor rotates $(2^{31} - 1)/2^{17}$ circles.

The target position in group H19 is only related to the set resolution.

- Individual comparison mode:

In the individual comparison mode, when comparison of the end point is done, the comparison function is switched off automatically and the current comparison value is cleared. Position comparison can be enabled again only when the position comparison switch is switched on again.

The real-time position feedback in the individual comparison mode is an absolute value, which means it is an accumulative value based on preceding comparison points, which cannot be cleared automatically.

- Cyclic comparison mode:

In the cyclic comparison mode, position comparison will not be switched off when the comparison end point is reached, and current position comparison value will be reset as the start point for position comparison. After comparison of each point is done, the real-time position feedback (H18.10) will be cleared and counted again for cyclic comparison. In the cyclic comparison mode, the target position is a relative (incremental) value. Each time a comparison point is reached, the real-time position feedback is cleared and counted again for comparison with the new target.

- Position comparison output width:

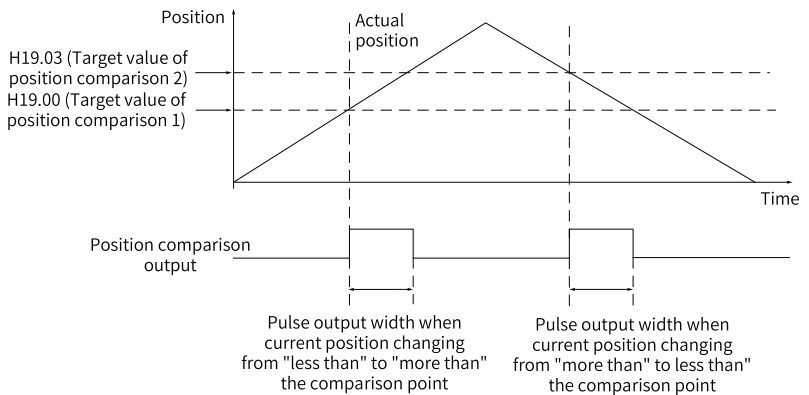
When the position comparison conditions are fulfilled, the servo drive outputs DO active level signal. The width of the active signal can be set in H18.05 (value range: 1 to 2047 x 0.1 ms). 1 to 2047 × 0.1 ms.

When position comparison DO is active, the comparison logic is suspended and no comparison will be performed. In this case, ensure the operating time between two target points is larger than the output width of DO.

- **Target value of position comparison**
There are 30 target values for position comparison. The target value is a 32-bit signed number. The target value and attribute value of position comparison must be updated to parameters in group H19 in advance.
- **Start point for comparison:**
The start point indicates the position of the first comparison point. For example, if the start point is set to 5, the comparison starts from position comparison 5.
- **End point for comparison:**
The end point indicates the position of the last comparison point. For example, if the end point is set to 7, the comparison stops or restarts from the start point after position comparison 7 is reached.
- **Zero offset of position comparison:**
The value of H18.10 (Real-time position feedback) will be changed to the offset value defined by H18.12 at the rising edge (0→1) of H18.04 (Current position as zero point).

2. Function operation

- When the position feedback of the encoder passes the target position comparison values (H19.00 to H19.21), the DO outputs the time width pulse defined by H18.05, as shown in the following figure.



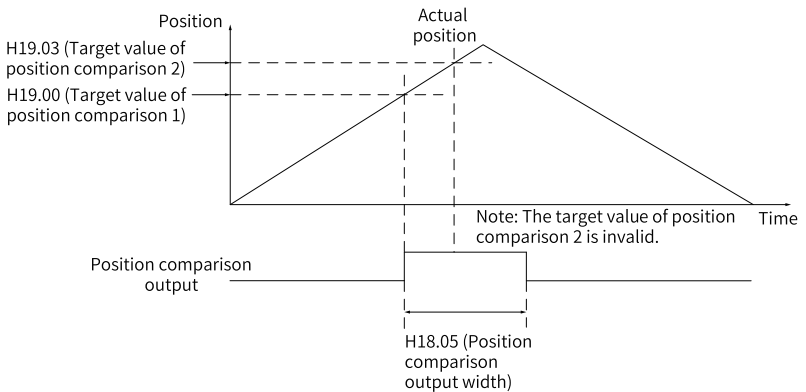
When the attribute of the comparison point is set to 1 (Output DO active signal if current position changes from "less than" to "more than" the comparison point), the DO outputs the position comparison signal when the axis passes the target position comparison point with position changing from "less than" to "more than" the comparison point position.

When the attribute of the comparison point is set to 2 (Output DO active signal if current position changing from "more than" to "less than" the comparison point), the DO outputs the position comparison signal when the axis passes the

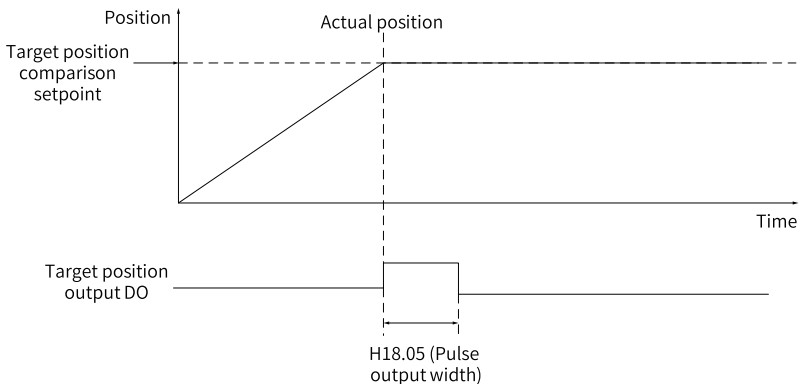
target position comparison point with position changing from "more than" to "less than" the comparison point position.

When the attribute of the comparison point is set to 3 (Output DO active signal in both situations), the DO outputs the position comparison signal when the axis passes the target position comparison point with position changing from "more than" to "less than" the comparison point position in either direction.

- When the direction of action reverses and multiple position comparison values are set, no comparison will be performed once the position comparison DO is active. Therefore, ensure the operating time between two position comparison points is larger than the pulse output width. As the operating time between two comparison points is smaller than the pulse output width, position comparison is not performed when current position changes from "more than" to "less than" the comparison point position.



- Only one pulse will be outputted when the stop position is the same with the target value of position comparison. See the following figure.



3. Interface of the software tool

The software tool supports division setting for users to set the target value of position comparison easily. Set a proper comparison mode, start point, and end point first.

- Individual comparison mode

a. Set H18.03 (Position comparison mode) to 0 (Individual position comparison).

The screenshot shows the [SV660N_1] Contrast output software interface. The left panel displays 'Position comparison setting' for 'Axis1'. The right panel shows 'Position comparison monitoring' and 'Target position parameter setting'.

Position comparison setting (Axis1):

- Position comparison output enable: 0 (Disable)
- Position comparison value resolution: 1 (23-bit)
- Position comparison mode selection: 0 (Single comparison mode)
- Zero at current position: 0 (Disable)
- Position comparison output width: 0 (0.000000 - 204.700000)
- Position comparison starting point: 0 (0 - 8)
- Position comparison termination point: 0 (-2147483648 - 2147483647)
- Position comparison zero offset: 0

Position comparison monitoring:

- Position comparison current status: 0.000000
- Position comparison real-time: 0.000000

Target position parameter setting:

- Distance length: 800000
- Compare points: 5
- Equal setting: [Button]
- Upload: [Button]
- Download: [Button]
- Comparison point range: 1 - 1
- Target attribute value: 0
- Set properties: [Button]

No.	Description	Address	Setting value	Current ...	Minimum ...	Maximum ...
1	Target value of p...	1900	***	0	-2147483648	2147483647
2	Attribute value of...	1902	***	0	0	3
3	Target value of p...	1903	***	0	-2147483648	2147483647
4	Attribute value of...	1905	***	0	0	3
5	Target value of p...	1906	***	0	-2147483648	2147483647
6	Attribute value of...	1908	***	0	0	3
7	Target value of p...	1909	***	0	-2147483648	2147483647
8	Attribute value of...	1908	***	0	0	3
9	Target value of p...	190C	***	0	-2147483648	2147483647
10	Attribute value of...	190E	***	0	0	3
11	Target value of p...	190F	***	0	-2147483648	2147483647
12	Attribute value of...	1911	***	0	0	3
13	Target value of p...	1912	***	0	-2147483648	2147483647
14	Attribute value of...	1914	***	0	0	3
15	Target value of p...	1915	***	0	-2147483648	2147483647
16	Attribute value of...	1917	***	0	0	3

b. **Target position parameter setting: Distance length** (total operating distance) and **Compare points**

c. In the single comparison mode, set the total running distance and number of comparison points. After clicking "Equal Setting", the target value of the first point is updated to "Offline x 1/Number of comparison points", the target value of the second point is updated to "Distance x 2/Number of comparison points", and the target value of the Nth point is updated to "Distance x N/Number of comparison points". Distance x N/Compare points

[SV660N_1]Contrast output

Select axis: **Axis1**

Position comparison setting:

- Position comparison output enable: **[Disable]**
- Position comparison value resolution: **[24-bit]**
- Position comparison mode selection: **[Single comparison mode]**
- Zero at current position: **[Disable]**
- Position comparison output width: **0** (0.000000 ~ 204.700000)
- Position comparison starting point: **0** (0 ~ 8)
- Position comparison termination point: **0** (-2147483648 ~ 2147483647)
- Position comparison zero offset: **0**

Position comparison monitoring:

Position comparison current status: **0.000000** Position comparison real-time: **0.000000**

Target position parameter setting:

Distance length: **800000** Compare points: **5** **Equal setting** **Upload** **Download**

Comparison point range: **1** - **1** Target attribute value: **0** **Set properties**

No...	Description	Address	Setting value	Current ...	Minimum ...	Maximum ...
1	Target value of p...	1900	***	0	-2147483648	2147483647
2	Attribute value of...	1902	***	0	0	3
3	Target value of p...	1903	***	0	-2147483648	2147483647
4	Attribute value of...	1905	***	0	0	3
5	Target value of p...	1906	***	0	-2147483648	2147483647
6	Attribute value of...	1908	***	0	0	3
7	Target value of p...	1909	***	0	-2147483648	2147483647
8	Attribute value of...	1908	***	0	0	3
9	Target value of p...	190C	***	0	-2147483648	2147483647
10	Attribute value of...	190E	***	0	0	3
11	Target value of p...	190F	***	0	-2147483648	2147483647
12	Attribute value of...	1911	***	0	0	3
13	Target value of p...	1912	***	0	-2147483648	2147483647
14	Attribute value of...	1914	***	0	0	3
15	Target value of p...	1915	***	0	-2147483648	2147483647
16	Attribute value of...	1917	***	0	0	3

When H18.00 (Position comparison output selection) changes from 0 to 1 (Enable (rising edge-triggered)), H18.09 (Current state of position comparison) changes from 0 to 1 and the first target position value will be compared. When H18.10 (Real-time position feedback) reaches the value of the first target position, H18.09 changes from 1 to 2, and so on.

- Cyclic comparison

a. Set position comparison mode to 1 (cyclic comparison).

[SV660N_1]Contrast output

Select axis: **Axis1**

Position comparison setting:

- Position comparison output enable: **[Disable]**
- Position comparison value resolution: **[23-bit]**
- Position comparison mode selection: **[Cyclic comparison mode]**
- Zero at current position: **[Disable]**
- Position comparison output width: **0** (0.000000 ~ 204.700000)
- Position comparison starting point: **0** (0 ~ 8)
- Position comparison termination point: **0** (-2147483648 ~ 2147483647)
- Position comparison zero offset: **0**

Position comparison monitoring:

Position comparison current status: **0.000000** Position comparison real-time: **0.000000**

Target position parameter setting:

Distance length: **800000** Compare points: **5** **Equal setting** **Upload** **Download**

Comparison point range: **1** - **1** Target attribute value: **0** **Set properties**

No...	Description	Address	Setting value	Current ...	Minimum ...	Maximum ...
1	Target value of p...	1900	***	0	-2147483648	2147483647
2	Attribute value of...	1902	***	0	0	3
3	Target value of p...	1903	***	0	-2147483648	2147483647
4	Attribute value of...	1905	***	0	0	3
5	Target value of p...	1906	***	0	-2147483648	2147483647
6	Attribute value of...	1908	***	0	0	3
7	Target value of p...	1909	***	0	-2147483648	2147483647
8	Attribute value of...	1908	***	0	0	3
9	Target value of p...	190C	***	0	-2147483648	2147483647
10	Attribute value of...	190E	***	0	0	3
11	Target value of p...	190F	***	0	-2147483648	2147483647
12	Attribute value of...	1911	***	0	0	3
13	Target value of p...	1912	***	0	-2147483648	2147483647
14	Attribute value of...	1914	***	0	0	3
15	Target value of p...	1915	***	0	-2147483648	2147483647
16	Attribute value of...	1917	***	0	0	3

b. Target position parameter setting: Distance length (distance between two adjacent points) and Compare points (points to be compared cyclically)

c. After clicking Equal setting, the target values of the 1st point to the Nth point are updated to equal interval distance values.

[SV660N-1] Contrast output

Select axis: **Axis1**

Position comparison setting

Position comparison output enable: **[Disable]**

Position comparison value resolution: **[24-bit]**

Position comparison mode selection: **[Cyclic comparison mode]**

Zero at current position: **[Disable]**

Position comparison output width: **0** 0.000000 ~ 204.700000

Position comparison starting point: **0** 0 ~ 8

Position comparison termination point: **0** -2147483648 ~ 2147483647

Position comparison zero offset: **0**

Setting **Read**

Position comparison monitoring

Position comparison current status: **0.000000** Position comparison real-time: **0.000000**

Target position parameter setting

Distance length: **800000** Compare points: **5** **Equal setting** **Upload** **Download**

Comparison point range: **1** ~ **1** Target attribute value: **0** **Set properties**

No...	Description	Address	Setting value	Current ...	Minimum ...	Maximum ...
☐ 1	Target value of p...	1900	***	0	-2147483648	2147483647
☐ 2	Attribute value of...	1902	***	0	0	3
☐ 3	Target value of p...	1903	***	0	-2147483648	2147483647
☐ 4	Attribute value of...	1905	***	0	0	3
☐ 5	Target value of p...	1906	***	0	-2147483648	2147483647
☐ 6	Attribute value of...	1908	***	0	0	3
☐ 7	Target value of p...	1909	***	0	-2147483648	2147483647
☐ 8	Attribute value of...	1908	***	0	0	3
☐ 9	Target value of p...	190C	***	0	-2147483648	2147483647
☐ 10	Attribute value of...	190E	***	0	0	3
☐ 11	Target value of p...	190F	***	0	-2147483648	2147483647
☐ 12	Attribute value of...	1911	***	0	0	3
☐ 13	Target value of p...	1912	***	0	-2147483648	2147483647
☐ 14	Attribute value of...	1914	***	0	0	3
☐ 15	Target value of p...	1915	***	0	-2147483648	2147483647
☐ 16	Attribute value of...	1917	***	0	0	3

When H18.00 (Position comparison output selection) changes from 0 to 1 (Enable (rising edge-triggered)), H18.09 (Current state of position comparison) changes from 0 to 1 and the first target position value will be compared. When H18.10 (Real-time position feedback) reaches the value of the first target position, H18.09 changes from 1 to 2, and so on.

Position comparison switch H18.18

Bit0: Enable/disable position comparison logic with 3 independent DOs.

Bit8: Enable user reference unit for H19 target position.

1. bit0 of H18.18 = 1:

Enabling is only effective when H18.03 = 0. The comparison logic does not switch off automatically. You must set H18.00 = 0 to disable position comparison.

a. Among H19.00 to H19.29, the first 10 target positions are used to set the comparison logic target value of DO1 (H04.00 = 25-Position comparison). When H18.10 comparison real-time position passes through any of them and the comparison condition attribute is met (reverse and forward pass-through), DO1 can output a signal with pulse width of H18.05. Taking into account that all target positions will continue to be compared during active DO operation, it is recommended that the servo drive moves between the two adjacent target positions for a longer time than the pulse width of the DO output.

b. The middle 10 target positions in H19.30 to H19.59 are used to set the comparison logic target value of DO2 (H04.02 = 25-position comparison). DO2 can output a signal with pulse width of H18.05 when H18.10 comparison real-time position passes through any of them and the comparison condition attribute is met (reverse and forward pass-through).

c. Among H19.60 to H19.89, the last 10 target positions are used to set the comparison logic target value of DO3 (H04.04 = 25-Position comparison). When H18.10 comparison real-time position passes through any of them and the comparison condition attribute is met (reverse and forward pass-through), DO3 can output a signal with pulse width of H18.05.

2. When bit8 of H18.18 = 1:

The position comparison target values of group H19 are in the user reference unit. When the target position of group H19 is configured by the user in the reference unit, the servo drive automatically converts the unit of all target positions into the same unit as H18.10 for internal position comparison.

Note

- The position comparison logic can only be enabled when H18.00 changes from 0 to 1.
 - To switch off position comparison, you can set H18.00 = 0.
 - When H18.18 bit8 = 1, the ^{servo} drive automatically converts the target value with the user reference unit to the same target value with the same unit as H18.10. If the converted target value exceeds $2^{31}-1$, the drive issues an E902.3 warning code, indicating target position overflow. For details, see the Troubleshooting Guide.
-

2.12.4 Forced EtherCAT DO

Function

Two DO options are available by default in the non-operational (non-OP) status (including network offline) for EtherCAT-forced DO status:

1. Status unchanged in the non-OP status: The servo status switches to the non-OP status and the forced DO status stays unchanged.
2. Initialization status: No forced DO is generated when the servo drive is in the non-OP status.

When the network switches to the operational (OP) status, the forced DO is determined by 60FE-1 and 60FE-2.

Select the forced DO function by bits. You can select the DO as EtherCAT-forced DO by bits, which means both the local functions and EtherCAT forced-DO function can be supported by the DO.

Related objects

See the following for related parameter settings.

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H04.23	2004-18h	EtherCAT forced DO logic in non-OP status	0: Status of DO1, DO2, and DO3 unchanged in the non-OP status 1: No output in DO1 and status of others unchanged in the non-OP status 2: No output in DO2 and status of others unchanged in the non-OP status 3: No output in DO1 or DO2 and status of DO3 unchanged in the non-OP status 4: No output in DO3 and status of others unchanged in the non-OP status 5: No output in DO1 or DO3 and status of DO2 unchanged in the non-OP status 6: No output in DO2 or DO3 and status of DO1 unchanged in the non-OP status 7: No output in DO1, DO2, or DO3 in the non-OP status	0	-	Real-time	<i>"H04_en.23" on page 198</i>

Descriptions for the setpoints are shown in the following table.

Table 2-9 Description of setpoints

Value	DO Function
0	Status of DO1, DO2, and DO3 unchanged in the non-OP status
1	No output in DO1 and status of others unchanged in the non-OP status
2	No output in DO2 and status of others unchanged in the non-OP status
3	No output in DO1 or DO2 and status of others unchanged in the non-OP status
4	No output in DO3 and status of others unchanged in the non-OP status
5	No output in DO1 or DO3 and status of others unchanged in the non-OP status
6	No output in DO2 or DO3 and status of others unchanged in the non-OP status
7	No output in DO1, DO2, or DO3 in the non-OP status

Setting method:

1. Assign DO function 31 (EtherCAT-forced DO) to the DO to be controlled forcibly by EtherCAT, and then set the bit of H04.23 as needed to select the forced DO status in the non-OP status.

2. Configure 60FE-1/60FE-2 as RPDO, and operate on bit16...bit18 to control the DO.

3 STO

3.1 General

3.1.1 Terms and Abbreviations

Terms and Abbreviations	Description
Cat.	Safety category It includes B, 1, 2, 3, and 4.
CCF	Common cause failure
DCavg	Average diagnostic coverage (%)
DTI	Diagnostic test interval time
SFF	Safe failure fraction
HFT	Hardware fault tolerance
PFH _D	Probability of a dangerous Failure per Hour
PL	Performance Level
SC	Systematic capability
SIL	Safety integrity level
T ₁	Test interval
DI	Digital input
DO	Digital output
PCB	Printed circuit board
MCU	Micro computer unit
FPGA	Field programmable gate array
MTTF _D	Mean time to dangerous failure
STO	The safe torque off (STO) function brings the machine safely into a no-torque state and prevents it from unexpected start. If the motor is running when STO function is activated, it coasts to 0 RPM.

3.1.2 Safety Standards

Standards compliance

- EC directives and standards
 - Low Voltage Directive 2014/35/EU Standard EN 61800-5-1
 - EMC Directive 2014/30/EU Standard EN 61800-3: 2018
 - Machinery Directive 2006/42/EC (Safety Functions) Standard IEC 61800-5-2
- Safety standard

Safety standard	Reference
Functional safety	IEC 61508: 2010 ISO 13849-1: 2015 ISO 13849-2: 2012 IEC 62061: 2021 EN 61508: 2010 EN ISO 13849-1: 2015 EN ISO 13849-2: 2012 EN IEC 62061: 2021 IEC 60204-1: 2016 (in extracts) EN 60204-1: 2018 (in extracts)
EMC	IEC 61800-5-2: 2016 IEC 61800-3: 2017 IEC 61326-3-1: 2017 IEC 61000-6-7: 2014 EN 61800-5-2: 2017 EN IEC 61800-3: 2018 EN 61326-3-1: 2017 EN 61000-6-7:2015
LVD	IEC 61800-5-1:2007/AMD1:2016 EN 61800-5-1:2007/A1:2017

- Safety data

Item	Safety data
SIL	SIL3, IEC61508 Maximum SIL3, EN IEC62061
PFH _D	$PFH_D \leq 1.1 \times 10^{-9} [1/h]$ (1.1% of SIL3)
Cat.	3, EN ISO 13849-1
PL	e, EN ISO 13849-1
MTTF _d	904 years (high)
DCavg	≥90% (medium)
T ₁	20 years
HFT	1
SC	SC3
λ _s	$2.5 \times 10^{-7}/h$
λ _{DD}	$1.3 \times 10^{-7}/h$
λ _{DU}	$2.0 \times 10^{-9}/h$
MTTR	0 hour
MRT	0 hour
Application mode	High demand or continuous mode
Device type	Type B

λ_s means the failure rate of safe failure which brings the system into safe state.

λ_{DD} means the failure rate of dangerous failure but can be diagnosed by the diagnosis subsystem.

λ_{DU} means the failure rate of dangerous failure and can't be diagnosed by the diagnosis subsystem.

Note

- See ISO13849-2: 2012 for failure modes of devices.
- Failure sharing of different failure modes of each device.
- See SN29500 for failure rate of each device.

Specifications

- Electrical safety according to IEC 61800-5-1:2016, overvoltage category II
- Environment test requirement according to IEC 61800-5-1:2016
- Operating conditions are shown as follows.

Item	Description																				
Ambient/Storage temperature	0 to 55°C/-20°C to +70°C																				
Ambient/Storage humidity	20%–95% RH (no condensation)																				
Vibration	<table> <tr> <th>Item</th><th>Test Condition</th></tr> <tr> <td>Test reference</td><td>See IEC 60068-2-6 4.6</td></tr> <tr> <td>Condition</td><td>EUT is powered on and works normally.</td></tr> <tr> <td>Motion mode</td><td>Sinusoidal</td></tr> <tr> <td>Vibration amplitude/ Acceleration rate</td><td>-</td></tr> <tr> <td>10 Hz ≤ f ≤ 57 Hz</td><td>0.075 mm amplitude</td></tr> <tr> <td>57 Hz < f ≤ 150 Hz</td><td>1 kg</td></tr> <tr> <td>Vibration duration</td><td>10 times on each of the three mutually perpendicular axes</td></tr> <tr> <td>Axis</td><td>X, Y, Z</td></tr> <tr> <td>Installation</td><td>According to the manufacturer's specifications</td></tr> </table>	Item	Test Condition	Test reference	See IEC 60068-2-6 4.6	Condition	EUT is powered on and works normally.	Motion mode	Sinusoidal	Vibration amplitude/ Acceleration rate	-	10 Hz ≤ f ≤ 57 Hz	0.075 mm amplitude	57 Hz < f ≤ 150 Hz	1 kg	Vibration duration	10 times on each of the three mutually perpendicular axes	Axis	X, Y, Z	Installation	According to the manufacturer's specifications
Item	Test Condition																				
Test reference	See IEC 60068-2-6 4.6																				
Condition	EUT is powered on and works normally.																				
Motion mode	Sinusoidal																				
Vibration amplitude/ Acceleration rate	-																				
10 Hz ≤ f ≤ 57 Hz	0.075 mm amplitude																				
57 Hz < f ≤ 150 Hz	1 kg																				
Vibration duration	10 times on each of the three mutually perpendicular axes																				
Axis	X, Y, Z																				
Installation	According to the manufacturer's specifications																				

Item	Description																
Shock resistance	<table> <tr> <th>Item</th><th>Test Condition</th></tr> <tr> <td>Test reference</td><td>See IEC 60068-2-27: 2008 Table 17</td></tr> <tr> <td>Condition</td><td>EUT is powered on and works normally.</td></tr> <tr> <td>Motion mode</td><td>Half-sine pulse</td></tr> <tr> <td>Shock amplitude/ Time</td><td>50 m/s² (5 g) 30 ms</td></tr> <tr> <td>Number of shocks</td><td>3 per axis on each of three mutually perpendicular axes</td></tr> <tr> <td>Axis</td><td>±X, ±Y, ±Z</td></tr> <tr> <td>Installation</td><td>According to the manufacturer's specifications</td></tr> </table>	Item	Test Condition	Test reference	See IEC 60068-2-27: 2008 Table 17	Condition	EUT is powered on and works normally.	Motion mode	Half-sine pulse	Shock amplitude/ Time	50 m/s ² (5 g) 30 ms	Number of shocks	3 per axis on each of three mutually perpendicular axes	Axis	±X, ±Y, ±Z	Installation	According to the manufacturer's specifications
Item	Test Condition																
Test reference	See IEC 60068-2-27: 2008 Table 17																
Condition	EUT is powered on and works normally.																
Motion mode	Half-sine pulse																
Shock amplitude/ Time	50 m/s ² (5 g) 30 ms																
Number of shocks	3 per axis on each of three mutually perpendicular axes																
Axis	±X, ±Y, ±Z																
Installation	According to the manufacturer's specifications																
IP rating	IP20																
Pollution degree (PD)	PD2: free of corrosive or explosive gases; free of exposure to water, oil or chemicals; free of dust, salts or iron dust																
Altitude	2000 m or below																
Cooling method	Dry clean air (natural convection)																
Others	Free of static electricity, strong electromagnetic fields, magnetic fields, or exposure to radioactivity																

- The drive complies with EMC standards EN/IEC 61800-3:2017, IEC 61326-3-1, and IEC 61800-5-2
- Others

Item	Description
Applicable servo drives SV660, SV630, SV635	SV6***S1R6I-FS SV6***S2R8I-FS SV6***S5R5I-FS SV6***S7R6I-FS SV6***S012I-FS SV6***T3R5I-FS SV6***T5R4I-FS SV6***T8R4I-FS SV6***T012I-FS SV6***T017I-FS SV6***T021I-FS SV6***T026I-FS
Position	Integrated on the control board of the drive
Safety function - Inputs	Two channels: STO1/STO2

The STO subsystem elements must always be able to operate within the range of temperature, humidity, corrosion, dust, and vibration and other requirements specified above.

3.1.3 Precautions for Use

General Safety Instructions

The chapter contains the warning symbols used in this manual and the safety instructions which you must obey when you install or connect an option module to a drive or inverter. If you ignore the safety instructions, injury, death or damage can occur. Read this chapter before you start the installation.

Any illustrations, photographs, or examples used in this manual are provided as examples only and may not apply to all products to which this manual is applicable.

The products and specifications described in this manual or the content and presentation of the manual may be changed without notice to improve the product and/or the manual.

Table 3-1 Warnings, Cautions and Notes

Pictogram	Signal word	Meaning	Consequences in case of disregard
Example:  DANGER  Hazardous voltage e.g. electric shock	DANGER	DANGER	Indicates that failure to comply with the notice will result in death or severe personal injuries
	WARNINGS	Warning	Indicates that failure to comply with the notice may result in death or severe personal injuries
	CAUTION	Note	Indicates that failure to comply with the notice may result in minor or moderate personal injuries or equipment damage
	STOP	Prohibit	Indicates that failure to comply with the notice will result in equipment or environmental damage



- High attention is required for electrical installation and at the system design to avoid hazards either in normal operation or in the event of equipment malfunction.
- System design, installation, commissioning and maintenance must be carried out by personnel who have the necessary training and experience. They must read the operating instruction and this safety information.

It is the responsibility of the machine builder/OEM/system integrator to make sure that the essential health and safety function requirements specified in the Machinery Directive are met. Risk analysis and risk assessment is needed before using a product. Make sure that adequate measures are taken to eliminate/reduce the relating risks and components chosen must meet the safety requirements.

This section describes the information that needs to be noted before starting operation. Read the following safety precautions, risk assessment information, and limitations before starting operation.

Safety function: Use the safety function after properly understanding all of these information. Incorrect use of safety functions or use of safety functions that are not sufficient to meet the safety requirements of the site may result in personal injury.

Safety Precautions

Carefully read the following important precautions and observe them when using the safety function.

- STO function is not intended as a replacement for the emergency stop function (E-stop). If only the STO function is triggered, with no extra measures taken, the power supply cannot be cut off in emergencies and high-current parts of the motor and drive are still energized, incurring the risk of electric shock or other risks result in electric energy. Therefore maintenance work on electrical parts of the drive or motor can only be carried out after isolating the drive system from the main supply.
- Depending on the standards and requirements for a particular application, it may be possible to use STO as an integral part of an E-stop system. However, its main purpose is for use in a dedicated safety control arrangement whose purpose is to prevent any hazard from occurring, without the use of an E-stop.
- An E-stop is often provided in a machine to allow for unexpected situations where an operator sees a hazard and can take action to prevent an accident.
- The design requirement for an E-stop differs from that of a safety interlock. Generally, the E-stop is required to be independent from any complex or "intelligent" control. It may use purely electromechanical devices to either disconnect the power or initiate a controlled rapid stop using other means such as dynamic or regenerative braking.

Note

- The design of safety-related systems requires specialist knowledge. To ensure that a complete control system is safe, it is necessary for the whole system to be designed according to recognized safety principles. The use of individual sub-systems such as drives with STO function, which are intended for safety-related applications, does not in itself ensure that the complete system is safe.
 - The STO function can be used to stop the drive in emergency stop situations.
 - In processes without personnel protection, it is recommended not to stop the drive by using the STO function. If a drive running is stopped by using STO, the drive performs a coast-to-stop. If this is not acceptable, the system should be stopped using the correct mode instead of the STO function.
 - This publication is a guide to the application of Inovance SV660 series safety functions, and also on the design of safety-related systems for machinery control.
 - It is the responsibility of the designer of the end product or application to ensure that it is safe and in compliance with the relevant regulations.
-

Risk Assessment

- When using the safety functions, perform risk assessment on the servo system in advance. Make sure that the safety integrity level of the standards is met.
 - The following residual risks can be present even when the safety functions operate. Therefore, safety must always be given consideration during risk assessment.
 - If external forces (such as gravitational force with a vertical axis) are applied when the safety functions are operating, the motor will rotate due to the action of these external forces. Therefore, you must use a separate mechanical brake to secure the motor.
-

Note

- In the case of failure of multiple IGBTs, regardless of whether the STO function is enabled, the servo drive can generate an alignment torque. This torque can cause the motor shaft to rotate within a range of up to $180 \div p$ (for a synchronous reluctance motor, the range is $180 \div 2p$).
 - p: Number of motor pole pairs.
-

To ensure safety, users should decide all the risk assessments and residual risks in the entire machine equipment. A company and individual who constructed the safety related system must take full responsibility for installation and commissioning of the system. Additionally, when complying with a European machinery directive, the system must acquire safety standards certification as a whole.

Perform all risk assessments and safe level certification to the machine or the system as a whole. It is recommended that a Certification Body final safety certification of the system be used.

The following shows residual risks concerning the safety function of this product.

Common residual risks

- At the shipment to end-users, check the settings of safety related components with programming tools and monitored/displayed contents on display and record and save the setting data concerning the safety observation function and the programming tools you used. Perform them using a check sheet, etc.
- The safety will not be ensured such as in assembling machine until installing, wiring, and adjustment are completed properly. Install, wire, and adjust your system referring to installation guide for each unit.
- Only qualified personnel are authorized to install, start-up, repair or adjust the machines in which these components are installed. Only trained engineers should install and operate the equipment.
- Separate the wiring for safety observation function from other signal wiring.
- Protect the cables with appropriate ways (routing them in a cabinet, using a cable guard, etc.).
- We recommend using a switch, relay, sensor, etc. which comply with safety standards. When using a switch, relay, sensor, etc. which do not comply with safety standards, perform a safety confirmation.
- Keep the required clearance/creepage distance depending on voltage you use.
- The time to a safety observation error depends on parameter settings.

Safe torque off (STO)

This function only cuts off the torque of the motor, and does not cut off the power supply of the servo/inverter. Before servicing the servo/inverter, cut off the power supply and ensure that the servo/inverter are not energized.

3.2 Safe Torque Off (STO)

3.2.1 Overview

Figure 3-1 Schematics of the STO function

Safe Torque Off (STO) is a safety function that complies with IEC 61800-5-2:2016. It is built into Inovance SV660F series servo drives.

The STO function inhibits the control signal of the power semiconductors on the drive output end, preventing the drive from generating torque at the motor shaft end.

The STO function prevents movement of the motor by two redundant external hardware signals (STO1 and STO2) that block the PWM signals from being outputted

to the power layer of the servo drive. STO1 and STO2 input signals must be both active to allow the servo drive to operate normally.

See the following table for the STO function.

STO1 input	STO2 input	PWM signal
H	H	Normal
L	H	Inhibited
H	L	Inhibited
L	L	Inhibited

STO (safe torque)	
Description	Cuts off the power of the motor.
Description	The safe torque off (STO) function brings the machine safely into a no-torque state and prevents it from unexpected start. If the motor is running when STO function is activated, it coasts to stop.
Safe state	Disables the PWM gating signal of the drive.
Operating mode	High demand mode or continuous mode

3.2.2 Function Use and Monitoring

Function Use

The keypad displays the STO function state and error information.

See the following table to identify the cause of a fault and the action to be taken.

Contact Inovance technical support if the fault persists after corrective actions listed in the following table are taken.

Fault codes related to the STO function are listed in the following table:

Fault Code	State	Description	Cause	Corrective Action
E150.1	Status of STO1 and STO2 inconsistent	Only one of STO1 and STO2 is in "Low" state, status of STO1 and STO2 are inconsistent.	The input states of STO1 and STO2 are inconsistent.	1. Ensure the requests for disconnecting the voltage of STO1 and STO2 are triggered simultaneously. 2. The input circuit is abnormal and a certain STO input signal is still in the "H" state after the 24 V signal is disconnected. Contact Inovance for technical support.
E150.2	STO activated	OV/UV of the 5V power supply is detected.	OV/UV of the 5V power supply.	Restore the 5 V power supply to normal state. Contact Inovance for technical support.

Fault Code	State	Description	Cause	Corrective Action
E150.3	STO activated	The input circuit of STO works improperly.	The input circuit of STO works improperly.	Fix the input circuit fault. Contact Invoiance for technical support.
E150.4	STO activated	The buffer circuit of STO works improperly.	The buffer circuit of STO works improperly.	Fix the buffer circuit fault. Contact Invoiance for technical support.

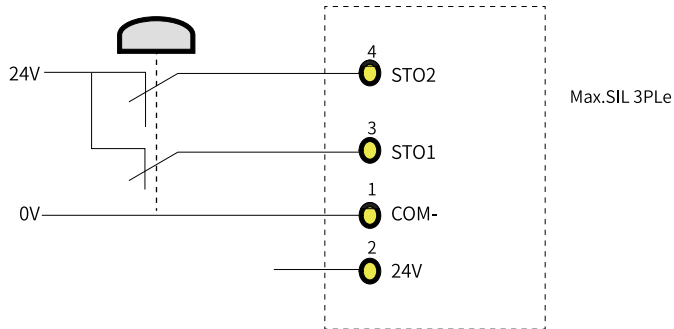
Note

- For a motor with brake, if either STO1 or STO2 closes, the drive will be disabled within 30 ms (STO response time).
- For a motor without brake, if either STO1 or STO2 closes, the drive will be disabled within 5 ms (STO response time).

Application Example of Safety Function

Example 1:

Emergency button (dual-contact) Class 3 ISO13849



3.2.3 Fault Reset

The exceptional operation refers to the durations of power-on and initialization, and how to return from the STO state.

- The PWM buffer is disabled as the enable terminal is pulled up during power-on, so the PWM signal is inhibited.
- The PWM buffer is disabled as the enable terminal is pulled up during initialization of the MCU, so the PWM signal is inhibited. Such condition is cleared and servo drive works normally after initialization is done.

- When all of the following conditions are met, the servo system that enters the safe state through the STO function can be back to normal with the safe state cleared after auto-reset of the drive.
 - The input state of the STO request must be "high".
 - The servo ON or servo RUN command must be inactive.
 - No dangerous faults exist.

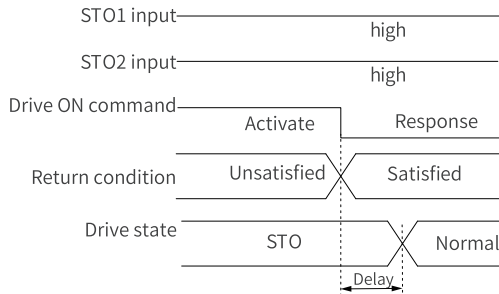


Figure 3-2 Return condition of servo ON/RUN command

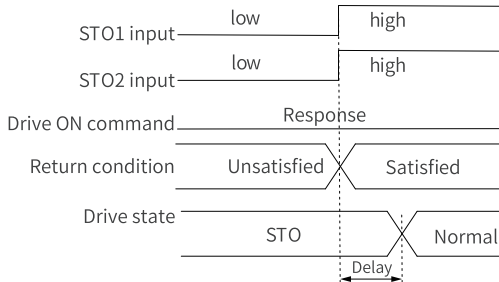


Figure 3-3 Return condition of external STO request state

- When STO_IN (STO1 or STO2 input) is restored to 24 V, the EDM and servo ready signals are immediately reset to 0. After 400 milliseconds, the servo operation signal is activated (when STO_IN keeps at 24 V). Servo operation is PWM drive signal output.

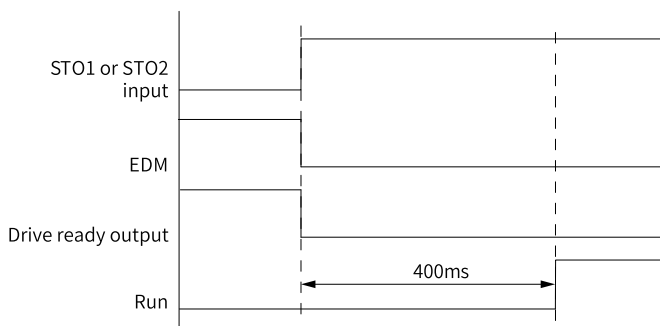
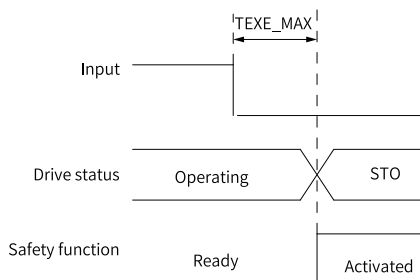


Figure 3-4 Servo drive reset timing diagram

3.2.4 Safety Function Response Time

The STO function prevents movement of the motor by two redundant external hardware signals (STO1 and STO2) that block the PWM signals from being outputted to the power layer of the servo drive. STO1 and STO2 input signals must be both active to allow the servo drive to operate normally.

If either one or both signals are set to "Low" level, the PWM signals will be blocked within 30 ms.



Note

[1]: The typical response time is 30 ms. The maximum response time is 100 ms, given the discrete type of the electronic device.

3.3 Acceptance

Basic requirements

- Technical staff must be trained to understand the requirements and principles of designing and operating safety-related systems.

- Person performing the maintenance must be trained to understand the requirements and principles of designing and operating safety-related systems.
- Operators must be trained to understand the requirements and principles of designing and operating safety-related systems.
- The safety-related circuit on the control board that fails to operate must be replaced with a new one as it is not repairable.

Commissioning Checklist

- Start-up test and validation
IEC 61508, EN/IEC 62061 and EN ISO 13849 require the final assembler of the equipment to verify the operation of the safety function through acceptance testing. This acceptance test is described in the drive manual. The testing of optional safety features is described in the corresponding manuals.

The acceptance test must be performed:

- at initial start-up of the safety function
- after any changes related to the safety function (wiring, components, settings and so on).
- after any maintenance work related to the safety function.

The acceptance test of the safety function must be carried out by an authorized person with expertise and knowledge of the safety function. The test must be documented and signed by the test staff.

Signed acceptance test reports must be stored in the logbook of the machine. The report shall include documentation of start-up activities and test results, references to failure reports and resolution of failures. Any new acceptance tests performed due to changes or maintenance need to be logged into the logbook.

- Checklist

Step	Action	Result
1	Ensure that the drive runs and stops freely during commissioning.	
2	Stop the drive (if running), switch the input power supply off and isolate the drive from the power line by a disconnector.	
3	Check the STO circuit connections based on the circuit diagram.	
4	Check that the shield of the STO input cable is grounded to the drive frame.	
5	Close the disconnector and switch the power supply on.	

Step	Action	Result
5.1	Test the STO signal #1 when the motor stops: Set STO1 and STO2 to "H". Send a stop command to the drive (if running) and wait until the motor shaft is at standstill. Awake the STO function by de-energizing (low state or open-circuit) the STO input signal #1 and send a start command to the drive. Ensure that the motor stays at a standstill and the keypad of the drive displays "E150.1".	
5.2	Set STO1 to "H" and disable the ON/RUN command of the drive. Then, reset the drive automatically and enable ON/RUN command of the drive. Finally, check whether the motor runs normally.	
5.3	Test the STO signal #2 when the motor stops: Set STO1 and STO2 to "H". Send a stop command to the drive (if running) and wait until the motor shaft is at standstill. Awake the STO function by de-energizing (low state or open-circuit) the STO input signal 2 and send a start command to the drive. Ensure that the motor stays at a standstill and the keypad of the drive displays "E150.1".	
5.4	Set STO2 to "H" and disable the ON/RUN command of the drive. Then, reset the drive automatically and enable ON/RUN command of the drive. Finally, check whether the motor runs normally.	
6.1	Test the STO channel 1 when the motor is running: Set STO1 and STO2 to "H". Start the drive and ensure the motor is running. Awake the STO function by de-energizing (low state or open-circuit) the STO input signal 1. Ensure that the motor stops and the drive trips. Reset the fault and try to start the drive. Ensure that the motor stays at a standstill and the keypad of the drive displays "E150.1".	
6.2	Set STO1 to "H" and disable the ON/RUN command of the drive. Then, reset the drive automatically and enable ON/RUN command of the drive. Finally, check whether the motor runs normally.	
6.3	Test the STO channel 2 when the motor is running: Set STO1 and STO2 to "H". Start the drive and ensure the motor is running. Awake the STO function by de-energizing (low state or open-circuit) the STO input signal 2. Ensure that the motor stops and the drive trips. Reset the fault and try to start the drive. Ensure that the motor stays at a standstill and the keypad of the drive displays "E150.1".	

Step	Action	Result
6.4	Set STO2 to "H" and disable the ON/RUN command of the drive. Then, reset the drive automatically and enable ON/RUN command of the drive. Finally, check whether the motor runs normally.	
7	Document and sign the acceptance test report which verifies that the safety function is safe and acceptable for operation.	

Special requirements

You must conduct STO diagnosis every three month by powering off and powering on the drive once, or running the STO function once.

Note

There are two ways to perform STO diagnosis:

- Power off and restart;
- Trigger and then cancel STO.

You can use either of them.

3.4 Troubleshooting

See the following table to identify the cause of a fault and the action to be taken. Contact Inovance technical support if the fault persists after corrective actions listed in the following table are taken. Fault codes related to the STO function are listed in the following table.

Error code	Cause	Corrective Action
E150.0	Neither STO1 nor STO2 is connected to the 24V signal.	Connect STO1 and STO2 to the 24V signal.
E150.1	The input states of STO1 and STO2 are inconsistent.	1. Ensure the requests for disconnecting the voltage of STO1 and STO2 are triggered simultaneously. 2. The input circuit is abnormal and a certain STO input signal is still in the "High" state after the 24 V signal is disconnected. Contact Inovance for technical support.
E150.2	OV/UV of the 5V power supply is detected.	Restore the 5 V power supply to normal state. Contact Inovance for technical support.
E150.3	The input circuit of STO works improperly.	Fix the input circuit fault. Contact Inovance for technical support.
E150.4	The buffer circuit of STO works improperly.	Fix the buffer circuit fault. Contact Inovance for technical support.

4 Multi-Machine Recipe Management

In EtherCAT-based multi-axis applications, each user device performs parameter reading or writing for each axis, which is costly and can be faulty. Therefore, EtherCAT networking devices need PC software capable of writing/reading parameters of all the servo axes at a time. And it should also save the complete device recipe.

Function

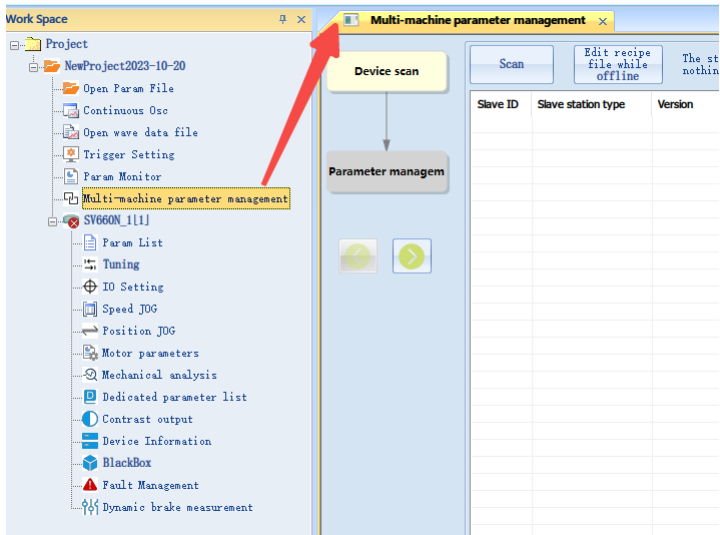
- Identification and scanning of axis drives: The software identifies Inovance EtherCAT devices (SV660N series servo drives) based on the configuration of the network card.
- Uploading and downloading of all the cascaded axis drive parameters.
- Saving and downloading of drive recipes.
- Comparison and copy of axis drive parameters.
- Comparison of device parameters and recipe parameters

Operating environment

- Hardware: PC
- Software supported:
Operating system: WIN7 32-bit/64-bit systems and WIN 10 32-bit/64-bit systems

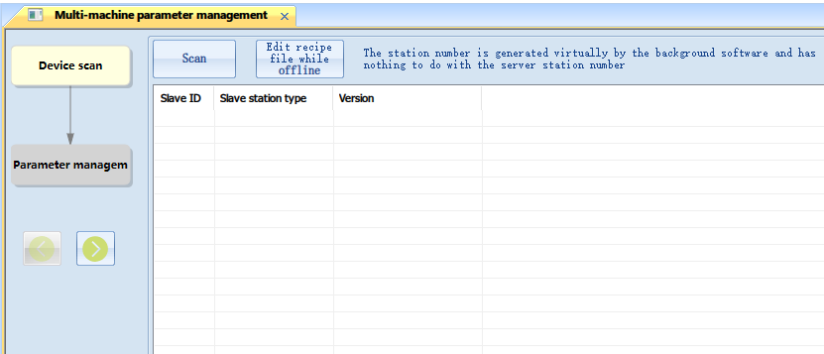
Instructions for use

1. Click the Multi-machine recipe button under SV660N to start the multi-machine recipe function, as shown below.

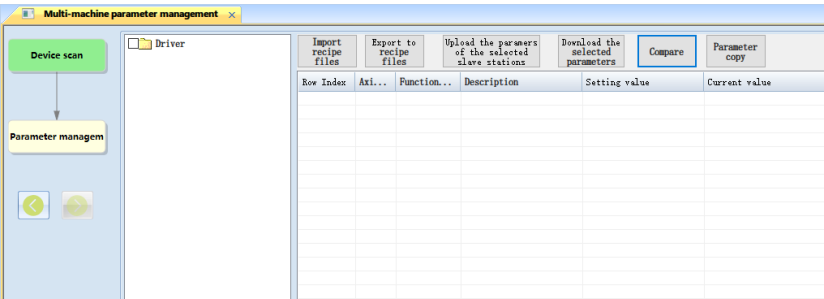


2. Scanning: Click the Scan button, and all the EtherCAT slaves cascaded will be scanned and displayed. The scanning time is directly proportional to the number of

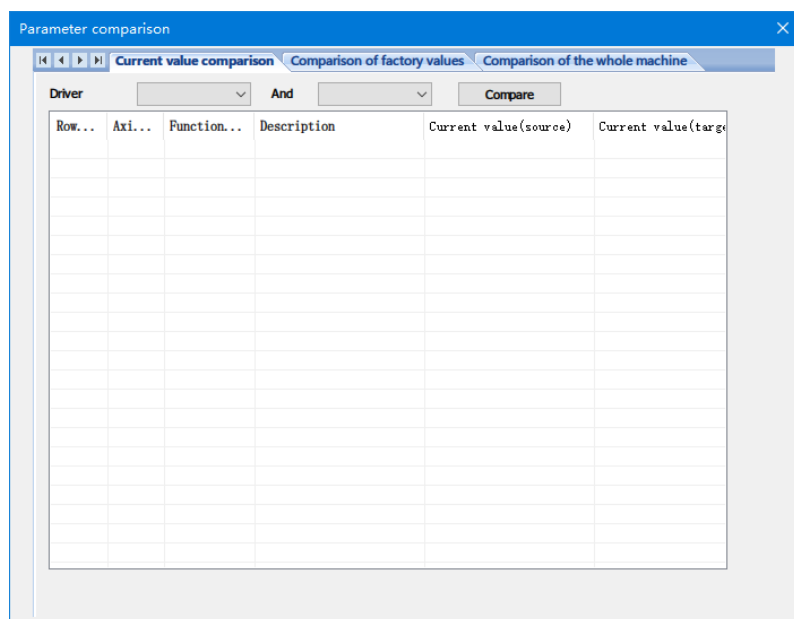
cascaded slaves, so you may wait a few minutes in case of large numbers of cascaded slaves. (Non-Inovance slaves are displayed as "Non-Inovance device".) (The non-Inovance slave will display "non-Inovance device").



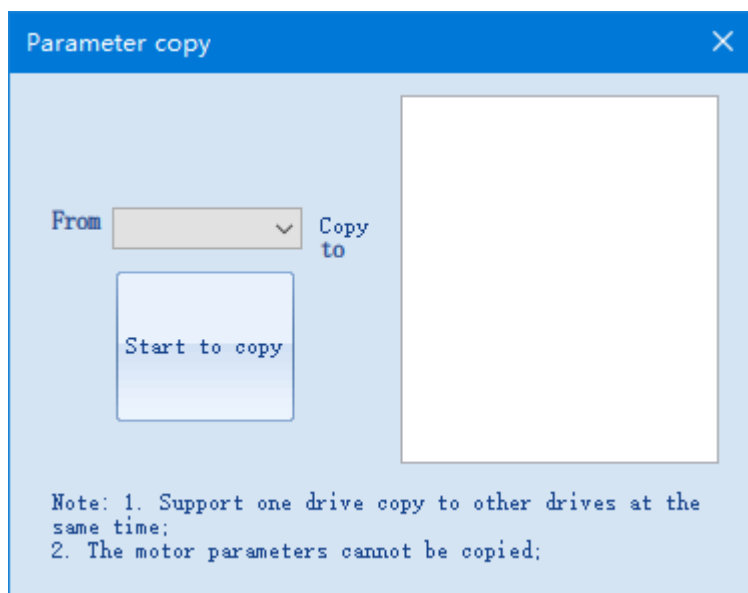
3. Click the ">" button to enter the parameter management interface.



- Import recipe files: Import the machine recipe saved in the local to the current device.
- Export to recipe files: Upload all the slave parameters and save them as a recipe file (the recipe file does not contain parameters in groups H00 or H01).
- Upload the parameters of the selected slave stations: You can choose to upload parameters of all slaves, some slaves or an individual slave.
- Compare: You can compare 1) current parameter values among slaves; 2) default values of slaves; and 3) machine recipes.



- Parameter copy: You can copy parameters from slave to slave.



5 Description of Parameters

5.1 H00 Servo Motor Parameters

H00.00

Motor SN

Hex:2000-01h

Effective mode:Upon the next power-on

Min.:0

Unit:-

Max.:65535

Data Type:UInt16

Default:14101

Change:At stop

Value Range:

0 to 65535

Description

Defines the code of the servo motor. The SV660N and SV630N series servo drive is intended to be used with a serial-type motor. The motor code is fixed to "14XXX". See H00.05 for details on serial-type motor models.

Setting the motor code to a wrong value will result in E120.0 (Unknown motor model).

H00.02

Customized No.

Hex:2000-03h

Effective mode:-

Min.:0.00

Unit:-

Max.:42949672.95

Data Type:UInt32

Default:0.00

Change:Unchangeable

Value Range:

0.00 to 42949672.95

Description

Displays customized software code in hexadecimal.

The display format is: XXX.YY.

XXX: Fixed No. for customized software

YY: Upgrade record No. for customized software

H00.04

Encoder version

Hex:2000-05h

Effective mode:-

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 encoder software version in the form of 2XXX.Y, with one decimal place.

The display format is 2XXX.Y.

H00.05 Serial-type motor code

Hex: 2000-06h

Effective mode: -

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 unmodifiable.

H00.06 FPGA customized SN

Hex: 2000-07h

Effective mode: -

Min.: 0.00

Unit: -

Max.: 655.35

Data Type: UInt16

Default: 0.00

Change: Unchangeable

Value Range:

0.00 to 655.35

Description

-

H00.07 STO version

Hex: 2000-08h

Effective mode: -

Min.: 0.0

Unit: -

Max.: 6553.5

Data Type: UInt16

Default: 0.0

Change: Unchangeable

Value Range:

0.0 to 6553.5

Description

-

H00.08 Bus encoder type

Hex: 2000-09h

Effective mode: Real time

Min.:	0.0	Unit:	-
Max.:	6553.5	Data Type:	UInt16
Default:	0.0	Change:	At stop

Value Range:

0.0 to 6553.5

Description

-

5.2 H01 Servo Drive Parameters

H01.00 MCU software version

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

Value Range:

0.0 to 6553.5

Description

It displays the MCU firmware version.

The display format is XXXX.Y, with one decimal place.

H01.01 FPGA software version

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

Value Range:

0.0 to 6553.5

Description

It displays the FPGA firmware version.

The display format is XXXX.Y, with one decimal place.

H01.10 Drive series No.

Hex:	2001-0Bh	Effective mode:	Upon the next power-on
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	3	Change:	At stop

Value Range:

2: S1R6
3: S2R8
5: S5R5
60005: S6R6
: S7R6
7: S012
10001: T3R5
10002: T5R4
10003: T8R4
10004: T012
10005: T017
10006: T021
10007: T026

Description

Defines the servo drive model. SV660N and SV630N series servo drive serial numbers are listed in the following table.

Value	Serial No.	Remarks
2	S1R6	The rated drive power is 0.2 kW and single-phase 220 V is input.
3	S2R8	The rated drive power is 0.4 kW and single-phase 220 V is input.
5	S5R5	The rated drive power is 0.75 kW and single-phase 220 V is input.
60005	S6R6	Rated power of the servo drive: 0.85 kW; Power supply of the main circuit: Single-phase/Three-phase 220 V ^[1]
6	S7R6	Rated power of the servo drive: 1.0 kW; Power supply of the main circuit: Single-phase/Three-phase 220 V ^[1]
7	S012	Rated power of the servo drive: 1.5 kW; Power supply of the main circuit: Single-phase/Three-phase 220 V ^[1]
10001	T3R5	The rated drive power is 1.0 kW and three-phase 380 V is input.
10002	T5R4	The rated drive power is 1.5 kW and three-phase 380 V is input.
10003	T8R4	The rated drive power is 2.0 kW and three-phase 380 V is input.
10004	T012	The rated drive power is 3.0 kW and three-phase 380 V is input.
10005	T017	The rated drive power is 5.0 kW and three-phase 380 V is input.
10006	T021	The rated drive power is 6.0 kW and three-phase 380 V is input.
10007	T026	The rated drive power is 7.5 kW and three-phase 380 V is input.

If the voltage input to the main circuit of the servo drive does not comply with the preceding specifications, E420.0 (Main circuit phase loss) occurs.

Note [1]: The main circuit of the servo drive supports single-phase 220 V power supplies without derating.

H01.11 DC-AC voltage class

Hex: 2001-0Ch

Effective mode: -

Min.: 0

Unit: VAC

Max.: 65535

Data Type: UInt16

Default: 220

Change: Unchangeable

Value Range:

0 VAC–65535 VAC

Description

-

H01.12 Drive rated power

Hex: 2001-0Dh

Effective mode: -

Min.: 0.00

Unit: kW

Max.: 655.35

Data Type: UInt32

Default: 0.40

Change: Unchangeable

Value Range:

0.00 kW–655.35kW

Description

-

H01.14 Max. output power of the drive

Hex: 2001-0Fh

Effective mode: -

Min.: 0.00

Unit: kW

Max.: 655.35

Data Type: UInt32

Default: 0.40

Change: Unchangeable

Value Range:

0.00 kW–655.35kW

Description

-

H01.16 Rated output current of the drive

Hex: 2001-11h

Effective mode: -

Min.: 0.00

Unit: A

Max.: 655.35

Data Type: UInt32

Default: 2.80

Change: Unchangeable

Value Range:

0.00A to 655.35A

Description

-

H01.18 Max. output current of the drive

Hex: 2001-13h

Effective mode: -

Min.: 0.00

Unit: A

Max.: 655.35

Default: 10.10

Value Range:

0.00A to 655.35A

Description

-

Data Type: UInt32

Change: Unchangeable

H01.40 DC bus overvoltage protection threshold

Hex: 2001-29h

Effective mode: -

Min.: 0

Unit: VDC

Max.: 2000

Data Type: UInt16

Default: 420

Change: Unchangeable

Value Range:

0 VDC to 2000 VDC

Description

-

5.3 H02 Basic Control Parameters

H02.00 Control mode

Hex: 2002-01h

Effective mode: Real time

Min.: 0

Unit: -

Max.: 9

Data Type: UInt16

Default: 9

Change: At stop

Value Range:

0: Velocity mode

1: Position mode

2: Torque mode

9: EtherCAT mode

Description

Defines the control mode of the servo drive.

When the servo drive is in the EtherCAT bus control mode, bit 9 of the status word 6041h is set to 1.

For the operation modes of the servo drive, see section "Basic Functions" in the Function Guide.

Value	Description
0	Speed control mode
1	Position control mode
2	Torque control mode
9	EtherCAT mode

H02.01 Absolute system selection

Hex:	2002-02h	Effective mode:	Upon the next power-on
Min.:	0	Unit:	-
Max.:	4	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Incremental mode

1: Absolute position linear mode

2: Absolute position rotation mode

3: Absolute position linear mode (without encoder overflow warning)

4: Absolute position single-turn mode

Description

Defines the mode of the absolute system.

Value	Absolute system selection	Remarks
0	Incremental position mode	The encoder is used as a serial incremental encoder without power-off memory.
1	Absolute position linear mode	The encoder is used as an absolute encoder with power-off memory. This mode is applicable to applications where the load travel range is fixed and multi-turn data does not overflow.
2	Absolute position rotation mode	The encoder is used as an absolute encoder with power-off memory. This mode applies to applications where the load travel range is not limited and the number of unidirectional revolutions is lower than 32767.
3	Absolute position linear mode (encoder overflow not detected)	Encoder overflow will not be detected in this mode.
4	Absolute position single-turn mode	-

H02.02 Rotation direction selection

Hex: 2002-03h

Effective mode: Upon the next power-on

Min.: 0

Unit: -

Max.: 1

Data Type: UInt16

Default: 0

Change: At stop

Value Range:

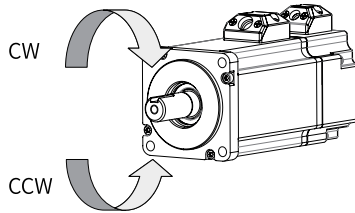
0: Counterclockwise (CCW) as forward direction

1: Clockwise (CW) as forward direction

Description

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

Value	Rotating direction	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	Counterclockwise (CW) 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.

**H02.05 Stop mode at S-ON OFF**

Hex: 2002-06h

Effective mode: Real time

Min.: -4

Unit: -

Max.: 2

Data Type: Int16

Default: 0

Change: At stop

Value Range:

- 4: Ramp to stop as defined by 6085h, keeping dynamic braking state
- 3: Stop at zero speed, keeping dynamic braking state
- 2: Ramp to stop as defined by 6084h/609Ah, keeping dynamic braking state
- 1: Dynamic braking stop, keeping dynamic braking state
- 0: Coast to stop, keeping de-energized state
- 1: Ramp to stop as defined by 6084h/ 609Ah, keeping de-energized state
- 2: Stop at zero speed, keeping de-energized state

Description

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

Value	Stop Mode
-4	Ramp to stop as defined by 6085h, keeping dynamic braking status
-3	Stop at zero speed, keeping dynamic braking status
-2	Ramp to stop as defined by 6084h/609Ah, keeping dynamic braking status
-1	Dynamic braking stop, keeping dynamic braking status
0	Coast to stop, keeping de-energized status
1	Ramp to stop as defined by 6084h/609Ah, keeping de-energized status
2	Stop at zero speed, keeping de-energized status

Set a proper stop mode according to the mechanical status and operation requirements.

For comparison of stop modes, see section "Servo OFF" in the Commissioning Guide.

After the brake output function is enabled, and motor stop mode is "forced braking" (bit2 of H0A.71 is 0), the stop mode for S-ON OFF is forcibly set to "Ramp to stop as defined by 6085h, keeping DB status". For NDB models, the stop mode is forced to "Ramp to stop as defined by 6084h/609Ah, keeping de-energized status".

H02.06 Stop mode at No.2 fault

Hex:	2002-07h	Effective mode:	Real time
Min.:	-5	Unit:	-
Max.:	3	Data Type:	Int16
Default:	2	Change:	At stop

Value Range:

- 5: Stop at zero speed, keeping dynamic braking state
- 4: Stop at emergency stop torque, keeping dynamic braking state
- 3: Ramp to stop as defined by 6085h, keeping dynamic braking state
- 2: Ramp to stop as defined by 6084h/ 609Ah, keeping dynamic braking state
- 1: Dynamic braking stop, keeping dynamic braking state
- 0: Coast to stop, keeping de-energized state
- 1: Ramp to stop as defined by 6084h/ 609Ah, keeping de-energized state
- 2: Ramp to stop as defined by 6085h, keeping de-energized state
- 3: Stop at emergency stop torque, keeping de-energized state^[1]

Description

Defines the deceleration mode of the motor for stopping rotating upon occurrence of a No. 2 fault and the motor status after stop.

- 5: Stop at zero speed, keeping dynamic braking state
- 4: Stop at emergency stop torque, keeping dynamic braking state
- 3: Ramp to stop as defined by 6085h, keeping dynamic braking state
- 2: Ramp to stop as defined by 6084h/ 609Ah, keeping dynamic braking state
- 1: Dynamic braking stop, keeping dynamic braking state
- 0: Coast to stop, keeping de-energized state
- 1: Ramp to stop as defined by 6084h/ 609Ah, keeping de-energized state
- 2: Ramp to stop as defined by 6085h, keeping de-energized state
- 3: Stop at emergency stop torque, keeping de-energized state
- 4: Dynamic braking stop, keeping de-energized state

Value	Stop Mode
-5	Stop at zero speed, keeping dynamic braking status
-4	Stop at emergency-stop torque, keeping dynamic braking status
-3	Ramp to stop as defined by 6085h, keeping dynamic braking status
-2	Ramp to stop as defined by 6084h/609Ah, keeping dynamic braking status
-1	Dynamic braking stop, keeping dynamic braking status
0	Coast to stop, keeping de-energized status
1	Ramp to stop as defined by 6084h/609Ah, keeping de-energized status
2	Ramp to stop as defined by 6085h, keeping the de-energized status
3	Stop at emergency-stop torque, keeping de-energized status
4	Dynamic braking stop, keeping de-energized status Note: This setpoint 4 is for the -NS model only.

After the brake output function is enabled, and motor stop mode is "forced braking" (bit2 of H0A.71 is 0), the stop mode on a No. 2 fault is forcibly set to "Ramp to stop as defined by 6085h, keeping de-energized state".

H02.07 Stop mode at overtravel

Hex:	2002-08h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	7	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
- 3: Stop based on ramp, keeping de-energized state
- 4: Stop based on ramp, keeping position lock state
- 5: Dynamic braking stop, keeping de-energized state
- 6: Dynamic braking stop, keeping dynamic braking state
- 7: Not responding to overtravel

Description

Defines the deceleration mode of the motor for stopping rotating upon overtravel and the motor status after stop.

Value	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
3	Ramp to stop as defined by 6085h, keeping the de-energized state
4	Ramp to stop as defined by 6085h, keeping position lock status
5	Dynamic braking stop, keeping de-energized status
6	Dynamic braking stop, keeping dynamic braking status
7	Not responding to overtravel

When the servo motor drives vertical axis, set H02.07 to 1 or 4 to make the motor axis in position locking state after the limit switch signal is active to ensure safety. For comparison of stop modes, see section Servo OFF in the Commissioning Guide.

After the brake output function is enabled, and motor stop mode is "forced braking" (bit2 of H0A.71 is 0), the stop mode at overtravel is forcibly set to "Ramp to stop as defined by 6085h, keeping position lock status".

H02.08 Stop mode at No.1 fault

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

Value Range:

- 0: Coast to stop, keeping de-energized state
- 1: DB stop, keeping de-energized state
- 2: DB stop, keeping DB state

Description

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

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

For details on No. 1 faults, see the Troubleshooting Guide.

For comparison of stop modes, see section Servo OFF in the Commissioning Guide.

After the brake output function is enabled, and motor stop mode is "forced braking" (bit2 of H0A.71 is 0), the stop mode on a No. 1 fault is forcibly set to "DB stop, keeping DB state". For a NDB mode, the stop mode is forced to "coast to stop, keeping de-energized state".

H02.09 Delay from brake output ON to command received

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

Value Range:

0ms to 500ms

Description

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

Within the time defined by H02.09, the servo drive does not receive position/speed/torque reference.

See section "Brake Settings" in the Commissioning Guide to check the brake sequence for the motor at standstill.

H02.10 Delay from brake output OFF to motor de-energized

Hex:	2002-0Bh	Effective mode:	Real time
Min.:	50	Unit:	ms
Max.:	1000	Data Type:	UInt16
Default:	150	Change:	Real-time

Value Range:

50ms to 1000ms

Description

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

See section "Brake Settings" in the Commissioning Guide to check the brake sequence for the motor at standstill.

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

Hex:	2002-0Ch	Effective mode:	Real time
Min.:	20	Unit:	RPM
Max.:	3000	Data Type:	UInt16
Default:	30	Change:	Real-time

Value Range:

20 rpm to 3000 rpm

Description

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

See section "Brake Settings" in the Commissioning Guide to check the brake sequence for a rotating motor.

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

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

Value Range:

1 ms to 1000 ms^[1]

Description

Defines the delay from the moment the S-ON signal is OFF to the moment the brake (BK) output is OFF in the rotation state.

See section "Brake Settings" in the Commissioning Guide to check the brake sequence for a rotating motor.

Note [1]: For the -NS model, the setpoint is 1 ms to 65535 ms.

H02.15 LED warning display

Hex:	2002-10h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	Real-time

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.

For details on No. 3 Warnings, see the Troubleshooting Guide.

H02.17 Stop mode upon main circuit power failure

Hex:	2002-12h	Effective mode:	Real time
Min.:	1	Unit:	-
Max.:	3	Data Type:	UInt16
Default:	2	Change:	Real-time

Value Range:

0: Keep current operation

1: Stop according to H02.06

2: Stop at S-ON OFF as defined by H02.05

3: Stop according to 605A

Description

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

Note: This parameter is only for the -NS model.

H02.21 Permissible minimum resistance of regenerative resistor

Hex:	2002-16h	Effective mode:	-
Min.:	1	Unit:	Ω
Max.:	1000	Data Type:	UInt16
Default:	40	Change:	Unchangeable

Value Range:

1 Ω to 1000 Ω

Description

The permissible minimum resistance of the regenerative resistor is only related to the servo drive model.

H02.22 Power of built-in regenerative resistor

Hex:	2002-17h	Effective mode:	-
Min.:	0	Unit:	W
Max.:	65535	Data Type:	UInt16
Default:	50	Change:	Unchangeable

Value Range:

0W–65535W

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

Hex: 2002-18h

Effective -

mode:

Min.: 0

Unit: Ω

Max.: 65535

Data Type: UInt16

Default: 50

Change: Unchangeable

Value Range:

0Ω to 65535Ω

Description

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

The built-in braking resistor comes into rescue when the maximum braking energy calculated exceeds the absorption capacity of the capacitor.

When using the built-in braking resistor, connect a jumper bar between terminals P and D.

When H01-02 (servo drive No.) = 2 or 3, there is no built-in braking resistor.

Servo drive model (SV660, SV630)		Specifications of Built-in Regenerative Resistor	
		Resistance (Ω)	Power (W)
Single-phase 220V	SV6 x 0NS1R6I	-	-
	SV6 x 0NS2R8I	-	-
	SV6 x 0NS5R5I	50	50
Three-phase 220V	SV6 x 0NS7R6I	25	80
	SV6 x 0NS012I		
Three-phase 380 V	SV6 x 0NT3R5I	100	80
	SV6 x 0NT5R4I	100	80
	SV6 x 0NT8R4I	50	80
	SV6 x 0NT012I		
	SV6 x 0NT017I	35	100
	SV6 x 0NT021I		
	SV6 x 0NT026I		

H02.24 Resistor heat dissipation coefficient

Hex: 2002-19h

Effective Real time

mode:

Min.: 10

Unit: %

Max.: 100

Data Type: UInt16

Default: 30

Change: Real-time

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.

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

H02.25 Regenerative resistor type

Hex:	2002-1Ah	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	3	Data Type:	UInt16
Default:	0 ^[1]	Change:	Real-time

Value Range:

0: Built-in

1: External, natural cooling

2: External, forced air cooling

3: No resistor needed

Description

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

Select the regenerative resistor type based on section "Wiring and Setting of Regenerative Resistor" in SV660N Series Servo Drive Hardware Guide.

Note: [1]: For the -NS model, the default value is 3.

H02.26 Power of external regenerative resistor

Hex:	2002-1Bh	Effective mode:	Real time
Min.:	1	Unit:	W
Max.:	65535	Data Type:	UInt16
Default:	40	Change:	Real-time

Value Range:

1W–65535W

Description

Defines the power of the external braking resistor.

Note: The value of this parameter cannot be lower than the calculated braking power.

H02.27 Resistance of external regenerative resistor

Hex:	2002-1Ch	Effective mode:	Real time
Min.:	15	Unit:	Ω
Max.:	1000	Data Type:	UInt16
Default:	50	Change:	Real-time

Value Range:

15 Ω to 1000 Ω

Description

Defines the power of the external braking resistor.

Note: The value of H02.27 (Resistance of external braking resistor) must not be lower than the value of H02.21 (Permissible min. resistance of external braking resistor).

H02.30 User password

Hex:	2002-1Fh	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

0 to 65535

Description

-

H02.31 System parameter initialization

Hex:	2002-20h	Effective mode:	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.

Value	Description	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.

If necessary, use Inovance software tool to back up parameters except those in groups H00 and H01.

H02.32 Selection of parameters in group H0b

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

Value Range:

0 to 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.

If a parameter not in group H0b is set, the keypad does not switch to the monitored value display mode.

H02.35 Keypad data update frequency

Hex: 2002-24h Effective mode: Real time
 mode:
 Min.: 0 Unit: Hz
 Max.: 20 Data Type: UInt16
 Default: 0 Change: Real-time

Value Range:

0Hz to 20Hz

Description

-

H02.38 Overload time of external resistor

Hex: 2002-27h Effective mode: Upon the next power-on
 mode:
 Min.: 0 Unit: -
 Max.: 200 Data Type: UInt16

Default: 40

Change: Real-time

Value Range:

0s to 200s

Description

Set the overload time threshold of the external braking resistor.

Note: This parameter is only for the -NS model.

H02.41 Manufacturer password

Hex: 2002-2Ah

Effective mode: Real time

Min.: 0

Unit: -

Max.: 65535

Data Type: UInt16

Default: 0

Change: Real-time

Value Range:

0 to 65535

Description

-

H02.47 Delay from S-ON OFF to brake output OFF in rotation state (effective on power line breakage)

Hex: 2002-30h

Effective mode: Real time

Min.: 0

Unit: ms

Max.: 1000

Data Type: UInt16

Default: 10

Change: Real-time

Value Range:

0ms to 1000ms

Description

It is the same as H02.12. In case of power line breakage, this parameter is used instead of H02.12 to avoid the vertical axis falling.

5.4 H03 Terminal Input Parameters

H03.02 DI1 function selection

Hex: 2003-03h

Effective mode: Real time

Min.: 0

Unit: -

Max.: 40

Data Type: UInt16

Default: 14

Change: Real-time

Value Range:

- 0: Undefined
- 1: Drive enable
- 2: Fault reset
- 14: Positive limit switch
- 15: Negative limit switch
- 31: Home switch
- 34: Emergency stop
- 38: Touch probe 1
- 39: Touch probe 2

Description

Defines the function of DI1. Descriptions for the setpoints are shown in the following table.

Value	DI Function
0	No assignment
1	Servo ON
2	Fault reset
14	Positive limit switch
15	Negative limit switch
31	Home switch
34	Emergency stop
38	Touch probe 1
39	Touch probe 2

Set H03.02 to a value listed in the table. Otherwise, E902.0 (invalid DI setting) will occur.

Do not assign the same function to different DIs. Otherwise, E122.1 will occur.

After assigning a certain function to a DI and activate the logic of this DI, this function will remain active even if you cancel the function assignment.

DI1–DI5 are high-speed DI terminals. The width of the input signal must be larger than 0.25 ms.

When the touch probe function is enabled, DI5 and DI4 are assigned with touch probe 1 and touch probe 2 respectively by default.

H03.03 DI1 logic selection

Hex: 2003-04h

Effective mode: Real time

Min.: 0

Unit: -

Max.: 1

Data Type: UInt16

Default: 0

Change: Real-time

Value Range:

0: Normally open

1: Closed

Description

Used to set the level logic of DI1 when the function assigned to DI1 is active.

DI1–DI5 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.

Value	DI Logic Upon Active DI Function	Remarks
0	Low level	Low level must remain active for more than 0.25ms.
1	High level	High level must remain active for more than 0.25ms.

H03.04 DI2 function selection

Hex: 2003-05h

Effective mode: Real time

Min.: 0

Unit: -

Max.: 40

Data Type: UInt16

Default: 15

Change: Real-time

Value Range:

Same as H03.02.

Description

-

H03.05 DI2 logic selection

Hex: 2003-06h

Effective mode: Real time

Min.: 0

Unit: -

Max.: 1

Data Type: UInt16

Default: 0

Change: Real-time

Value Range:

0: Normally open

1: Closed

Description

-

H03.06 DI3 function selection

Hex: 2003-07h

Effective mode: Real time

Min.: 0

Unit: -

Max.: 40

Data Type: UInt16

Default: 31

Change: Real-time

Value Range:

Same as H03.02.

Description

-

H03.07 D13 logic selection

Hex: 2003-08h

Effective mode: Real time

Min.: 0

Unit: -

Max.: 1

Data Type: UInt16

Default: 0

Change: Real-time

Value Range:

0: Normally open

1: Closed

Description

-

H03.08 D14 function selection

Hex: 2003-09h

Effective mode: Real time

Min.: 0

Unit: -

Max.: 40

Data Type: UInt16

Default: 39

Change: Real-time

Value Range:

Same as H03.02.

Description

-

H03.09 D14 logic selection

Hex: 2003-0Ah

Effective mode: Real time

Min.: 0

Unit: -

Max.: 1

Data Type: UInt16

Default: 0

Change: Real-time

Value Range:

0: Normally open

1: Closed

Description

-

H03.10 DI5 function selection

Hex: 2003-0Bh

Min.: 0

Max.: 40

Default: 38

Value Range:

Same as H03.02.

Description

-

Effective mode:

Unit: -

Data Type: UInt16

Change: Real-time

H03.11 DI5 logic selection

Hex: 2003-0Ch

Min.: 0

Max.: 1

Default: 0

Value Range:

0: Normally open

1: Closed

Description

-

Effective mode:

Unit: -

Data Type: UInt16

Change: Real-time

H03.60 DI1 fitter time

Hex: 2003-3Dh

Min.: 0.00

Max.: 500.00

Default: 0.50^[1]

Value Range:

0.00ms to 500.00ms

Description

Note [1]: For the -NS model only, the default value is 3.

Effective mode:

Unit: ms

Data Type: UInt16

Change: Real-time

H03.61 DI2 fitter time

Hex: 2003-3Eh

Min.: 0.00

Max.: 500.00

Default: 0.50^[1]

Value Range:

0.00ms to 500.00ms

Effective mode:

Unit: ms

Data Type: UInt16

Change: Real-time

Description

Note [1]: For the -NS model only, the default value is 0.5.

H03.62 D13 fitter time

Hex:	2003-3Fh	Effective mode:	Real time
Min.:	0.00	Unit:	ms
Max.:	500.00	Data Type:	UInt16
Default:	0.50 ^[1]	Change:	Real-time

Value Range:

0.00ms to 500.00ms

Description

Note [1]: For the -NS model only, the default value is 0.5.

H03.63 D14 fitter time

Hex:	2003-40h	Effective mode:	Real time
Min.:	0.00	Unit:	ms
Max.:	500.00	Data Type:	UInt16
Default:	0.50 ^[1]	Change:	Real-time

Value Range:

0.00ms to 500.00ms

Description

Note [1]: For the -NS model only, the default value is 0.5.

H03.64 D15 fitter time

Hex:	2003-41h	Effective mode:	Real time
Min.:	0.00	Unit:	ms
Max.:	500.00	Data Type:	UInt16
Default:	0.50 ^[1]	Change:	Real-time

Value Range:

0.00ms to 500.00ms

Description

Note [1]: For the -NS model only, the default value is 0.5.

5.5 H04 Terminal Output Parameters**H04.00 DO1 function selection**

Hex:	2004-01h	Effective mode:	Real time
------	----------	-----------------	-----------

Min.: 0
Max.: 32
Default: 1

Unit: -
Data Type: UInt16
Change: Real-time

Value Range:

0: Undefined
1: Servo ready
2: Motor rotation
5: Positioning completed
9: Brake output
10: Warning
11: Fault
18: Torque reached
25: Comparison output
31: EtherCAT forced output
32: EDM safe state

Description

Defines the function of DO1.
Descriptions for the setpoints are shown in the following table.

Value	DO Function
0	No assignment
1	Ready to switch on
2	Motor rotation
5	Positioning completed
9	Brake output
10	Warning
11	Fault
18	Torque reach
25	Comparison output
31	EtherCAT-forced output
32	EDM safety state output

Set H04.00 to a value listed in the preceding table.
Different VDOs can be assigned with the same function.

H04.01 DO1 logic selection

Hex: 2004-02h

Min.: 0
Max.: 1
Default: 0

Effective mode: Real time
Unit: -
Data Type: UInt16
Change: Real-time

Value Range:

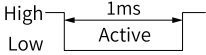
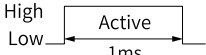
0: Normally open

1: Closed

Description

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

DO1 to DO3 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.

Value	DO1 Logic Upon Active DO Function	Transistor Status	Minimum Signal Width
0	Low level	ON	
1	High level	OFF	

Before receiving DO logic changes, view the setpoint of H0d.17 (Forced DI/DO selection) to check whether the DO level is determined by the actual operating status of the drive or by forced DO (H0d.19 or 60FEh).

H04.02 DO2 function selection

Hex: 2004-03h

Effective mode: Real time

Min.: 0

Unit: -

Max.: 32

Data Type: UInt16

Default: 11

Change: Real-time

Value Range:

Same as H04.00.

Description

-

H04.03 DO2 logic selection

Hex: 2004-04h

Effective mode: Real time

Min.: 0

Unit: -

Max.: 1

Data Type: UInt16

Default: 0

Change: Real-time

Value Range:

0: Normally open

1: Closed

Description

-

H04.04 DO3 function selection

Hex: 2004-05h

Effective mode: Real time

Min.: 0

Unit: -

Max.: 32

Data Type: UInt16

Default: 9

Change: Real-time

Value Range:

Same as H04.00.

Description

-

H04.05 DO3 logic selection

Hex: 2004-06h

Effective mode: Real time

Min.: 0

Unit: -

Max.: 1

Data Type: UInt16

Default: 0

Change: Real-time

Value Range:

0: Normally open

1: Closed

Description

-

H04.23 EtherCAT forced DO logic in non-OP status

Hex: 2004-18h

Effective mode: Real time

Min.: 0

Unit: -

Max.: 7

Data Type: UInt16

Default: 0

Change: Real-time

Value Range:

0: Status of DO1, DO2, and DO3 unchanged in the non-OP status

1: No output in DO1 and status of others unchanged in the non-OP status

2: No output in DO2 and status of others unchanged in the non-OP status

3: No output in DO1 or DO2 and status of DO3 unchanged in the non-OP status

4: No output in DO3 and status of others unchanged in the non-OP status

5: No output in DO1 or DO3 and status of DO2 unchanged in the non-OP status

6: No output in DO2 or DO3 and status of DO1 unchanged in the non-OP status

7: No output in DO1, DO2, or DO3 in the non-OP status

Description

Descriptions for the setpoints are shown in the following table.

Value	DO Function
0	Status of DO1, DO2, and DO3 unchanged in the non-OP status
1	No output in DO1 and status of others unchanged in the non-OP status
2	No output in DO2 and status of others unchanged in the non-OP status
3	No output in DO1 or DO2 and status of others unchanged in the non-OP status
4	No output in DO3 and status of others unchanged in the non-OP status
5	No output in DO1 or DO3 and status of others unchanged in the non-OP status
6	No output in DO2 or DO3 and status of others unchanged in the non-OP status
7	No output in DO1, DO2, or DO3 in the non-OP status

5.6 H05 Position Control Parameters

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

Hex:	2005-05h	Effective mode:	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 6553.5ms

Description

-

H05.05 Moving average filter time constant 1

Hex:	2005-06h	Effective mode:	Real time
Min.:	0.0	Unit:	ms
Max.:	1000.0	Data Type:	UInt16
Default:	0.0	Change:	At stop

Value Range:

0.0 ms to 1000.0 ms

Description

-

H05.06 Moving average filter time constant 2

Hex:	2005-07h	Effective mode:	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 128.0ms

Description

-

H05.07 Numerator of electronic gear ratio

Hex:	2005-08h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	4294967295	Data Type:	UInt32
Default:	1	Change:	Real-time

Value Range:0–4294967295^[1]**Description**

Note [1]: For the -NS model, the set point is 0 to 1073741824.

H05.09 Denominator of electronic gear ratio

Hex:	2005-0Ah	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	4294967295	Data Type:	UInt32
Default:	1	Change:	Real-time

Value Range:0 to 4294967295^[1]**Description**

Note [1]: For the -NS model, the setpoint is 0 to 1073741824

H05.19 Speed feedforward control

Hex:	2005-14h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	3	Data Type:	UInt16
Default:	1	Change:	At stop

Value Range:

- 0: No speed feedforward
- 1: Internal speed feedforward
- 2: 60B1h used as speed feedforward
- 3: Zero phase control

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.

Value	Speed feedforward source	Remarks
0	No speed feedforward	-
1	Internal speed feedforward	The speed information corresponding to the position reference (encoder unit) is used as the speed loop feedforward source.
2	60B1 used as speed feedforward	60B1h is used as the source of external speed feedforward signal in the CSP mode. The polarity of 60B1h can be set in bit6 of 607Eh.
3	Zero phase control	Zero phase control can be used together with H08.17 (Zero phase delay) to reduce the position follow-up deviation during startup.

Speed feedforward control parameters include H08.18 (Speed feedforward filter time constant) and H08.19 (Speed feedforward gain). See section "Feedforward Gain" for details.

H05.21 Threshold of positioning completed

Hex:	2005-16h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	5872	Change:	Real-time

Value Range:

0 to 65535

Description

-

H05.30 Local homing

Hex:	2005-1Fh	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	8	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

0: No operation

6: Current position as the home

Description

Used to execute local homing when the homing method in CiA402 profile cannot be called by the host controller through operating bit4 of the control word.

Use this function in the S-OFF state only. Failure to comply may result in malfunction of the motor due to sudden change in the position feedback. After homing is done successfully, the present position feedback will be cleared.

Value	Description
0	0: No operation
6	6: Current position as the home

H05.35 Home search time limit

Hex: 2005-24h

Effective mode: Real time

Min.: 0.0

Unit: -

Max.: 6553.5

Data Type: UInt16

Default: 5000.0

Change: Real-time

Value Range:

0.0s to 6553.5s

Description

Defines the maximum homing time.

Setting H05.35 to a too small value or if the home is not found within the time defined by H05.35, E601.0 (Homing timeout) will occur.

H05.36 Local home offset

Hex: 2005-25h

Effective mode: Real time

Min.: -1073741824

Unit: Encoder unit

Max.: 1073741824

Data Type: Int32

Default: 0

Change: Real-time

Value Range:

-1073741824 to 1073741824 (in encoder unit)^[1]

Description

H05.36 is used together with H05.30. After homing is done, the present position feedback is the value of H05.36.

Note [1]: For the -NS model, the setpoint is -2147483648 to 2147483647.

H05.50 Mechanical gear ratio (numerator)

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

Value Range:

1 to 65535

Description

-

H05.51 Denominator of mechanical gear ratio

Hex:	2005-34h	Effective mode:	Real time
Min.:	1	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	1	Change:	At stop

Value Range:

1 to 65535

Description

Defines the ratio of the feedback pulses (encoder unit) per load revolution to the absolute position fed back by the encoder when the absolute encoder system works in the rotation mode ($H02.01 = 2$).

Assume that the encoder resolution is RE, the encoder pulses per load revolution is RM, and H05.52 and H05.54 are 0, then $RM = RE * H05.50 / H05.51$.

H05.52 Pulses per load revolution in absolute position rotation mode (low 32 bits)

Hex:	2005-35h	Effective mode:	Real time
Min.:	0	Unit:	Encoder unit
Max.:	4294967295	Data Type:	UInt32
Default:	0	Change:	At stop

Value Range:

0 to 4294967295

Description

-

H05.54 Pulses per load revolution in absolute position rotation mode (high 32 bits)

Hex:	2005-37h	Effective mode:	Real time
Min.:	0	Unit:	Encoder unit
Max.:	4294967295	Data Type:	UInt32

Default: 0

Change: At stop

Value Range:

0 to 4294967295

Description

Defines the feedback pulses (encoder unit) per load revolution when the absolute encoder system works in the rotation mode (H02.01 = 2).

Assume the encoder pulses per load revolution is RM and H05.52 or 05.54 is not 0,
 $RM = H05.54 \times 2^{32} + H05.52$.

H05.57 Single-turn absolute mode homing offset^[1]

Hex: 2005-3Ah

Effective mode: Upon the next power-on

Min.: -2147483648

Unit: -

Max.: 2147483647

Data Type: Int32

Default: 0

Change: At stop

Value Range:

-2147483648 to 2147483647

Description

Note [1]: For the -NS model, the corresponding parameter is H05.67.

H05.59 Hard limit homing torque limit^[1]

Hex: 2005-3Ch

Effective mode: Real time

Min.: 0.0

Unit: -

Max.: 400.0

Data Type: UInt16

Default: 200.0

Change: Real-time

Value Range:

0.0 to 400.0

Description

Note [1]: For the -NS model, the corresponding parameter is H05.58.

H05.64 Optocoupler state for probe rising edge

Hex: 2005-41h

Effective mode: Upon the next power-on

Min.: 0

Unit: -

Max.: 1

Data Type: UInt16

Default: 0

Change: At stop

Value Range:

0: Off

1: On

Description

-

5.7 H06 Speed Control Parameters**H06.03 Speed reference**

Hex:	2006-04h	Effective mode:	Real time
Min.:	-6000	Unit:	RPM
Max.:	6000	Data Type:	Int16
Default:	200	Change:	Real-time

Value Range:

-6000 rpm to +6000 rpm

Description

2006-04h is valid in the local speed mode and invalid in the EtherCAT mode.

H06.04 DI jog speed setpoint

Hex:	2006-05h	Effective mode:	Real time
Min.:	0	Unit:	RPM
Max.:	6000	Data Type:	UInt16
Default:	150	Change:	Real-time

Value Range:

0rpm to 6000rpm

Description

-

H06.05 Acc. ramp time of speed reference

Hex:	2006-06h	Effective mode:	Real time
Min.:	0	Unit:	ms
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

0ms to 65535ms

Description

2006-06h is valid in the local speed mode and invalid in the EtherCAT mode.

H06.06 Dec. ramp time of speed reference

Hex:	2006-07h	Effective mode:	Real time
Min.:	0	Unit:	ms
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

0ms to 65535ms

Description

2006-0Ah is valid in the local speed mode and invalid in the EtherCAT mode.

H06.08 Forward speed limit

Hex:	2006-09h	Effective mode:	Real time
Min.:	0	Unit:	RPM
Max.:	6000	Data Type:	UInt16
Default:	6000	Change:	Real-time

Value Range:

0rpm to 6000rpm

Description

2006-09h is valid in the local speed mode and invalid in the EtherCAT mode.

H06.09 Reverse speed limit

Hex:	2006-0Ah	Effective mode:	Real time
Min.:	0	Unit:	RPM
Max.:	6000	Data Type:	UInt16
Default:	6000	Change:	Real-time

Value Range:

0rpm to 6000rpm

Description

2006-0Ah is valid in the local speed mode and invalid in the EtherCAT mode.

H06.10 Deceleration unit in emergency stop

Hex:	2006-0Bh	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	2	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

- 0: Multiplied by 1
- 1: Multiplied by 10
- 2: Multiplied by 100

Description

The default value is 0. When 6085h (Quick stop deceleration) is set to the maximum value but the ramp time still exceeds the expected value, enlarge the value of 6085h through this parameter to reduce the stop time.

Value	Parameter Name
0	x 1
1	x 10
2	x 100

Note: When the brake function is enabled and the stop mode at S-ON OFF is set to "Ramp to stop", the maximum time of ramp-to-stop is Min (H02.12, stop time defined by 6085h).

H06.11 Torque feedforward control

Hex:	2006-0Ch	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	2	Data Type:	UInt16
Default:	1	Change:	Real-time

Value Range:

- 0: No torque feedforward
- 1: Internal torque feedforward
- 2: 60B2h as external torque feedforward

Description

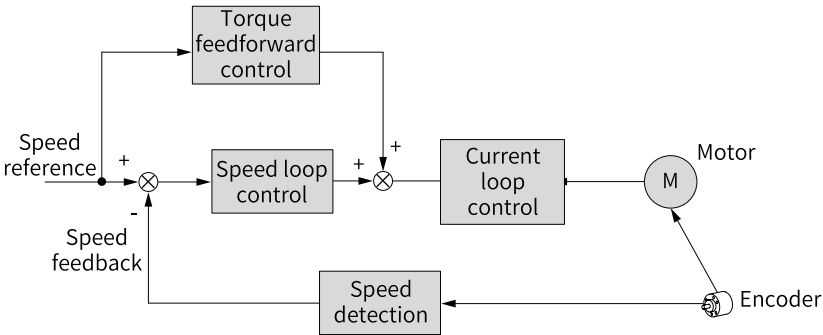
Defines whether to enable internal torque feedforward in the control modes other than torque control.

Torque feedforward can be used to improve the torque reference response speed and reduce the position deviation during acceleration/deceleration at constant speed.

Value	Torque feedforward control	Remarks
0	N/A	-
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.
2	60B2h used as external torque feedforward source	60B2h is used as the external torque feedforward signal source in the CSP and CSV modes. The polarity of the torque feedforward signal can be set in bit5 of 607Eh. Note: When 60B2h is used as the torque feedforward signal, you can adjust (H08.21) and time constant (H08.20) to achieve the desired performance.

Parameters of the torque feedforward function include H08.21 (Torque feedforward filter time constant) and H08.20 (Torque feedforward gain). For details, see section Feedforward Gain.

In non-torque control, the control block diagram of torque feedforward is shown in the following figure.



H06.12 Acceleration ramp time of jog speed

Hex:	2006-0Dh	Effective mode:	Real time
Min.:	0	Unit:	ms

Max.: 65535

Data Type: UInt16

Default: 10

Change: Real-time

Value Range:

0ms to 65535ms

Description

Defines the acceleration/deceleration time of jog speed references in the jog mode set through H0d.11 or the software tool.

H06.13 Speed feedforward smoothing filter

Hex: 2006-0Eh

Effective mode: Real time

Min.: 0

Unit: us

Max.: 2000

Data Type: UInt16

Default: 0

Change: Real-time

Value Range:0 us–2000 us^[1]**Description**

Defines the speed feedforward filter time constant.

Note [1]: For the -NS model, the setpoint is 0 us–65535 us.

H06.14 CSV instruction interpolation

Hex: 2006-0Fh

Effective mode: Real time

Min.: 0

Unit: -

Max.: 1

Data Type: UInt16

Default: 0

Change: At stop

Value Range:

0: Disabled

1: Enabled

Description

-

H06.16 Threshold of TGON (motor rotation) signal

Hex: 2006-11h

Effective mode: Real time

Min.: 0

Unit: RPM

Max.: 1000

Data Type: UInt16

Default: 20

Change: Real-time

Value Range:

0 rpm to 1000 rpm

Description

-

H06.28 Cogging torque compensation selection

Hex:	2006-1Dh	Effective mode:	Upon the next power-on
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	1	Change:	At stop

Value Range:

0: Disabled

1: Enabled

Description

-

H06.36 Sine velocity superposition enable

Hex:	2006-25h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

0: Disabled

1: Enabled

Description

-

H06.37 Sine velocity superposition frequency

Hex:	2006-26h	Effective mode:	Real time
Min.:	0	Unit:	Hz
Max.:	100	Data Type:	UInt16
Default:	50	Change:	Real-time

Value Range:

0Hz to 100Hz

Description

-

H06.38 Sine velocity superposition amplitude

Hex:	2006-27h	Effective mode:	Real time
------	----------	-----------------	-----------

Min.:	0	Unit:	RPM
Max.:	100	Data Type:	UInt16
Default:	30	Change:	Real-time

Value Range:

0 RPM –100 RPM

Description

-

5.8 H07 Torque Control Parameters

H07.03 Torque reference set using the operating panel

Hex:	2007-04h	Effective mode:	Real time
Min.:	-400.0	Unit:	%
Max.:	400.0	Data Type:	Int16
Default:	0.0	Change:	Real-time

Value Range:

-400.0% to 400.0%

Description

-

H07.05 Torque reference filter time constant 1

Hex:	2007-06h	Effective mode:	Real time
Min.:	0.00	Unit:	ms
Max.:	30.00	Data Type:	UInt16
Default:	0.50	Change:	Real-time

Value Range:

0.00ms to 30.00ms

Description

-

H07.06 Torque reference filter time constant 2

Hex:	2007-07h	Effective mode:	Real time
Min.:	0.00	Unit:	ms
Max.:	30.00	Data Type:	UInt16
Default:	0.27	Change:	Real-time

Value Range:

0.00ms to 30.00ms

Description

Defines the torque reference filter time constant.

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.

H07.09 Forward internal torque limit

Hex: 2007-0Ah

Effective mode: Real time

Min.: 0.0

Unit: %

Max.: 400.0

Data Type: UInt16

Default: 350.0

Change: Real-time

Value Range:

0.0% to 400.0%

Description

-

H07.10 Reverse internal torque limit

Hex: 2007-0Bh

Effective mode: Real time

Min.: 0.0

Unit: %

Max.: 400.0

Data Type: UInt16

Default: 350.0

Change: Real-time

Value Range:

0.0% to 400.0%

Description

-

H07.15 Emergency-stop torque

Hex: 2007-10h

Effective mode: Real time

Min.: 0.0

Unit: %

Max.: 400.0

Data Type: UInt16

Default: 100.0

Change: Real-time

Value Range:

0.0% to 400.0%

Description

-

H07.19 Internal speed limit in torque control

Hex: 2007-14h

Effective mode: Real time

Min.:	0	Unit:	RPM
Max.:	6000	Data Type:	UInt16
Default:	3000	Change:	Real-time

Value Range:

0rpm to 6000rpm

Description

-

H07.20 Negative internal speed limit in torque control

Hex:	2007-15h	Effective mode:	Real time
Min.:	0	Unit:	RPM
Max.:	6000	Data Type:	UInt16
Default:	3000	Change:	Real-time

Value Range:

0rpm to 6000rpm

Description

H07.19 and H07.20 are effective in the local torque mode only (H02.00 = 2). Use 607Fh for speed limit in the EtherCAT mode, CST mode and PT mode.

H07.21 Torque reach base value

Hex:	2007-16h	Effective mode:	Real time
Min.:	0.0	Unit:	%
Max.:	400.0	Data Type:	UInt16
Default:	0.0	Change:	Real-time

Value Range:

0.0% to 400.0%

Description

-

H07.22 Output torque upon torque reach and DO signal activation

Hex:	2007-17h	Effective mode:	Real time
Min.:	0.0	Unit:	%
Max.:	400.0	Data Type:	UInt16
Default:	20.0	Change:	Real-time

Value Range:

0.0% to 400.0%

Description

-

H07.23 Output torque upon torque reach and DO signal deactivation

Hex:	2007-18h	Effective mode:	Real time
Min.:	0.0	Unit:	%
Max.:	400.0	Data Type:	UInt16
Default:	10.0	Change:	Real-time

Value Range:

0.0% to 400.0%

Description

The torque reach function is used to judge whether the actual torque reference reaches the range of valid torque reach. If yes, the servo drive outputs the corresponding flag (bit10 of status word) to the host controller.

Actual torque reference (viewed in H0b.02): A;

Reference value for torque arrival (H07.21): B;

Threshold of valid torque arrival (H07.22): C;

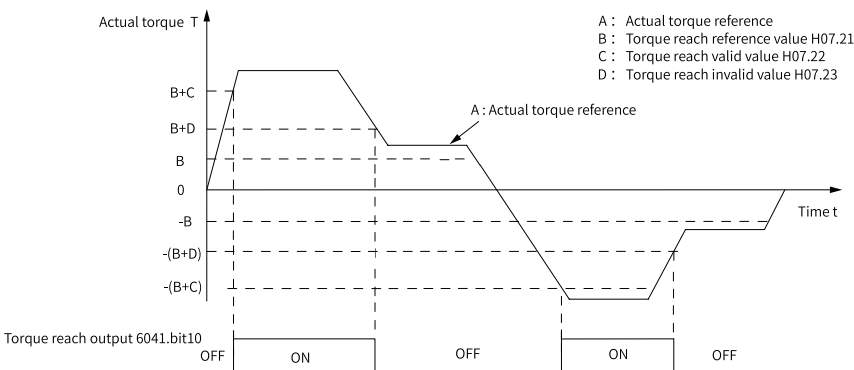
Threshold of invalid torque arrival (H07.23): D;

C and D are the offset based on B.

The torque reach signal is activated only when the actual torque reference meets the following condition: $|A| \geq B + C$

Otherwise, the torque reach signal remains inactive.

The torque reach signal is deactivated only when the actual torque reference meets the following condition: $|A| < B + D$.



H07.24 Field weakening depth

Hex:	2007-19h	Effective mode:	Real time
Min.:	60	Unit:	%
Max.:	115	Data Type:	UInt16
Default:	115	Change:	Real-time

Value Range:

60% to 115%

Description

Use the default value in general cases. Reducing the flux weakening depth improves the dynamic performance of flux-weakening area and reduces current ripple, but also leads to load rate rise.

H07.25 Max. permissible demagnetizing current

Hex:	2007-1Ah	Effective mode:	Real time
Min.:	0	Unit:	%
Max.:	200	Data Type:	UInt16
Default:	100	Change:	Real-time

Value Range:

0%–200%^[1]

Description

Use the default value in general cases. Increasing the demagnetizing current extends the motor speed range, but also poses a greater challenge on the bearing capacity of the motor. If you need to increase the setpoint of 2007-1Ah, contact Inovance first.

Note [1]: For the -NS model, the setpoint is 0% to 300%.

H07.26 Field weakening selection

Hex:	2007-1Bh	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Disabled

1: Enabled

Description

0: Disabled; 1: Enabled

H07.27 Flux weakening gain

Hex:	2007-1Ch	Effective mode:	Real time
Min.:	0.001	Unit:	-
Max.:	1.000	Data Type:	UInt16
Default:	0.030	Change:	Real-time

Value Range:

0.001 to 1.000

Description

-

H07.28 Speed of flux weakening point

Hex: 2007-1Dh

Effective mode: Real time

Min.: 0

Unit: RPM

Max.: 65535

Data Type: UInt16

Default: 0

Change: At stop

Value Range:

0 RPM to 65535 RPM

Description

-

H07.36 Time constant of low-pass filter 2

Hex: 2007-25h

Effective mode: Real time

Min.: 0.00

Unit: ms

Max.: 10.00

Data Type: UInt16

Default: 0.00

Change: Real-time

Value Range:

0.00ms to 10.00ms

Description

-

H07.37 Torque reference filter selection

Hex: 2007-26h

Effective mode: Real time

Min.: 0

Unit: -

Max.: 1

Data Type: UInt16

Default: 0

Change: Real-time

Value Range:

0: First-order filter

1: Biquad filter

Description

0: First-order filter

1: Biquad filter

H07.38 Biquad filter attenuation ratio

Hex: 2007-27h

Effective mode: Real time

Min.:	0	Unit:	-
Max.:	50	Data Type:	UInt16
Default:	16	Change:	At stop

Value Range:

0 to 50

Description

-

H07.40 Time threshold of speed limit

Hex:	2007-29h	Effective mode:	Real time
Min.:	0	Unit:	ms
Max.:	300	Data Type:	UInt16
Default:	10	Change:	Real-time

Value Range:

0ms to 300ms

Description

-

5.9 H08 Gain Parameters**H08.00 Speed loop gain**

Hex:	2008-01h	Effective mode:	Real time
Min.:	0.1	Unit:	Hz
Max.:	2000.0	Data Type:	UInt16
Default:	40.0	Change:	Real-time

Value Range:

0.1Hz to 2000.0Hz

Description

Defines the proportional gain of the speed loop.

2008-01h determines the responsiveness of the speed loop. The higher the setpoint, the higher the responsiveness. 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

Hex:	2008-02h	Effective mode:	Real time
------	----------	-----------------	-----------

Min.:	0.15	Unit:	ms
Max.:	512.00	Data Type:	UInt16
Default:	19.89	Change:	Real-time

Value Range:

0.15ms to 512.00ms

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.

There is no integral action when H08.01 is set to 512.00.

H08.02 Position loop gain

Hex:	2008-03h	Effective mode:	Real time
Min.:	0.1	Unit:	Hz
Max.:	2000.0	Data Type:	UInt16
Default:	64.0	Change:	Real-time

Value Range:

0.1Hz to 2000.0Hz

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 H07.06 (Filter time constant of torque reference).

H08.03 2nd speed loop gain

Hex:	2008-04h	Effective mode:	Real time
Min.:	0.1	Unit:	Hz
Max.:	2000.0	Data Type:	UInt16
Default:	75.0	Change:	Real-time

Value Range:

0.1Hz to 2000.0Hz

Description

-

H08.04 2nd speed loop integral time constant

Hex:	2008-05h	Effective mode:	Real time
------	----------	-----------------	-----------

Min.:	0.15	Unit:	ms
Max.:	512.00	Data Type:	UInt16
Default:	10.61	Change:	Real-time

Value Range:

0.15ms to 512.00ms

Description

-

H08.05 2nd position loop gain

Hex:	2008-06h	Effective mode:	Real time
Min.:	0.1	Unit:	Hz
Max.:	2000.0	Data Type:	UInt16
Default:	120.0	Change:	Real-time

Value Range:

0.1Hz to 2000.0Hz

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). For information about gain switching, see "Gain Switching" in the Commissioning Guide.

H08.08 2nd gain mode setting

Hex:	2008-09h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	1	Change:	Real-time

Value Range:

0: Fixed to the 1st gain, switched between P and PI as defined by bit26 of external 60FEh

1: Switched between the 1st and 2nd gain sets as defined by H08.09

Description

Defines the mode for switching to the 2nd gain set.

Value	Mode
0	0: Fixed to the 1st gain set, P/PI switched by bit26 of 60FE (switched to P when bit26 of 60FE is set to 1)
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

Hex: 2008-0Ah

Effective Real time
mode:

Min.: 0

Unit: -

Max.: 10

Data Type: UInt16

Default: 0

Change: Real-time

Value Range:

0: Fixed to the 1st gain set (PS)

1: Switched as defined by bit26 of 60FEh

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

See the following table for gain switchover conditions.

Table 5-1 Conditions for gain switchover

Value	Gain switchover condition	Remarks
0	Fixed to the 1st gain set	The 1st gain set applies.
1	DI	Gains are switched through bit26 of 60FE. bit26 signal inactive: 1st gain set (H08.00 to H08.02, H07.05) bit26 signal active: 2nd gain set (H08.03 to H08.05, H07.06) If the bit26 signal cannot be assigned to DI, the 1st gain set applies.

Value	Gain switchover condition	Remarks
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 the position control mode 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. The 1st gain set applies in control modes other than position control.
7	Position reference available	Active only in the position control mode 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. The 1st gain set applies in control modes other than position control.
8	Positioning completed	Active only in the position control mode 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. The 1st gain set applies in control modes other than position control.

Value	Gain switchover condition	Remarks
9	Actual speed too high	Active only in the position control mode 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. The 1st gain set applies in control modes other than position control.
10	Position reference + Actual speed	Active only in the position control mode 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 keeps being 0 within the delay defined by H08.10 in the last 2nd gain set, the 2nd gain set applies. When the position reference keeps being 0 after the time defined by H08.10 elapses, if the absolute value of actual speed does not reach (Level) [RPM], the servo drive switches to the 1st gain set (except the speed integral time constant which is fixed to H08.04 (2nd speed loop integral time constant)); if the absolute value of the actual speed is lower than (Level - Dead time) [RPM], the servo drive switches to the 1st gain set without any exception. The 1st gain set applies in control modes other than position control.

H08.10 Gain switchover delay

Hex: 2008-0Bh

Effective Real time
mode:

Min.: 0.0

Unit: ms

Max.: 1000.0

Data Type: UInt16

Default: 5.0

Change: Real-time

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

Hex: 2008-0Ch

Effective Real time
mode:

Min.: 0

Unit: -

Max.: 20000

Data Type: UInt16

Default: 50

Change: Real-time

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 hysteresis

Hex:	2008-0Dh	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	20000	Data Type:	UInt16
Default:	30	Change:	Real-time

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.

H08.13 Position gain switchover time

Hex:	2008-0Eh	Effective mode:	Real time
Min.:	0.0	Unit:	ms
Max.:	1000.0	Data Type:	UInt16
Default:	3.0	Change:	Real-time

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.

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.

H08.15 Load moment of inertia ratio

Hex:	2008-10h	Effective mode:	Real time
Min.:	0.00	Unit:	-
Max.:	120.00	Data Type:	UInt16
Default:	3.00	Change:	Real-time

Value Range:

0.00 to 120.00

Description

Defines the mechanical load inertia ratio relative to the motor moment of inertia. 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. The servo drive automatically calculates and updates the value of H08.15 through inertia auto-tuning (including offline and online).

When online inertia auto-tuning (H09.03 set to a non-zero value) is used, the servo drive set H08-15 automatically. To set H08-15 manually set H09.03 (Online inertia auto-tuning mode) to 0 (Disabled).

H08.16 Save ITune parameter

Hex: 2008-11h

Effective mode: Real time

Min.: 0

Unit: -

Max.: 65535

Data Type: UInt16

Default: 0

Change: Real-time

Value Range:

0 to 65535

Description

-

H08.17 Zero phase delay

Hex: 2008-12h

Effective mode: Real time

Min.: 0.0

Unit: ms

Max.: 4.0

Data Type: UInt16

Default: 0.0

Change: Real-time

Value Range:

0.0 ms to 4.0ms

Description

-

H08.18 Time constant of speed feedforward filter

Hex: 2008-13h

Effective mode: Real time

Min.: 0.00

Unit: ms

Max.: 64.00

Data Type: UInt16

Default: 0.50

Change: Real-time

Value Range:

0.00ms to 64.00ms

Description

Defines the filter time constant of speed feedforward.

H08.19 Speed feedforward gain

Hex:	2008-14h	Effective mode:	Real time
Min.:	0.0	Unit:	%
Max.:	100.0	Data Type:	UInt16
Default:	0.0	Change:	Real-time

Value Range:

0.0% to 100.0%

Description

In the position control mode, speed feedforward is the value of H08.19 multiplied by the speed feedforward signal, which 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.

H08.20 Torque feedforward filter time constant

Hex:	2008-15h	Effective mode:	Real time
Min.:	0.00	Unit:	ms
Max.:	64.00	Data Type:	UInt16
Default:	0.50	Change:	Real-time

Value Range:

0.00ms to 64.00ms

Description

Defines the filter time constant of torque feedforward.

H08.21 Torque feedforward gain

Hex:	2008-16h	Effective mode:	Real time
Min.:	0.0	Unit:	%
Max.:	300.0	Data Type:	UInt16
Default:	0.0	Change:	Real-time

Value Range:

0.0% to 300.0%

Description

In control modes other than torque control, torque feedforward is the product of torque feedforward 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.

H08.22 Speed feedback filtering option

Hex:	2008-17h	Effective mode:	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.

H08.23 Cutoff frequency of speed feedback low-pass filter

Hex:	2008-18h	Effective mode:	Real time
Min.:	100	Unit:	Hz
Max.:	8000	Data Type:	UInt16
Default:	8000	Change:	Real-time

Value Range:

100Hz to 8000 Hz

Description

Defines the cutoff frequency for first-order low-pass filtering on the speed feedback.

H08.24 PDFF control coefficient

Hex: 2008-19h

Effective Real time

mode:

Min.: 0.0

Unit: %

Max.: 200.0

Data Type: UInt16

Default: 100.0

Change: Real-time

Value Range:

0.0% to 200.0%

Description

Defines the control mode of the speed loop.

When the parameter is set to 200.0, PI control (default control mode of the speed loop) is applied to the speed loop, which features fast 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 Speed observer cutoff frequency

Hex: 2008-1Ch

Effective Real time

mode:

Min.: 50

Unit: Hz

Max.: 600

Data Type: UInt16

Default: 170

Change: Real-time

Value Range:

50 Hz to 600Hz

Description

-

H08.28 Speed observer inertia correction coefficient

Hex: 2008-1Dh

Effective Real time

mode:

Min.: 1

Unit: %

Max.: 1600

Data Type: UInt16

Default: 100

Change: Real-time

Value Range:

1% to 1600%

Description

-

H08.29 Speed observer filter time

Hex:	2008-1Eh	Effective mode:	Real time
Min.:	0.00	Unit:	ms
Max.:	10.00	Data Type:	UInt16
Default:	0.80	Change:	Real-time

Value Range:

0.00ms to 10.00ms

Description

-

H08.31 Disturbance cutoff frequency

Hex:	2008-20h	Effective mode:	Real time
Min.:	1	Unit:	Hz
Max.:	4000	Data Type:	UInt16
Default:	600	Change:	Real-time

Value Range:

1Hz to 4000Hz

Description

Note: For the -NS model, the setpoint is 10 Hz to 4000 Hz.

H08.32 Disturbance compensation gain

Hex:	2008-21h	Effective mode:	Real time
Min.:	0	Unit:	%
Max.:	100	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

0% to 100%

Description

-

H08.33 Disturbance observer inertia correction coefficient

Hex:	2008-22h	Effective mode:	Real time
Min.:	1	Unit:	%
Max.:	1600	Data Type:	UInt16
Default:	100	Change:	Real-time

Value Range:

1% to 1600%

Description

-

H08.34 The constant ratio of APF for perturbation observation

Hex:	2008-23h	Effective mode:	Real time
Min.:	0	Unit:	%
Max.:	1600	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

0% to 1600%

Description

-

H08.35 Vibration suppression frequency

Hex:	2008-24h	Effective mode:	Real time
Min.:	0	Unit:	Hz
Max.:	1600	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

0Hz to 1600Hz

Description

-

H08.36 Vibration suppression coefficient of disturbance observation

Hex:	2008-25h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	200	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

0 to 200

Description

-

H08.37 Phase modulation for medium-frequency jitter suppression 2

Hex:	2008-26h	Effective mode:	Real time
Min.:	-90	Unit:	°
Max.:	90	Data Type:	Int16

Default: 0	Change: Real-time
Value Range: -90° to 90°	
Description -	

H08.38 Medium-frequency suppression 2 frequency

Hex: 2008-27h	Effective mode: Real time
Min.: 0	Unit: Hz
Max.: 1000	Data Type: UInt16
Default: 0	Change: Real-time
Value Range: 0Hz to 1000Hz	
Description -	

H08.39 Compensation gain of medium-frequency jitter suppression 2

Hex: 2008-28h	Effective mode: Real time
Min.: 0	Unit: %
Max.: 300	Data Type: UInt16
Default: 0	Change: Real-time
Value Range: 0% to 300%	
Description -	

H08.40 Speed observer selection

Hex: 2008-29h	Effective mode: Real time
Min.: 0	Unit: -
Max.: 1	Data Type: UInt16
Default: 0	Change: Real-time
Value Range: 0: Disabled 1: Enabled	
Description -	

H08.42 Model control selection

Hex: 2008-2Bh

Effective mode: Real time

Min.: 0

Unit: -

Max.: 2

Data Type: UInt16

Default: 0

Change: Real-time

Value Range:

0: Disabled

1: Enabled

2: Dual-inertia model

Description

-

H08.43 Model gain

Hex: 2008-2Ch

Effective mode: Real time

Min.: 0.1

Unit: -

Max.: 2000.0

Data Type: UInt16

Default: 40.0

Change: Real-time

Value Range:

0.1 to 2000.0

Description

-

H08.46 Feedforward value

Hex: 2008-2Fh

Effective mode: Real time

Min.: 0.0

Unit: -

Max.: 102.4

Data Type: UInt16

Default: 95.0

Change: Real-time

Value Range:

0.0 to 102.4

Description

-

H08.53 Medium- and low-frequency jitter suppression frequency 3

Hex: 2008-36h

Effective mode: Real time

Min.: 0.0

Unit: Hz

Max.: 300.0

Data Type: UInt16

Default: 0.0

Change: Real-time

Value Range:

0.0Hz to 300.0Hz

Description

-

H08.54 Medium- and low-frequency jitter suppression compensation 3

Hex: 2008-37h

Effective Real time
mode:

Min.: 0

Unit: %

Max.: 200

Data Type: UInt16

Default: 0

Change: Real-time

Value Range:

0% to 200%

Description

-

H08.56 Medium- and low-frequency jitter suppression phase modulation 3

Hex: 2008-39h

Effective Real time
mode:

Min.: 0

Unit: %

Max.: 600

Data Type: UInt16

Default: 100

Change: Real-time

Value Range:

0% to 600%

Description

-

H08.59 Medium- and low-frequency jitter suppression frequency 4

Hex: 2008-3Ch

Effective Real time
mode:

Min.: 0.0

Unit: Hz

Max.: 300.0

Data Type: UInt16

Default: 0.0

Change: Real-time

Value Range:

0.0Hz to 300.0Hz

Description

-

H08.60 Medium- and low-frequency jitter suppression compensation 4

Hex: 2008-3Dh

Effective Real time
mode:

Min.: 0

Unit: %

Max.: 200	Data Type: UInt16
Default: 0	Change: Real-time
Value Range:	
0% to 200%	
Description	
-	

H08.61 Medium- and low-frequency jitter suppression phase modulation 4

Hex: 2008-3Eh	Effective mode:	Real time
Min.: 0	Unit:	%
Max.: 600	Data Type:	UInt16
Default: 100	Change:	Real-time
Value Range:		
0% to 600%		
Description		
-		

H08.62 Position loop integral time constant

Hex: 2008-3Fh	Effective mode:	Real time
Min.: 0.15	Unit:	-
Max.: 512.00	Data Type:	UInt16
Default: 512.00	Change:	Real-time
Value Range:		
0.15 to 512.00		
Description		
-		

H08.63 2nd position loop integral time constant

Hex: 2008-40h	Effective mode:	Real time
Min.: 0.15	Unit:	-
Max.: 512.00	Data Type:	UInt16
Default: 512.00	Change:	Real-time
Value Range:		
0.15 to 512.00		
Description		
-		

H08.64 Speed observer feedback source

Hex:	2008-41h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

0: Disabled

1: Enabled

Description

-

5.10 H09 Auto-tuning Parameters

H09.00 Auto-adjustment mode

Hex:	2009-01h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	7	Data Type:	UInt16
Default:	4	Change:	Real-time

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: Normal mode+Inertia auto-tuning

6: Quick positioning mode+Inertia auto-tuning

Description

2009-01h is set to 4 by default.

H09.01 Stiffness level selection

Hex:	2009-02h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	41	Data Type:	UInt16
Default:	15	Change:	Real-time

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

Hex:	2009-03h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	4	Data Type:	UInt16
Default:	0	Change:	Real-time

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.

H09.03 Online inertia auto-tuning mode

Hex:	2009-04h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	3	Data Type:	UInt16
Default:	0	Change:	Real-time

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.

H09.05 Offline inertia auto-tuning mode

Hex:	2009-06h	Effective mode:	Real time
Min.:	0	Unit:	-

Max.: 1	Data Type: UInt16
Default: 0	Change: At stop

Value Range:

0: Bi-directional

1: Unidirectional

Description

Defines the offline inertia auto-tuning mode. The offline inertia auto-tuning function can be enabled through H0d.02.

For details on offline inertia auto-tuning, see section Inertia Auto-tuning in the Commissioning Guide.

H09.06 Max. speed of inertia auto-tuning

Hex: 2009-07h	Effective mode:	Real time
Min.: 100	Unit:	RPM
Max.: 1000	Data Type:	UInt16
Default: 500	Change:	At stop

Value Range:

100rpm to 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

Hex: 2009-08h	Effective mode:	Real time
Min.: 20	Unit:	ms
Max.: 800	Data Type:	UInt16
Default: 125	Change:	At stop

Value Range:

20 ms to 800 ms^[1]

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.

Note [1]: For the -NS model, the setpoint is 10 ms to 5000 ms.

H09.08 Interval time after an individual inertia auto-tuning

Hex: 2009-09h	Effective mode:	Real time
---------------	-----------------	-----------

Min.:	50	Unit:	ms
Max.:	10000	Data Type:	UInt16
Default:	800	Change:	At stop

Value Range:

50ms to 10000ms

Description

Defines the time interval between two consecutive speed references when H09.05 (Offline inertia auto-tuning mode) is set to 0 (Bidirectional).

H09.09 Number of motor revolutions per inertia auto-tuning

Hex:	2009-0Ah	Effective mode:	Real time
Min.:	0.00	Unit:	-
Max.:	100.00	Data Type:	UInt16
Default:	1.00	Change:	Real-time

Value Range:

0.00 to 100.00

Description

Defines the number of motor revolutions needed when H09.05 (Offline inertia auto-tuning mode) is set to 0 (Bidirectional).

H09.11 Vibration threshold

Hex:	2009-0Ch	Effective mode:	Real time
Min.:	0.0	Unit:	%
Max.:	100.0	Data Type:	UInt16
Default:	5.0	Change:	Real-time

Value Range:

0.0% to 100.0%

Description

Defines the threshold of vibration detected by the notch. When the current feedback exceeds the threshold, the notch starts working.

H09.12 Frequency of the 1st notch

Hex:	2009-0Dh	Effective mode:	Real time
Min.:	50	Unit:	Hz
Max.:	8000	Data Type:	UInt16
Default:	8000	Change:	Real-time

Value Range:

50 Hz to 8000 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 8000Hz deactivates the notch function.

H09.13 Width level of the 1st notch

Hex:	2009-0Eh	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	20	Data Type:	UInt16
Default:	2	Change:	Real-time

Value Range:

0 to 20

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

Hex:	2009-0Fh	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	99	Data Type:	UInt16
Default:	0	Change:	Real-time

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.

For details on offline inertia auto-tuning, see section Inertia Auto-tuning in the Commissioning Guide.

H09.15 Frequency of the 2nd notch

Hex:	2009-10h	Effective mode:	Real time
Min.:	50	Unit:	Hz
Max.:	8000	Data Type:	UInt16

Default: 8000

Change: Real-time

Value Range:

50 Hz to 8000 Hz

Description

-

H09.16 Width level of the 2nd notch

Hex: 2009-11h

Effective Real time

mode:

Min.: 0

Unit: -

Max.: 20

Data Type: UInt16

Default: 2

Change: Real-time

Value Range:

0 to 20

Description

-

H09.17 Depth level of the 2nd notch

Hex: 2009-12h

Effective Real time

mode:

Min.: 0

Unit: -

Max.: 99

Data Type: UInt16

Default: 0

Change: Real-time

Value Range:

0 to 99

Description

Descriptions for parameters of the 2nd notch are the same as that of the 1st notch.

H09.18 Frequency of the 3rd notch

Hex: 2009-13h

Effective Real time

mode:

Min.: 50

Unit: Hz

Max.: 8000

Data Type: UInt16

Default: 8000

Change: Real-time

Value Range:

50 Hz to 8000 Hz

Description

-

H09.19 Width level of the 3rd notch

Hex: 2009-14h

Effective Real time

mode:

Min.: 0

Unit: -

Max.: 20

Data Type: UInt16

Default: 2

Change: Real-time

Value Range:

0 to 20

Description

-

H09.20 Depth level of the 3rd notch

Hex: 2009-15h

Effective Real time

mode:

Min.: 0

Unit: -

Max.: 99

Data Type: UInt16

Default: 0

Change: Real-time

Value Range:

0 to 99

Description

See H09.12 (Frequency of the 1st notch), H09.13 (Width level of the 1st notch) and H09.14 (Depth level of the 1st notch) for parameters descriptions of the 3rd notch.

H09.21 Frequency of the 4th notch

Hex: 2009-16h

Effective Real time

mode:

Min.: 50

Unit: Hz

Max.: 8000

Data Type: UInt16

Default: 8000

Change: Real-time

Value Range:

50 Hz to 8000 Hz

Description

-

H09.22 Width level of the 4th notch

Hex: 2009-17h

Effective Real time

mode:

Min.: 0

Unit: -

Max.: 20

Data Type: UInt16

Default: 2

Change: Real-time

Value Range:

0 to 20

Description

-

H09.23 Depth level of the 4th notch

Hex:	2009-18h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	99	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

0 to 99

Description

See H09.12 (Frequency of the 1st notch), H09.13 (Width level of the 1st notch) and H09.14 (Depth level of the 1st notch) to understand the 4th notch parameters.

H09.24 Auto-tuned resonance frequency

Hex:	2009-19h	Effective mode:	-
Min.:	0	Unit:	Hz
Max.:	5000	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0Hz to 5000Hz

Description

When H09.02 (Adaptive notch mode) is set to 3, the current mechanical resonance frequency is displayed.

H09.30 Tension fluctuation compensation gain

Hex:	2009-1Fh	Effective mode:	Real time
Min.:	-100.0	Unit:	-
Max.:	100.0	Data Type:	Int16
Default:	0.0	Change:	Real-time

Value Range:

-100.0 to 100.0

Description

-

H09.31 Tension fluctuation compensation filter time

Hex:	2009-20h	Effective mode:	Real time
------	----------	-----------------	-----------

Min.:	0.00	Unit:	-
Max.:	25.00	Data Type:	UInt16
Default:	0.50	Change:	Real-time

Value Range:

0.00 to 25.00

Description

-

H09.32 Gravity compensation value

Hex:	2009-21h	Effective mode:	Real time
Min.:	-100.0	Unit:	%
Max.:	100.0	Data Type:	Int16
Default:	0.0	Change:	Real-time

Value Range:

-100.0% to 100.0%

Description

-

H09.33 Positive friction compensation value

Hex:	2009-22h	Effective mode:	Real time
Min.:	0.0	Unit:	%
Max.:	100.0	Data Type:	UInt16
Default:	0.0	Change:	Real-time

Value Range:

0.0% to 100.0%

Description

-

H09.34 Negative friction compensation value

Hex:	2009-23h	Effective mode:	Real time
Min.:	-100.0	Unit:	%
Max.:	0.0	Data Type:	Int16
Default:	0.0	Change:	Real-time

Value Range:

-100.0% to 0.0%

Description

-

H09.35 Friction compensation speed

Hex: 2009-24h

Effective mode: Real time

Min.: 0.0

Unit: -

Max.: 20.0

Data Type: UInt16

Default: 2.0

Change: Real-time

Value Range:

0.0 to 20.0

Description

-

H09.36 Friction compensation speed

Hex: 2009-25h

Effective mode: Real time

Min.: 0

Unit: -

Max.: 19

Data Type: UInt16

Default: 0

Change: Real-time

Value Range:

0: Slow mode+Speed reference

1: Slow mode+Model speed

2: Slow mode+Speed feedback

3: Slow mode+Observe speed

16: Quick mode +Speed reference

17: Quick mode +Model speed

18: Quick mode +Speed feedback

19: Quick mode+Observe speed

Description

Description

Value	Description
0	Slow speed mode + Speed reference
1	Slow speed mode + Model speed
2	Slow-speed mode + Speed feedback
3	Slow speed mode + Observed speed
16	High-speed mode + Speed reference
17	High-speed mode + Model speed
18	High-speed mode + Speed feedback
19	High speed mode + Observed speed

H09.37 Vibration monitoring time

Hex:	2009-26h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	300	Change:	Real-time
Value Range:			
0 to 65535			
Description			
-			

H09.38 Frequency of low-frequency resonance suppression 1 at the mechanical end

Hex:	2009-27h	Effective mode:	Real time
Min.:	1.0	Unit:	Hz
Max.:	100.0	Data Type:	UInt16
Default:	100.0	Change:	At stop
Value Range:			
1.0Hz to 100.0Hz			
Description			
-			

H09.39 Low-frequency resonance suppression 1 at the mechanical end

Hex:	2009-28h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	3	Data Type:	UInt16
Default:	2	Change:	At stop
Value Range:			
0 to 3			
Description			
-			

H09.44 Frequency of low-frequency resonance suppression 2 at mechanical load end

Hex:	2009-2Dh	Effective mode:	Real time
Min.:	0.0	Unit:	-
Max.:	200.0	Data Type:	UInt16
Default:	0.0	Change:	Real-time ^[1]
Value Range:			
0.0 to 200.0			

Description

Note [1]: For the -NS model, the effective mode is at stop.

H09.45 Responsiveness of low-frequency resonance suppression 2 at mechanical load end

Hex:	2009-2Eh	Effective mode:	Real time
Min.:	0.01	Unit:	-
Max.:	10.00	Data Type:	UInt16
Default:	1.00	Change:	Real-time ^[1]

Value Range:

0.01 to 10.00

Description

Note [1]: For the -NS model, the effective mode is at stop.

H09.47 Width of low-frequency resonance suppression 2 at mechanical load end

Hex:	2009-30h	Effective mode:	Real time
Min.:	0.00	Unit:	-
Max.:	2.00	Data Type:	UInt16
Default:	1.00	Change:	Real-time ^[1]

Value Range:

0.00 to 2.00

Description

Note [1]: For the -NS model, the effective mode is at stop.

H09.49 Frequency of low-frequency resonance suppression 3 at mechanical load end

Hex:	2009-32h	Effective mode:	Real time
Min.:	0.0	Unit:	-
Max.:	200.0	Data Type:	UInt16
Default:	0.0	Change:	Real-time ^[1]

Value Range:

0.0 to 200.0

Description

Note [1]: For the -NS model, the effective mode is at stop.

H09.50 Responsiveness of low-frequency resonance suppression 3 at mechanical load end

Hex:	2009-33h	Effective mode:	Real time
------	----------	-----------------	-----------

Min.:	0.01	Unit:	-
Max.:	10.00	Data Type:	UInt16
Default:	1.00	Change:	Real-time ^[1]

Value Range:

0.01 to 10.00

Description

Note [1]: For the -NS model, the effective mode is at stop.

H09.52 Width of low-frequency resonance suppression 3 at mechanical load end

Hex:	2009-35h	Effective mode:	Real time
Min.:	0.00	Unit:	-
Max.:	2.00	Data Type:	UInt16
Default:	1.00	Change:	Real-time ^[1]

Value Range:

0.00 to 2.00

Description

Note [1]: For the -NS model, the effective mode is at stop.

H09.54 Resonance detection torque threshold

Hex:	2009-37h	Effective mode:	Real time
Min.:	0.0	Unit:	-
Max.:	300.0	Data Type:	UInt16
Default:	50.0	Change:	Real-time

Value Range:

0.0 to 300.0

Description

-

H09.55 Medium frequency vibration suppression 2 cut-off frequency

Hex:	2009-38h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	1200	Change:	Real-time

Value Range:

0 to 65535

Description

-

H09.56 Max. overmodulation one-key adjustment

Hex:	2009-39h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	2936	Change:	Real-time

Value Range:

0 to 65535

Description

-

H09.57 STune resonance suppression switchover frequency

Hex:	2009-3Ah	Effective mode:	Real time
Min.:	0	Unit:	Hz
Max.:	4000	Data Type:	UInt16
Default:	900	Change:	Real-time

Value Range:

0Hz to 4000Hz

Description

-

H09.58 STune resonance suppression reset selection

Hex:	2009-3Bh	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	2	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

0: Disabled

1: Enabled

Description

-

5.11 H0A Fault and Protection Parameters**H0A.00 Power input phase loss protection**

Hex:	200A-01h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	3	Data Type:	UInt16

Default: 0

Change: Real-time

Value Range:

0: Enabled

1: Disabled

3: Enable power-off detection

Description

Servo drives supporting single-phase/three-phase 220 V and three-phase 380 V power supplies are available. When voltage fluctuation or phase loss occurs on the power supply, the drive triggers power input phase loss protection based on H0A.00.

H0A.01 Absolute position limit

Hex: 200A-02h

Effective mode: Real time

Min.: 0

Unit: -

Max.: 2

Data Type: UInt16

Default: 0

Change: Real-time

Value Range:

0: Disabled

1: Enabled

2: Enabled after homing

Description

Defines whether the absolute position limit is active and the condition for activation.

After the absolute position limit is enabled, when the target position reference exceeds the position limit in the position control mode, the servo drive takes the position limit as the target and stops after reaching the limit; when the absolute position feedback reaches the position limit in other control modes, the servo drive reports an overtravel warning and stops in the mode defined by H02.07 (Stop mode at overtravel).

H0A.04 Motor overload protection gain

Hex: 200A-05h

Effective mode: Real time

Min.: 50

Unit: -

Max.: 300

Data Type: UInt16

Default: 100

Change: Real-time

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**

Hex:	200A-09h	Effective mode:	Real time
Min.:	0	Unit:	RPM
Max.:	20000	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

0rpm to 20000rpm

Description

Defines the overspeed threshold of the motor.

H0A.10 **Threshold of excessive local position deviation**

Hex:	200A-0Bh	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	4294967295	Data Type:	UInt32
Default:	27486951	Change:	Real-time

Value Range:

0 to 4294967295

Description

Defines the threshold for reporting EB00.0 (Position deviation too large). The function is the same as 6065h (Following error window), both of which are active.

H0A.12 **Runaway protection enable**

Hex:	200A-0Dh	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	1	Change:	Real-time

Value Range:

0: Disable

1: Enable

Description

Used to enable runaway protection.

H0A.18 IGBT over-temperature threshold

Hex:	200A-13h	Effective mode:	Real time
Min.:	120	Unit:	°C
Max.:	175	Data Type:	UInt16
Default:	135	Change:	Real-time

Value Range:

120°C to 175°C

Description

Defines the over-temperature protection threshold of the power module.

H0A.19 Filter time constant of touch probe 1

Hex:	200A-14h	Effective mode:	Real time
Min.:	0.00	Unit:	us
Max.:	6.30	Data Type:	UInt16
Default:	2.00	Change:	Real-time

Value Range:

0.00us–6.30us

Description

-

H0A.20 Filter time constant of touch probe 2

Hex:	200A-15h	Effective mode:	Real time
Min.:	0.00	Unit:	us
Max.:	6.30	Data Type:	UInt16
Default:	2.00	Change:	Real-time

Value Range:

0.00us–6.30us

Description

Touch probe 1 and touch probe 2 are high-speed DIs. When external input signals suffer from spike interference, set H0A.19 or H0A.20 to filter the out spike interference.

Note: The oscilloscope in the software tool displays the unfiltered signals of touch probe 1 and touch probe 2. Signals with width lower than 0.25 ms will not be displayed.

H0A.21 STO function display selection

Hex:	200A-16h	Effective mode:	Real time
Min.:	0	Unit:	-

Max.: 3	Data Type: UInt16
Default: 0	Change: Real-time

Value Range:

0 to 3

Description

Defines whether to display the STO status or report E150.0 after the STO function is triggered.

0: Displays the STO status. The keypad displays "sto_" after the STO function is triggered. In this case, no fault is reported and no output is generated from the fault DO.

1: Displays the STO fault. The keypad displays "E150.0" after the STO function is triggered. In this case, the drive reports the fault and the faulty DO outputs.

H0A.22 Sigma_Delta filter time

Hex: 200A-17h	Effective mode: Upon the next power-on
Min.: 0	Unit: -
Max.: 3	Data Type: UInt16
Default: 1	Change: At stop

Value Range:

0 to 3

Description

-

H0A.23 TZ signal filter time

Hex: 200A-18h	Effective mode: Upon the next power-on
Min.: 0	Unit: 25ns
Max.: 31	Data Type: UInt16
Default: 15	Change: At stop

Value Range:

0ns to 31ns

Description

-

H0A.25 Filter time constant of speed feedback display value

Hex: 200A-1Ah	Effective mode: Real time
Min.: 0	Unit: ms
Max.: 5000	Data Type: UInt16
Default: 50 ^[1]	Change: Real-time

Value Range:

0ms to 5000ms

Description

Defines the filter time constant of the speed feedback display value to smoothen the speed feedback.

H0b.00 displays the actual motor speed filtered by this parameter.

Note: [1]: For the -NS model, the default value is 0.

H0A.26 Motor overload detection

Hex:	200A-1Bh	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

0: Show motor overload warning (E909.0) and fault (E620.0)

1: Hide motor overload warning (E909.0) and fault (E620.0)

Description

Defines whether to enable motor overload detection.

H0A.27 Motor rotation DO speed filter time

Hex:	200A-1Ch	Effective mode:	Real time
Min.:	0	Unit:	ms
Max.:	5000	Data Type:	UInt16
Default:	50	Change:	Real-time

Value Range:

0 ms to 5000 ms^[1]

Description

Defines the low-pass filter time constant of speed feedback signals.

This parameter is effective only when the speed feedback signals are used to judge the speed-related DO signals.

Note [1]: For the -NS model, the setpoint is 0 ms to 100 ms.

H0A.32 Time threshold for locked motor overheat protection

Hex:	200A-21h	Effective mode:	Real time
Min.:	10	Unit:	ms
Max.:	65535	Data Type:	UInt16
Default:	200	Change:	Real-time

Value Range:

10ms to 65535ms

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 Locked motor overheat protection

Hex:	200A-22h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	1	Change:	Real-time

Value Range:

0: Disabled

1: Enabled

Description

Defines whether to enable the detection for E630.0 (Motor stall overtemperature protection).

H0A.36 Encoder multi-turn overflow fault selection

Hex:	200A-25h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

0: Not hide

1: Hide

Description

Defines whether to mask E735.0 (Encoder multi-turn counting overflow) in the absolute position linear mode.

H0A.40 Overtravel compensation selection

Hex:	200A-29h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	7	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0 to 7

Description

Bit0: Overtravel compensation
Bit1: Probe rising edge compensation
Bit2: Probe falling edge compensation

H0A.49 Regenerative resistor overtemperature threshold

Hex:	200A-32h	Effective mode:	Real time
Min.:	100	Unit:	°C
Max.:	175	Data Type:	UInt16
Default:	115	Change:	Real-time

Value Range:
100°C to 175°C

Description
-

H0A.50 Encoder communication fault tolerance threshold

Hex:	200A-33h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	31	Data Type:	UInt16
Default:	31	Change:	Real-time

Value Range:
0 to 31

Description
-

H0A.51 Phase loss detection filter times

Hex:	200A-34h	Effective mode:	Real time
Min.:	3	Unit:	55ms
Max.:	36	Data Type:	UInt16
Default:	20	Change:	Real-time

Value Range:
3ms to 36ms

Description
-

H0A.52 Encoder temperature protection threshold

Hex:	200A-35h	Effective mode:	Real time
------	----------	-----------------	-----------

Min.:	0	Unit:	°C
Max.:	175	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

0°C to 175°C

Description

0: Disable

H0A.53 Probe rising edge compensation time

Hex:	200A-36h	Effective mode:	Real time
Min.:	-30000	Unit:	25ns
Max.:	30000	Data Type:	Int16
Default:	0	Change:	Real-time

Value Range:-30000 ns to 30000 ns^[1]**Description**

Note: [1]: For the -NS model, the setpoint is -3000 ns to 3000 ns.

H0A.54 Probe falling edge compensation time

Hex:	200A-37h	Effective mode:	Real time
Min.:	-30000	Unit:	25ns
Max.:	30000	Data Type:	Int16
Default:	0	Change:	Real-time

Value Range:-30000 ns to 30000 ns^[1]**Description**

Note: [1]: For the -NS model, the setpoint is -3000 ns to 3000 ns.

H0A.55 Runaway current threshold

Hex:	200A-38h	Effective mode:	Real time
Min.:	100.0	Unit:	%
Max.:	400.0	Data Type:	UInt16
Default:	200.0	Change:	Real-time

Value Range:

100.0% to 400.0%

Description

-

H0A.56 Fault reset delay

Hex: 200A-39h

Effective Real time

mode:

Min.: 0

Unit: ms

Max.: 60000

Data Type: UInt16

Default: 10000

Change: Real-time

Value Range:

0ms to 60000ms

Description

Faults E620.0, E630.0, E640.0, E640.1, and E650.0 can be reset only after the set delay.

H0A.57 Runaway speed threshold

Hex: 200A-3Ah

Effective Real time

mode:

Min.: 1

Unit: RPM

Max.: 1000

Data Type: UInt16

Default: 50

Change: Real-time

Value Range:

1 rpm to 1000 rpm

Description

-

H0A.58 Runaway speed filter time

Hex: 200A-3Bh

Effective Upon the next power-on

mode:

Min.: 0.1

Unit: ms

Max.: 100.0

Data Type: UInt16

Default: 2.0

Change: Real-time

Value Range:

0.1ms to 100.0ms

Description

-

H0A.59 Runaway protection detection time

Hex: 200A-3Ch

Effective Real time

mode:

Min.: 10

Unit: ms

Max.: 1000

Data Type: UInt16

Default: 30

Change: Real-time

Value Range:

10ms to 1000ms

Description

-

H0A.70 Overspeed threshold 2

Hex: 200A-47h

Effective Real time
mode:

Min.: 0

Unit: RPM

Max.: 20000

Data Type: UInt16

Default: 0

Change: Real-time

Value Range:

0rpm to 20000rpm

Description

-

H0A.71 Servo function switch

Hex: 200A-48h

Effective Real time
mode:

Min.: 0

Unit: -

Max.: 65535

Data Type: UInt16

Default: 0

Change: Real-time

Value Range:

0 to 65535

Description

bit	Function	Description
0	MS1 overload curve selection	0: New 1: Old
1	Power failure bleeder switch	0: On 1: Off
2	Forced brake motor stop	0: Enabled 1: Disabled
3	Reserved	-
4	E120.3 mask switch	0: Disabled 1: Enabled
5	Prohibit software reading function code	0: Disabled 1: Enabled
6	E108.4 mask switch	0: Disabled 1: Enabled
7	CSV command update timing	0: At SyncActive 1: At IRQ interrupt
8	Reserved	-
9	Power line breakage detection	0: Enabled 1: Disabled
10	Torque limit source	0: Auto switch acc. to H02.00 1: H07.09 and H07.10
11	Reserved	-
12	Homing completion signal power failure retention	0: Disabled 1: Enabled
13	Status word selection in STO state	0: Switch on disable 1: Fault
14	Reserved	-
15	Reserved	-

H0A.72 Maximum stop time in ramp-to-stop

Hex:	200A-49h	Effective mode:	Real time
Min.:	0	Unit:	ms
Max.:	65535	Data Type:	UInt16
Default:	10000	Change:	At stop

Value Range:

0ms to 65535ms

Description

Defines the maximum time taken by the motor in decelerating from 6000 RPM to 0 RPM when the stop mode is set to "Ramp to stop as defined by 6084h/609Ah (HM)" or "Ramp to stop as defined by 6085h".

H0A.73 STO 24 V disconnection filter time

Hex:	200A-4Ah	Effective mode:	Real time
Min.:	0	Unit:	ms
Max.:	5	Data Type:	UInt16
Default:	5	Change:	Real-time

Value Range:

0 ms to 5 ms^[1]

Description

Defines the filter time from the moment when STO2 is disconnected from the 24 V power supply to the moment when the STO status is displayed or E150.0 is reported.

Note: [1]: For the -NS model, the setpoint is 1 ms to 5 ms.

H0A.74 Filter time for two inconsistent STO channels

Hex:	200A-4Bh	Effective mode:	Real time
Min.:	0	Unit:	ms
Max.:	1000	Data Type:	UInt16
Default:	10	Change:	Real-time

Value Range:

0 ms to 1000 ms^[1]

Description

Defines the filter time from the moment when STO2 is input with different voltage to the moment when E150.1 is reported.

Note: [1]: For the -NS model, the setpoint is 1 ms to 1000 ms.

H0A.75 Servo OFF delay after STO triggered

Hex:	200A-4Ch	Effective mode:	Real time
Min.:	0	Unit:	ms
Max.:	25	Data Type:	UInt16
Default:	20	Change:	Real-time

Value Range:

0ms to 25ms

Description

Defines filter time from the moment when the STO status is displayed or E150.0/E150.1 is reported to the moment when the servo drive is off.

H0A.85 Wire breakage detection torque threshold

Hex:	200A-56h	Effective mode:	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

Hex:	200A-57h	Effective mode:	Real time
Min.:	5	Unit:	ms
Max.:	1000	Data Type:	UInt16
Default:	30	Change:	At stop

Value Range:

5ms to 1000ms

Description

-

5.12 H0b Monitoring Parameters

H0b.00 Motor speed actual value

Hex:	200b-01h	Effective mode:	-
Min.:	-32767	Unit:	RPM
Max.:	32767	Data Type:	Int16
Default:	0	Change:	Unchangeable

Value Range:

-32767rpm to 32767rpm

Description

It displays the actual speed of the servo motor after round-off, in unit of 1 RPM. Set in H0A.25 (Filter time constant of speed feedback display) the filter time constant for H0b.00.

H0b.01 Speed reference

Hex:	200b-02h	Effective mode:	-
Min.:	-32767	Unit:	RPM
Max.:	32767	Data Type:	Int16
Default:	0	Change:	Unchangeable

Value Range:

-32767rpm to 32767rpm

Description

Indicates the present speed reference (accurate to 1rpm) of the drive in the position and speed control modes.

H0b.02 Internal torque reference

Hex:	200b-03h	Effective mode:	-
Min.:	-3276.7	Unit:	%
Max.:	3276.7	Data Type:	Int16
Default:	0.0	Change:	Unchangeable

Value Range:

-3276.7% to 3276.7%

Description

Displays present torque reference (accurate to 0.1%). The value 100.0% corresponds to the rated torque of the motor.

H0b.03 Input (DI) signal monitoring

Hex:	200b-04h	Effective mode:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

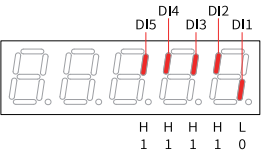
0 to 65535

Description

Indicates the level status of DI1 to DI5 without filtering.

Upper LED segments ON: high level (indicated by "1") Lower LED segments ON: low level (indicated by "0") For example, if DI1 is low level and DI2 to DI5 are high level, and the binary value is 11110, then the decimal value read from H0b.03 in the Inovance servo commissioning software is 30.

The panel display is as follows:



H0b.05 Output (DO) signal monitoring

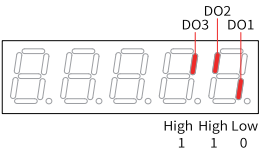
Hex:	200b-06h	Effective mode:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

It displays the level states of the 3 DO terminals without filtering.
Upper LED segments ON: high level (indicated by "1") Lower LED segments ON: low level (indicated by "0") For example, if DO1 is low level and DO2 to DO3 are high level, and the binary value is 110, then the decimal value of H0b.05 read from Inovance servo commissioning software is 6, and the keypad displays the following figure:
The panel display is as follows:



H0b.07 Absolute position counter

Hex:	200b-08h	Effective mode:	-
Min.:	-2147483648	Unit:	Encoder unit
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Unchangeable

Value Range:

-2147483648 to 2147483647

Description

It displays the current motor absolute position (reference unit) 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

Hex: 200b-0Ah

Effective -

mode:

Min.: 0.0

Unit: °

Max.: 360.0

Data Type: UInt16

Default: 0.0

Change: Unchangeable

Value Range:

0.0° to 360.0°

Description

Displays present mechanical angle (encoder unit) of the motor. The setpoint 0 indicates the mechanical angle is 0°.

H0b.10 Electrical angle

Hex: 200b-0Bh

Effective -

mode:

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 varies from -360° to +360.0° when the motor is rotating.

Similarly, if the motor has 4 pairs of poles, each revolution generates 4 rounds of angle changes from 0° to 359.9°.

Also, if the motor has 5 pairs of poles, each revolution generates 5 rounds of angle changes from 0° to 359.9°.

H0b.12 Average load ratio

Hex: 200b-0Dh

Effective -

mode:

Min.: 0.0

Unit: %

Max.: 800.0

Data Type: UInt16

Default: 0.0

Change: Unchangeable

Value Range:

0.0% to 800.0%

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.15 Position following error (encoder unit)

Hex:	200b-10h	Effective mode:	-
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.17 Feedback pulse counter

Hex:	200b-12h	Effective mode:	-
Min.:	-2147483648	Unit:	Encoder unit
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Unchangeable

Value Range:

-2147483648 to 2147483647

Description

-

H0b.19 Total power-on time

Hex:	200b-14h	Effective mode:	-
Min.:	0.0	Unit:	-
Max.:	6553.5	Data Type:	UInt32
Default:	0.0	Change:	Unchangeable

Value Range:

0.0s to 6553.5s

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.

H0b.24 Phase current RMS value

Hex:	200b-19h	Effective mode:	-
Min.:	0.0	Unit:	A
Max.:	6553.5	Data Type:	UInt16
Default:	0.0	Change:	Unchangeable

Value Range:

0.0A to 6553.5A

Description

Displays the RMS value of the phase current of the motor, accurate to 0.1A.

H0b.26 Bus voltage

Hex: 200b-1Bh

Effective -

mode:

Min.: 0.0

Unit: VDC

Max.: 6553.5

Data Type: UInt16

Default: 0.0

Change: Unchangeable

Value Range:

0.0 VDC–6553.5 VDC

Description

Displays the DC bus voltage of the main circuit input voltage after rectification, which is accurate to 0.1V.

H0b.27 Module temperature

Hex: 200b-1Ch

Effective -

mode:

Min.: -20

Unit: °C

Max.: 200

Data Type: Int16

Default: 0

Change: Unchangeable

Value Range:

-20°C to 200°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

Hex: 200b-1Dh

Effective -

mode:

Min.: 0

Unit: -

Max.: 65535

Data Type: UInt16

Default: 0

Change: Unchangeable

Value Range:

0 to 65535

Description

-

H0b.29 Axis status information given by FPGA

Hex: 200b-1Eh

Effective -

mode:

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

Value Range:

0 to 65535

Description

-

H0b.30 Axis fault information given by FPGA

Hex:	200b-1Fh	Effective mode:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

-

H0b.31 Encoder fault information

Hex:	200b-20h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

0 to 65535

Description

-

H0b.33 Fault log

Hex:	200b-22h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	9	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

0: Active 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

Description

Used to view any one of the latest 10 faults that occurred on the servo drive. For -NS models, 20 faults can be recorded.

H0b.34 Fault code set by H0B-33

Hex: 200b-23h

Effective mode: -

Min.: 0

Unit: -

Max.: 65535

Data Type: UInt16

Default: 0

Change: Unchangeable

Value Range:

0 to 65535

Description

-

H0b.35 Timestamp of the selected fault

Hex: 200b-24h

Effective mode: -

Min.: 0.0

Unit: -

Max.: 429496729.5

Data Type: UInt32

Default: 0.0

Change: Unchangeable

Value Range:

0.0s–429496729.5s

Description

-

H0b.37 Motor speed upon occurrence of the selected fault

Hex: 200b-26h

Effective mode: -

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

Hex: 200b-27h

Effective -

mode:

Min.: -3276.7

Unit: A

Max.: 3276.7

Data Type: Int16

Default: 0.0

Change: Unchangeable

Value Range:

-3276.7A to 3276.7A

Description

-

H0b.39 Motor phase V current upon occurrence of the selected fault

Hex: 200b-28h

Effective -

mode:

Min.: -3276.7

Unit: A

Max.: 3276.7

Data Type: Int16

Default: 0.0

Change: Unchangeable

Value Range:

-3276.7A to 3276.7A

Description

-

H0b.40 Bus voltage upon occurrence of the selected fault

Hex: 200b-29h

Effective -

mode:

Min.: 0.0

Unit: VDC

Max.: 6553.5

Data Type: UInt16

Default: 0.0

Change: Unchangeable

Value Range:

0.0 VDC–6553.5 VDC

Description

-

H0b.41 Input terminal state on selected fault

Hex: 200b-2Ah

Effective -

mode:

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

Value Range:

0 to 65535

Description

-

H0b.43 Output terminal status upon occurrence of the selected fault

Hex: 200b-2Ch	Effective mode: -
Min.: 0	Unit: -
Max.: 65535	Data Type: UInt16
Default: 0	Change: Unchangeable

Value Range:

0 to 65535

Description

H0b.35 to H0b.43 display the related data when the fault displayed in H0b.34 occurs.

H0b.45 Internal fault code

Hex: 200b-2Eh	Effective mode: -
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

Hex: 200b-2Fh	Effective mode: -
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

Hex:	200b-30h	Effective mode:	-
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

Hex:	200b-31h	Effective mode:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

-

H0b.49 Encoder fault information upon occurrence of the selected fault

Hex:	200b-32h	Effective mode:	-
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

Hex:	200b-34h	Effective mode:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

-

H0b.53 Position following error (reference unit)

Hex:	200b-36h	Effective mode:	-
Min.:	-2147483648	Unit:	Encoder unit
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Unchangeable

Value Range:

-2147483648 to 2147483647

Description

-

H0b.55 Motor speed actual value

Hex:	200b-38h	Effective mode:	-
Min.:	-214748364.8	Unit:	RPM
Max.:	214748364.7	Data Type:	Int32
Default:	0.0	Change:	Unchangeable

Value Range:

-214748364.8rpm to 214748364.7rpm

Description

Indicates the actual value of motor speed, which is accurate to 0.1 rpm.

This parameter is a 32-bit integer, which is displayed as a decimal on the keypad.

H0A.25 (Filter time constant of speed feedback display) can be used to set the filter time constant of the speed feedback.

H0b.57 Control circuit bus voltage

Hex:	200b-3Ah	Effective mode:	-
Min.:	0.0	Unit:	VDC
Max.:	6553.5	Data Type:	UInt16
Default:	0.0	Change:	Unchangeable

Value Range:

0.0 VDC–6553.5 VDC

Description

It displays the DC bus voltage of the input control power after rectification.

H0b.58 Mechanical absolute position (low 32 bits)

Hex:	200b-3Bh	Effective mode:	-
Min.:	-2147483648	Unit:	Encoder unit
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Unchangeable

Value Range:

-2147483648 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)

Hex:	200b-3Dh	Effective mode:	-
Min.:	-2147483648	Unit:	Encoder unit
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Unchangeable

Value Range:

-2147483648 to 2147483647

Description

-

H0b.63 NotRdy state

Hex:	200b-40h	Effective mode:	-
Min.:	0	Unit:	-
Max.:	5	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0: None

1: Control power abnormal (H0b.57)

2: Abnormal condition detected in phase loss detection

3: Abnormal condition detected in main circuit power detection (including short-to-ground fault)

4: Other faults

5: Short circuit to ground detection failure

Description

Display Value	Description
0	None
1	Control circuit power supply error (H0b.57)
2	Phase loss detection error
3	Main circuit power supply error (including short-circuited-to-ground error)
4	Other servo drive faults
5	Detection on short circuit to ground failed

H0b.66 Encoder temperature

Hex: 200b-43h Effective mode: -
 Min.: -32768 Unit: °C
 Max.: 32767 Data Type: UInt16
 Default: 0 Change: Unchangeable

Value Range:

-32768°C to 32767°C

Description

Indicates the encoder temperature value.

H0b.67 Load rate of regenerative resistor

Hex: 200b-44h Effective mode: -
 Min.: 0.0 Unit: %
 Max.: 200.0 Data Type: UInt16
 Default: 0.0 Change: Unchangeable

Value Range:

0.0% to 200.0%

Description

Indicates the brake load rate. When the load rate exceeds 100%, the servo drive stops braking.

H0b.70 Number of absolute encoder revolutions

Hex: 200b-47h Effective mode: -
 Min.: 0 Unit: Rev
 Max.: 65535 Data Type: UInt16
 Default: 0 Change: Unchangeable

Value Range:

0Rev to 65535Rev

Description

Indicates the number of revolutions of the absolute encoder.

H0b.71 Single-turn position fed back by the absolute encoder

Hex:	200b-48h	Effective mode:	-
Min.:	0	Unit:	Encoder unit
Max.:	2147483647	Data Type:	UInt32
Default:	0	Change:	Unchangeable

Value Range:

0 to 2147483647

Description

It displays the single-turn position feedback of the absolute encoder.

H0b.74 System fault information given by FPGA

Hex:	200b-4Bh	Effective mode:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

-

H0b.77 Encoder position (low 32 bits)

Hex:	200b-4Eh	Effective mode:	-
Min.:	-2147483648	Unit:	Encoder unit
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Unchangeable

Value Range:

-2147483648 to 2147483647

Description

-

H0b.79 Encoder position (high 32 bits)

Hex:	200b-50h	Effective mode:	-
Min.:	-2147483648	Unit:	Encoder unit

Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Unchangeable

Value Range:

-2147483648 to 2147483647

Description

-

H0b.81 Single-turn position of the rotary load (low 32 bits)

Hex:	200b-52h	Effective mode:	-
Min.:	-2147483648	Unit:	Encoder unit
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Unchangeable

Value Range:

-2147483648 to 2147483647

Description

Displays the low 32-bit value (encoder unit) of the position feedback of the rotating load when the absolute encoder system works in the rotation mode (H02.01 = 2).

H0b.83 Single-turn position of the rotary load (high 32 bits)

Hex:	200b-54h	Effective mode:	-
Min.:	-2147483648	Unit:	Encoder unit
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Unchangeable

Value Range:

-2147483648 to 2147483647

Description

-

H0b.85 Single-turn position of the rotary load (reference unit)

Hex:	200b-56h	Effective mode:	-
Min.:	-2147483648	Unit:	Encoder unit
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Unchangeable

Value Range:

-2147483648 to 2147483647

Description

-

H0b.87 IGBT junction temperature

Hex:	200b-58h	Effective mode:	-
Min.:	0	Unit:	°C
Max.:	200	Data Type:	UInt16
Default:	0	Change:	Unchangeable
Value Range:			
0°C to 200°C			
Description			
-			

H0b.90 No. of the group with abnormal parameters

Hex:	200b-5Bh	Effective mode:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable
Value Range:			
0 to 65535			
Description			
Indicates the group number of the abnormal parameter when E101 occurs.			

H0b.91 Offset in the group with abnormal parameters

Hex:	200b-5Ch	Effective mode:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable
Value Range:			
0 to 65535			
Description			
Indicates the offset of the abnormal parameter within the parameter group when E101 occurs.			

5.13 H0d Auxiliary Parameters

H0d.00 Software Reset

Hex:	200d-01h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16

Default: 0

Change: At stop

Value Range:

0: No operation

1: Enable

Description

Defines whether to enable software reset.

Software reset is available in the following cases:

The servo is in the S-OFF state.

No. 1 non-resettable faults do not occur.

No e2prom operation is performed. The software reset function is invalid when H0A.03 (Retentive at power failure) is set to 1 (Enabled).

Value	Function	Remarks
0	No operation	-
1	Software Reset	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

Hex: 200d-02h

Effective mode: Real time

Min.: 0

Unit: -

Max.: 1

Data Type: UInt16

Default: 0

Change: At stop

Value Range:

0: No operation

1: Enable

Description

Defines whether to enable fault reset.

Value	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. When a No. 3 warning occurs, you can enable the fault reset function directly, regardless of the servo drive status.

For fault classification, see the Troubleshooting Guide.

The fault reset function, once enabled, stops the keypad from displaying the fault only. It does not activate modifications made on parameters.

This function is not applicable to non-resettable faults. Use this function with caution in cases where the fault causes are not rectified.

H0d.02 Offline inertia auto-tuning selection

Hex:	200d-03h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	65	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

0 to 65

Description

Used to enable offline inertia auto-tuning through the keypad.

In the parameter display mode, switch to H0d.02 and press the SET key to enable offline inertia auto-tuning. For details on offline inertia auto-tuning, see section "Inertia Auto-tuning".

H0d.04 Read/write in encoder ROM

Hex:	200d-05h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	3	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: No operation

1: Write ROM

2: Read ROM

3: ROM failure

Description

Value	Function
0	No operation
1	Write ROM
2	Read ROM
3	ROM failed

H0d.05 Emergency stop

Hex:	200d-06h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

0: No operation

1: Emergency stop

Description

Defines whether to enable emergency stop.

Value	Function
0	No operation
1	Enable

When this function is enabled, the servo drive immediately stops according to the Stop mode at S-ON OFF 605Ch regardless of its state.

H0d.12 Phase U/V current balance correction

Hex:	200d-0Dh	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Disabled

1: Enabled

Description

-

H0d.17 Forced DI/DO enable switch

Hex:	200d-12h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	4	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

0:0-No operation

1: Forced DI enabled, forced DO disabled

2: Forced DO enabled, forced DI disabled

3: Forced DI and DO enabled

4: EtherCAT-controlled forced DO enabled^[1]

Description

Forced DI/DO selection.

Note [1]: For the -NS model, the setpoint is

0: No operation

1: Forced DI enabled, forced DO disabled

2: Forced DI disabled, forced DO enabled3: Forced DI and DO enabled

H0d.18 Forced DI value

Hex:	200d-13h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	31	Data Type:	UInt16
Default:	31	Change:	Real-time

Value Range:

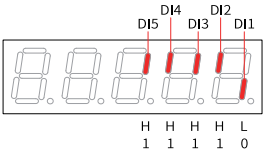
0 to 31

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 0x1E, and the corresponding binary value is 11110, indicating that DI1 is low level and DI2 to DI5 are high level. The 5 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 value

Hex:	200d-14h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	7	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

0 to 7

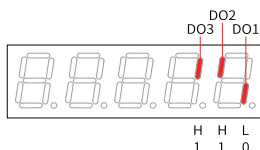
Description

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 0x06, the corresponding binary is 110, indicating that the DO1 function is effective and functions of DO2 to DO3 are ineffective. DO level is output based on DO level settings of H04. Assume that DO1 to DO3 logics in group H04 use 0 to indicate low level output for ineffective function, then H0B.05 displays the following results:



H0d.20 Absolute encoder reset

Hex: 200d-15h

Effective mode:

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.

Value	Function
0	No operation
1	Reset encoder fault
2	Reset encoder fault and multi-turn data

Note: After reset of encoder feedback multi-turn data, the absolute position of the encoder changes abruptly. In this case, perform the mechanical homing operation.

5.14 H0E Communication Function Parameters

H0E.00 Node address

Hex: 200E-01h

Effective mode:

Min.: 1

Unit: -

Max.: 127

Data Type: UInt16

Default: 1

Change: Real-time

Value Range:

1 to 127

Description

Defines the servo drive axis address during RS232 communication.

1 to 127: Each of the servo drive networked must have a unique address.

Otherwise, communication error or failure will occur.

H0E.01 Save objects written through communication to EEPROM

Hex: 200E-02h

Effective Real time

mode:

Min.: 0

Unit: -

Max.: 3^[1]

Data Type: UInt16

Default: 3

Change: Real-time

Value Range:

0: Not save

1: Save parameters

2: Save object dictionaries

3: Save both^[2]**Description**

Sets if parameters written through 232 and/or EtherCAT communication (SDO) are saved to e2prom.

Note:

- [1]: For the –NS model, the maximum value is 255.
- [2]: For the -NS model, the setpoints are
 - 0: Not save
 - 1: Save parameters
 - 2: Save object dictionaries
 - 3: Save parameters and object dictionaries
 - 4: Save object dictionaries written before communication (OP)
 - 255: Determine through H0E03 and H0E04

H0E.03 Save objects written through software (commissioning protocol) to e2prom

Hex: 200E-04h

Effective Real time

mode:

Min.: 0

Unit: -

Max.: 1

Data Type: UInt16

Default: 1

Change: Real-time

Value Range:

0: Do not save

1: Save

Description

Saves objects written through software (commissioning protocol) to e2prom, including the parameter and object dictionary.

Note: This parameter is only for the -NS model.

H0E.04 Save objects written through communication to e2prom (excluding commissioning protocol)

Hex:	200E-05h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

0: Do not save

1: Save

Description

You can use this parameter to determine whether to save communication written data in e2prom (excluding commissioning protocol) (Ethernet COE). The data include the function code and object dictionary.

Note: This parameter is only for the -NS model.

H0E.20 EtherCAT slave name

Hex:	200E-15h	Effective mode:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

Indicates the station number assigned to the slave by the master during EtherCAT communication.

H0E.21 EtherCAT slave alias

Hex:	200E-16h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	At stop

Value Range:

0 to 65535

Description

For masters that fail to assign the station numbers, set the slave station numbers through the parameter during EtherCAT communication.

H0E.21 = 0: The master assigns the station numbers by default.

H0E.21 ≠ 0: Use the set station number, and the one assigned by master is deactivated.

H0E.22 Number of synchronous loss events allowed by EtherCAT

Hex:	200E-17h	Effective mode:	Real time
Min.:	1	Unit:	-
Max.:	20	Data Type:	UInt16
Default:	8	Change:	Real-time

Value Range:

1 to 20

Description

Defines the maximum number of master signal loss events allowed by the slave. The slave reports EE08.2 (IRQ loss) if the value of 200E-17h.

H0E.24 Sync loss count

Hex:	200E-19h	Effective mode:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

-

H0E.25 Max. error value and invalid frames of EtherCAT port 0 per unit time

Hex:	200E-1Ah	Effective mode:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

Port0 terminal CRC check error. If there is a count, the frame received by the port0 terminal is damaged. Possible cause: Cable, PHY terminal. 0x301RXER included. Normally, 0x300 = 0x301. If 0x300 > 0x301, the CRC check error is still present in the network.

H0E.26 Max. error value and invalid frames of EtherCAT port 1 per unit time

Hex:	200E-1Bh	Effective	-
		mode:	
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

Port1 terminal CRC check error. If there is a count, the frame received by the port0 terminal is damaged. Possible cause: Cable, PHY terminal. 0x301RXER included. Normally, 0x300 = 0x301. If 0x300 > 0x301, the CRC check error is still present in the network.

H0E.27 Max. transfer error of EtherCAT port per unit time

Hex:	200E-1Ch	Effective	-
		mode:	
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

If the received data is wrong and ended with an extra error flag, it indicates the data has been processed by other stations.

H0E.28 Max. EtherCAT data frame processing unit error per unit time

Hex:	200E-1Dh	Effective	-
		mode:	
Min.:	0	Unit:	-
Max.:	255	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 255

Description

If data exchange error occurs between ESC and internal MCU, keep the setpoint to 0. If the counting value increases, the internal anti-disturbance performance of the board is abnormal.

H0E.29 Max. link loss value of EtherCAT port 0 per unit time

Hex:	200E-1Eh	Effective	-
		mode:	

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

Value Range:

0 to 65535

Description

If data link loss is detected by the ESC port, the counting value of the corresponding link loss counter increases. Such scenario may be caused by poor contact or damaged cables.

H0E.30 E15 alarm detection delay

Hex: 200E-1Fh	Effective mode: Upon the next power-on
Min.: 0	Unit: -
Max.: 60000	Data Type: UInt16
Default: 0	Change: Real-time

Value Range:

0 to 60000

Description

-

H0E.31 EtherCAT synchronization mode setting

Hex: 200E-20h	Effective mode: Upon the next power-on
Min.: 0	Unit: -
Max.: 3	Data Type: UInt16
Default: 1	Change: At stop

Value Range:

0 to 3^[1]

Description

Defines the synchronization mode.

Note [1]: For the -NS model, the range is 0 to 2.

H0E.32 EtherCAT synchronization error threshold

Hex: 200E-21h	Effective mode: Real time
Min.: 100	Unit: ns
Max.: 10000	Data Type: UInt16
Default: 3000 ^[1]	Change: At stop

Value Range:

100ns to 10000ns

Description

Defines the permissible jitter range of synchronization signals when the servo drive works in synchronization mode 1 (H0E.31 = 1).

Note: [1]: For the -NS model, the default value is 4000.

H0E.33 EtherCAT state machine status and port connection status

Hex: 200E-22h Effective mode: -
 Min.: 0 Unit: -
 Max.: 65535 Data Type: UInt16
 Default: 0 Change: Unchangeable

Value Range:

0 to 65535

Description

Displays the connection status of the servo state machine and EtherCAT network ports.

bit	Value
0 to 7	Correspond to EtherCAT state machines: 1/2/4/8
8 to 15	Correspond to terminal connection state: • 0: No link • 1: IN port linked • 2: OUT port linked • 3: IN and OUT ports linked

H0E.34 Allowed duration of CSP position reference error

Hex: 200E-23h Effective mode: Real time
 Min.: 1 Unit: ms
 Max.: 30 Data Type: UInt16
 Default: 20 Change: Real-time

Value Range:

1ms to 30ms

Description

Defines the counting value when the position reference increment exceeds the maximum position reference increment threshold. When the counting value exceeds the threshold, EB01.0 or EB01.1 will be reported.

H0E.35 AL fault code

Hex: 200E-24h Effective mode: -
 Min.: 0 Unit: -

Max.: 65535
Default: 0
Value Range:
0 to 65535

Data Type: UInt16
Change: Unchangeable

Description

-

H0E.36 EtherCAT enhanced link enable

Hex: 200E-25h

Effective mode: Upon the next power-on

Min.: 0
Max.: 1
Default: 0

Unit: -
Data Type: UInt16
Change: Real-time

Value Range:

0: Disabled

1: Enabled

Description

-

H0E.37 EtherCAT XML reset selection

Hex: 200E-26h

Effective mode: Upon the next power-on

Min.: 0
Max.: 1
Default: 0

Unit: -
Data Type: UInt16
Change: Real-time

Value Range:

0: Disabled

1: Enabled

Description

-

H0E.59 PHY chip half-duplex mode

Hex: 200E-3Ch

Effective mode: Upon the next power-on

Min.: 0
Max.: 1
Default: 0

Unit: -
Data Type: UInt16
Change: Real-time

Value Range:

0: Enabled

1: Disabled

Description

-

H0E.74 Link signal delay

Hex:	200E-4Bh	Effective mode:	Upon the next power-on
Min.:	1	Unit:	ms
Max.:	65535	Data Type:	UInt16
Default:	400	Change:	At stop

Value Range:

1ms to 65535ms

Description

Sets the delay time of the Link signal.

Note: This parameter is only for the -NS model.

H0E.80 Modbus baud rate

Hex:	200E-51h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	10	Data Type:	UInt16
Default:	9	Change:	Real-time

Value Range:

0: 300 bps

1: 600 bps

2: 1200 bps

3: 2400 bps

4: 4800 bps

5: 9600 bps

6: 19200 bps

7: 38400 bps

8: 57600 bps

9: 115200 bps

Description

Defines the communication rate between the servo drive and the host controller. The baud rate set in the servo drive must be the same as that in the host controller. Otherwise, communication will fail.

Value	Baud rate (bps)
0	300
1	600
2	1200
3	2400
4	4800
5	9600
6	19200
7	38400
8	57600
9	115200

H0E.81 Modbus data format

Hex:	200E-52h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	3	Data Type:	UInt16
Default:	3	Change:	Real-time

Value Range:

- 0: No parity, 2 stop bits (8-N-2)
- 1: Even parity, 1 stop bit (8-E-1)
- 2: Odd parity, 1 stop bit (8-O-1)
- 3: No parity, 1 stop bit (8-N-1)

Description

Defines the data check mode between the servo drive and the host controller during communication.

The data format set in the servo drive must be the same as that in the host controller. Otherwise, communication will fail.

H0E.82 Modbus response delay

Hex:	200E-53h	Effective mode:	Real time
Min.:	0	Unit:	ms
Max.:	20	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

0ms to 20ms

Description

-

H0E.83 Modbus communication timeout

Hex: 200E-54h

Effective Real time

mode:

Min.: 0

Unit: ms

Max.: 600

Data Type: UInt16

Default: 0

Change: Real-time

Value Range:

0ms to 600ms

Description

-

H0E.90 Communication version

Hex: 200E-5Bh

Effective -

mode:

Min.: 0.00

Unit: -

Max.: 655.35

Data Type: UInt16

Default: 0.00

Change: Unchangeable

Value Range:

0.00 to 655.35

Description

-

H0E.93 PHY hardware version

Hex: 200E-5Eh

Effective -

mode:

Min.: 0

Unit: -

Max.: 3

Data Type: UInt16

Default: 0

Change: Unchangeable

Value Range:

0 to 3

Description

-

H0E.96 XML version information

Hex: 200E-61h

Effective -

mode:

Min.: 0.00

Unit: -

Max.: 655.35

Data Type: UInt16

Default: 0.00

Change: Unchangeable

Value Range:

0.00 to 655.35

Description

-

5.15 H18 Position Comparison Output

H18.00 Position comparison output selection

Hex:	2018-01h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

0: Disable

1: Enable (rising edge-triggered)

Description

-

H18.02 Position comparison resolution

Hex:	2018-03h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	7	Data Type:	UInt16
Default:	1	Change:	Real-time

Value Range:

0: 24-bit

1: 23-bit

2: 22-bit

3: 21-bit

4: 20-bit

5: 19-bit

6: 18-bit

7: 17-bit

Description

-

H18.03 Position comparison mode

Hex:	2018-04h	Effective mode:	Real time
------	----------	-----------------	-----------

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

Value Range:

0: Single

1: Cyclic comparison mode

Description

-

H18.04 Current position as zero

Hex: 2018-05h	Effective mode: Real time
Min.: 0	Unit: -
Max.: 1	Data Type: UInt16
Default: 0	Change: Real-time

Value Range:

0: Disable

1: Enable (rising edge-triggered)

Description

Note: This function needs to be used when the comparison state is inactive, otherwise the comparison logic may malfunction.

H18.05 Position comparison output width

Hex: 2018-06h	Effective mode: Real time
Min.: 0.0	Unit: ms
Max.: 204.7	Data Type: UInt16
Default: 0.0 ^[1]	Change: Real-time

Value Range:0.0 ms to 204.7 ms^[2]**Description**

Note:

[1]: The default value is 0.1.

[2]: For the -NS model, the setpoint is 0.1 ms to 204.7 ms.

H18.07 Position comparison start point

Hex: 2018-08h	Effective mode: Real time
Min.: 0	Unit: -
Max.: 30	Data Type: UInt16
Default: 0	Change: Real-time

Value Range:

0 to 30

Description

-

H18.08 Position comparison end point

Hex: 2018-09h

Effective mode: Real time

Min.: 0

Unit: -

Max.: 30

Data Type: UInt16

Default: 0

Change: Real-time

Value Range:

0 to 30

Description

-

H18.09 Current state of position comparison

Hex: 2018-0Ah

Effective mode: -

Min.: 0

Unit: -

Max.: 1024

Data Type: UInt16

Default: 0

Change: Unchangeable

Value Range:

0 to 1024

Description

-

H18.10 Real-time position of position comparison

Hex: 2018-0Bh

Effective mode: -

Min.: -2147483648

Unit: -

Max.: 2147483647

Data Type: Int32

Default: 0

Change: Unchangeable

Value Range:

-2147483648 to 2147483647

Description

-

H18.12 Zero offset of position comparison

Hex: 2018-0Dh

Effective mode: Real time

Min.:	-2147483648	Unit:	-
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Real-time

Value Range:

-2147483648 to 2147483647

Description

-

H18.18 Position comparison switch

Hex:	2018-13h	Effective mode:	Upon the next power-on
Min.:	0	Unit:	-
Max.:	257	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

Bit 0: Comparison logic independently enabled

bit 8: Target position reference unit

Description

-

5.16 H19 Target Position Parameters**H19.00 Target value of position comparison 1**

Hex:	2019-01h	Effective mode:	Real time
Min.:	-2147483648	Unit:	-
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Real-time

Value Range:

-2147483648 to 2147483647

Description

-

H19.02 Attribute value of position comparison 1

Hex:	2019-03h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	387	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

bit	Description
0	0-Enables passing through the point in the forward direction. 1-Enables passing through the point in the reverse direction.
1	- When bit0 = 0 and bit1 = 0, the comparison logic skips the point. - When bit0=1 and bit1=0, DO active signal is output if current position changes from "less than" to "more than" the comparison point. - When bit0=0 and bit1=1, DO active signal is output if current position changes from "more than" to "less than" the comparison point. - When bit0=1 and bit1=1, DO active signal is output in both situations.
2 to 6	N/A
7	Bit7 and bit8 ^[1] are used to configure which DO outputs the pulse signal when the position comparison is valid.
8	- When bit7 = 0 and bit8 = 0, the original design method is retained and the DO serial number of position comparison is selected from group H04. - When bit7 = 1 and bit8 = 0, the pulse signal is output from DO1 when the position comparison is valid. - When bit7 = 0 and bit8 = 1, the pulse signal is output from DO2 when the position comparison is valid. - When bit7 = 1 and bit8 = 1, the pulse signal is output from DO3 when the position comparison is valid.

Description

[1]: For the -NS model, there is no bit7 or bit8.

H19.03 Target value of position comparison 2

Hex:	2019-04h	Effective mode:	Real time
Min.:	-2147483648	Unit:	-
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Real-time

Value Range:

-2147483648 to 2147483647

Description

-

H19.05 Attribute value of position comparison 2

Hex:	2019-06h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	387	Data Type:	UInt16

Change: Real-time

Same as H19.02.

—

Hex:	2019-07h	Effective mode:	Real time
Min.:	-2147483648	Unit:	-
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Real-time

Effective mode: Real time

Unit: -

Data Type: Int32

Change: Real-time

-2147483648 to 2147483647

—

Hex:	2019-09h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	387	Data Type:	UInt16
Default:	0	Change:	Real-time

Effective Real time
mode:

Unit: -

Data Type: UInt16

Change: Real-time

Same as H19.02.

—

Hex:	2019-0Ah	Effective mode:	Real time
Min.:	-2147483648	Unit:	-
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Real-time

Effective Real time
mode:

Unit: -

Data Type: Int32

Change: Real-time

-2147483648 to 2147483647

—

Hex:	2019-0Ch	Effective mode:	Real time
------	----------	-----------------	-----------

Effective Real time
mode:

Min.:	0	Unit:	-
Max.:	387	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

Same as H19.02.

Description

-

H19.12 Target value of position comparison 5

Hex:	2019-0Dh	Effective mode:	Real time
Min.:	-2147483648	Unit:	-
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Real-time

Value Range:

-2147483648 to 2147483647

Description

-

H19.14 Attribute value of position comparison 5

Hex:	2019-0Fh	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	387	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

Same as H19.02.

Description

-

H19.15 Target value of position comparison 6

Hex:	2019-10h	Effective mode:	Real time
Min.:	-2147483648	Unit:	-
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Real-time

Value Range:

-2147483648 to 2147483647

Description

-

H19.17 Attribute value of position comparison 6

Hex:	2019-12h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	387	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

Same as H19.02.

Description

-

H19.18 Target value of position comparison 7

Hex:	2019-13h	Effective mode:	Real time
Min.:	-2147483648	Unit:	-
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Real-time

Value Range:

-2147483648 to 2147483647

Description

-

H19.20 Attribute value of position comparison 7

Hex:	2019-15h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	387	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

Same as H19.02.

Description

-

H19.21 Target value of position comparison 8

Hex:	2019-16h	Effective mode:	Real time
Min.:	-2147483648	Unit:	-
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Real-time

Value Range:

-2147483648 to 2147483647

Description

-

H19.23 Attribute value of position comparison 8

Hex:	2019-18h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	387	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

Same as H19.02.

Description

-

H19.24 Target value of position comparison 9

Hex:	2019-19h	Effective mode:	Real time
Min.:	-2147483648	Unit:	-
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Real-time

Value Range:

-2147483648 to 2147483647

Description

-

H19.26 Attribute value of position comparison 9

Hex:	2019-1Bh	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	387	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

Same as H19.02.

Description

-

H19.27 Target value of position comparison 10

Hex:	2019-1Ch	Effective mode:	Real time
Min.:	-2147483648	Unit:	-
Max.:	2147483647	Data Type:	Int32

Change: Real-time

Value Range:

-2147483648 to 2147483647

Description

—

H19.29 Attribute value of position comparison 10

Hex: 2019-1Eh

Effective Real time
mode:

Min.: 0

Unit: -

Max.: 387

Data Type: UInt16

Default: 0

Change: Real-time

Value Range:

Same as H19.02.

Description

—

H19.30 Target value of position comparison 11

Hex: 2019-1Fh

Effective Real time
mode:

Min.: -2147483648

Unit: -

Max.: 2147483647

Data Type: Int32

Default: 0

Change: Real-time

Value Range:

-2147483648 to 2147483647

Description

—

H19.32 Attribute value of position comparison 11

Hex: 2019-21h

Effective Real time
mode:

Min.: 0

Unit: -

Max.: 387

Data Type: UInt16

Default: 0

Change: Real-time

Value Range:

Same as H19.02.

Description

—

H19.33 Target value of position comparison 12

Hex: 2019-22h

Effective Real time
mode:

Min.:	-2147483648	Unit:	-
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Real-time

Value Range:

-2147483648 to 2147483647

Description

-

H19.35 Attribute value of position comparison 12

Hex:	2019-24h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	3	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

Same as H19.02.

Description

-

H19.36 Target value of position comparison 13

Hex:	2019-25h	Effective mode:	Real time
Min.:	-2147483648	Unit:	-
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Real-time

Value Range:

-2147483648 to 2147483647

Description

-

H19.38 Attribute value of position comparison 13

Hex:	2019-27h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	387	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

Same as H19.02.

Description

-

H19.39 Target value of position comparison 14

Hex:	2019-28h	Effective mode:	Real time
Min.:	-2147483648	Unit:	-
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Real-time

Value Range:

-2147483648 to 2147483647

Description

-

H19.41 Attribute value of position comparison 14

Hex:	2019-2Ah	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	387	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

Same as H19.02.

Description

-

H19.42 Target value of position comparison 15

Hex:	2019-2Bh	Effective mode:	Real time
Min.:	-2147483648	Unit:	-
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Real-time

Value Range:

-2147483648 to 2147483647

Description

-

H19.44 Attribute value of position comparison 15

Hex:	2019-2Dh	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	387	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

Same as H19.02.

Description

-

H19.45 Target value of position comparison 16

Hex:	2019-2Eh	Effective mode:	Real time
Min.:	-2147483648	Unit:	-
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Real-time

Value Range:

-2147483648 to 2147483647

Description

-

H19.47 Attribute value of position comparison 16

Hex:	2019-30h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	387	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

Same as H19.02.

Description

-

H19.48 Target value of position comparison 17

Hex:	2019-31h	Effective mode:	Real time
Min.:	-2147483648	Unit:	-
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Real-time

Value Range:

-2147483648 to 2147483647

Description

-

H19.50 Attribute value of position comparison 17

Hex:	2019-33h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	387	Data Type:	UInt16

Change: Real-time

Same as H19.02.

—

Hex:	2019-34h	Effective mode:	Real time
Min.:	-2147483648	Unit:	-
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Real-time

Effective Real time
mode:

Unit: -

Data Type: Int32

Change: Real-time

-2147483648 to 2147483647

—

Hex:	2019-36h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	387	Data Type:	UInt16
Default:	0	Change:	Real-time

Effective Real time
mode:

Unit: -

Data Type: UInt16

Change: Real-time

Same as H19.02.

—

Hex:	2019-37h	Effective	Real time
Min.:	-2147483648	mode:	-
Max.:	2147483647	Unit:	
Default:	0	Data Type:	Int32
		Change:	Real-time

Effective Real time
mode:

Unit: -

Data Type: Int32

Change: Real-time

-2147483648 to 2147483647

—

Hex:	2019-39h	Effective mode:	Real time
------	----------	-----------------	-----------

Effective Real time
mode:

Min.: 0	Unit: -
Max.: 387	Data Type: UInt16
Default: 0	Change: Real-time

Value Range:

Same as H19.02.

Description

-

H19.57 Target value of position comparison 20

Hex: 2019-3Ah	Effective mode: Real time
Min.: -2147483648	Unit: -
Max.: 2147483647	Data Type: Int32
Default: 0	Change: Real-time

Value Range:

-2147483648 to 2147483647

Description

-

H19.59 Attribute value of position comparison 20

Hex: 2019-3Ch	Effective mode: Real time
Min.: 0	Unit: -
Max.: 387	Data Type: UInt16
Default: 0	Change: Real-time

Value Range:

Same as H19.02.

Description

-

H19.60 Target value of position comparison 21

Hex: 2019-3Dh	Effective mode: Real time
Min.: -2147483648	Unit: -
Max.: 2147483647	Data Type: Int32
Default: 0	Change: Real-time

Value Range:

-2147483648 to 2147483647

Description

-

H19.62 Attribute value of position comparison 21

Hex:	2019-3Fh	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	387	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

Same as H19.02.

Description

-

H19.63 Target value of position comparison 22

Hex:	2019-40h	Effective mode:	Real time
Min.:	-2147483648	Unit:	-
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Real-time

Value Range:

-2147483648 to 2147483647

Description

-

H19.65 Attribute value of position comparison 22

Hex:	2019-42h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	387	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

Same as H19.02.

Description

-

H19.66 Target value of position comparison 23

Hex:	2019-43h	Effective mode:	Real time
Min.:	-2147483648	Unit:	-
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Real-time

Value Range:

-2147483648 to 2147483647

Description

-

H19.68 Attribute value of position comparison 23

Hex:	2019-45h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	387	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

Same as H19.02.

Description

-

H19.69 Target value of position comparison 24

Hex:	2019-46h	Effective mode:	Real time
Min.:	-2147483648	Unit:	-
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Real-time

Value Range:

-2147483648 to 2147483647

Description

-

H19.71 Attribute value of position comparison 24

Hex:	2019-48h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	387	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

Same as H19.02.

Description

-

H19.72 Target value of position comparison 25

Hex:	2019-49h	Effective mode:	Real time
Min.:	-2147483648	Unit:	-
Max.:	2147483647	Data Type:	Int32

Change: Real-time

Value Range:

-2147483648 to 2147483647

Description

—

H19.74 Attribute value of position comparison 25

Hex: 2019-4Bh

Effective Real time
mode:

Min.: 0

Unit: -

Max.: 387

Data Type: UInt16

Default: 0

Change: Real-time

Value Range:

Same as H19.02.

Description

—

H19.75 Target value of position comparison 26

Hex: 2019-4Ch

Effective Real time
mode:

Min.: -2147483648

Unit: -

Max.: 2147483647

Data Type: Int32

Default: 0

Change: Real-time

Value Range:

-2147483648 to 2147483647

Description

—

H19.77 Attribute value of position comparison 26

Hex: 2019-4Eh

Effective Real time
mode:

Min.: 0

Unit: -

Max.: 387

Data Type: UInt16

Default: 0

Change: Real-time

Value Range:

Same as H19.02.

Description

—

H19.78 Target value of position comparison 27

Hex: 2019-4Fh

Effective Real time
mode:

Min.:	-2147483648	Unit:	-
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Real-time

Value Range:

-2147483648 to 2147483647

Description

-

H19.80 Attribute value of position comparison 27

Hex:	2019-51h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	387	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

Same as H19.02.

Description

-

H19.81 Target value of position comparison 28

Hex:	2019-52h	Effective mode:	Real time
Min.:	-2147483648	Unit:	-
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Real-time

Value Range:

-2147483648 to 2147483647

Description

-

H19.83 Attribute value of position comparison 28

Hex:	2019-54h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	387	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

Same as H19.02.

Description

-

H19.84 Target value of position comparison 29

Hex:	2019-55h	Effective mode:	Real time
Min.:	-2147483648	Unit:	-
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Real-time

Value Range:

-2147483648 to 2147483647

Description

-

H19.86 Attribute value of position comparison 29

Hex:	2019-57h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	387	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

Same as H19.02.

Description

-

H19.87 Target value of position comparison 30

Hex:	2019-58h	Effective mode:	Real time
Min.:	-2147483648	Unit:	-
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Real-time

Value Range:

-2147483648 to 2147483647

Description

-

H19.89 Attribute value of position comparison 30

Hex:	2019-5Ah	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	387	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

Same as H19.02.

Description

-

5.17 H1F Software Tool Parameters

H1F.90 DI function state 1 read through communication

Hex:	201F-5Bh	Effective	-
		mode:	
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

-

H1F.91 DI function state 2 read through communication

Hex:	201F-5Ch	Effective	-
		mode:	
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

-

H1F.92 DI function state 3 read through communication

Hex:	201F-5Dh	Effective	-
		mode:	
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

-

H1F.93 DI function state 4 read through communication

Hex:	201F-5Eh	Effective	-
		mode:	

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

Value Range:

0 to 65535

Description

-

H1F.94 DO function state 1 read through communication

Hex:	201F-5Fh	Effective mode:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

-

H1F.95 DO function state 2 read through communication

Hex:	201F-60h	Effective mode:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

-

5.18 H30 Related Variables Read through Communication**H30.16 Encoder communication timeout count**

Hex:	2030-11h	Effective mode:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

Indicates the total number of timeout errors in encoder communication.

Note: This parameter is only for the -NS model.

H30.17 Encoder communication CRC error count

Hex:	2030-12h	Effective	-
		mode:	
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

Indicates the total number of CRC errors in encoder communication.

Note: This parameter is only for the -NS model.

H30.18 Encoder communication frame stop bit error count

Hex:	2030-13h	Effective	-
		mode:	
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

It indicates the total number of frame stop bit errors in encoder communication.

Note: This parameter is only for the -NS model.

H30.20 Servo SN code digits 0 & 1

Hex:	2030-15h	Effective	-
		mode:	
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

H30.20–H30.27 are servo 16-bit SN codes, which are displayed in the form of ASSIC codes.

H30.21 Servo SN code digits 2 & 3

Hex: 2030-16h

Effective -

mode:

Min.: 0

Unit: -

Max.: 65535

Data Type: UInt16

Default: 0

Change: Unchangeable

Value Range:

0 to 65535

Description

-

H30.22 Servo SN code digits 4 & 5

Hex: 2030-17h

Effective -

mode:

Min.: 0

Unit: -

Max.: 65535

Data Type: UInt16

Default: 0

Change: Unchangeable

Value Range:

0 to 65535

Description

-

H30.23 Servo SN code digits 6 & 7

Hex: 2030-18h

Effective -

mode:

Min.: 0

Unit: -

Max.: 65535

Data Type: UInt16

Default: 0

Change: Unchangeable

Value Range:

0 to 65535

Description

-

H30.24 Servo SN code digits 8 & 9

Hex: 2030-19h

Effective -

mode:

Min.: 0

Unit: -

Max.: 65535

Data Type: UInt16

Default: 0

Change: Unchangeable

Value Range:

0 to 65535

	Description		
	-		
H30.25	Servo SN code digits 10 & 11		
Hex:	2030-1Ah	Effective mode:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable
	Value Range:		
	0 to 65535		
	Description		
	-		
H30.26	Servo SN code digits 12 & 13		
Hex:	2030-1Bh	Effective mode:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable
	Value Range:		
	0 to 65535		
	Description		
	-		
H30.27	Servo SN code digits 14 & 15		
Hex:	2030-1Ch	Effective mode:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable
	Value Range:		
	0 to 65535		
	Description		
	-		

5.19 1000h Object Dictionary

1000.00h Device type			
Hex:	1000-00h	Effective mode:	-

Min.: 0
 Max.: 2147483647
 Default: 131474

Unit: -
 Data Type: UInt32
 Change: Unchangeable

Value Range:

0 to 2147483647

Description

-

1001.00h Error Register

Hex: 1001-00h

Effective mode: -

Min.: 0
 Max.: 255
 Default: 0

Unit: -
 Data Type: UInt16
 Change: Unchangeable

Value Range:

0 to 255

Description

-

1018.01h Vendor ID

Hex: 1018-01h

Effective mode: -

Min.: 0
 Max.: 2147483647
 Default: 1048576

Unit: -
 Data Type: UInt32
 Change: Unchangeable

Value Range:

0 to 2147483647

Description

-

1018.02h Product code

Hex: 1018-02h

Effective mode: -

Min.: 0
 Max.: 2147483647
 Default: 786701

Unit: -
 Data Type: UInt32
 Change: Unchangeable

Value Range:

0 to 2147483647

Description

-

1018.03h Revision number

Hex:	1018-03h	Effective mode:	-
Min.:	0	Unit:	-
Max.:	2147483647	Data Type:	UInt32
Default:	65537	Change:	Unchangeable

Value Range:

0 to 2147483647

Description

-

1600.00h Number of valid mapped objects in RPDO1

Hex:	1600-00h	Effective mode:	-
Min.:	0	Unit:	-
Max.:	10	Data Type:	UInt16
Default:	3	Change:	Real-time

Value Range:

0 to 10

Description

This object can be modified only when PDO is inactive. When 0 is written, the mapping objects of other sub-indexes are cleared.

1600.01h Mapped object 1 in RPDO1

Hex:	1600-01h	Effective mode:	-
Min.:	0	Unit:	-
Max.:	4294967295	Data Type:	UInt32
Default:	1614807056	Change:	Real-time

Value Range:

0 to 4294967295

Description

The total length of a mapping object cannot exceed 64 bits. Mapping based on bytes instead of bits is supported. The indexes and sub-indexes of mapping objects must exist in the object dictionary list. The attribute of mapping objects is readable and the objects can be mapped.

Sub-indexes are written in the following format:

bit31 to bit16: index

bit15 to bit8: sub-index

bit7 to bit0: object length

1600.02h Mapped object 2 in RPDO1

Hex: 1600-02h

Min.: 0

Max.: 4294967295

Default: 1616904200

Value Range:

0 to 4294967295

Description

Same as 1600.01h.

Effective mode:

Unit: -

Data Type: UInt32

Change: Real-time

1600.03h Mapped object 3 in RPDO1

Hex: 1600-03h

Min.: 0

Max.: 4294967295

Default: 1622671376

Value Range:

0 to 4294967295

Description

Same as 1600.01h.

Effective mode:

Unit: -

Data Type: UInt32

Change: Real-time

1600.04h Mapped object 4 in RPDO1

Hex: 1600-04h

Min.: 0

Max.: 4294967295

Default: 0

Value Range:

0 to 4294967295

Description

Same as 1600.01h.

Effective mode:

Unit: -

Data Type: UInt32

Change: Real-time

1600.05h Mapped object 5 in RPDO1

Hex: 1600-05h

Min.: 0

Max.: 4294967295

Default: 0

Value Range:

0 to 4294967295

Effective mode:

Unit: -

Data Type: UInt32

Change: Real-time

Description

Same as 1600.01h.

1600.06h Mapped object 6 in RPDO1

Hex:	1600-06h	Effective mode:	-
Min.:	0	Unit:	-
Max.:	4294967295	Data Type:	UInt32
Default:	0	Change:	Real-time

Value Range:

0 to 4294967295

Description

Same as 1600.01h.

1600.07h Mapped object 7 in RPDO1

Hex:	1600-07h	Effective mode:	-
Min.:	0	Unit:	-
Max.:	4294967295	Data Type:	UInt32
Default:	0	Change:	Real-time

Value Range:

0 to 4294967295

Description

Same as 1600.01h.

1600.08h Mapped object 8 in RPDO1

Hex:	1600-08h	Effective mode:	-
Min.:	0	Unit:	-
Max.:	4294967295	Data Type:	UInt32
Default:	0	Change:	Real-time

Value Range:

0 to 4294967295

Description

Same as 1600.01h.

1600.09h Mapped object 9 in RPDO1

Hex:	1600-09h	Effective mode:	-
Min.:	0	Unit:	-
Max.:	4294967295	Data Type:	UInt32

Default: 0

Change: Real-time

Value Range:

0 to 4294967295

Description

Same as 1600.01h.

1600.0Ah Mapped object 10 in RPDO1

Hex: 1600-0Ah

Effective -

mode:

Min.: 0

Unit: -

Max.: 4294967295

Data Type: UInt32

Default: 0

Change: Real-time

Value Range:

0 to 4294967295

Description

Same as 1600.01h.

1600.0Bh Mapped object 11 in RPDO1

Hex: 1600-0Bh

Effective -

mode:

Min.: 0

Unit: -

Max.: 4294967295

Data Type: UInt32

Default: 0

Change: Real-time

Value Range:

0 to 4294967295

Description

Same as 1600.01h.

1600.0Ch Mapped object 12 in RPDO1

Hex: 1600-0Ch

Effective -

mode:

Min.: 0

Unit: -

Max.: 4294967295

Data Type: UInt32

Default: 0

Change: Real-time

Value Range:

0 to 4294967295

Description

Same as 1600.01h.

**1600.0D- Mapped object 13 in RPDO1
h**

Hex:	1600-0Dh	Effective mode:	-
Min.:	0	Unit:	-
Max.:	4294967295	Data Type:	UInt32
Default:	0	Change:	Real-time
Value Range:			
0 to 4294967295			
Description			
Same as 1600.01h.			

1600.0Eh Mapped object 14 in RPDO1

Hex:	1600-0Eh	Effective mode:	-
Min.:	0	Unit:	-
Max.:	4294967295	Data Type:	UInt32
Default:	0	Change:	Real-time
Value Range:			
0 to 4294967295			
Description			
Same as 1600.01h.			

1600.0Fh Mapped object 15 in RPDO1

Hex:	1600-0Fh	Effective mode:	-
Min.:	0	Unit:	-
Max.:	4294967295	Data Type:	UInt32
Default:	0	Change:	Real-time
Value Range:			
0 to 4294967295			
Description			
Same as 1600.01h.			

1600.10h Mapped object 16 in RPDO1

Hex:	1600-10h	Effective mode:	-
Min.:	0	Unit:	-
Max.:	4294967295	Data Type:	UInt32
Default:	0	Change:	Real-time
Value Range:			
0 to 4294967295			

Description

Same as 1600.01h.

1600.11h Mapped object 17 in RPDO1

Hex: 1600-11h

Effective -

mode:

Min.: 0

Unit: -

Max.: 4294967295

Data Type: UInt32

Default: 0

Change: Real-time

Value Range:

0 to 4294967295

Description

Same as 1600.01h.

1600.12h Mapped object 18 in RPDO1

Hex: 1600-12h

Effective -

mode:

Min.: 0

Unit: -

Max.: 4294967295

Data Type: UInt32

Default: 0

Change: Real-time

Value Range:

0 to 4294967295

Description

Same as 1600.01h.

1600.13h Mapped object 19 in RPDO1

Hex: 1600-13h

Effective -

mode:

Min.: 0

Unit: -

Max.: 4294967295

Data Type: UInt32

Default: 0

Change: Real-time

Value Range:

0 to 4294967295

Description

Same as 1600.01h.

1600.14h Mapped object 20 in RPDO1

Hex: 1600-14h

Effective -

mode:

Min.: 0

Unit: -

Max.: 4294967295

Data Type: UInt32

Default: 0

Change: Real-time

Value Range:

0 to 4294967295

Description

Same as 1600.01h.

1A00.00h Number of valid mapped objects in TPDO1

Hex: 1A00-00h

Effective -

mode:

Min.: 0

Unit: -

Max.: 10

Data Type: UInt16

Default: 7

Change: Real-time

Value Range:

0 to 10

Description

This object can be modified only when PDO is inactive. When 0 is written, the mapping objects of other sub-indexes are cleared.

1A00.01h Mapped object 1 in TPDO1

Hex: 1A00-01h

Effective -

mode:

Min.: 0

Unit: -

Max.: 4294967295

Data Type: UInt32

Default: 1614872592

Change: Real-time

Value Range:

0 to 4294967295

Description

The total length of a mapping object cannot exceed 64 bits. Mapping based on bytes instead of bits is supported. The indexes and sub-indexes of mapping objects must exist in the object dictionary list. The attribute of mapping objects is readable and the objects can be mapped.

Sub-indexes are written in the following format:

bit31 to bit16: index

bit15 to bit8: sub-index

bit7 to bit0: object length

1A00.02h Mapped object 2 in TPDO1

Hex: 1A00-02h

Effective -

mode:

Min.: 0

Unit: -

Max.: 4294967295

Data Type: UInt32

Default: 1617166368

Change: Real-time

Value Range:

0 to 4294967295

Description

Same as 1A00.01h.

1A00.03h Mapped object 3 in TPD01

Hex: 1A00-03h

Effective -

mode:

Min.: 0

Unit: -

Max.: 4294967295

Data Type: UInt32

Default: 1622736912

Change: Real-time

Value Range:

0 to 4294967295

Description

Same as 1A00.01h.

1A00.04h Mapped object 4 in TPD01

Hex: 1A00-04h

Effective -

mode:

Min.: 0

Unit: -

Max.: 4294967295

Data Type: UInt32

Default: 1622802464

Change: Real-time

Value Range:

0 to 4294967295

Description

Same as 1A00.01h.

1A00.05h Mapped object 5 in TPD01

Hex: 1A00-05h

Effective -

mode:

Min.: 0

Unit: -

Max.: 4294967295

Data Type: UInt32

Default: 1622933536

Change: Real-time

Value Range:

0 to 4294967295

Description

Same as 1A00.01h.

1A00.06h Mapped object 6 in TPD01

Hex: 1A00-06h

Effective -

mode:

Min.: 0
Max.: 4294967295
Default: 1614741520

Unit: -
Data Type: UInt32
Change: Real-time

Value Range:

0 to 4294967295

Description

Same as 1A00.01h.

1A00.07h Mapped object 7 in TPD01

Hex: 1A00-07h

Effective mode: -

Min.: 0
Max.: 4294967295
Default: 1627193360

Unit: -
Data Type: UInt32
Change: Real-time

Value Range:

0 to 4294967295

Description

Same as 1A00.01h.

1A00.08h Mapped object 8 in TPD01

Hex: 1A00-08h

Effective mode: -

Min.: 0
Max.: 4294967295
Default: 0

Unit: -
Data Type: UInt32
Change: Real-time

Value Range:

0 to 4294967295

Description

Same as 1A00.01h.

1A00.09h Mapped object 9 in TPD01

Hex: 1A00-09h

Effective mode: -

Min.: 0
Max.: 4294967295
Default: 0

Unit: -
Data Type: UInt32
Change: Real-time

Value Range:

0 to 4294967295

Description

Same as 1A00.01h.

1A00.0Ah Mapped object 10 in TPDO1

Hex: 1A00-0Ah

Effective mode: -

Min.: 0

Unit: -

Max.: 4294967295

Data Type: UInt32

Default: 0

Change: Real-time

Value Range:

0 to 4294967295

Description

Same as 1A00.01h.

1A00.0Bh Mapped object 11 in TPDO1

Hex: 1A00-0Bh

Effective mode: -

Min.: 0

Unit: -

Max.: 4294967295

Data Type: UInt32

Default: 0

Change: Real-time

Value Range:

0 to 4294967295

Description

Same as 1A00.01h.

1A00.0Ch Mapped object 12 in TPDO1

Hex: 1A00-0Ch

Effective mode: -

Min.: 0

Unit: -

Max.: 4294967295

Data Type: UInt32

Default: 0

Change: Real-time

Value Range:

0 to 4294967295

Description

Same as 1A00.01h.

1A00.0Dh Mapped object 13 in TPDO1

Hex: 1A00-0Dh

Effective mode: -

Min.: 0

Unit: -

Max.: 4294967295

Data Type: UInt32

Default: 0

Change: Real-time

Value Range:

0 to 4294967295

Description

Same as 1A00.01h.

1A00.0Eh Mapped object 14 in TPD01

Hex: 1A00-0Eh

Effective mode: -

Min.: 0

Unit: -

Max.: 4294967295

Data Type: UInt32

Default: 0

Change: Real-time

Value Range:

0 to 4294967295

Description

Same as 1A00.01h.

1A00.0Fh Mapped object 15 in TPD01

Hex: 1A00-0Fh

Effective mode: -

Min.: 0

Unit: -

Max.: 4294967295

Data Type: UInt32

Default: 0

Change: Real-time

Value Range:

0 to 4294967295

Description

Same as 1A00.01h.

1A00.10h Mapped object 16 in TPD01

Hex: 1A00-10h

Effective mode: -

Min.: 0

Unit: -

Max.: 4294967295

Data Type: UInt32

Default: 0

Change: Real-time

Value Range:

0 to 4294967295

Description

Same as 1A00.01h.

1A00.11h Mapped object 17 in TPD01

Hex: 1A00-11h

Effective mode: -

Min.: 0
 Max.: 4294967295
 Default: 0

Unit: -
 Data Type: UInt32
 Change: Real-time

Value Range:

0 to 4294967295

Description

Same as 1A00.01h.

1A00.12h Mapped object 18 in TPDO1

Hex: 1A00-12h

Effective mode: -

Min.: 0
 Max.: 4294967295
 Default: 0

Unit: -
 Data Type: UInt32
 Change: Real-time

Value Range:

0 to 4294967295

Description

Same as 1A00.01h.

1A00.13h Mapped object 19 in TPDO1

Hex: 1A00-13h

Effective mode: -

Min.: 0
 Max.: 4294967295
 Default: 0

Unit: -
 Data Type: UInt32
 Change: Real-time

Value Range:

0 to 4294967295

Description

Same as 1A00.01h.

1A00.14h Mapped object 20 in TPDO1

Hex: 1A00-14h

Effective mode: -

Min.: 0
 Max.: 4294967295
 Default: 0

Unit: -
 Data Type: UInt32
 Change: Real-time

Value Range:

0 to 4294967295

Description

Same as 1A00.01h.

1C12.00h Number of assigned PDOs

Hex:	1C12-00h	Effective mode:	-
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt8
Default:	1	Change:	Real-time
Value Range:			
0 to 1			
Description			
-			

1C12.01h PDO mapping object index of assigned RxPDO1

Hex:	1C12-01h	Effective mode:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	5889	Change:	Real-time
Value Range:			
0 to 65535			
Description			
-			

1C13.00h Number of assigned PDOs

Hex:	1C13-00h	Effective mode:	-
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt8
Default:	1	Change:	Real-time
Value Range:			
0 to 1			
Description			
-			

1C13.01h PDO mapping object index of assigned TxPDO1

Hex:	1C13-01h	Effective mode:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	6913	Change:	Real-time
Value Range:			
0 to 65535			

Description

-

1C32.01h Sync mode

Hex: 1C32-01h

Effective -

mode:

Min.: 0

Unit: -

Max.: 65535

Data Type: UInt16

Default: 2

Change: Real-time

Value Range:

0 to 65535

Description

-

1C32.02h Cycle time

Hex: 1C32-02h

Effective -

mode:

Min.: 0

Unit: -

Max.: 4294967295

Data Type: UInt32

Default: 0

Change: Real-time

Value Range:

0 to 4294967295

Description

-

1C32.04h Sync modes supported

Hex: 1C32-04h

Effective -

mode:

Min.: 0

Unit: -

Max.: 65535

Data Type: UInt16

Default: 4

Change: Real-time

Value Range:

0 to 65535

Description

-

1C32.05h Minimum cycle time

Hex: 1C32-05h

Effective -

mode:

Min.: 0

Unit: -

Max.: 4294967295

Data Type: UInt32

Default: 250000

Change: Real-time

Value Range:

0 to 4294967295

Description

-

1C33.01h Sync mode

Hex: 1C33-01h

Effective -

mode:

Min.: 0

Unit: -

Max.: 65535

Data Type: UInt16

Default: 2

Change: Real-time

Value Range:

0 to 65535

Description

-

1C33.02h Cycle time

Hex: 1C33-02h

Effective -

mode:

Min.: 0

Unit: -

Max.: 4294967295

Data Type: UInt32

Default: 0

Change: Real-time

Value Range:

0 to 4294967295

Description

-

1C33.04h Sync modes supported

Hex: 1C33-04h

Effective -

mode:

Min.: 0

Unit: -

Max.: 65535

Data Type: UInt16

Default: 4

Change: Real-time

Value Range:

0 to 65535

Description

-

1C33.05h Minimum cycle time

Hex: 1C33-05h

Effective -

mode:

Min.:	0	Unit:	-
Max.:	4294967295	Data Type:	UInt32
Default:	250000	Change:	Real-time

Value Range:

0 to 4294967295

Description

-

5.20 6000h Object Dictionary

603Fh Error code

Hex:	603Fh	Effective mode:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

When an error described in the DSP402 profile occurs on the servo drive, 603Fh is as described in DSP402.

When an error specified by the user occurs on the servo drive, 603Fh is 0xFF00.

The value of 603Fh is in hexadecimal.

In addition, the object dictionary 203Fh displays auxiliary bytes of fault codes in hexadecimal.

203Fh is a UInt32 value, in which the high 16 bits indicate the internal fault code of the manufacturer, and the low 16 bits indicate the external fault code of the manufacturer.

6040h Control word

Hex:	6040h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

0 to 65535

Description

For description of status words, see section Basic Functions of the function guide.

6041h Status word

Hex: 6041h

Effective -

mode:

Min.: 0

Unit: -

Max.: 65535

Data Type: UInt16

Default: 0

Change: Unchangeable

Value Range:

0 to 65535

Description

For description of status words, see section Basic Functions of the function guide.

605Ah Quick stop mode

Hex: 605Ah

Effective Real time

mode:

Min.: 0

Unit: -

Max.: 7

Data Type: Int16

Default: 2

Change: At stop

Value Range:

0: Coast to stop, keeping de-energized state

1: Ramp to stop as defined by 6084h/609Ah (HM), keeping de-energized state

2: Ramp to stop as defined by 6085h, keeping de-energized state

3: Stop at emergency stop torque, keeping de-energized state

5: Ramp to stop as defined by 6084h/609Ah (HM), keeping position lock state

6: Ramp to stop as defined by 6085h, keeping position lock state

7: Stop at emergency stop torque, keeping position lock state

Description

Defines the deceleration mode of the motor for stopping rotating upon quick stop and the motor status after stop.

Value	Stop Mode
0	Coast to stop, keeping de-energized status
1	Ramp to stop as defined by 6084h/609Ah (HM), keeping the de-energized status
2	Ramp to stop as defined by 6085h, keeping the de-energized state
3	Stop at the emergency stop torque, keeping de-energized state
4	N/A
5	Ramp to stop as defined by 6084h/609Ah (HM), keeping position lock status
6	Ramp to stop as defined by 6085h, keeping position lock status
7	Stop at emergency-stop torque, keeping position lock status

When the brake function is enabled and the value of 605Ah is lower than 4, the stop mode is forcibly set to "Ramp to stop as defined by 6085h, keeping de-energized state".

605Ch Stop mode at S-OFF

Hex:	605Ch	Effective mode:	Real time
Min.:	-4	Unit:	-
Max.:	2	Data Type:	Int16
Default:	0	Change:	At stop

Value Range:

- 4: Ramp to stop as defined by 6085h, keeping dynamic braking state
- 3: at zero speed, keeping dynamic braking state
- 2: Ramp to stop as defined by 6084h/609Ah (HM), keeping dynamic braking state
- 1: Dynamic braking stop, keeping dynamic braking state
- 0: Coast to stop, keeping de-energized state
- 1: Ramp to stop as defined by 6084h/609Ah (HM), keeping de-energized state
- 2: Dynamic braking stop, keeping de-energized state

Description

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

Value	Stop Mode
-4	Ramp to stop as defined by 6085h, keeping dynamic braking status
-3	Stop at zero speed, keeping dynamic braking status
-2	Ramp to stop as defined by 6084h/609Ah (HM), keeping dynamic braking status
-1	Dynamic braking stop, keeping dynamic braking status
0	Coast to stop, keeping de-energized status
1	Ramp to stop as defined by 6084h/609Ah (HM), keeping de-energized status
2	Dynamic braking stop, keeping de-energized status

605Dh Halt mode

Hex:	605Dh	Effective mode:	Real time
Min.:	1	Unit:	-
Max.:	3	Data Type:	Int16
Default:	1	Change:	At stop

Value Range:

- 1: Ramp to stop as defined by 6084h/ 609Ah (HM), keeping position lock state
- 2: Ramp to stop as defined by 6085h, keeping position lock state
- 3: Stop at emergency stop torque, keeping position lock state

Description

Defines the halt mode.

Defines the deceleration mode of the motor for stopping rotating upon halt and the motor status after stop.

PP/PV/HM mode:

Value	Stop Mode
1	Ramp to stop as defined by 6084h/609Ah (HM), keeping position lock status
2	Ramp to stop as defined by 6085h, keeping position lock status
3	Stop at emergency-stop torque, keeping position lock status

PT mode:

Value	Stop Mode
1/2/3	Ramp to stop as defined by 6087h, keeping position lock status

605Eh Stop mode at No. 2 fault

Hex:	605Eh	Effective mode:	Real time
Min.:	-5	Unit:	-
Max.:	4	Data Type:	Int16
Default:	2	Change:	At stop

Value Range:

- 5: Stop at zero speed, keeping dynamic braking state
- 4: Stop at emergency stop torque, keeping dynamic braking state
- 3: Ramp to stop as defined by 6085h, keeping dynamic braking state
- 2: Ramp to stop as defined by 6084h/ 609Ah (HM), keeping dynamic braking state
- 1: Dynamic braking stop, keeping dynamic braking state
- 0: Coast to stop, keeping de-energized state
- 1: Ramp to stop as defined by 6084h/ 609Ah (HM), keeping de-energized state
- 2: Ramp to stop as defined by 6085h, keeping de-energized state
- 3: Stop at emergency stop torque, keeping de-energized state
- 4: Dynamic braking stop, keeping de-energized state

Description

Defines the deceleration mode of the motor for stopping rotating upon occurrence of a No. 2 fault and the motor status after stop.

Value	Stop Mode
-5	Stop at zero speed, keeping dynamic braking status
-4	Stop at emergency-stop torque, keeping dynamic braking status
-3	Ramp to stop as defined by 6085h, keeping dynamic braking status
-2	Ramp to stop as defined by 6084h/609Ah (HM), keeping dynamic braking status
-1	Dynamic braking stop, keeping dynamic braking status
0	Coast to stop, keeping de-energized status
1	Ramp to stop as defined by 6084h/609Ah (HM), keeping de-energized status
2	Ramp to stop as defined by 6085h, keeping de-energized status
3	Stop at emergency-stop torque, keeping de-energized status
4	Dynamic braking stop, keeping de-energized status

After the brake (BK) output function is enabled, the stop mode at No. 2 fault is forcibly set to "Ramp to stop as defined by 6085h, keeping dynamic braking status".

6060h Servo drive mode

Hex:	6060h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	11	Data Type:	UInt8
Default:	0	Change:	Real-time

Value Range:

- 1: Profile position (PP) mode
- 3: Profile velocity (PV) mode
- 4: Profile torque (PT) mode
- 6: Homing (HM) mode
- 8: CSP mode
- 9: CSV mode
- 10: CST mode

Description

It defines the operation mode of the servo drive.

- If an unsupported operation mode is set through SDO, an SDO error will be returned.
- If an operation mode not supported is set through PDO, this operation mode is invalid.

Value	Servo mode	
0	N/A	Reserved
1	Profile position (PP)	See section Profile Position Mode in the Function Guide.
2	N/A	Reserved
3	Profile Velocity (PV) Mode	See section Profile Velocity Mode in the Function Guide.
4	Profile torque (PT) mode	See section Profile Torque Mode in the Function Guide.
5	N/A	Reserved
6	Homing (HM) mode	See section Homing Mode in the Function Guide.
7	Interpolated position (IP) mode	Not supported
8	Cyclic Synchronous Position (CSP) Mode	See section Cyclic Synchronous Position Mode in the Function Guide.
9	Cyclic synchronous velocity (CSV) mode	See section Cyclic Synchronous Velocity Mode in the Function Guide.
10	Cyclic synchronous torque (CST) mode	See section Cyclic Synchronous Torque Mode in the Function Guide.

6061h Operation mode display

Hex: 6061h

Effective mode: -

Min.: 0

Unit: -

Max.: 10

Data Type: UInt8

Default: 0

Change: Unchangeable

Value Range:

1: Profile position (PP) mode

3: Profile velocity (PV) mode

4: Profile torque (PT) mode

6: Homing (HM) mode

8: CSP mode

9: CSV mode

10: CST mode

Description

Indicates the actual operation mode.

Value	Servo mode	
0	N/A	Reserved
1	Profile position (PP)	See section Profile Position Mode in the Function Guide.
2	N/A	Reserved

Value	Servo mode	
3	Profile Velocity (PV) Mode	See section Profile Velocity Mode in the Function Guide.
4	Profile torque (PT) mode	See section Profile Torque Mode in the Function Guide.
5	N/A	Reserved
6	Homing (HM) mode	See section Homing Mode in the Function Guide.
7	Interpolated position (IP) mode	Not supported
8	Cyclic Synchronous Position (CSP) Mode	See section Cyclic Synchronous Position Mode in the Function Guide.
9	Cyclic synchronous velocity (CSV) mode	See section Cyclic Synchronous Velocity Mode in the Function Guide.
10	Cyclic synchronous torque (CST) mode	See section Cyclic Synchronous Torque Mode in the Function Guide.

6062h Position reference

Hex: 6062h

Effective mode: -

Min.: -2147483648

Unit: Reference unit

Max.: 2147483647

Data Type: Int32

Default: 0

Change: Unchangeable

Value Range:

-2147483648 to 2147483647

Description

The baud rate set in the servo drive must be the same as that in the host controller. Otherwise, communication will fail.

6063h Position actual value

Hex: 6063h

Effective mode: -

Min.: -2147483648

Unit: Encoder unit

Max.: 2147483647

Data Type: Int32

Default: 0

Change: Unchangeable

Value Range:

-2147483648 to 2147483647

Description

Indicates the absolute position feedback (encoder unit) of the motor in real time.

6064h Position actual value

Hex: 6064h

Effective mode: -

Min.:	-2147483648	Unit:	Reference unit
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Unchangeable

Value Range:

-2147483648 to 2147483647

Description

Indicates the absolute position feedback (reference unit) in real time.

Position actual value in user-defined unit (6064h) x Gear ratio (6091h) = Position actual value in encoder unit (6063h)

6065h Following error window

Hex:	6065h	Effective mode:	Real time
Min.:	0	Unit:	Reference unit
Max.:	4294967295	Data Type:	UInt32
Default:	27486951	Change:	Real-time

Value Range:

0 to 4294967295

Description

Defines the threshold of excessive position deviation (reference unit).

When the difference value between position demand value (6062h) and position actual value (6064h) keeps exceeding $\pm 6065h$ after the time defined by 6066h elapses, B00.0 (Position deviation too large) occurs.

6066h Defines the time lapse to trigger excessive position deviation (EB00.0).

Hex:	6066h	Effective mode:	Real time
Min.:	0	Unit:	ms
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

0ms to 65535ms

Description

Defines the time lapse to trigger excessive position deviation (EB00.0), which must be used together with 6065h.

6067h Position window

Hex:	6067h	Effective mode:	Real time
Min.:	0	Unit:	Reference unit
Max.:	4294967295	Data Type:	UInt32

Default: 5872

Change: Real-time

Value Range:

0 to 4294967295

Description

Defines the threshold for position reach.

If the difference between 6062h and 6064h is within $\pm 6067h$ and the time reaches 6068h, the position is reached. In this case, bit 10 of 6041h is set to 1 in the profile position mode.

This flag bit is valid only when the S-ON signal is valid in profile position control mode.

6068h Position window time

Hex: 6068h

Effective mode: Real time

Min.: 0

Unit: ms

Max.: 65535

Data Type: UInt16

Default: 0

Change: Real-time

Value Range:

0ms to 65535ms

Description

Defines the window time for position reach, which must be used together with 6067h.

606Ch Actual speed

Hex: 606Ch

Effective mode: -

Min.: -2147483648

Unit: Reference unit/s

Max.: 2147483647

Data Type: Int32

Default: 0

Change: Unchangeable

Value Range:

-2147483648 to +2147483647

Description

It indicates the velocity actual value.

606Dh Velocity window

Hex: 606Dh

Effective mode: Real time

Min.: 0

Unit: RPM

Max.: 65535

Data Type: UInt16

Default: 10

Change: Real-time

Value Range:

0 RPM to 65535 RPM

Description

Defines the threshold for speed reach.

If the difference value between the target speed 60FFh and the actual speed 606Ch is within $\pm 606Dh$ and the time reaches 606Eh, the speed is reached and bit 10 of the status word 6041h is set to 1 in the profile velocity (PV) mode.

This flag bit is meaningful only when the servo drive is enabled in PV mode.

606Eh Velocity window time

Hex:	606Eh	Effective mode:	Real time
Min.:	0	Unit:	ms
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

0ms to 65535ms

Description

Defines the time window for speed reach, which must be used together with 606Dh.

606Fh Zero speed signal threshold

Hex:	606Fh	Effective mode:	Real time
Min.:	0	Unit:	RPM
Max.:	65535	Data Type:	UInt16
Default:	10	Change:	Real-time

Value Range:

0 RPM to 65535 RPM

Description

Defines the threshold for determining whether the user velocity is 0.

When 606Ch is within $\pm 606Fh$ and the time reaches the value set by 6070h, the user velocity is 0. When either condition is not met, the user velocity is not 0.

This flag bit is valid only in PV mode.

This flag bit is unrelated to the enable/disable state of the servo drive.

6070h Velocity threshold time

Hex:	6070h	Effective mode:	Real time
Min.:	0	Unit:	ms
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

0ms to 65535ms

Description

Defines the time window for determining whether the user velocity is 0, which must be used together with 606Fh.

6071h Target torque

Hex:	6071h	Effective mode:	Real time
Min.:	-4000	Unit:	-
Max.:	4000	Data Type:	Int16
Default:	0	Change:	Real-time

Value Range:

-4000 to 4000

Description

Defines the target torque of the servo drive in the profile torque mode. The value 1000 corresponds to the rated torque of the motor.

6072h Max. torque reference

Hex:	6072h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	4000	Data Type:	UInt16
Default:	3500	Change:	Real-time

Value Range:

0 to 4000

Description

Defines the maximum torque reference limit. The value 1000 corresponds to the rated torque of the motor.

6074h Torque reference

Hex:	6074h	Effective mode:	-
Min.:	-4000	Unit:	-
Max.:	4000	Data Type:	Int16
Default:	0	Change:	Unchangeable

Value Range:

-4000 to 4000

Description

Defines the target torque value. The value 1000 corresponds to the rated torque of the motor.

6077h Actual torque

Hex:	6077h	Effective mode:	-
Min.:	-4000	Unit:	-
Max.:	4000	Data Type:	Int16
Default:	0	Change:	Unchangeable

Value Range:

-4000 to 4000

Description

It displays the internal actual torque of the servo drive.
The value 1000 corresponds to the rated torque of the motor.

607Ah Target position

Hex:	607Ah	Effective mode:	Real time
Min.:	-2147483648	Unit:	Reference unit
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Real-time

Value Range:

-2147483648 to 2147483647

Description

Defines the target position of the servo drive in the profile position mode.

Table 5-2 bit6 setpoint of 6040h

Bit6 setpoint	Description	Remarks
0	607Ah is the absolute target position of the current segment.	After positioning of the current segment is complete, the user absolute position 6064h= 607Ah.
1	607Ah indicates the target increment displacement of the current segment.	After positioning of the current segment is complete, the user displacement increment is equal to 607Ah.

607Ch Home offset

Hex:	607Ch	Effective mode:	At stop
Min.:	-2147483648	Unit:	Reference unit
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Real-time

Value Range:

-2147483648 to 2147483647

Description

Defines the physical location of mechanical zero that deviates from the home of the motor in position control modes (profile position mode, interpolation mode, and homing mode).

The home offset takes effect in the following conditions: The device is powered on, the homing operation is complete, and bit15 of 6041h is set to 1.

After homing is done, the position actual value (6064h) will be the same as the value of 607Ch.

If 607Ch is outside the value of 607Dh (Software position limit), EE09.1 (Home setting error) will occur.

607D.01- Min. position limit

h

Hex:	607D-01h	Effective mode:	Real time
Min.:	-2147483648	Unit:	Reference unit
Max.:	2147483647	Data Type:	Int32
Default:	-2147483648	Change:	Real-time

Value Range:

-2147483648 to 2147483647

Description

Defines the minimum software position limit relative to the mechanical zero point.

Minimum software position limit = (607D.01h)

The software position limit is used to judge the absolute position. When homing is not performed, the internal software position limit is invalid.

The condition for activating the software position limit is set in H0A.01 (object dictionary 0x200A.02h).

607D.02- Max. position limit

h

Hex:	607D-02h	Effective mode:	Real time
Min.:	-2147483648	Unit:	Reference unit
Max.:	2147483647	Data Type:	Int32
Default:	2147483647	Change:	Real-time

Value Range:

-2147483648 to 2147483647

Description

Defines the maximum software position limit relative to the mechanical zero.

Maximum software position limit = (607D.02h)

607Eh Reference polarity

Hex:	607Eh	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	127	Data Type:	UInt16
Default:	0	Change:	Real-time

Value Range:

0 to 127

Description

Defines the polarity of position or speed references.

Bit	Description
0 to 4	Undefined
5	Torque reference polarity 0: Multiply by 1 1: Multiply by -1 PT: Inverts the target torque (6071h). CSP/CSV: Inverts the torque offset (60B2h). CST: Inverts the torque reference (6071h + 60B2h).
6	Speed reference polarity 0: Multiply by 1 1: Multiply by -1 PV: Inverts the target torque (6071h). CSP: Reverse to speed feedforward 60B1h CSV: Inverts the speed reference (60FFh + 60B1h).
7	Position reference polarity 0: Multiply by 1 1: Multiply by -1 PP: Inverts the target position (607Ah) CSP: Inverts the position reference (607Ah + 60B0h).

607Fh Max. speed

Hex:	607Fh	Effective mode:	Real time
Min.:	0	Unit:	Reference unit/s
Max.:	4294967295	Data Type:	UInt32
Default:	838860800	Change:	Real-time

Value Range:

0 to 4294967295

Description

Defines the maximum user running speed.

Set a proper gear ratio (8:1 recommended) when using a 23-bit encoder.

Otherwise, the motor speed will be limited to 3840 RPM.

6081h Profile velocity

Hex:	6081h	Effective mode:	Real time
Min.:	0	Unit:	Reference unit/s
Max.:	4294967295	Data Type:	UInt32
Default:	13981013	Change:	Real-time

Value Range:

0 to 4294967295

Description

It sets the average velocity normally attained at the end of the acceleration ramp during a profiled motion.

The setpoint takes effect after the slave receives the displacement reference.

6083h Profile acceleration

Hex:	6083h	Effective mode:	Real time
Min.:	0	Unit:	Reference unit/s ²
Max.:	4294967295	Data Type:	UInt32
Default:	1398101333	Change:	Real-time

Value Range:

0 to 4294967295

Description

Defines the acceleration rate in the acceleration stage of the displacement reference in the profile position mode.

The following formula applies if a motor equipped with 23-bit encoder needs to run at 400 RPM (6081h: $400 \times 8388608/60$) with acceleration rate being 400 RPM/s (6083h: $400 \times 8388608/60$) and deceleration rate being 200 RPM/s (6084h: $200 \times 8388608/60$) under a gear ratio of 1:1:

Acceleration time $t_{up} = \Delta 6081h / \Delta 6083h = 1$ (s); Deceleration time $t_{down} = \Delta 6081h / \Delta 6084h = 2$ (s).

For 609Ah, the setpoint 0 will be forcibly changed to 1.

6084h Profile deceleration

Hex:	6084h	Effective mode:	Real time
Min.:	0	Unit:	Reference unit/s ²
Max.:	4294967295	Data Type:	UInt32
Default:	1398101333	Change:	Real-time

Value Range:

0 to 4294967295

Description

Defines the deceleration rate in the deceleration stage of the displacement reference in the profile position mode.

The following formula applies if a motor equipped with 23-bit encoder needs to run at 400 RPM (6081h: $400 \times 8388608/60$) with acceleration rate being 400 RPM/s (6083h: $400 \times 8388608/60$) and deceleration rate being 200 RPM/s (6084h: $200 \times 8388608/60$) under a gear ratio of 1:1:

Acceleration time $t_{up} = \Delta 6081h / \Delta 6083h = 1$ (s); Deceleration time $t_{down} = \Delta 6081h / \Delta 6084h = 2$ (s).

For 609Ah, the setpoint 0 will be forcibly changed to 1.

6085h Quick stop deceleration

Hex:	6085h	Effective mode:	Real time
Min.:	0	Unit:	Reference unit/s ²
Max.:	4294967295	Data Type:	UInt32
Default:	2147483647	Change:	Real-time

Value Range:

0 to 4294967295

Description

Defines the deceleration rate when the quick stop command (6040h = 0x0002) is active and 605Ah (Quick stop option code) is set to 2 or 5.

For 609Ah, the setpoint 0 will be forcibly changed to 1.

6087h Torque slope

Hex:	6087h	Effective mode:	Real time
Min.:	0.0	Unit:	%/s
Max.:	429496729.5	Data Type:	UInt32
Default:	429496729.5	Change:	Real-time

Value Range:

0.0%/S to 429496729.5%/s

Description

It sets the rate of change of torque in profile torque mode, in unit of torque increment per second.

In the profile torque mode, if 605Ah is set to 1, 2, 5, or 6, or 605Dh is set to 1 or 2, the servo drive decelerates to stop as defined by 6087h.

If the value exceeds the torque reference limit, the servo drive runs at the limit.

The setting value 0 will be forcibly changed into 1.

6091.01h Motor resolution

Hex:	6091-01h	Effective mode:	Real time
Min.:	1	Unit:	-
Max.:	4294967295	Data Type:	UInt32
Default:	1	Change:	At stop

Value Range:

1 to 4294967295

Description

Defines the numerator of the gear ratio.

Defines the proportional relation between the load shaft displacement designated by the user and the motor shaft displacement.

The relation between motor position feedback (encoder unit) and load shaft position feedback (reference unit) is as follows.

Motor position feedback = Load shaft position feedback x Gear ratio

The relation between the motor speed (RPM) and the load shaft speed (reference unit/s) is as follows:

$$\text{Motor speed (rpm)} = \frac{\text{Loaded shaft speed} \times \text{Gear ratio 6091h}}{\text{Encoder resolution}} \times 60$$

The motor acceleration (RPM/ms) and the load shaft acceleration (reference unit/s²) is in the following relationship:

$$\text{Motor acceleration} = \frac{\text{Loaded shaft acc.} \times \text{Gear ratio 6091h}}{\text{Encoder resolution}} \times \frac{1000}{60}$$

6091.02h Shaft resolution

Hex:	6091-02h	Effective mode:	Real time
Min.:	1	Unit:	-
Max.:	4294967295	Data Type:	UInt32
Default:	1	Change:	At stop

Value Range:

1 to 4294967295

Description

Defines the denominator of the gear ratio.

6098h Homing method

Hex:	6098h	Effective mode:	Real time
Min.:	-3	Unit:	-
Max.:	35	Data Type:	Int16

Default: 1

Change: Real-time

Value Range:

-3 to 35

Description

It selects the homing method.

Table 5-3 Description of homing method

Value	Description
-3	The initial direction is automatically determined, and the stop occurs at the nearest Z signal.
-2	Forward, positive mechanical limit as deceleration point and Z signal as home
-1	Reverse, negative mechanical limit as deceleration point and Z signal as home
1	Reverse, negative limit switch as deceleration point and Z signal as home, falling edge of the negative limit switch signal must be reached before Z signal
2	Forward, positive limit switch as deceleration point and Z signal as home, falling edge of positive limit switch signal must be reached before Z signal
3	Forward, home switch as deceleration point and Z signal as home, falling edge on the same side of the home switch signal must be reached before Z signal
4	Forward, home switch as deceleration point and Z signal as home, rising edge on the same side of the home switch signal must be reached before Z signal
5	Reverse, home switch as deceleration point and Z signal as home, falling edge on the same side of the home switch signal must be reached before Z signal
6	Reverse, home switch as deceleration point and Z signal as home, rising edge on the same side of the home switch signal must be reached before Z signal
7	Forward, home switch as deceleration point and Z signal as home, falling edge on the same side of the home switch signal must be reached before Z signal
8	Forward, home switch as deceleration point and Z signal as home, rising edge on the same side of the home switch signal must be reached before Z signal
9	Forward, home switch as deceleration point and Z signal as home, rising edge on the other side of the home switch signal must be reached before Z signal
10	Forward, home switch as deceleration point and Z signal as home, falling edge on the other side of the home switch signal must be reached before Z signal
11	Reverse, home switch as deceleration point and Z signal as home, falling edge on the same side of the home switch signal must be reached before Z signal
12	Reverse, home switch as deceleration point and Z signal as home, rising edge on the same side of the home switch signal must be reached before Z signal
13	Reverse, home switch as deceleration point and Z signal on the other side of the home switch signal as home, rising edge on the other side of the home switch signal must be reached before Z signal
14	Reverse, home switch as deceleration point and Z signal on the other side of the home switch signal as home, falling edge on the other side of the home switch signal must be reached before Z signal

Value	Description
15 to 16	Undefined. The servo drive does not perform the homing operation.
17 to 30	Similar to setpoints 1...14 except that the deceleration point coincide with the home
31 to 32	Undefined. The servo drive does not perform the homing operation.
33	Reverse, Z signal as home
34	Forward, Z signal as home
35	Current position as home

6099.01h Speed during search for switch

Hex:	6099-01h	Effective mode:	Real time
Min.:	0	Unit:	Reference unit/s
Max.:	4294967295	Data Type:	UInt32
Default:	13981013	Change:	At stop

Value Range:

0 to 4294967295

Description

Defines the speed during search for the deceleration point signal. A large setpoint helps prevent E601.0 (Homing timeout).

6099.02h Speed during search for zero

Hex:	6099-02h	Effective mode:	Real time
Min.:	0	Unit:	Reference unit/s
Max.:	4294967295	Data Type:	UInt32
Default:	1398101	Change:	At stop

Value Range:

0 to 4294967295

Description

Defines the speed in searching for the home signal. Setting this speed to a low value prevents overshoot during stop at high speed, avoiding excessive deviation between the stop position and the set mechanical home.

609Ah Homing acceleration

Hex:	609Ah	Effective mode:	Real time
Min.:	0	Unit:	Reference unit/s ²
Max.:	4294967295	Data Type:	UInt32
Default:	1398101333	Change:	Real-time

Value Range:

0 to 4294967295

Description

It sets the acceleration during the homing operation.

60B0h Position offset

Hex: 60B0h

Effective mode: Real time

Min.: -2147483648

Unit: Reference unit

Max.: 2147483647

Data Type: Int32

Default: 0

Change: Real-time

Value Range:

-2147483648 to 2147483647

Description

-

60B1h Velocity offset

Hex: 60B1h

Effective mode: Real time

Min.: -2147483648

Unit: Reference unit/s

Max.: 2147483647

Data Type: Int32

Default: 0

Change: Real-time

Value Range:

-2147483648 to +2147483647

Description

-

60B2h Torque offset

Hex: 60B2h

Effective mode: Real time

Min.: -4.000

Unit: -

Max.: 4.000

Data Type: Int16

Default: 0.000

Change: Real-time

Value Range:

-4.000 to 4.000

Description

-

60B8h Touch probe function

Hex: 60B8h

Effective mode: Real time

Min.: 0

Unit: -

Max.: 65535

Data Type: UInt16

Default: 0

Change: Real-time

Value Range:

0 to 65535

Description

Defines the functions of touch probe 1 and touch probe 2.

For absolute encoders, Z signal refers to the zero point of the single-turn position feedback.

See the following table for descriptions of each bit of 60B8.

Bit	Description	Description
0	Probe 1 enable: 0: Disabled 1: Enabled	Bit0 to bit5: settings related to probe 1 When a DI is used to trigger the touch probe function, the DI source cannot be changed once the touch probe function is enabled. For absolute encoders, Z signal refers to the zero point of the single-turn position feedback.
1	Touch probe 1 trigger mode 0: Single trigger mode (Latches the position at the first trigger event.) 1: Continuous trigger mode	
2	Touch probe 1 trigger signal selection 0: DI signal 1: Z signal	
3	N/A	
4	Touch probe 1 positive edge 0: Switch off latching at positive edge 1: Enable latching at positive edge	
5	Touch probe 1 negative edge 0: Switch off latching at negative edge 1: Enable latching at negative edge	

Bit	Description	Description
6 to 7	N/A	Bit8 to bit13: settings related to probe 2
8	Touch probe 2 function selection 0: Switch off touch probe 2 1: Enable touch probe 2	
9	Touch probe 2 trigger mode 0: Single trigger mode (Latches the position at the first trigger event.) 1: Continuous trigger mode	
10	Touch probe 2 trigger signal selection 0: DI signal 1: Z signal	
11	N/A	
12	Touch probe 2 positive edge 0: Switch off latching at positive edge 1: Enable latching at positive edge	
13	Touch probe 2 negative edge 0: Switch off latching at negative edge 1: Enable latching at negative edge	
14 to 15	N/A	-

60B9h Touch probe status

Hex: 60B9h

Effective mode: -

Min.: 0

Unit: -

Max.: 65535

Data Type: UInt16

Default: 0

Change: Unchangeable

Value Range:

0 to 65535

Description

Indicates the status of touch probe 1 and touch probe 2.

Bit	Description	Description
0	Probe 1 enable: 0: Switch off Touch probe 1 1: Enabled	Bit0 to bit7: Status of probe 1
1	Touch probe 1 positive edge value 0: No positive edge value latched 1: Positive edge value latched	
2	Touch probe 1 negative edge value 0: No negative edge value latched 1: Negative edge value latched	
3 to 5	N/A	-
6 to 7	When the function of probe 1 is selected as continuous sampling, the total number of times the probe is triggered	When the function of probe 1 is selected as continuous sampling, the total number of times (0–3) the probe is triggered
8	Touch probe 2 function selection 0: Switch off Touch probe 2 1: Enable touch probe 2	Bit8 to bit10: Status of probe 2
9	Touch probe 2 positive edge value 0: No positive edge value latched 1: Positive edge value latched	
10	Touch probe 2 negative edge value 0: No negative edge value latched 1: Negative edge value latched	
11 to 13	N/A	-
14 to 15	When the function of probe 2 is selected as continuous sampling, the total number of times the probe is triggered	When the function of probe 2 is selected as continuous sampling, the total number of times (0–3) the probe is triggered

60BAh Touch probe 1 positive edge

Hex:	60BAh	Effective mode:	-
Min.:	-2147483648	Unit:	Reference unit
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Unchangeable

Value Range:

-2147483648 to 2147483647

Description

Indicates the position feedback value (reference unit) latched at positive edge of touch probe 1 signal.

60BBh Touch probe 1 negative edge

Hex:	60BBh	Effective mode:	-
Min.:	-2147483648	Unit:	Reference unit
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Unchangeable

Value Range:

-2147483648 to 2147483647

Description

Indicates the position feedback value (reference unit) latched at negative edge of touch probe 1 signal.

60BCh Touch probe 2 positive edge

Hex:	60BCh	Effective mode:	-
Min.:	-2147483648	Unit:	Reference unit
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Unchangeable

Value Range:

-2147483648 to 2147483647

Description

Indicates the position feedback value (reference unit) latched at positive edge of touch probe 2 signal.

60BDh Touch probe 2 negative edge

Hex:	60BDh	Effective mode:	-
Min.:	-2147483648	Unit:	Reference unit
Max.:	2147483647	Data Type:	Int32

Default: 0

Change: Unchangeable

Value Range:
-2147483648 to 2147483647

Description
Indicates the position feedback value (reference unit) latched at negative edge of touch probe 2 signal.

60C5h Max. acceleration

Hex: 60C5h

Effective mode: Real time

Min.: 0

Unit: Reference unit/s2

Max.: 4294967295

Data Type: UInt32

Default: 4294967295

Change: Real-time

Value Range:
0 to 4294967295

Description
Defines the maximum permissible acceleration rate of the acceleration segment in the profile position mode, profile velocity mode, and homing mode.
For 609Ah, the setpoint 0 will be forcibly changed to 1.

60C6h Max. deceleration

Hex: 60C6h

Effective mode: Real time

Min.: 0

Unit: Reference unit/s2

Max.: 4294967295

Data Type: UInt32

Default: 4294967295

Change: Real-time

Value Range:
0 to 4294967295

Description
Defines the maximum permissible deceleration in the profile position mode, profile velocity mode, and homing mode.
For 609Ah, the setpoint 0 will be forcibly changed to 1.

60D5h Touch probe 1 positive edge counter

Hex: 60D5h

Effective mode: -

Min.: 0

Unit: -

Max.: 65535

Data Type: UInt16

Default: 0

Change: Unchangeable

Value Range:
0 to 65535

Description

The counting value is added by "1" each time this object is triggered.

60D6h Touch probe 1 negative edge counter

Hex:	60D6h	Effective mode:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

The counting value is added by "1" each time this object is triggered.

60D7h Touch probe 2 positive edge counter

Hex:	60D7h	Effective mode:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

The counting value is added by "2" each time this object is triggered.

60D8h Touch probe 2 negative edge counter

Hex:	60D8h	Effective mode:	-
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

The counting value is added by "2" each time this object is triggered.

60E0h Positive torque limit

Hex:	60E0h	Effective mode:	Real time
Min.:	0.000	Unit:	-
Max.:	4.000	Data Type:	UInt16

Change: Real-time

0.000 to 4.000

It sets the maximum positive torque in the motor.

60E1h Negative torque limit

Effective Real time
mode:

Unit: -

Data Type: UInt16

Change: Real-time

0.000 to 4.000

It sets the maximum negative torque in the motor.

60E3.01h Supported homing method 1

Effective N/A

mode:

Unit: -

Data Type: UInt16

Change: Unchangeable

0 to 65535

bit	Function
bit0 to bit7	The low 8 bits indicate the supported homing method. Set 6098h to the corresponding value.
bit8	Relative position homing 0: Not supported 1: Supported
bit9	Absolute position homing 0: Not supported 1: Supported
bit10 to bit15	N/A

60E3.02h Supported homing method 2

Effective mode: N/A

Min.: 0
 Max.: 65535
 Default: 2

Value Range:

0 to 65535

Description

-

Unit: -
 Data Type: UInt16
 Change: Unchangeable

60E3.03h Supported homing method 3

Hex: 60E3-03h

Min.: 0
 Max.: 65535
 Default: 3

Value Range:

0 to 65535

Description

-

Effective mode: N/A
 Unit: -
 Data Type: UInt16
 Change: Unchangeable

60E3.04h Supported homing method 4

Hex: 60E3-04h

Min.: 0
 Max.: 65535
 Default: 4

Value Range:

0 to 65535

Description

-

Effective mode: N/A
 Unit: -
 Data Type: UInt16
 Change: Unchangeable

60E3.05h Supported homing method 5

Hex: 60E3-05h

Min.: 0
 Max.: 65535
 Default: 5

Value Range:

0 to 65535

Description

-

Effective mode: N/A
 Unit: -
 Data Type: UInt16
 Change: Unchangeable

60E3.06h Supported homing method 6

Hex:	60E3-06h	Effective mode:	N/A
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	6	Change:	Unchangeable
Value Range:			
0 to 65535			
Description			
-			

60E3.07h Supported homing method 7

Hex:	60E3-07h	Effective mode:	N/A
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	7	Change:	Unchangeable
Value Range:			
0 to 65535			
Description			
-			

60E3.08h Supported homing method 8

Hex:	60E3-08h	Effective mode:	N/A
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	8	Change:	Unchangeable
Value Range:			
0 to 65535			
Description			
-			

60E3.09h Supported homing method 9

Hex:	60E3-09h	Effective mode:	N/A
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	9	Change:	Unchangeable
Value Range:			
0 to 65535			

Description

-

60E3.10h Supported homing method 10

Hex: 60E3-10h

Effective N/A

mode:

Min.: 0

Unit: -

Max.: 65535

Data Type: UInt16

Default: 10

Change: Unchangeable

Value Range:

0 to 65535

Description

-

60E3.11h Supported homing method 11

Hex: 60E3-11h

Effective N/A

mode:

Min.: 0

Unit: -

Max.: 65535

Data Type: UInt16

Default: 11

Change: Unchangeable

Value Range:

0 to 65535

Description

-

60E3.12h Supported homing method 12

Hex: 60E3-12h

Effective N/A

mode:

Min.: 0

Unit: -

Max.: 65535

Data Type: UInt16

Default: 12

Change: Unchangeable

Value Range:

0 to 65535

Description

-

60E3.13h Supported homing method 13

Hex: 60E3-13h

Effective N/A

mode:

Min.: 0

Unit: -

Max.: 65535

Data Type: UInt16

Default: 13

Value Range:

0 to 65535

Description

-

Change:

Unchangeable

60E3.14h Supported homing method 14

Hex: 60E3-14h

Min.: 0

Max.: 65535

Default: 14

Value Range:

0 to 65535

Description

-

Effective mode:

Unit:

Data Type:

Change:

N/A

-

UInt16

Unchangeable

60E3.15h Supported homing method 17

Hex: 60E3-15h

Min.: 0

Max.: 65535

Default: 17

Value Range:

0 to 65535

Description

-

Effective mode:

Unit:

Data Type:

Change:

N/A

-

UInt16

Unchangeable

60E3.16h Supported homing method 18

Hex: 60E3-16h

Min.: 0

Max.: 65535

Default: 18

Value Range:

0 to 65535

Description

-

Effective mode:

Unit:

Data Type:

Change:

N/A

-

UInt16

Unchangeable

60E3.17h Supported homing method 19

Hex: 60E3-17h

Effective mode:

N/A

Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	19	Change:	Unchangeable

Value Range:

0 to 65535

Description

-

60E3.18h Supported homing method 20

Hex:	60E3-18h	Effective mode:	N/A
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	20	Change:	Unchangeable

Value Range:

0 to 65535

Description

-

60E3.19h Supported homing method 21

Hex:	60E3-19h	Effective mode:	N/A
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	21	Change:	Unchangeable

Value Range:

0 to 65535

Description

-

60E3.20h Supported homing method 22

Hex:	60E3-20h	Effective mode:	N/A
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	22	Change:	Unchangeable

Value Range:

0 to 65535

Description

-

60E3.21h Supported homing method 23

Hex:	60E3-21h	Effective mode:	N/A
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	23	Change:	Unchangeable
Value Range:			
0 to 65535			
Description			
-			

60E3.22h Supported homing method 24

Hex:	60E3-22h	Effective mode:	N/A
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	24	Change:	Unchangeable
Value Range:			
0 to 65535			
Description			
-			

60E3.23h Supported homing method 25

Hex:	60E3-23h	Effective mode:	N/A
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	25	Change:	Unchangeable
Value Range:			
0 to 65535			
Description			
-			

60E3.24h Supported homing method 26

Hex:	60E3-24h	Effective mode:	N/A
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	26	Change:	Unchangeable
Value Range:			
0 to 65535			

Description

-

60E3.25h Supported homing method 27

Hex: 60E3-25h

Effective N/A

mode:

Min.: 0

Unit: -

Max.: 65535

Data Type: UInt16

Default: 27

Change: Unchangeable

Value Range:

0 to 65535

Description

-

60E3.26h Supported homing method 28

Hex: 60E3-26h

Effective N/A

mode:

Min.: 0

Unit: -

Max.: 65535

Data Type: UInt16

Default: 28

Change: Unchangeable

Value Range:

0 to 65535

Description

-

60E3.27h Supported homing method 29

Hex: 60E3-27h

Effective N/A

mode:

Min.: 0

Unit: -

Max.: 65535

Data Type: UInt16

Default: 29

Change: Unchangeable

Value Range:

0 to 65535

Description

-

60E3.28h Supported homing method 30

Hex: 60E3-28h

Effective N/A

mode:

Min.: 0

Unit: -

Max.: 65535

Data Type: UInt16

Default: 30

Value Range:

0 to 65535

Description

-

Change:

Unchangeable

60E3.29h Supported homing method 33

Hex: 60E3-29h

Min.: 0

Max.: 65535

Default: 33

Value Range:

0 to 65535

Description

-

Effective mode:

Unit:

Data Type: UInt16

Change: Unchangeable

N/A

-

60E3.30h Supported homing method 34

Hex: 60E3-30ht

Min.: 0

Max.: 65535

Default: 34

Value Range:

0 to 65535

Description

-

Effective mode:

Unit:

Data Type: UInt16

Change: Unchangeable

N/A

-

60E3.31h Supported homing method 35

Hex: 60E3-31h

Min.: 0

Max.: 65535

Default: 35

Value Range:

0 to 65535

Description

-

Effective mode:

Unit:

Data Type: UInt16

Change: Unchangeable

N/A

-

60E3.32h Supported homing method -1

Hex: 60E3-32h

Effective mode:

N/A

Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	-1	Change:	Unchangeable

Value Range:

0 to 65535

Description

-

60E3.33h Supported homing method -2

Hex:	60E3-33h	Effective mode:	N/A
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	-2	Change:	Unchangeable

Value Range:

0 to 65535

Description

-

60E3.34h Supported homing method -3

Hex:	60E3-34h	Effective mode:	N/A
Min.:	0	Unit:	-
Max.:	65535	Data Type:	UInt16
Default:	-3	Change:	Unchangeable

Value Range:

0 to 65535

Description

-

60E6h Actual position calculation method

Hex:	60E6h	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	1	Data Type:	UInt8
Default:	0	Change:	Real-time

Value Range:

0 to 1

Description

Defines the method for calculating the mechanical position after homing is done. After homing is triggered, changes in 60E6h will be blocked.

Value	Actual position calculation method
0	Absolute homing After homing is completed: $6064h \text{ (Position actual value)} = 607Ch \text{ (Home offset)}$
1	Relative homing After homing is completed: $6064h \text{ (Position actual value)} = \text{Present position feedback} + 607Ch \text{ (Home offset)}$

60F4h Position deviation

Hex:	60F4h	Effective mode:	-
Min.:	-2147483648	Unit:	Reference unit
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Unchangeable

Value Range:

-2147483648 to 2147483647

Description

Indicates the position deviation (reference unit).

60FCh Position reference

Hex:	60FCh	Effective mode:	-
Min.:	-2147483648	Unit:	Encoder unit
Max.:	2147483647	Data Type:	Int32
Default:	0	Change:	Unchangeable

Value Range:

-2147483648 to 2147483647

Description

Indicates the position reference (encoder unit).

If no warning is detected when the S-ON signal is active, the relation between the position reference in reference unit and that in encoder unit is as follows:

$60FCh \text{ (in encoder unit)} = 6062h \text{ (in reference unit)} \times 6091h$

60FDh DI state

Hex:	60FDh	Effective mode:	Real time
Min.:	0	Unit:	-

Max.: 4294967295

Data Type: UInt32

Default: 0

Change: Unchangeable

Value Range:

0 to 4294967295

Description

Indicates current DI logic of the drive.

0: Inactive

1: Active

The signal indicated by each bit is described as follows:

Table 5-4 The DI signal indicated by each bit

bit	Description
0	Reverse overtravel active
1	Forward overtravel active
2	Home signal active
3 to 15	N/A
16	DI1 input active
17	DI2 input active
18	DI3 input active
19	DI4 input active
20	DI5 input active
21 to 26	N/A
27	STO1 signal input
28	STO2 signal input
29	EDM output active
30	Z signal active ^[1]
31	N/A

60FE.01h Physical output

Hex: 60FE-01h

Effective Real time

mode:

Min.: 0

Unit: -

Max.: 4294967295

Data Type: UInt32

Default: 0

Change: Real-time

Value Range:

0 to 4294967295

Description

Indicates the DO logic.

The signal indicated by each bit is described as follows:

bit	Related Signal	Description
0 to 15	N/A	-
16	DO1	Forced output (0: off, 1: on); when bit 16 of 60FE.02 is set to 1
17	DO2	Forced output (0: off, 1: on); when bit 17 of 60FE.02 is set to 1
18 to 25	N/A	-
26	Gain Switchover	Switched between P and PI, only when bit26 of 60FE.02 is set to 1
27 to 31	N/A	-

60FE.02h Bitmask

Hex: 60FE-02h

Effective mode: Real time

Min.: 0

Unit: -

Max.: 4294967295

Data Type: UInt32

Default: 0

Change: Real-time

Value Range:

0 to 4294967295

Description

0 to 15: N/A

16: Forced DO1 output enable

17: Forced DO2 output enable

18 to 25: N/A

26: P/PI switchover enable

27 to 31: N/A

60FFh Target speed

Hex: 60FFh

Effective mode: Real time

Min.: -2147483648

Unit: Reference unit/s

Max.: 2147483647

Data Type: Int32

Default: 0

Change: Real-time

Value Range:

-2147483648 to +2147483647

Description

Defines the target speed in the cyclic synchronous velocity mode/profile velocity mode.

6502h Supported drive mode

Hex:	6502h	Effective mode:	N/A
Min.:	0	Unit:	-
Max.:	4294967295	Data Type:	UInt32
Default:	941	Change:	Unchangeable

Value Range:

0 to 4294967295

Description

Defines the target speed in the cyclic synchronous velocity mode/profile velocity mode.

6 Parameter List

6.1 Parameter Group H00

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H00.00	2000-01h	Motor SN	0 to 65535	14101	-	At stop	"H00_en.00" on page 170
H00.02	2000-03h	Customized No.	0.00 to 42949672.95	0.00	-	Unchangeable	"H00_en.02" on page 170
H00.04	2000-05h	Encoder version	0.0 to 6553.5	0.0	-	Unchangeable	"H00_en.04" on page 170
H00.05	2000-06h	Serial-type motor code	0 to 65535	0	-	Unchangeable	"H00_en.05" on page 171
H00.06	2000-07h	FPGA customized SN	0.00 to 655.35	0.00	-	Unchangeable	"H00_en.06" on page 171
H00.07	2000-08h	STO version	0.0 to 6553.5	0.0	-	Unchangeable	"H00_en.07" on page 171
H00.08	2000-09h	Bus encoder type	0.0 to 6553.5	0.0	-	At stop	"H00_en.08" on page 171

6.2 Parameter Group H01

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H01.00	2001-01h	MCU software version	0.0 to 6553.5	0.0	-	Unchangeable	"H01_en.00" on page 172
H01.01	2001-02h	FPGA software version	0.0 to 6553.5	0.0	-	Unchangeable	"H01_en.01" on page 172
H01.10	2001-0Bh	Drive series No.	2: S1R6 3: S2R8 5: S5R5 6: S7R6 7: S012 10001: T3R5 10002: T5R4 10003: T8R4 10004: T012 10005: T017 10006: T021 10007: T026	3	-	At stop	"H01_en.10" on page 172
H01.11	2001-0Ch	DC-AC voltage class	0 VAC–65535 VAC	220	VAC	Unchangeable	"H01_en.11" on page 174

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H01.12	2001-0Dh	Drive rated power	0.00 kW–655.35kW	0.40	kW	Unchangeable	"H01_en.12" on page 175
H01.14	2001-0Fh	Max. output power of the drive	0.00 kW–655.35kW	0.40	kW	Unchangeable	"H01_en.14" on page 175
H01.16	2001-11h	Rated output current of the drive	0.00A to 655.35A	2.80	A	Unchangeable	"H01_en.16" on page 175
H01.18	2001-13h	Max. output current of the drive	0.00A to 655.35A	10.10	A	Unchangeable	"H01_en.18" on page 175
H01.40	2001-29h	DC bus overvoltage protection threshold	0 VDC to 2000 VDC	420	VDC	Unchangeable	"H01_en.40" on page 176

6.3 Parameter Group H02

Param.	Object Dictionary	Name	Value	Default	Unit	Change Mode	Page
H02.00	2002-01h	Control mode	0: Velocity mode 1: Position mode 2: Torque mode 9: EtherCAT mode	9	-	At stop	"H02_en.00" on page 176
H02.01	2002-02h	Absolute system selection	0: Incremental mode 1: Absolute position linear mode 2: Absolute position rotation mode 3: Absolute position linear mode (without encoder overflow warning) 4: Absolute position single-turn mode	0	-	At stop	"H02_en.01" on page 177
H02.02	2002-03h	Rotation direction selection	0: Counterclockwise (CCW) as forward direction 1: Clockwise (CW) as forward direction	0	-	At stop	"H02_en.02" on page 178

Param.	Object Dictionary	Name	Value	Default	Unit	Change Mode	Page
H02.05	2002-06h	Stop mode at S-ON OFF	-4: Ramp to stop as defined by 6085h, keeping dynamic braking state -3: Stop at zero speed, keeping dynamic braking state -2: Ramp to stop as defined by 6084h/609Ah, keeping dynamic braking state -1: Dynamic braking stop, keeping dynamic braking state 0: Coast to stop, keeping de-energized state 1: Ramp to stop as defined by 6084h/ 609Ah, keeping de-energized state 2: Stop at zero speed, keeping de-energized state	0	-	At stop	"H02_en.05" on page 179
H02.06	2002-07h	Stop mode at No.2 fault	-5: Stop at zero speed, keeping dynamic braking state -4: Stop at emergency stop torque, keeping dynamic braking state -3: Ramp to stop as defined by 6085h, keeping dynamic braking state -2: Ramp to stop as defined by 6084h/ 609Ah, keeping dynamic braking state -1: Dynamic braking stop, keeping dynamic braking state 0: Coast to stop, keeping de-energized state 1: Ramp to stop as defined by 6084h/ 609Ah, keeping de-energized state 2: Ramp to stop as defined by 6085h, keeping de-energized state 3: Stop at emergency stop torque, keeping de-energized state	2	-	At stop	"H02_en.06" on page 180

Param.	Object Dictionary	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 3: Stop based on ramp, keeping de-energized state 4: Stop based on ramp, keeping position lock state 5: Dynamic braking stop, keeping de-energized state 6: Dynamic braking stop, keeping dynamic braking state 7: Not responding to overtravel	1	-	At stop	"H02_en.07" on page 181
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 182
H02.09	2002-0Ah	Delay from brake output ON to command received	0ms to 500ms	250	ms	Real-time	"H02_en.09" on page 183
H02.10	2002-0Bh	Delay from brake output OFF to motor de-energized	50ms to 1000ms	150	ms	Real-time	"H02_en.10" on page 183
H02.11	2002-0Ch	Motor speed threshold at brake output OFF in rotation state	20 rpm to 3000 rpm	30	RPM	Real-time	"H02_en.11" on page 184
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 184
H02.15	2002-10h	LED warning display	0: Output warning information immediately 1: Not output warning information	0	-	Real-time	"H02_en.15" on page 184
H02.17	2002-12h	Stop mode upon main circuit power failure	0: Keep current operation 1: Stop according to H02.06 2: Stop at S-ON OFF as defined by H02.05 3: Stop according to 605A	2	-	Real-time	"H02_en.17" on page 185

Param.	Object Dictionary	Name	Value	Default	Unit	Change Mode	Page
H02.21	2002-16h	Permissible minimum resistance of regenerative resistor	1Ω to 1000 Ω	40	Ω	Unchangeable	" H02_en.21" on page 185
H02.22	2002-17h	Power of built-in regenerative resistor	0W–65535W	50	W	Unchangeable	" H02_en.22" on page 185
H02.23	2002-18h	Resistance of built-in regenerative resistor	0Ω to 65535Ω	50	Ω	Unchangeable	" H02_en.23" on page 186
H02.24	2002-19h	Resistor heat dissipation coefficient	10% to 100%	30	%	Real-time	" H02_en.24" on page 186
H02.25	2002-1Ah	Regenerative resistor type	0: Built-in 1: External, natural cooling 2: External, forced air cooling 3: No resistor needed	0	-	Real-time	" H02_en.25" on page 187
H02.26	2002-1Bh	Power of external regenerative resistor	1W–65535W	40	W	Real-time	" H02_en.26" on page 187
H02.27	2002-1Ch	Resistance of external regenerative resistor	15 Ω to 1000 Ω	50	Ω	Real-time	" H02_en.27" on page 188
H02.30	2002-1Fh	User password	0 to 65535	0	-	Real-time	" H02_en.30" on page 188
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 188
H02.32	2002-21h	Selection of parameters in group H0b	0 to 99	50	-	Real-time	" H02_en.32" on page 189
H02.35	2002-24h	Keypad data update frequency	0Hz to 20Hz	0	Hz	Real-time	" H02_en.35" on page 189
H02.38	2002-27h	Overload time of external resistor	0s to 200s	40	-	Real-time	" H02_en.38" on page 189

Param.	Object Dictionary	Name	Value	Default	Unit	Change Mode	Page
H02.41	2002-2Ah	Manufacturer password	0 to 65535	0	-	Real-time	"H02_en.41" on page 190
H02.47	2002-30h	Delay from S-ON OFF to brake output OFF in rotation state (effective on power line breakage)	0ms to 1000ms	10	ms	Real-time	"H02_en.47" on page 190

6.4 Parameter Group H03

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H03.02	2003-03h	D11 function selection	0: Undefined 1: Drive enable 2: Fault reset 14: Positive limit switch 15: Negative limit switch 31: Home switch 34: Emergency stop 38: Touch probe 1 39: Touch probe 2	14	-	Real-time	"H03_en.02" on page 190
H03.03	2003-04h	D11 logic selection	0: Normally open 1: Closed	0	-	Real-time	"H03_en.03" on page 191
H03.04	2003-05h	D12 function selection	Same as H03.02.	15	-	Real-time	"H03_en.04" on page 192
H03.05	2003-06h	D12 logic selection	0: Normally open 1: Closed	0	-	Real-time	"H03_en.05" on page 192
H03.06	2003-07h	D13 function selection	Same as H03.02.	31	-	Real-time	"H03_en.06" on page 192
H03.07	2003-08h	D13 logic selection	0: Normally open 1: Closed	0	-	Real-time	"H03_en.07" on page 193
H03.08	2003-09h	D14 function selection	Same as H03.02.	39	-	Real-time	"H03_en.08" on page 193
H03.09	2003-0Ah	D14 logic selection	0: Normally open 1: Closed	0	-	Real-time	"H03_en.09" on page 193
H03.10	2003-0Bh	D15 function selection	Same as H03.02.	38	-	Real-time	"H03_en.10" on page 194
H03.11	2003-0Ch	D15 logic selection	0: Normally open 1: Closed	0	-	Real-time	"H03_en.11" on page 194
H03.60	2003-3Dh	D11 fitter time	0.00ms to 500.00ms	0.50	ms	Real-time	"H03_en.60" on page 194

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H03.61	2003-3Eh	DI2 fitter time	0.00ms to 500.00ms	0.50	ms	Real-time	"H03_en.61" on page 194
H03.62	2003-3Fh	DI3 fitter time	0.00ms to 500.00ms	0.50	ms	Real-time	"H03_en.62" on page 195
H03.63	2003-40h	DI4 fitter time	0.00ms to 500.00ms	0.50	ms	Real-time	"H03_en.63" on page 195
H03.64	2003-41h	DI5 fitter time	0.00ms to 500.00ms	0.50	ms	Real-time	"H03_en.64" on page 195

6.5 Parameter Group H04

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H04.00	2004-01h	DO1 function selection	0: Undefined 1: Servo ready 2: Motor rotation 5: Positioning completed 9: Brake output 10: Warning 11: Fault 18: Torque reached 25: Comparison output 31: EtherCAT forced output 32: EDM safe state	1	-	Real-time	"H04_en.00" on page 195
H04.01	2004-02h	DO1 logic selection	0: Normally open 1: Closed	0	-	Real-time	"H04_en.01" on page 196
H04.02	2004-03h	DO2 function selection	Same as H04.00.	11	-	Real-time	"H04_en.02" on page 197
H04.03	2004-04h	DO2 logic selection	0: Normally open 1: Closed	0	-	Real-time	"H04_en.03" on page 197
H04.04	2004-05h	DO3 function selection	Same as H04.00.	9	-	Real-time	"H04_en.04" on page 198

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H04.05	2004-06h	DO3 logic selection	0: Normally open 1: Closed	0	-	Real-time	"H04_en.05" on page 198
H04.23	2004-18h	EtherCAT forced DO logic in non-OP status	0: Status of DO1, DO2, and DO3 unchanged in the non-OP status 1: No output in DO1 and status of others unchanged in the non-OP status 2: No output in DO2 and status of others unchanged in the non-OP status 3: No output in DO1 or DO2 and status of DO3 unchanged in the non-OP status 4: No output in DO3 and status of others unchanged in the non-OP status 5: No output in DO1 or DO3 and status of DO2 unchanged in the non-OP status 6: No output in DO2 or DO3 and status of DO1 unchanged in the non-OP status 7: No output in DO1, DO2, or DO3 in the non-OP status	0	-	Real-time	"H04_en.23" on page 198

6.6 Parameter Group H05

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H05.04	2005-05h	First-order low-pass filter time constant	0.0 ms to 6553.5ms	0.0	ms	At stop	"H05_en.04" on page 199
H05.05	2005-06h	Moving average filter time constant 1	0.0 ms to 1000.0 ms	0.0	ms	At stop	"H05_en.05" on page 199
H05.06	2005-07h	Moving average filter time constant 2	0.0 ms to 128.0ms	0.0	ms	At stop	"H05_en.06" on page 200
H05.07	2005-08h	Numerator of electronic gear ratio	0 to 4294967295	1	-	Real-time	"H05_en.07" on page 200
H05.09	2005-0Ah	Denominator of electronic gear ratio	0 to 4294967295	1	-	Real-time	"H05_en.09" on page 200

Parameter List

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H05.19	2005-14h	Speed feedforward control	0: No speed feedforward 1: Internal speed feedforward 2: 60B1h used as speed feedforward 3: Zero phase control	1	-	At stop	"H05_en.19" on page 200
H05.21	2005-16h	Threshold of positioning completed	0 to 65535	5872	-	Real-time	"H05_en.21" on page 201
H05.30	2005-1Fh	Local homing	0: No operation 6: Current position as the home	0	-	Real-time	"H05_en.30" on page 201
H05.35	2005-24h	Home search time limit	0.0s to 6553.5s	5000.0	-	Real-time	"H05_en.35" on page 202
H05.36	2005-25h	Local home offset	-1073741824 to 1073741824	0	Encoder unit	Real-time	"H05_en.36" on page 202
H05.50	2005-33h	Mechanical gear ratio (numerator)	1 to 65535	1	-	At stop	"H05_en.50" on page 203
H05.51	2005-34h	Denominator of mechanical gear ratio	1 to 65535	1	-	At stop	"H05_en.51" on page 203
H05.52	2005-35h	Pulses per load revolution in absolute position rotation mode (low 32 bits)	0 to 4294967295	0	Encoder unit	At stop	"H05_en.52" on page 203
H05.54	2005-37h	Pulses per load revolution in absolute position rotation mode (high 32 bits)	0 to 4294967295	0	Encoder unit	At stop	"H05_en.54" on page 203
H05.57	2005-3Ah	Single-turn absolute mode homing offset	-2147483648 to 2147483647	0	-	At stop	"H05_en.57" on page 204
H05.59	2005-3Ch	Hard limit homing torque limit	0.0 to 400.0	200.0	-	Real-time	"H05_en.59" on page 204
H05.64	2005-41h	Optocoupler state for probe rising edge	0: Off 1: On	0	-	At stop	"H05_en.64" on page 204

6.7 Parameter Group H06

Param.	Object Dictionary	Name	Value	Default	Unit	Change Mode	Page
H06.03	2006-04h	Speed reference	–6000 rpm to +6000 rpm	200	RPM	Real-time	"H06_en.03" on page 205
H06.04	2006-05h	DI jog speed setpoint	0rpm to 6000rpm	150	RPM	Real-time	"H06_en.04" on page 205
H06.05	2006-06h	Acc. ramp time of speed reference	0ms to 65535ms	0	ms	Real-time	"H06_en.05" on page 205
H06.06	2006-07h	Dec. ramp time of speed reference	0ms to 65535ms	0	ms	Real-time	"H06_en.06" on page 206
H06.08	2006-09h	Forward speed limit	0rpm to 6000rpm	6000	RPM	Real-time	"H06_en.08" on page 206
H06.09	2006-0Ah	Reverse speed limit	0rpm to 6000rpm	6000	RPM	Real-time	"H06_en.09" on page 206
H06.10	2006-0Bh	Deceleration unit in emergency stop	0: Multiplied by 1 1: Multiplied by 10 2: Multiplied by 100	0	-	At stop	"H06_en.10" on page 206
H06.11	2006-0Ch	Torque feedforward control	0: No torque feedforward 1: Internal torque feedforward 2: 60B2h as external torque feedforward	1	-	Real-time	"H06_en.11" on page 207
H06.12	2006-0Dh	Acceleration ramp time of jog speed	0ms to 65535ms	10	ms	Real-time	"H06_en.12" on page 208
H06.13	2006-0Eh	Speed feedforward smoothing filter	Note [1]: For the -NS model, the setpoint is 0% to 300 ms.	0	us	Real-time	"H06_en.13" on page 209
H06.14	2006-0Fh	CSV instruction interpolation	0: Disabled 1: Enabled	0	-	At stop	"H06_en.14" on page 209
H06.16	2006-11h	Threshold of TGON (motor rotation) signal	0 rpm to 1000 rpm	20	RPM	Real-time	"H06_en.16" on page 209
H06.28	2006-1Dh	Cogging torque compensation selection	0: Disabled 1: Enabled	1	-	At stop	"H06_en.28" on page 210
H06.36	2006-25h	Sine velocity superposition enable	0: Disabled 1: Enabled	0	-	Real-time	"H06_en.36" on page 210

Param.	Object Dictionary	Name	Value	Default	Unit	Change Mode	Page
H06.37	2006-26h	Sine velocity superposition frequency	0Hz to 100Hz	50	Hz	Real-time	"H06_en.37" on page 210
H06.38	2006-27h	Sine velocity superposition amplitude	0 RPM –100 RPM	30	RPM	Real-time	"H06_en.38" on page 210

6.8 Parameter Group H07

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H07.03	2007-04h	Torque reference set using the operating panel	-400.0% to 400.0%	0.0	%	Real-time	"H07_en.03" on page 211
H07.05	2007-06h	Torque reference filter time constant 1	0.00ms to 30.00ms	0.50	ms	Real-time	"H07_en.05" on page 211
H07.06	2007-07h	Torque reference filter time constant 2	0.00ms to 30.00ms	0.27	ms	Real-time	"H07_en.06" on page 211
H07.09	2007-0Ah	Forward internal torque limit	0.0% to 400.0%	350.0	%	Real-time	"H07_en.09" on page 212
H07.10	2007-0Bh	Reverse internal torque limit	0.0% to 400.0%	350.0	%	Real-time	"H07_en.10" on page 212
H07.15	2007-10h	Emergency-stop torque	0.0% to 400.0%	100.0	%	Real-time	"H07_en.15" on page 212
H07.19	2007-14h	Internal speed limit in torque control	0rpm to 6000rpm	3000	RPM	Real-time	"H07_en.19" on page 212
H07.20	2007-15h	Negative internal speed limit in torque control	0rpm to 6000rpm	3000	RPM	Real-time	"H07_en.20" on page 213
H07.21	2007-16h	Torque reach base value	0.0% to 400.0%	0.0	%	Real-time	"H07_en.21" on page 213
H07.22	2007-17h	Output torque upon torque reach and DO signal activation	0.0% to 400.0%	20.0	%	Real-time	"H07_en.22" on page 213

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H07.23	2007-18h	Output torque upon torque reach and DO signal deactivation	0.0% to 400.0%	10.0	%	Real-time	"H07_en.23" on page 214
H07.24	2007-19h	Field weakening depth	60% to 115%	115	%	Real-time	"H07_en.24" on page 214
H07.25	2007-1Ah	Max. permissible demagnetizing current	0% to 200%	100	%	Real-time	"H07_en.25" on page 215
H07.26	2007-1Bh	Field weakening selection	0: Disabled 1: Enabled	0	-	At stop	"H07_en.26" on page 215
H07.27	2007-1Ch	Flux weakening gain	0.001 to 1.000	0.030	-	Real-time	"H07_en.27" on page 215
H07.28	2007-1Dh	Speed of flux weakening point	0 RPM to 65535 RPM	0	RPM	At stop	"H07_en.28" on page 216
H07.36	2007-25h	Time constant of low-pass filter 2	0.00ms to 10.00ms	0.00	ms	Real-time	"H07_en.36" on page 216
H07.37	2007-26h	Torque reference filter selection	0: First-order filter 1: Biquad filter	0	-	Real-time	"H07_en.37" on page 216
H07.38	2007-27h	Biquad filter attenuation ratio	0 to 50	16	-	At stop	"H07_en.38" on page 216
H07.40	2007-29h	Time threshold of speed limit	0ms to 300ms	10	ms	Real-time	"H07_en.40" on page 217

6.9 Parameter Group H08

Param.	Object Dictionary	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 217
H08.01	2008-02h	Speed loop integral time constant	0.15ms to 512.00ms	19.89	ms	Real-time	"H08_en.01" on page 217
H08.02	2008-03h	Position loop gain	0.1Hz to 2000.0Hz	64.0	Hz	Real-time	"H08_en.02" on page 218

Param.	Object Dictionary	Name	Value	Default	Unit	Change Mode	Page
H08.03	2008-04h	2nd speed loop gain	0.1Hz to 2000.0Hz	75.0	Hz	Real-time	"H08_en.03" on page 218
H08.04	2008-05h	2nd speed loop integral time constant	0.15ms to 512.00ms	10.61	ms	Real-time	"H08_en.04" on page 218
H08.05	2008-06h	2nd position loop gain	0.1Hz to 2000.0Hz	120.0	Hz	Real-time	"H08_en.05" on page 219
H08.08	2008-09h	2nd gain mode setting	0: Fixed to the 1st gain, switched between P and PI as defined by bit26 of external 60FEh 1: Switched between the 1st and 2nd gain sets as defined by H08.09	1	-	Real-time	"H08_en.08" on page 219
H08.09	2008-0Ah	Gain switchover condition	0: Fixed to the 1st gain set (PS) 1: Switched as defined by bit26 of 60FEh 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 220
H08.10	2008-0Bh	Gain switchover delay	0.0 ms to 1000.0 ms	5.0	ms	Real-time	"H08_en.10" on page 222
H08.11	2008-0Ch	Gain switchover level	0 to 20000	50	-	Real-time	"H08_en.11" on page 222
H08.12	2008-0Dh	Gain switchover hysteresis	0 to 20000	30	-	Real-time	"H08_en.12" on page 223
H08.13	2008-0Eh	Position gain switchover time	0.0 ms to 1000.0 ms	3.0	ms	Real-time	"H08_en.13" on page 223
H08.15	2008-10h	Load moment of inertia ratio	0.00 to 120.00	3.00	-	Real-time	"H08_en.15" on page 223

Param.	Object Dictionary	Name	Value	Default	Unit	Change Mode	Page
H08.16	2008-11h	Save iTunes parameter	0 to 65535	0	-	Real-time	"H08_en.16" on page 224
H08.17	2008-12h	Zero phase delay	0.0 ms to 4.0ms	0.0	ms	Real-time	"H08_en.17" on page 224
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 224
H08.19	2008-14h	Speed feedforward gain	0.0% to 100.0%	0.0	%	Real-time	"H08_en.19" on page 225
H08.20	2008-15h	Torque feedforward filter time constant	0.00ms to 64.00ms	0.50	ms	Real-time	"H08_en.20" on page 225
H08.21	2008-16h	Torque feedforward gain	0.0% to 300.0%	0.0	%	Real-time	"H08_en.21" on page 225
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 226
H08.23	2008-18h	Cutoff frequency of speed feedback low-pass filter	100Hz to 8000 Hz	8000	Hz	Real-time	"H08_en.23" on page 226
H08.24	2008-19h	PDFF control coefficient	0.0% to 200.0%	100.0	%	Real-time	"H08_en.24" on page 227
H08.27	2008-1Ch	Speed observer cutoff frequency	50 Hz to 600Hz	170	Hz	Real-time	"H08_en.27" on page 227
H08.28	2008-1Dh	Speed observer inertia correction coefficient	1% to 1600%	100	%	Real-time	"H08_en.28" on page 227
H08.29	2008-1Eh	Speed observer filter time	0.00ms to 10.00ms	0.80	ms	Real-time	"H08_en.29" on page 228
H08.31	2008-20h	Disturbance cutoff frequency	1Hz to 4000Hz	600	Hz	Real-time	"H08_en.31" on page 228
H08.32	2008-21h	Disturbance compensation gain	0% to 100%	0	%	Real-time	"H08_en.32" on page 228

Param.	Object Dictionary	Name	Value	Default	Unit	Change Mode	Page
H08.33	2008-22h	Disturbance observer inertia correction coefficient	1% to 1600%	100	%	Real-time	" H08_en.33" on page 228
H08.34	2008-23h	The constant ratio of APF for perturbation observation	0% to 1600%	0	%	Real-time	" H08_en.34" on page 229
H08.35	2008-24h	Vibration suppression frequency	0Hz to 1600Hz	0	Hz	Real-time	" H08_en.35" on page 229
H08.36	2008-25h	Vibration suppression coefficient of disturbance observation	0 to 200	0	-	Real-time	" H08_en.36" on page 229
H08.37	2008-26h	Phase modulation for medium-frequency jitter suppression 2	-90° to 90°	0	°	Real-time	" H08_en.37" on page 229
H08.38	2008-27h	Medium-frequency suppression 2 frequency	0Hz to 1000Hz	0	Hz	Real-time	" H08_en.38" on page 230
H08.39	2008-28h	Compensation gain of medium-frequency jitter suppression 2	0% to 300%	0	%	Real-time	" H08_en.39" on page 230
H08.40	2008-29h	Speed observer selection	0: Disabled 1: Enabled	0	-	Real-time	" H08_en.40" on page 230
H08.42	2008-2Bh	Model control selection	0: Disabled 1: Enabled 2: Dual-inertia model	0	-	Real-time	" H08_en.42" on page 231
H08.43	2008-2Ch	Model gain	0.1 to 2000.0	40.0	-	Real-time	" H08_en.43" on page 231
H08.46	2008-2Fh	Feedforward value	0.0 to 102.4	95.0	-	Real-time	" H08_en.46" on page 231
H08.53	2008-36h	Medium- and low-frequency jitter suppression frequency 3	0.0Hz to 300.0Hz	0.0	Hz	Real-time	" H08_en.53" on page 231

Param.	Object Dictionary	Name	Value	Default	Unit	Change Mode	Page
H08.54	2008-37h	Medium- and low-frequency jitter suppression compensation 3	0% to 200%	0	%	Real-time	" H08_en.54" on page 232
H08.56	2008-39h	Medium- and low-frequency jitter suppression phase modulation 3	0% to 600%	100	%	Real-time	" H08_en.56" on page 232
H08.59	2008-3Ch	Medium- and low-frequency jitter suppression frequency 4	0.0Hz to 300.0Hz	0.0	Hz	Real-time	" H08_en.59" on page 232
H08.60	2008-3Dh	Medium- and low-frequency jitter suppression compensation 4	0% to 200%	0	%	Real-time	" H08_en.60" on page 232
H08.61	2008-3Eh	Medium- and low-frequency jitter suppression phase modulation 4	0% to 600%	100	%	Real-time	" H08_en.61" on page 233
H08.62	2008-3Fh	Position loop integral time constant	0.15 to 512.00	512.00	-	Real-time	" H08_en.62" on page 233
H08.63	2008-40h	2nd position loop integral time constant	0.15 to 512.00	512.00	-	Real-time	" H08_en.63" on page 233
H08.64	2008-41h	Speed observer feedback source	0: Disabled 1: Enabled	0	-	Real-time	" H08_en.64" on page 234

6.10 Parameter Group H09

Param.	Object Dictionary	Name	Value	Default	Unit	Change Mode	Page
H09.00	2009-01h	Auto-adjustment 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: Normal mode+Inertia auto-tuning 6: Quick positioning mode+Inertia auto-tuning	4	-	Real-time	"H09_en.00" on page 234
H09.01	2009-02h	Stiffness level selection	0 to 41	15	-	Real-time	"H09_en.01" on page 234
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 235
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 235
H09.05	2009-06h	Offline inertia auto-tuning mode	0: Bi-directional 1: Unidirectional	0	-	At stop	"H09_en.05" on page 235
H09.06	2009-07h	Max. speed of inertia auto-tuning	100rpm to 1000rpm	500	RPM	At stop	"H09_en.06" on page 236
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 236

Param.	Object Dictionary	Name	Value	Default	Unit	Change Mode	Page
H09.08	2009-09h	Interval time after an individual inertia auto-tuning	50ms to 10000ms	800	ms	At stop	"H09_en.08" on page 236
H09.09	2009-0Ah	Number of motor revolutions per inertia auto-tuning	0.00 to 100.00	1.00	-	Real-time	"H09_en.09" on page 237
H09.11	2009-0Ch	Vibration threshold	0.0% to 100.0%	5.0	%	Real-time	"H09_en.11" on page 237
H09.12	2009-0Dh	Frequency of the 1st notch	50 Hz to 8000 Hz	8000	Hz	Real-time	"H09_en.12" on page 237
H09.13	2009-0Eh	Width level of the 1st notch	0 to 20	2	-	Real-time	"H09_en.13" on page 238
H09.14	2009-0Fh	Depth level of the 1st notch	0 to 99	0	-	Real-time	"H09_en.14" on page 238
H09.15	2009-10h	Frequency of the 2nd notch	50 Hz to 8000 Hz	8000	Hz	Real-time	"H09_en.15" on page 238
H09.16	2009-11h	Width level of the 2nd notch	0 to 20	2	-	Real-time	"H09_en.16" on page 239
H09.17	2009-12h	Depth level of the 2nd notch	0 to 99	0	-	Real-time	"H09_en.17" on page 239
H09.18	2009-13h	Frequency of the 3rd notch	50 Hz to 8000 Hz	8000	Hz	Real-time	"H09_en.18" on page 239
H09.19	2009-14h	Width level of the 3rd notch	0 to 20	2	-	Real-time	"H09_en.19" on page 240
H09.20	2009-15h	Depth level of the 3rd notch	0 to 99	0	-	Real-time	"H09_en.20" on page 240
H09.21	2009-16h	Frequency of the 4th notch	50 Hz to 8000 Hz	8000	Hz	Real-time	"H09_en.21" on page 240
H09.22	2009-17h	Width level of the 4th notch	0 to 20	2	-	Real-time	"H09_en.22" on page 240
H09.23	2009-18h	Depth level of the 4th notch	0 to 99	0	-	Real-time	"H09_en.23" on page 241
H09.24	2009-19h	Auto-tuned resonance frequency	0Hz to 5000Hz	0	Hz	Unchange able	"H09_en.24" on page 241
H09.30	2009-1Fh	Tension fluctuation compensation gain	-100.0 to 100.0	0.0	-	Real-time	"H09_en.30" on page 241

Param.	Object Dictionary	Name	Value	Default	Unit	Change Mode	Page
H09.31	2009-20h	Tension fluctuation compensation filter time	0.00 to 25.00	0.50	-	Real-time	"H09_en.31" on page 241
H09.32	2009-21h	Gravity compensation value	-100.0% to 100.0%	0.0	%	Real-time	"H09_en.32" on page 242
H09.33	2009-22h	Positive friction compensation value	0.0% to 100.0%	0.0	%	Real-time	"H09_en.33" on page 242
H09.34	2009-23h	Negative friction compensation value	-100.0% to 0.0%	0.0	%	Real-time	"H09_en.34" on page 242
H09.35	2009-24h	Friction compensation speed	0.0 to 20.0	2.0	-	Real-time	"H09_en.35" on page 243
H09.36	2009-25h	Friction compensation speed	0: Slow mode+Speed reference 1: Slow mode+Model speed 2: Slow mode+Speed feedback 3: Slow mode+Observe speed 16: Quick mode +Speed reference 17: Quick mode +Model speed 18: Quick mode +Speed feedback 19: Quick mode+Observe speed	0	-	Real-time	"H09_en.36" on page 243
H09.37	2009-26h	Vibration monitoring time	0 to 65535	300	-	Real-time	"H09_en.37" on page 244
H09.38	2009-27h	Frequency of low-frequency resonance suppression 1 at the mechanical end	1.0Hz to 100.0Hz	100.0	Hz	At stop	"H09_en.38" on page 244
H09.39	2009-28h	Low-frequency resonance suppression 1 at the mechanical end	0 to 3	2	-	At stop	"H09_en.39" on page 244

Param.	Object Dictionary	Name	Value	Default	Unit	Change Mode	Page
H09.44	2009-2Dh	Frequency of low-frequency resonance suppression 2 at mechanical load end	0.0 to 200.0	0.0	-	Real-time	" H09_en.44" on page 244
H09.45	2009-2Eh	Responsiveness of low-frequency resonance suppression 2 at mechanical load end	0.01 to 10.00	1.00	-	Real-time	" H09_en.45" on page 245
H09.47	2009-30h	Width of low-frequency resonance suppression 2 at mechanical load end	0.00 to 2.00	1.00	-	Real-time	" H09_en.47" on page 245
H09.49	2009-32h	Frequency of low-frequency resonance suppression 3 at mechanical load end	0.0 to 200.0	0.0	-	Real-time	" H09_en.49" on page 245
H09.50	2009-33h	Responsiveness of low-frequency resonance suppression 3 at mechanical load end	0.01 to 10.00	1.00	-	Real-time	" H09_en.50" on page 245
H09.52	2009-35h	Width of low-frequency resonance suppression 3 at mechanical load end	0.00 to 2.00	1.00	-	Real-time	" H09_en.52" on page 246
H09.54	2009-37h	Resonance detection torque threshold	0.0 to 300.0	50.0	-	Real-time	" H09_en.54" on page 246
H09.55	2009-38h	Medium frequency vibration suppression 2 cut-off frequency	0 to 65535	1200	-	Real-time	" H09_en.55" on page 246

Param.	Object Dictionary	Name	Value	Default	Unit	Change Mode	Page
H09.56	2009-39h	Max. overmodulation one-key adjustment	0 to 65535	2936	-	Real-time	"H09_en.56" on page 247
H09.57	2009-3Ah	STune resonance suppression switchover frequency	0Hz to 4000Hz	900	Hz	Real-time	"H09_en.57" on page 247
H09.58	2009-3Bh	STune resonance suppression reset selection	0: Disabled 1: Enabled	0	-	Real-time	"H09_en.58" on page 247

6.11 Parameter Group H0A

Param.	Object Dictionary	Name	Value	Default	Unit	Change Mode	Page
H0A.00	200A-01h	Power input phase loss protection	0: Enabled 1: Disabled 3: Enable power-off detection	0	-	Real-time	"H0A_en.00" on page 247
H0A.01	200A-02h	Absolute position limit	0: Disabled 1: Enabled 2: Enabled after homing	0	-	Real-time	"H0A_en.01" on page 248
H0A.04	200A-05h	Motor overload protection gain	50 to 300	100	-	Real-time	"H0A_en.04" on page 248
H0A.08	200A-09h	Overspeed threshold	0rpm to 20000rpm	0	RPM	Real-time	"H0A_en.08" on page 249
H0A.10	200A-0Bh	Threshold of excessive local position deviation	0 to 4294967295	2748695 1	-	Real-time	"H0A_en.10" on page 249
H0A.12	200A-0Dh	Runaway protection enable	0: Disable 1: Enable	1	-	Real-time	"H0A_en.12" on page 249
H0A.18	200A-13h	IGBT over-temperature threshold	120°C to 175°C	135	°C	Real-time	"H0A_en.18" on page 250
H0A.19	200A-14h	Filter time constant of touch probe 1	0.00us–6.30us	2.00	us	Real-time	"H0A_en.19" on page 250
H0A.20	200A-15h	Filter time constant of touch probe 2	0.00us–6.30us	2.00	us	Real-time	"H0A_en.20" on page 250

Param.	Object Dictionary	Name	Value	Default	Unit	Change Mode	Page
H0A.21	200A-16h	STO function display selection	0 to 3	0	-	Real-time	"H0A_en.21" on page 250
H0A.22	200A-17h	Sigma_Delta filter time	0 to 3	1	-	At stop	"H0A_en.22" on page 251
H0A.23	200A-18h	TZ signal filter time	0ns to 31ns	15	25ns	At stop	"H0A_en.23" on page 251
H0A.25	200A-1Ah	Filter time constant of speed feedback display value	0ms to 5000ms	50	ms	Real-time	"H0A_en.25" on page 251
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)	0	-	Real-time	"H0A_en.26" on page 252
H0A.27	200A-1Ch	Motor rotation DO speed filter time	0ms to 5000ms	50	ms	Real-time	"H0A_en.27" on page 252
H0A.32	200A-21h	Time threshold for locked motor overheat protection	10ms to 65535ms	200	ms	Real-time	"H0A_en.32" on page 252
H0A.33	200A-22h	Locked motor overheat protection	0: Disabled 1: Enabled	1	-	Real-time	"H0A_en.33" on page 253
H0A.36	200A-25h	Encoder multi-turn overflow fault selection	0: Not hide 1: Hide	0	-	Real-time	"H0A_en.36" on page 253
H0A.40	200A-29h	Compensation function selection	0 to 7	0	-	At stop	"H0A_en.40" on page 253
H0A.49	200A-32h	Regenerative resistor overtemperature threshold	100°C to 175°C	115	°C	Real-time	"H0A_en.49" on page 254
H0A.50	200A-33h	Encoder communication fault tolerance threshold	0 to 31	31	-	Real-time	"H0A_en.50" on page 254
H0A.51	200A-34h	Phase loss detection filter times	3ms to 36ms	20	55ms	Real-time	"H0A_en.51" on page 254

Param.	Object Dictionary	Name	Value	Default	Unit	Change Mode	Page
H0A.52	200A-35h	Encoder temperature protection threshold	0°C to 175°C	0	°C	Real-time	"H0A_en.52" on page 254
H0A.53	200A-36h	Probe rising edge compensation time	-30000ns to 30000ns	0	25ns	Real-time	"H0A_en.53" on page 255
H0A.54	200A-37h	Probe falling edge compensation time	-30000ns to 30000ns	0	25ns	Real-time	"H0A_en.54" on page 255
H0A.55	200A-38h	Runaway current threshold	100.0% to 400.0%	200.0	%	Real-time	"H0A_en.55" on page 255
H0A.56	200A-39h	Fault reset delay	0ms to 60000ms	10000	ms	Real-time	"H0A_en.56" on page 256
H0A.57	200A-3Ah	Runaway speed threshold	1 rpm to 1000 rpm	50	RPM	Real-time	"H0A_en.57" on page 256
H0A.58	200A-3Bh	Runaway speed filter time	0.1ms to 100.0ms	2.0	ms	Real-time	"H0A_en.58" on page 256
H0A.59	200A-3Ch	Runaway protection detection time	10ms to 1000ms	30	ms	Real-time	"H0A_en.59" on page 256
H0A.70	200A-47h	Overspeed threshold 2	0rpm to 20000rpm	0	RPM	Real-time	"H0A_en.70" on page 257
H0A.71	200A-48h	Servo function switch	0 to 65535	0	-	Real-time	"H0A_en.71" on page 257
H0A.72	200A-49h	Maximum stop time in ramp-to-stop	0ms to 65535ms	10000	ms	At stop	"H0A_en.72" on page 258
H0A.73	200A-4Ah	STO 24 V disconnection filter time	0ms to 5ms	5	ms	Real-time	"H0A_en.73" on page 259
H0A.74	200A-4Bh	Filter time for two inconsistent STO channels	0ms to 1000ms	10	ms	Real-time	"H0A_en.74" on page 259
H0A.75	200A-4Ch	Servo OFF delay after STO triggered	0ms to 25ms	20	ms	Real-time	"H0A_en.75" on page 259

Param.	Object Dictionary	Name	Value	Default	Unit	Change Mode	Page
H0A.85	200A-56h	Wire breakage detection torque threshold	4.0% to 400.0%	5.0	%	At stop	"H0A_en.85" on page 260
H0A.86	200A-57h	Wire breakage detection filter time	5ms to 1000ms	30	ms	At stop	"H0A_en.86" on page 260

6.12 Parameter Group H0b

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H0b.00	200b-01h	Motor speed actual value	-32767rpm to 32767rpm	0	RPM	Unchangeable	"H0b_en.00" on page 260
H0b.01	200b-02h	Speed reference	-32767rpm to 32767rpm	0	RPM	Unchangeable	"H0b_en.01" on page 261
H0b.02	200b-03h	Internal torque reference	-3276.7% to 3276.7%	0.0	%	Unchangeable	"H0b_en.02" on page 261
H0b.03	200b-04h	Input (DI) signal monitoring	0 to 65535	0	-	Unchangeable	"H0b_en.03" on page 261
H0b.05	200b-06h	Output (DO) signal monitoring	0 to 65535	0	-	Unchangeable	"H0b_en.05" on page 262
H0b.07	200b-08h	Absolute position counter	-2147483648 to 2147483647	0	Encoder unit	Unchangeable	"H0b_en.07" on page 262
H0b.09	200b-0Ah	Mechanical angle	0.0° to 360.0°	0.0	°	Unchangeable	"H0b_en.09" on page 263
H0b.10	200b-0Bh	Electrical angle	0.0° to 360.0°	0.0	°	Unchangeable	"H0b_en.10" on page 263
H0b.12	200b-0Dh	Average load ratio	0.0% to 800.0%	0.0	%	Unchangeable	"H0b_en.12" on page 263
H0b.15	200b-10h	Position following error (encoder unit)	-2147483648 to 2147483647	0	Encoder unit	Unchangeable	"H0b_en.15" on page 264
H0b.17	200b-12h	Feedback pulse counter	-2147483648 to 2147483647	0	Encoder unit	Unchangeable	"H0b_en.17" on page 264
H0b.19	200b-14h	Total power-on time	0.0s to 6553.5s	0.0	-	Unchangeable	"H0b_en.19" on page 264
H0b.24	200b-19h	Phase current RMS value	0.0A to 6553.5A	0.0	A	Unchangeable	"H0b_en.24" on page 264
H0b.26	200b-1Bh	Bus voltage	0.0 VDC–6553.5 VDC	0.0	VDC	Unchangeable	"H0b_en.26" on page 265

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H0b.27	200b-1Ch	Module temperature	-20°C to 200°C	0	°C	Unchangeable	"H0b_en.27" on page 265
H0b.28	200b-1Dh	Absolute encoder fault information given by FPGA	0 to 65535	0	-	Unchangeable	"H0b_en.28" on page 265
H0b.29	200b-1Eh	Axis status information given by FPGA	0 to 65535	0	-	Unchangeable	"H0b_en.29" on page 265
H0b.30	200b-1Fh	Axis fault information given by FPGA	0 to 65535	0	-	Unchangeable	"H0b_en.30" on page 266
H0b.31	200b-20h	Encoder fault information	0 to 65535	0	-	Real-time	"H0b_en.31" on page 266
H0b.33	200b-22h	Fault log	0: Active 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	0	-	Real-time	"H0b_en.33" on page 266
H0b.34	200b-23h	Fault code set by H0B-33	0 to 65535	0	-	Unchangeable	"H0b_en.34" on page 267
H0b.35	200b-24h	Timestamp of the selected fault	0.0s–429496729.5s	0.0	-	Unchangeable	"H0b_en.35" on page 267
H0b.37	200b-26h	Motor speed upon occurrence of the selected fault	-32767rpm to 32767rpm	0	RPM	Unchangeable	"H0b_en.37" on page 267
H0b.38	200b-27h	Motor phase U current upon occurrence of the selected fault	-3276.7A to 3276.7A	0.0	A	Unchangeable	"H0b_en.38" on page 268
H0b.39	200b-28h	Motor phase V current upon occurrence of the selected fault	-3276.7A to 3276.7A	0.0	A	Unchangeable	"H0b_en.39" on page 268

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H0b.40	200b-29h	Bus voltage upon occurrence of the selected fault	0.0 VDC–6553.5 VDC	0.0	VDC	Unchangeable	"H0b_en.40" on page 268
H0b.41	200b-2Ah	Input terminal state on selected fault	0 to 65535	0	-	Unchangeable	"H0b_en.41" on page 268
H0b.43	200b-2Ch	Output terminal status upon occurrence of the selected fault	0 to 65535	0	-	Unchangeable	"H0b_en.43" on page 269
H0b.45	200b-2Eh	Internal fault code	0 to 65535	0	-	Unchangeable	"H0b_en.45" on page 269
H0b.46	200b-2Fh	Absolute encoder fault information given by FPGA upon occurrence of the selected fault	0 to 65535	0	-	Unchangeable	"H0b_en.46" on page 269
H0b.47	200b-30h	System status information given by FPGA upon occurrence of the selected fault	0 to 65535	0	-	Unchangeable	"H0b_en.47" on page 270
H0b.48	200b-31h	System fault information given by FPGA upon occurrence of the selected fault	0 to 65535	0	-	Unchangeable	"H0b_en.48" on page 270
H0b.49	200b-32h	Encoder fault information upon occurrence of the selected fault	0 to 65535	0	-	Unchangeable	"H0b_en.49" on page 270

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H0b.51	200b-34h	Internal fault code upon occurrence of the selected fault	0 to 65535	0	-	Unchangeable	"H0b_en.51" on page 270
H0b.53	200b-36h	Position following error (reference unit)	-2147483648 to 2147483647	0	Encoder unit	Unchangeable	"H0b_en.53" on page 271
H0b.55	200b-38h	Motor speed actual value	-214748364.8rpm to 214748364.7rpm	0.0	RPM	Unchangeable	"H0b_en.55" on page 271
H0b.57	200b-3Ah	Control circuit bus voltage	0.0 VDC–6553.5 VDC	0.0	VDC	Unchangeable	"H0b_en.57" on page 271
H0b.58	200b-3Bh	Mechanical absolute position (low 32 bits)	-2147483648 to 2147483647	0	Encoder unit	Unchangeable	"H0b_en.58" on page 272
H0b.60	200b-3Dh	Mechanical absolute position (high 32 bits)	-2147483648 to 2147483647	0	Encoder unit	Unchangeable	"H0b_en.60" on page 272
H0b.63	200b-40h	NotRdy state	0: None 1: Control power abnormal (H0b.57) 2: Abnormal condition detected in phase loss detection 3: Abnormal condition detected in main circuit power detection (including short-to-ground fault) 4: Other faults 5: Short circuit to ground detection failure	0	-	Unchangeable	"H0b_en.63" on page 272
H0b.66	200b-43h	Encoder temperature	-32768°C to 32767°C	0	°C	Unchangeable	"H0b_en.66" on page 273
H0b.67	200b-44h	Load rate of regenerative resistor	0.0% to 200.0%	0.0	%	Unchangeable	"H0b_en.67" on page 273
H0b.70	200b-47h	Number of absolute encoder revolutions	0Rev to 65535Rev	0	Rev	Unchangeable	"H0b_en.70" on page 273
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 274

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H0b.74	200b-4Bh	System fault information given by FPGA	0 to 65535	0	-	Unchangeable	"H0b_en.74" on page 274
H0b.77	200b-4Eh	Encoder position (low 32 bits)	-2147483648 to 2147483647	0	Encoder unit	Unchangeable	"H0b_en.77" on page 274
H0b.79	200b-50h	Encoder position (high 32 bits)	-2147483648 to 2147483647	0	Encoder unit	Unchangeable	"H0b_en.79" on page 274
H0b.81	200b-52h	Single-turn position of the rotary load (low 32 bits)	-2147483648 to 2147483647	0	Encoder unit	Unchangeable	"H0b_en.81" on page 275
H0b.83	200b-54h	Single-turn position of the rotary load (high 32 bits)	-2147483648 to 2147483647	0	Encoder unit	Unchangeable	"H0b_en.83" on page 275
H0b.85	200b-56h	Single-turn position of the rotary load (reference unit)	-2147483648 to 2147483647	0	Encoder unit	Unchangeable	"H0b_en.85" on page 275
H0b.87	200b-58h	IGBT junction temperature	0°C to 200°C	0	°C	Unchangeable	"H0b_en.87" on page 276
H0b.90	200b-5Bh	Group No. of the abnormal parameter	0 to 65535	0	-	Unchangeable	"H0b_en.90" on page 276
H0b.91	200b-5Ch	Offset of the abnormal parameter within the parameter group	0 to 65535	0	-	Unchangeable	"H0b_en.91" on page 276

6.13 Parameter Group H0d

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H0d.00	200d-01h	Software Reset	0: No operation 1: Enable	0	-	At stop	"H0d_en.00" on page 276
H0d.01	200d-02h	Fault reset	0: No operation 1: Enable	0	-	At stop	"H0d_en.01" on page 277
H0d.02	200d-03h	Offline inertia auto-tuning selection	0 to 65	0	-	Real-time	"H0d_en.02" on page 278

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H0d.04	200d-05h	Read/write in encoder ROM	0: No operation 1: Write ROM 2: Read ROM 3: ROM failure	0	-	At stop	"H0d_en.04" on page 278
H0d.05	200d-06h	Emergency stop	0: No operation 1: Emergency stop	0	-	Real-time	"H0d_en.05" on page 278
H0d.12	200d-0Dh	Phase U/V current balance correction	0: Disabled 1: Enabled	0	-	At stop	"H0d_en.12" on page 279
H0d.17	200d-12h	Forced DI/DO enable switch	0:0-No operation 1: Forced DI enabled, forced DO disabled 2: Forced DO enabled, forced DI disabled 3: Forced DI and DO enabled 4: EtherCAT-controlled forced DO enabled	0	-	Real-time	"H0d_en.17" on page 279
H0d.18	200d-13h	Forced DI value	0 to 31	31	-	Real-time	"H0d_en.18" on page 280
H0d.19	200d-14h	Forced DO value	0 to 7	0	-	Real-time	"H0d_en.19" on page 280
H0d.20	200d-15h	Absolute encoder reset	0: No operation 1: Reset 2: Reset the fault and multi-turn data	0	-	At stop	"H0d_en.20" on page 281

6.14 Parameter Group H0E

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H0E.00	200E-01h	Node address	1 to 127	1	-	Real-time	"H0E_en.00" on page 281
H0E.01	200E-02h	Save objects written through communication to EEPROM	0: Not save 1: Save parameters 2: Save object dictionaries 3: Save both	3	-	Real-time	"H0E_en.01" on page 282
H0E.03	200E-04h	Save objects written through software (commissioning protocol) to e2prom	0: Do not save 1: Save	1	-	Real-time	"H0E_en.03" on page 282

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H0E.04	200E-05h	Save objects written through communication to e2prom (excluding commissioning protocol)	0: Do not save 1: Save	0	-	Real-time	"H0E_en.04" on page 283
H0E.20	200E-15h	EtherCAT slave name	0 to 65535	0	-	Unchangeable	"H0E_en.20" on page 283
H0E.21	200E-16h	EtherCAT slave alias	0 to 65535	0	-	At stop	"H0E_en.21" on page 283
H0E.22	200E-17h	Number of synchronous loss events allowed by EtherCAT	1 to 20	8	-	Real-time	"H0E_en.22" on page 284
H0E.24	200E-19h	Sync loss count	0 to 65535	0	-	Unchangeable	"H0E_en.24" on page 284
H0E.25	200E-1Ah	Max. error value and invalid frames of EtherCAT port 0 per unit time	0 to 65535	0	-	Unchangeable	"H0E_en.25" on page 284
H0E.26	200E-1Bh	Max. error value and invalid frames of EtherCAT port 1 per unit time	0 to 65535	0	-	Unchangeable	"H0E_en.26" on page 285
H0E.27	200E-1Ch	Max. transfer error of EtherCAT port per unit time	0 to 65535	0	-	Unchangeable	"H0E_en.27" on page 285
H0E.28	200E-1Dh	Max. EtherCAT data frame processing unit error per unit time	0 to 255	0	-	Unchangeable	"H0E_en.28" on page 285
H0E.29	200E-1Eh	Max. link loss value of EtherCAT port 0 per unit time	0 to 65535	0	-	Unchangeable	"H0E_en.29" on page 285
H0E.30	200E-1Fh	E15 alarm detection delay	0ms to 60000ms	0	-	Real-time	"H0E_en.30" on page 286

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H0E.31	200E-20h	EtherCAT synchronization mode setting	0 to 3	1	-	At stop	"H0E_en.31" on page 286
H0E.32	200E-21h	EtherCAT synchronization error threshold	100ns to 10000ns	3000	ns	At stop	"H0E_en.32" on page 286
H0E.33	200E-22h	EtherCAT state machine status and port connection status	0 to 65535	0	-	Unchangeable	"H0E_en.33" on page 287
H0E.34	200E-23h	Allowed duration of CSP position reference error	1ms to 30ms	20	ms	Real-time	"H0E_en.34" on page 287
H0E.35	200E-24h	AL fault code	0 to 65535	0	-	Unchangeable	"H0E_en.35" on page 287
H0E.36	200E-25h	EtherCAT enhanced link enable	0: Disabled 1: Enabled	0	-	Real-time	"H0E_en.36" on page 288
H0E.37	200E-26h	EtherCAT XML reset selection	0: Disabled 1: Enabled	0	-	Real-time	"H0E_en.37" on page 288
H0E.59	200E-3Ch	PHY chip half-duplex mode	0: Enabled 1: Disabled	0	-	Real-time	"H0E_en.59" on page 288
H0E.74	200E-4Bh	Link signal delay	1ms to 65535ms	400	ms	At stop	"H0E_en.74" on page 289
H0E.80	200E-51h	Modbus baud rate	0: 300 bps 1: 600 bps 2: 1200 bps 3: 2400 bps 4: 4800 bps 5: 9600 bps 6: 19200 bps 7: 38400 bps 8: 57600 bps 9: 115200 bps	9	-	Real-time	"H0E_en.80" on page 289
H0E.81	200E-52h	Modbus data format	0: No parity, 2 stop bits (8-N-2) 1: Even parity, 1 stop bit (8-E-1) 2: Odd parity, 1 stop bit (8-O-1) 3: No parity, 1 stop bit (8-N-1)	3	-	Real-time	"H0E_en.81" on page 290
H0E.82	200E-53h	Modbus response delay	0ms to 20ms	0	ms	Real-time	"H0E_en.82" on page 290
H0E.83	200E-54h	Modbus communication timeout	0ms to 600ms	0	ms	Real-time	"H0E_en.83" on page 291

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H0E.90	200E-5Bh	Communication version	0.00 to 655.35	0.00	-	Unchangeable	"H0E_en.90" on page 291
H0E.93	200E-5Eh	PHY hardware version	0 to 3	0	-	Unchangeable	"H0E_en.93" on page 291
H0E.96	200E-61h	XML version information	0.00 to 655.35	0.00	-	Unchangeable	"H0E_en.96" on page 291

6.15 Parameter Group H18

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H18.00	2018-01h	Position comparison output selection	0: Disable 1: Enable (rising edge-triggered)	0	-	Real-time	"H18_en.00" on page 292
H18.02	2018-03h	Position comparison resolution	0: 24-bit 1: 23-bit 2: 22-bit 3: 21-bit 4: 20-bit 5: 19-bit 6: 18-bit 7: 17-bit	1	-	Real-time	"H18_en.02" on page 292
H18.03	2018-04h	Position comparison mode	0: Single 1: Cyclic comparison mode	0	-	Real-time	"H18_en.03" on page 292
H18.04	2018-05h	Current position as zero	0: Disable 1: Enable (rising edge-triggered)	0	-	Real-time	"H18_en.04" on page 293
H18.05	2018-06h	Position comparison output width	0.0 ms to 204.7ms	0.0	ms	Real-time	"H18_en.05" on page 293
H18.07	2018-08h	Position comparison start point	0 to 30	0	-	Real-time	"H18_en.07" on page 293
H18.08	2018-09h	Position comparison end point	0 to 30	0	-	Real-time	"H18_en.08" on page 294
H18.09	2018-0Ah	Current state of position comparison	0 to 1024	0	-	Unchangeable	"H18_en.09" on page 294

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H18.10	2018-0Bh	Real-time position of position comparison	-2147483648 to 2147483647	0	-	Unchangeable	"H18_en.10" on page 294
H18.12	2018-0Dh	Zero offset of position comparison	-2147483648 to 2147483647	0	-	Real-time	"H18_en.12" on page 294
H18.18	2018-13h	Position comparison switch	Bit 0: Comparison logic independently enabled bit 8: Target position reference unit	0	-	Real-time	"H18_en.18" on page 295

6.16 Parameter Group H19

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H19.00	2019-01h	Target value of position comparison 1	-2147483648 to 2147483647	0	-	Real-time	"H19_en.00" on page 295
H19.02	2019-03h	Attribute value of position comparison 1	0 to 387	0	-	Real-time	"H19_en.02" on page 295
H19.03	2019-04h	Target value of position comparison 2	-2147483648 to 2147483647	0	-	Real-time	"H19_en.03" on page 296
H19.05	2019-06h	Attribute value of position comparison 2	Same as H19.02.	0	-	Real-time	"H19_en.05" on page 296
H19.06	2019-07h	Target value of position comparison 3	-2147483648 to 2147483647	0	-	Real-time	"H19_en.06" on page 297
H19.08	2019-09h	Attribute value of position comparison 3	Same as H19.02.	0	-	Real-time	"H19_en.08" on page 297
H19.09	2019-0Ah	Target value of position comparison 4	-2147483648 to 2147483647	0	-	Real-time	"H19_en.09" on page 297
H19.11	2019-0Ch	Attribute value of position comparison 4	Same as H19.02.	0	-	Real-time	"H19_en.11" on page 297
H19.12	2019-0Dh	Target value of position comparison 5	-2147483648 to 2147483647	0	-	Real-time	"H19_en.12" on page 298

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H19.14	2019-0Fh	Attribute value of position comparison 5	Same as H19.02.	0	-	Real-time	"H19_en.14" on page 298
H19.15	2019-10h	Target value of position comparison 6	-2147483648 to 2147483647	0	-	Real-time	"H19_en.15" on page 298
H19.17	2019-12h	Attribute value of position comparison 6	Same as H19.02.	0	-	Real-time	"H19_en.17" on page 299
H19.18	2019-13h	Target value of position comparison 7	-2147483648 to 2147483647	0	-	Real-time	"H19_en.18" on page 299
H19.20	2019-15h	Attribute value of position comparison 7	Same as H19.02.	0	-	Real-time	"H19_en.20" on page 299
H19.21	2019-16h	Target value of position comparison 8	-2147483648 to 2147483647	0	-	Real-time	"H19_en.21" on page 299
H19.23	2019-18h	Attribute value of position comparison 8	Same as H19.02.	0	-	Real-time	"H19_en.23" on page 300
H19.24	2019-19h	Target value of position comparison 9	-2147483648 to 2147483647	0	-	Real-time	"H19_en.24" on page 300
H19.26	2019-1Bh	Attribute value of position comparison 9	Same as H19.02.	0	-	Real-time	"H19_en.26" on page 300
H19.27	2019-1Ch	Target value of position comparison 10	-2147483648 to 2147483647	0	-	Real-time	"H19_en.27" on page 300
H19.29	2019-1Eh	Attribute value of position comparison 10	Same as H19.02.	0	-	Real-time	"H19_en.29" on page 301
H19.30	2019-1Fh	Target value of position comparison 11	-2147483648 to 2147483647	0	-	Real-time	"H19_en.30" on page 301
H19.32	2019-21h	Attribute value of position comparison 11	Same as H19.02.	0	-	Real-time	"H19_en.32" on page 301
H19.33	2019-22h	Target value of position comparison 12	-2147483648 to 2147483647	0	-	Real-time	"H19_en.33" on page 301
H19.35	2019-24h	Attribute value of position comparison 12	Same as H19.02.	0	-	Real-time	"H19_en.35" on page 302

Parameter List

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H19.36	2019-25h	Target value of position comparison 13	-2147483648 to 2147483647	0	-	Real-time	"H19_en.36" on page 302
H19.38	2019-27h	Attribute value of position comparison 13	Same as H19.02.	0	-	Real-time	"H19_en.38" on page 302
H19.39	2019-28h	Target value of position comparison 14	-2147483648 to 2147483647	0	-	Real-time	"H19_en.39" on page 303
H19.41	2019-2Ah	Attribute value of position comparison 14	Same as H19.02.	0	-	Real-time	"H19_en.41" on page 303
H19.42	2019-2Bh	Target value of position comparison 15	-2147483648 to 2147483647	0	-	Real-time	"H19_en.42" on page 303
H19.44	2019-2Dh	Attribute value of position comparison 15	Same as H19.02.	0	-	Real-time	"H19_en.44" on page 303
H19.45	2019-2Eh	Target value of position comparison 16	-2147483648 to 2147483647	0	-	Real-time	"H19_en.45" on page 304
H19.47	2019-30h	Attribute value of position comparison 16	Same as H19.02.	0	-	Real-time	"H19_en.47" on page 304
H19.48	2019-31h	Target value of position comparison 17	-2147483648 to 2147483647	0	-	Real-time	"H19_en.48" on page 304
H19.50	2019-33h	Attribute value of position comparison 17	Same as H19.02.	0	-	Real-time	"H19_en.50" on page 304
H19.51	2019-34h	Target value of position comparison 18	-2147483648 to 2147483647	0	-	Real-time	"H19_en.51" on page 305
H19.53	2019-36h	Attribute value of position comparison 18	Same as H19.02.	0	-	Real-time	"H19_en.53" on page 305
H19.54	2019-37h	Target value of position comparison 19	-2147483648 to 2147483647	0	-	Real-time	"H19_en.54" on page 305
H19.56	2019-39h	Attribute value of position comparison 19	Same as H19.02.	0	-	Real-time	"H19_en.56" on page 305
H19.57	2019-3Ah	Target value of position comparison 20	-2147483648 to 2147483647	0	-	Real-time	"H19_en.57" on page 306

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H19.59	2019-3Ch	Attribute value of position comparison 20	Same as H19.02.	0	-	Real-time	"H19_en.59" on page 306
H19.60	2019-3Dh	Target value of position comparison 21	-2147483648 to 2147483647	0	-	Real-time	"H19_en.60" on page 306
H19.62	2019-3Fh	Attribute value of position comparison 21	Same as H19.02.	0	-	Real-time	"H19_en.62" on page 307
H19.63	2019-40h	Target value of position comparison 22	-2147483648 to 2147483647	0	-	Real-time	"H19_en.63" on page 307
H19.65	2019-42h	Attribute value of position comparison 22	Same as H19.02.	0	-	Real-time	"H19_en.65" on page 307
H19.66	2019-43h	Target value of position comparison 23	-2147483648 to 2147483647	0	-	Real-time	"H19_en.66" on page 307
H19.68	2019-45h	Attribute value of position comparison 23	Same as H19.02.	0	-	Real-time	"H19_en.68" on page 308
H19.69	2019-46h	Target value of position comparison 24	-2147483648 to 2147483647	0	-	Real-time	"H19_en.69" on page 308
H19.71	2019-48h	Attribute value of position comparison 24	Same as H19.02.	0	-	Real-time	"H19_en.71" on page 308
H19.72	2019-49h	Target value of position comparison 25	-2147483648 to 2147483647	0	-	Real-time	"H19_en.72" on page 308
H19.74	2019-4Bh	Attribute value of position comparison 25	Same as H19.02.	0	-	Real-time	"H19_en.74" on page 309
H19.75	2019-4Ch	Target value of position comparison 26	-2147483648 to 2147483647	0	-	Real-time	"H19_en.75" on page 309
H19.77	2019-4Eh	Attribute value of position comparison 26	Same as H19.02.	0	-	Real-time	"H19_en.77" on page 309
H19.78	2019-4Fh	Target value of position comparison 27	-2147483648 to 2147483647	0	-	Real-time	"H19_en.78" on page 309
H19.80	2019-51h	Attribute value of position comparison 27	Same as H19.02.	0	-	Real-time	"H19_en.80" on page 310

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H19.81	2019-52h	Target value of position comparison 28	-2147483648 to 2147483647	0	-	Real-time	"H19_en.81" on page 310
H19.83	2019-54h	Attribute value of position comparison 28	Same as H19.02.	0	-	Real-time	"H19_en.83" on page 310
H19.84	2019-55h	Target value of position comparison 29	-2147483648 to 2147483647	0	-	Real-time	"H19_en.84" on page 311
H19.86	2019-57h	Attribute value of position comparison 29	Same as H19.02.	0	-	Real-time	"H19_en.86" on page 311
H19.87	2019-58h	Target value of position comparison 30	-2147483648 to 2147483647	0	-	Real-time	"H19_en.87" on page 311
H19.89	2019-5Ah	Attribute value of position comparison 30	Same as H19.02.	0	-	Real-time	"H19_en.89" on page 311

6.17 Parameter Group H1F

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H1F.90	201F-5Bh	DI function state 1 read through communication	0 to 65535	0	-	Unchangeable	"H1F_en.90" on page 312
H1F.91	201F-5Ch	DI function state 2 read through communication	0 to 65535	0	-	Unchangeable	"H1F_en.91" on page 312
H1F.92	201F-5Dh	DI function state 3 read through communication	0 to 65535	0	-	Unchangeable	"H1F_en.92" on page 312
H1F.93	201F-5Eh	DI function state 4 read through communication	0 to 65535	0	-	Unchangeable	"H1F_en.93" on page 312

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H1F.94	201F-5Fh	DO function state 1 read through communication	0 to 65535	0	-	Unchangeable	"H1F_en.94" on page 313
H1F.95	201F-60h	DO function state 2 read through communication	0 to 65535	0	-	Unchangeable	"H1F_en.95" on page 313

6.18 Parameter Group H30

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
H30.16	2030-11h	Encoder communication timeout count	0 to 65535	0	-	Unchangeable	"H30_en.16" on page 313
H30.17	2030-12h	Encoder communication CRC error count	0 to 65535	0	-	Unchangeable	"H30_en.17" on page 314
H30.18	2030-13h	Encoder communication frame stop bit error count	0 to 65535	0	-	Unchangeable	"H30_en.18" on page 314
H30.20	2030-15h	Servo SN code digits 0 & 1	0 to 65535	0	-	Unchangeable	"H30_en.20" on page 314
H30.21	2030-16h	Servo SN code digits 2 & 3	0 to 65535	0	-	Unchangeable	"H30_en.21" on page 315
H30.22	2030-17h	Servo SN code digits 4 & 5	0 to 65535	0	-	Unchangeable	"H30_en.22" on page 315
H30.23	2030-18h	Servo SN code digits 6 & 7	0 to 65535	0	-	Unchangeable	"H30_en.23" on page 315
H30.24	2030-19h	Servo SN code digits 8 & 9	0 to 65535	0	-	Unchangeable	"H30_en.24" on page 315
H30.25	2030-1Ah	Servo SN code digits 10 & 11	0 to 65535	0	-	Unchangeable	"H30_en.25" on page 316
H30.26	2030-1Bh	Servo SN code digits 12 & 13	0 to 65535	0	-	Unchangeable	"H30_en.26" on page 316
H30.27	2030-1Ch	Servo SN code digits 14 & 15	0 to 65535	0	-	Unchangeable	"H30_en.27" on page 316

6.19 1000 Parameters

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
1000.00h	1000-00h	Device type	0 to 2147483647	131474	-	Unchangeable	"1000_en.00h" on page 316
1001.00h	1001-00h	Error Register	0 to 255	0	-	Unchangeable	"1001_en.00h" on page 317
1018.01h	1018-01h	Vendor ID	0 to 2147483647	1048576	-	Unchangeable	"1018_en.01h" on page 317
1018.02h	1018-02h	Product code	0 to 2147483647	786701	-	Unchangeable	"1018_en.02h" on page 317
1018.03h	1018-03h	Revision number	0 to 2147483647	65537	-	Unchangeable	"1018_en.03h" on page 318
1600.00h	1600-00h	Number of valid mapped objects in RPDO1	0 to 10	3	-	Real-time	"1600_en.00h" on page 318
1600.01h	1600-01h	RPDO1 mapping object 1	0 to 4294967295	1614807056	-	Real-time	"1600_en.01h" on page 318
1600.02h	1600-02h	RPDO1 mapping object 2	0 to 4294967295	1616904200	-	Real-time	"1600_en.02h" on page 319
1600.03h	1600-03h	RPDO1 mapping object 3	0 to 4294967295	1622671376	-	Real-time	"1600_en.03h" on page 319
1600.04h	1600-04h	RPDO1 mapping object 4	0 to 4294967295	0	-	Real-time	"1600_en.04h" on page 319
1600.05h	1600-05h	RPDO1 mapping object 5	0 to 4294967295	0	-	Real-time	"1600_en.05h" on page 319
1600.06h	1600-06h	RPDO1 mapping object 6	0 to 4294967295	0	-	Real-time	"1600_en.06h" on page 320
1600.07h	1600-07h	RPDO1 mapping object 7	0 to 4294967295	0	-	Real-time	"1600_en.07h" on page 320
1600.08h	1600-08h	RPDO1 mapping object 8	0 to 4294967295	0	-	Real-time	"1600_en.08h" on page 320

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
1600.09h	1600-09h	RPDO1 mapping object 9	0 to 4294967295	0	-	Real-time	"1600_en.09h" on page 320
1600.0Ah	1600-0Ah	RPDO1 mapping object 10	0 to 4294967295	0	-	Real-time	"1600_en.0Ah" on page 321
1600.0Bh	1600-0Bh	RPDO1 mapping object 11	0 to 4294967295	0	-	Real-time	"1600_en.0Bh" on page 321
1600.0Ch	1600-0Ch	RPDO1 mapping object 12	0 to 4294967295	0	-	Real-time	"1600_en.0Ch" on page 321
1600.0Dh	1600-0Dh	RPDO1 mapping object 13	0 to 4294967295	0	-	Real-time	"1600_en.0Dh" on page 322
1600.0Eh	1600-0Eh	RPDO1 mapping object 14	0 to 4294967295	0	-	Real-time	"1600_en.0Eh" on page 322
1600.0Fh	1600-0Fh	RPDO1 mapping object 15	0 to 4294967295	0	-	Real-time	"1600_en.0Fh" on page 322
1600.10h	1600-10h	RPDO1 mapping object 16	0 to 4294967295	0	-	Real-time	"1600_en.10h" on page 322
1600.11h	1600-11h	RPDO1 mapping object 17	0 to 4294967295	0	-	Real-time	"1600_en.11h" on page 323
1600.12h	1600-12h	RPDO1 mapping object 18	0 to 4294967295	0	-	Real-time	"1600_en.12h" on page 323
1600.13h	1600-13h	RPDO1 mapping object 19	0 to 4294967295	0	-	Real-time	"1600_en.13h" on page 323
1600.14h	1600-14h	RPDO1 mapping object 20	0 to 4294967295	0	-	Real-time	"1600_en.14h" on page 323
1A00.00h	1A00-00h	Number of valid mapped objects in TPDO1	0 to 10	7	-	Real-time	"1A00_en.00h" on page 324
1A00.01h	1A00-01h	TPDO1 mapping object 1	0 to 4294967295	1614872592	-	Real-time	"1A00_en.01h" on page 324

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
1A00.02h	1A00-02h	TPDO1 mapping object 2	0 to 4294967295	1617166368	-	Real-time	"1A00_en.02h" on page 324
1A00.03h	1A00-03h	TPDO1 mapping object 3	0 to 4294967295	1622736912	-	Real-time	"1A00_en.03h" on page 325
1A00.04h	1A00-04h	TPDO1 mapping object 4	0 to 4294967295	1622802464	-	Real-time	"1A00_en.04h" on page 325
1A00.05h	1A00-05h	TPDO1 mapping object 5	0 to 4294967295	1622933536	-	Real-time	"1A00_en.05h" on page 325
1A00.06h	1A00-06h	TPDO1 mapping object 6	0 to 4294967295	1614741520	-	Real-time	"1A00_en.06h" on page 325
1A00.07h	1A00-07h	TPDO1 mapping object 7	0 to 4294967295	1627193360	-	Real-time	"1A00_en.07h" on page 326
1A00.08h	1A00-08h	TPDO1 mapping object 8	0 to 4294967295	0	-	Real-time	"1A00_en.08h" on page 326
1A00.09h	1A00-09h	TPDO1 mapping object 9	0 to 4294967295	0	-	Real-time	"1A00_en.09h" on page 326
1A00.0Ah	1A00-0Ah	TPDO1 mapping object 10	0 to 4294967295	0	-	Real-time	"1A00_en.0Ah" on page 327
1A00.0Bh	1A00-0Bh	TPDO1 mapping object 11	0 to 4294967295	0	-	Real-time	"1A00_en.0Bh" on page 327
1A00.0Ch	1A00-0Ch	TPDO1 mapping object 12	0 to 4294967295	0	-	Real-time	"1A00_en.0Ch" on page 327
1A00.0Dh	1A00-0Dh	TPDO1 mapping object 13	0 to 4294967295	0	-	Real-time	"1A00_en.0Dh" on page 327
1A00.0Eh	1A00-0Eh	TPDO1 mapping object 14	0 to 4294967295	0	-	Real-time	"1A00_en.0Eh" on page 328
1A00.0Fh	1A00-0Fh	TPDO1 mapping object 15	0 to 4294967295	0	-	Real-time	"1A00_en.0Fh" on page 328
1A00.10h	1A00-10h	TPDO1 mapping object 16	0 to 4294967295	0	-	Real-time	"1A00_en.10h" on page 328

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
1A00.11h	1A00-11h	TPDO1 mapping object 17	0 to 4294967295	0	-	Real-time	"1A00_en.11h" on page 328
1A00.12h	1A00-12h	TPDO1 mapping object 18	0 to 4294967295	0	-	Real-time	"1A00_en.12h" on page 329
1A00.13h	1A00-13h	TPDO1 mapping object 19	0 to 4294967295	0	-	Real-time	"1A00_en.13h" on page 329
1A00.14h	1A00-14h	TPDO1 mapping object 20	0 to 4294967295	0	-	Real-time	"1A00_en.14h" on page 329
1C12.00h	1C12-00h	Number of assigned PDOs	0 to 1	1	-	Real-time	"1C12_en.00h" on page 330
1C12.01h	1C12-01h	PDO mapping object index of assigned RxPDO1	0 to 65535	5889	-	Real-time	"1C12_en.01h" on page 330
1C13.00h	1C13-00h	Number of assigned PDOs	0 to 1	1	-	Real-time	"1C13_en.00h" on page 330
1C13.01h	1C13-01h	PDO mapping object index of assigned TxPDO1	0 to 65535	6913	-	Real-time	"1C13_en.01h" on page 330
1C32.01h	1C32-01h	Sync mode	0 to 65535	2	-	Real-time	"1C32_en.01h" on page 331
1C32.02h	1C32-02h	Cycle time	0 to 4294967295	0	-	Real-time	"1C32_en.02h" on page 331
1C32.04h	1C32-04h	Sync modes supported	0 to 65535	4	-	Real-time	"1C32_en.04h" on page 331
1C32.05h	1C32-05h	Minimum cycle time	0 to 4294967295	250000	-	Real-time	"1C32_en.05h" on page 331
1C33.01h	1C33-01h	Sync mode	0 to 65535	2	-	Real-time	"1C33_en.01h" on page 332
1C33.02h	1C33-02h	Cycle time	0 to 4294967295	0	-	Real-time	"1C33_en.02h" on page 332

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
1C33.04h	1C33-04h	Sync modes supported	0 to 65535	4	-	Real-time	"1C33_en.04h" on page 332
1C33.05h	1C33-05h	Minimum cycle time	0 to 4294967295	250000	-	Real-time	"1C33_en.05h" on page 332

6.20 6000 Parameters

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
603Fh	603Fh	Error code	0 to 65535	0	-	Unchangeable	"603Fh" on page 333
6040h	6040h	Control word	0 to 65535	0	-	Real-time	"6040h" on page 333
6041h	6041h	Status word	0 to 65535	0	-	Unchangeable	"6041h" on page 334
605Ah	605Ah	Quick stop mode	0: Coast to stop, keeping de-energized state 1: Ramp to stop as defined by 6084h/609Ah (HM), keeping de-energized state 2: Ramp to stop as defined by 6085h, keeping de-energized state 3: Stop at emergency stop torque, keeping de-energized state 5: Ramp to stop as defined by 6084h/609Ah (HM), keeping position lock state 6: Ramp to stop as defined by 6085h, keeping position lock state 7: Stop at emergency stop torque, keeping position lock state	2	-	At stop	"605Ah" on page 334

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
605Ch	605Ch	Stop mode at S-OFF	-4: Ramp to stop as defined by 6085h, keeping dynamic braking state -3: at zero speed, keeping dynamic braking state -2: Ramp to stop as defined by 6084h/609Ah (HM), keeping dynamic braking state -1: Dynamic braking stop, keeping dynamic braking state 0: Coast to stop, keeping de-energized state 1: Ramp to stop as defined by 6084h/609Ah (HM), keeping de-energized state 2: Dynamic braking stop, keeping de-energized state	0	-	At stop	"605Ch" on page 335
605Dh	605Dh	Halt mode	1: Ramp to stop as defined by 6084h/ 609Ah (HM), keeping position lock state 2: Ramp to stop as defined by 6085h, keeping position lock state 3: Stop at emergency stop torque, keeping position lock state	1	-	At stop	"605Dh" on page 335

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
605Eh	605Eh	Stop mode at No. 2 fault	-5: Stop at zero speed, keeping dynamic braking state -4: Stop at emergency stop torque, keeping dynamic braking state -3: Ramp to stop as defined by 6085h, keeping dynamic braking state -2: Ramp to stop as defined by 6084h/ 609Ah (HM), keeping dynamic braking state -1: Dynamic braking stop, keeping dynamic braking state 0: Coast to stop, keeping de-energized state 1: Ramp to stop as defined by 6084h/ 609Ah (HM), keeping de-energized state 2: Ramp to stop as defined by 6085h, keeping de-energized state 3: Stop at emergency stop torque, keeping de-energized state 4: Dynamic braking stop, keeping de-energized state	2	-	At stop	"605Eh" on page 336
6060h	6060h	Servo drive mode	1: Profile position (PP) mode 3: Profile velocity (PV) mode 4: Profile torque (PT) mode 6: Homing (HM) mode 8: CSP mode 9: CSV mode 10: CST mode	0	-	Real-time	"6060h" on page 337
6061h	6061h	Operation mode display	1: Profile position (PP) mode 3: Profile velocity (PV) mode 4: Profile torque (PT) mode 6: Homing (HM) mode 8: CSP mode 9: CSV mode 10: CST mode	0	-	Unchangeable	"6061h" on page 338
6062h	6062h	Position reference	-2147483648 to 2147483647	0	Reference unit	Unchangeable	"6062h" on page 339
6063h	6063h	Position actual value	-2147483648 to 2147483647	0	Encoder unit	Unchangeable	"6063h" on page 339
6064h	6064h	Position actual value	-2147483648 to 2147483647	0	Reference unit	Unchangeable	"6064h" on page 339

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
6065h	6065h	Following error window	0 to 4294967295	27486951	Reference unit	Real-time	"6065h" on page 340
6066h	6066h	Defines the time lapse to trigger excessive position deviation (EB00.0).	0ms to 65535ms	0	ms	Real-time	"6066h" on page 340
6067h	6067h	Position window	0 to 4294967295	5872	Reference unit	Real-time	"6067h" on page 340
6068h	6068h	Position window time	0ms to 65535ms	0	ms	Real-time	"6068h" on page 341
606Ch	606Ch	Actual speed	-2147483648 to +2147483647	0	Reference unit/s	Unchangeable	"606Ch" on page 341
606Dh	606Dh	Velocity window	0 RPM to 65535 RPM	10	RPM	Real-time	"606Dh" on page 341
606Eh	606Eh	Velocity window time	0ms to 65535ms	0	ms	Real-time	"606Eh" on page 342
606Fh	606Fh	Zero speed signal threshold	0 RPM to 65535 RPM	10	RPM	Real-time	"606Fh" on page 342
6070h	6070h	Velocity threshold time	0ms to 65535ms	0	ms	Real-time	"6070h" on page 342
6071h	6071h	Target torque	-4000 to 4000	0	-	Real-time	"6071h" on page 343
6072h	6072h	Max. torque reference	0 to 4000	3500	-	Real-time	"6072h" on page 343
6074h	6074h	Torque reference	-4000 to 4000	0	-	Unchangeable	"6074h" on page 343
6077h	6077h	Actual torque	-4000 to 4000	0	-	Unchangeable	"6077h" on page 344
607Ah	607Ah	Target position	-2147483648 to 2147483647	0	Reference unit	Real-time	"607Ah" on page 344
607Ch	607Ch	Home offset	-2147483648 to 2147483647	0	Reference unit	Real-time	"607Ch" on page 344
607D.01h	607D-01h	Min. position limit	-2147483648 to 2147483647	-2147483648	Reference unit	Real-time	"607D_01h" on page 345

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
607D.02h	607D-02h	Max. position limit	-2147483648 to 2147483647	2147483647	Reference unit	Real-time	"607D_en.02h" on page 345
607Eh	607Eh	Reference polarity	0 to 127	0	-	Real-time	"607Eh" on page 346
607Fh	607Fh	Max. speed	0 to 4294967295	838860800	Reference unit/s	Real-time	"607Fh" on page 346
6081h	6081h	Profile velocity	0 to 4294967295	13981013	Reference unit/s	Real-time	"6081h" on page 347
6083h	6083h	Profile acceleration	0 to 4294967295	1398101333	Reference unit/s ²	Real-time	"6083h" on page 347
6084h	6084h	Profile deceleration	0 to 4294967295	1398101333	Reference unit/s ²	Real-time	"6084h" on page 347
6085h	6085h	Quick stop deceleration	0 to 4294967295	2147483647	Reference unit/s ²	Real-time	"6085h" on page 348
6087h	6087h	Torque slope	0.0%/s to 429496729.5%/s	429496729.5	%/s	Real-time	"6087h" on page 348
6091.01h	6091-01h	Motor resolution	1 to 4294967295	1	-	At stop	"6091_en.01h" on page 349
6091.02h	6091-02h	Shaft resolution	1 to 4294967295	1	-	At stop	"6091_en.02h" on page 349
6098h	6098h	Homing method	-3 to 35	1	-	Real-time	"6098h" on page 349
6099.01h	6099-01h	Speed during search for switch	0 to 4294967295	13981013	Reference unit/s	At stop	"6099_en.01h" on page 351
6099.02h	6099-02h	Speed during search for zero	0 to 4294967295	1398101	Reference unit/s	At stop	"6099_en.02h" on page 351
609Ah	609Ah	Homing acceleration	0 to 4294967295	1398101333	Reference unit/s ²	Real-time	"609Ah" on page 351
60B0h	60B0h	Position offset	-2147483648 to 2147483647	0	Reference unit	Real-time	"60B0h" on page 352
60B1h	60B1h	Velocity offset	-2147483648 to +2147483647	0	Reference unit/s	Real-time	"60B1h" on page 352

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
60B2h	60B2h	Torque offset	-4.000 to 4.000	0.000	-	Real-time	"60B2h" on page 352
60B8h	60B8h	Touch probe function	0 to 65535	0	-	Real-time	"60B8h" on page 352
60B9h	60B9h	Touch probe status	0 to 65535	0	-	Unchangeable	"60B9h" on page 355
60BAh	60BAh	Touch probe 1 positive edge	-2147483648 to 2147483647	0	Reference unit	Unchangeable	"60BAh" on page 357
60BBh	60BBh	Touch probe 1 negative edge	-2147483648 to 2147483647	0	Reference unit	Unchangeable	"60BBh" on page 357
60BCh	60BCh	Touch probe 2 positive edge	-2147483648 to 2147483647	0	Reference unit	Unchangeable	"60BCh" on page 357
60BDh	60BDh	Touch probe 2 negative edge	-2147483648 to 2147483647	0	Reference unit	Unchangeable	"60BDh" on page 357
60C5h	60C5h	Max. acceleration	0 to 4294967295	4294967295	Reference unit/s2	Real-time	"60C5h" on page 358
60C6h	60C6h	Max. deceleration	0 to 4294967295	4294967295	Reference unit/s2	Real-time	"60C6h" on page 358
60D5h	60D5h	Touch probe 1 positive edge counter	0 to 65535	0	-	Unchangeable	"60D5h" on page 358
60D6h	60D6h	Touch probe 1 negative edge counter	0 to 65535	0	-	Unchangeable	"60D6h" on page 359
60D7h	60D7h	Touch probe 2 positive edge counter	0 to 65535	0	-	Unchangeable	"60D7h" on page 359
60D8h	60D8h	Touch probe 2 negative edge counter	0 to 65535	0	-	Unchangeable	"60D8h" on page 359
60E0h	60E0h	Positive torque limit	0.000 to 4.000	3.500	-	Real-time	"60E0h" on page 359
60E1h	60E1h	Negative torque limit	0.000 to 4.000	3.500	-	Real-time	"60E1h" on page 360
60E3.01h	60E3-01h	Supported homing method 1	0 to 65535	1	-	Unchangeable	"60E3_en.01h" on page 360
60E3.02h	60E3-02h	Supported homing method 2	0 to 65535	2	-	Unchangeable	"60E3_en.02h" on page 360

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
60E3.03h	60E3-03h	Supported homing method 3	0 to 65535	3	-	Unchangeable	"60E3_en.03h" on page 361
60E3.04h	60E3-04h	Supported homing method 4	0 to 65535	4	-	Unchangeable	"60E3_en.04h" on page 361
60E3.05h	60E3-05h	Supported homing method 5	0 to 65535	5	-	Unchangeable	"60E3_en.05h" on page 361
60E3.06h	60E3-06h	Supported homing method 6	0 to 65535	6	-	Unchangeable	"60E3_en.06h" on page 362
60E3.07h	60E3-07h	Supported homing method 7	0 to 65535	7	-	Unchangeable	"60E3_en.07h" on page 362
60E3.08h	60E3-08h	Supported homing method 8	0 to 65535	8	-	Unchangeable	"60E3_en.08h" on page 362
60E3.09h	60E3-09h	Supported homing method 9	0 to 65535	9	-	Unchangeable	"60E3_en.09h" on page 362
60E3.10h	60E3-10h	Supported homing method 10	0 to 65535	10	-	Unchangeable	"60E3_en.10h" on page 363
60E3.11h	60E3-11h	Supported homing method 11	0 to 65535	11	-	Unchangeable	"60E3_en.11h" on page 363
60E3.12h	60E3-12h	Supported homing method 12	0 to 65535	12	-	Unchangeable	"60E3_en.12h" on page 363
60E3.13h	60E3-13h	Supported homing method 13	0 to 65535	13	-	Unchangeable	"60E3_en.13h" on page 363
60E3.14h	60E3-14h	Supported homing method 14	0 to 65535	14	-	Unchangeable	"60E3_en.14h" on page 364
60E3.15h	60E3-15h	Supported homing method 17	0 to 65535	17	-	Unchangeable	"60E3_en.15h" on page 364
60E3.16h	60E3-16h	Supported homing method 18	0 to 65535	18	-	Unchangeable	"60E3_en.16h" on page 364
60E3.17h	60E3-17h	Supported homing method 19	0 to 65535	19	-	Unchangeable	"60E3_en.17h" on page 364

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
60E3.18h	60E3-18h	Supported homing method 20	0 to 65535	20	-	Unchangeable	"60E3_en.18h" on page 365
60E3.19h	60E3-19h	Supported homing method 21	0 to 65535	21	-	Unchangeable	"60E3_en.19h" on page 365
60E3.20h	60E3-20h	Supported homing method 22	0 to 65535	22	-	Unchangeable	"60E3_en.20h" on page 365
60E3.21h	60E3-21h	Supported homing method 23	0 to 65535	23	-	Unchangeable	"60E3_en.21h" on page 366
60E3.22h	60E3-22h	Supported homing method 24	0 to 65535	24	-	Unchangeable	"60E3_en.22h" on page 366
60E3.23h	60E3-23h	Supported homing method 25	0 to 65535	25	-	Unchangeable	"60E3_en.23h" on page 366
60E3.24h	60E3-24h	Supported homing method 26	0 to 65535	26	-	Unchangeable	"60E3_en.24h" on page 366
60E3.25h	60E3-25h	Supported homing method 27	0 to 65535	27	-	Unchangeable	"60E3_en.25h" on page 367
60E3.26h	60E3-26h	Supported homing method 28	0 to 65535	28	-	Unchangeable	"60E3_en.26h" on page 367
60E3.27h	60E3-27h	Supported homing method 29	0 to 65535	29	-	Unchangeable	"60E3_en.27h" on page 367
60E3.28h	60E3-28h	Supported homing method 30	0 to 65535	30	-	Unchangeable	"60E3_en.28h" on page 367
60E3.29h	60E3-29h	Supported homing method 33	0 to 65535	33	-	Unchangeable	"60E3_en.29h" on page 368
60E3.30h	60E3-30h	Supported homing method 34	0 to 65535	34	-	Unchangeable	"60E3_en.30h" on page 368
60E3.31h	60E3-31h	Supported homing method 35	0 to 65535	35	-	Unchangeable	"60E3_en.31h" on page 368
60E3.32h	60E3-32h	Supported homing method -1	0 to 65535	-1	-	Unchangeable	"60E3_en.32h" on page 368

Param.	Hex	Name	Value	Default	Unit	Change Mode	Page
60E3.33h	60E3-33h	Supported homing method -2	0 to 65535	-2	-	Unchangeable	"60E3_en.33h" on page 369
60E3.34h	60E3-34h	Supported homing method -3	0 to 65535	-3	-	Unchangeable	"60E3_en.34h" on page 369
60E6h	60E6h	Actual position calculation method	0 to 1	0	-	Real-time	"60E6h" on page 369
60F4h	60F4h	Position deviation	-2147483648 to 2147483647	0	Reference unit	Unchangeable	"60F4h" on page 370
60FCh	60FCh	Position reference	-2147483648 to 2147483647	0	Encoder unit	Unchangeable	"60FCh" on page 370
60FDh	60FDh	DI state	0 to 4294967295	0	-	Unchangeable	"60FDh" on page 370
60FE.01h	60FE-01h	Physical output	0 to 4294967295	0	-	Real-time	"60FE_en.01h" on page 371
60FE.02h	60FE-02h	Bitmask	0 to 4294967295	0	-	Real-time	"60FE_en.02h" on page 372
60FFh	60FFh	Target speed	-2147483648 to +2147483647	0	Reference unit/s	Real-time	"60FFh" on page 372
6502h	6502h	Supported drive mode	0 to 4294967295	941	-	Unchangeable	"6502h" on page 373

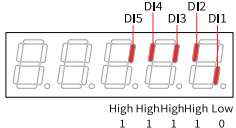
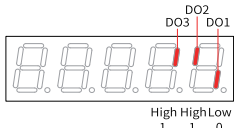
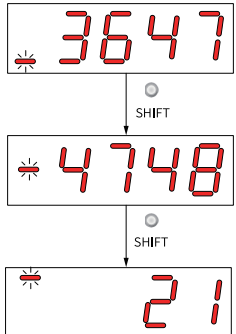
7 Appendix

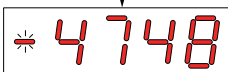
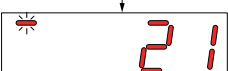
7.1 Display of Monitoring Parameters

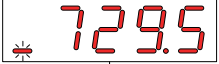
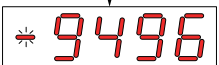
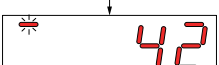
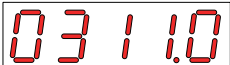
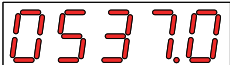
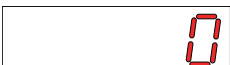
- Group H0b (200b): Displays parameters used to monitor the operating state of the servo drive.
- Set H02.32(2002.21h) (Default keypad display) properly. After the motor operates normally, the keypad switches from status display to parameter display. The parameter group number is H0b(200b) and the offset within the group is the setpoint of H02.32(2002.21h).
- For example, if H02.32 (2002.21h) is set to 00 and the motor speed is not 0 RPM, the keypad displays the value of H0b.00 (200b- 00h).

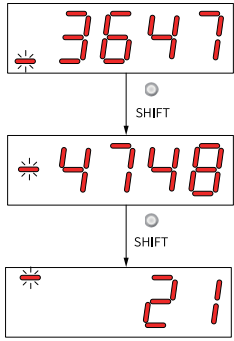
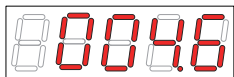
The following table describes the monitoring parameters in group H0b.

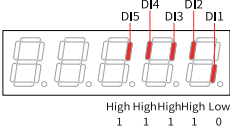
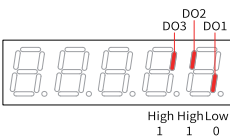
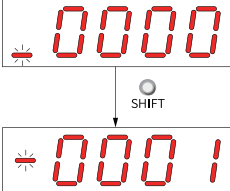
Parameter	Name	Unit	Meaning	Example of Display
H0b.00	Motor speed actual value	rpm	Displays the actual value of the motor speed after round-off, which can be accurate to 1 rpm.	Display of 3000 rpm:  -3000 rpm: 
H0b.01	Speed reference	rpm	Displays the present speed reference of the servo drive.	Display of 3000 rpm:  -3000 rpm: 
H0b.02	Internal torque reference	%	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%: 

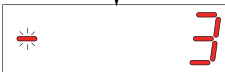
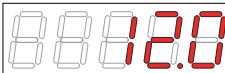
Parameter	Name	Unit	Meaning	Example of Display
H0b.03	Monitored DI status	-	Indicates level status of DI1 to DI5: Upper LED segments ON: high level (indicated by "1") Lower LED segments ON: low level (indicated by "0") The value of H0b.03 read in the software tool is a decimal.	For example, if DI1 is low level and DI2 to DI5 are high level, The corresponding binary value is "11110", and the value of H0b.03 read in the software tool is 0x001E. The keypad displays as follows: 
H0b.05	Monitored DO status	-	Indicates level status of DO1 to DO3: Upper LED segments ON: high level (indicated by "1") Lower LED segments ON: low level (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 DO3 are high level, then, the binary value is "110". The value of H0b.05 read in the software tool is 0x0006. 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	°	Displays current mechanical angle of the motor.	Display of 360.0°: 

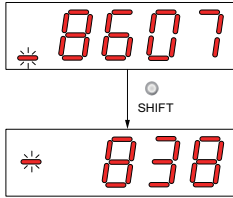
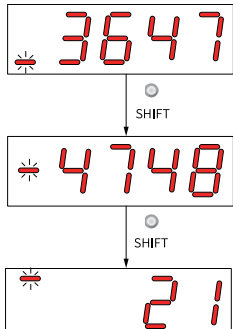
Parameter	Name	Unit	Meaning	Example of Display
H0b.10	Rotation angle (electrical angle)	°	Displays current electrical angle of the motor.	Display of 360.0°: 
H0b.11	Speed corresponding to the input position reference	rpm	Displays the speed corresponding to the position reference per control cycle of the servo drive.	Display of 3000 rpm:  -3000 rpm: 
H0b.12	Average load rate	%	Displays the ratio of the average load torque to the rated torque of the motor.	Display of 100.0%: 
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:  SHIFT 
H0b.17	Feedback pulse counter (32-bit decimal)	Encoder unit	Counts and displays the number of pulses fed back by the encoder (encoder unit). Note When the motor used is equipped with an absolute encoder, H0b.17 only reflects values of the low 32 bits of the motor position feedback. To get the actual motor position feedback, view H0b.77 (Encoder position (low 32 bits) and H0b.79 (Encoder position (high 32 bits).	Display of 1073741824 in encoder unit:  SHIFT  SHIFT 

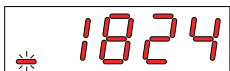
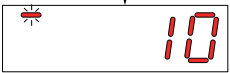
Parameter	Name	Unit	Meaning	Example of Display
H0b.19	Total power-on time (32-bit decimal)	s	Counts and displays the total power-on time of the servo drive.	Display of 429496729.5s:  Press and hold SHIFT  Press and hold SHIFT 
H0b.24	RMS value of phase current	A	Displays the RMS value of the phase current of the servo motor.	Display of 4.60 A: 
H0b.26	Bus voltage	V	Indicates the DC bus voltage of the main circuit, namely the voltage between terminals P⊕ and N ⊖.	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: 
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 value of H0b.34 is 0.	If H0b.33 is 0, and H0b.34 is E941.0, the current fault code is 941.0. Corresponding display: 

Parameter	Name	Unit	Meaning	Example of 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 941.0 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	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: 
H0b.39	Motor phase V current upon occurrence of the selected fault	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: 

Parameter	Name	Unit	Meaning	Example of Display
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 DI5 when the fault displayed in H0b.34 occurred. 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).	For example, when the value of H0B-41 read in the software tool is 0x0001, the corresponding binary code will be 0000 0000 0000 0001. 
H0b.43	DO status upon occurrence of the selected fault	-	Displays the high/low level status of DO1 to DO3 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.43 = 0x0003: 
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:  SHIFT  Display of -3000.0 RPM:  SHIFT 
H0b.57	Control circuit voltage	V	Displays the DC voltage of the control circuit.	Display of 12.0 V: 
H0b.58	Mechanical absolute position (low 32 bits)	Encoder unit	Displays the mechanical absolute position (low 32 bits) when an absolute encoder is used.	Display of 2147483647 in encoder unit:  SHIFT  SHIFT 
H0b.60	Mechanical absolute position (high 32 bits)	Encoder unit	Displays the mechanical absolute position (high 32 bits) when an absolute encoder is used.	Display of 32767: 
H0b.70	Number of absolute encoder revolutions	Rev	Displays the present number of revolutions of the absolute encoder.	Display of 32767: 

Parameter	Name	Unit	Meaning	Example of Display
H0b.71	Single-turn position feedback of an absolute encoder	Encoder unit	Displays the single-turn position feedback of the absolute encoder.	Display of 8388607 in encoder unit: 
H0b.77	Absolute encoder position (low 32 bits)	Encoder unit	Displays the absolute position (low 32 bits) of the motor when the absolute encoder is used.	Display of 2147483647 in encoder unit: 
H0b.79	Absolute encoder position (high 32 bits)	Encoder unit	Displays the absolute position (high 32 bits) of the motor when the absolute encoder is used.	Display of -1 in encoder unit: 
H0b.81	Single-turn position feedback of the load in rotation mode (low 32 bits)	Encoder unit	Displays the position feedback (low 32 bits) of the mechanical load when the absolute system works in the rotation mode.	Display of 2147483647 in encoder unit: 

Parameter	Name	Unit	Meaning	Example of Display
H0b.83	Single-turn position feedback of the load in rotation mode (high 32 bits)	Encoder unit	Displays the position feedback (high 32 bits) of the mechanical load when the absolute system works in the rotation mode.	Display of 1 in encoder unit: 
H0b.85	Single-turn position of the load in rotation mode	Reference unit	Displays the mechanical absolute position when the absolute system works in the rotation mode.	Display of 1073741824 in reference unit:  ↓ SHIFT  ↓ SHIFT 

7.2 DIDO Function Assignment

Code	Parameter Name	Function Name	Description	Remarks
Description of DI Signals				
FunIN.1	S-ON	Servo ON	Disabled - Servo motor disabled in local mode Enabled - Servo motor enabled in local mode	The S-ON function is only active in non-bus control mode. The corresponding terminal logic must be level-triggered.
FunIN.2	ALM-RST	Alarm reset signal	Enabled - Fault reset executed in local mode Disabled - Fault reset not executed in local mode	The ALM-RST function is only active in non-bus control mode. The corresponding terminal logic is recommended to be level-triggered.
FunIN.14	P-OT	Positive limit switch	Enabled - Forward drive inhibited Disabled - Forward drive permitted	Overtravel prevention applies when the load moves beyond the limit. The corresponding terminal logic is recommended to be level-triggered.
FunIN.15	N-OT	Negative limit switch	Enabled - Reverse drive inhibited Disabled - Reverse drive permitted	Overtravel prevention applies when the load moves beyond the limit. The corresponding terminal logic is recommended to be level-triggered.

Code	Parameter Name	Function Name	Description	Remarks
FunIN.31	HomeSwitch	Home switch	Disabled - Mechanical load beyond the home switch range Enabled - Mechanical load within the home switch range	The corresponding terminal logic must be level-triggered.
FunIN.34	Emergence Stop	Emergency stop	Enabled: Position lock applied after stop at zero speed Disabled: Current operating state unaffected	The corresponding terminal logic is recommended to be level-triggered.
FunIN.38	TouchProbe1	Touch probe 1	Disabled - Touch probe not triggered Enabled - Touch probe triggerable	The touch probe logic is only related to the touch probe function (60B8h).
FunIN.39	TouchProbe2	Touch probe 2	Disabled - Touch probe not triggered Enabled - Touch probe triggerable	The touch probe logic is only related to the touch probe function (60B8h).
Description of DO signals				
FunOUT.1	S-RDY	Ready to switch on	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 signal	Inactive. Absolute value of filtered motor speed is lower than the setpoint of H06.16. Active. Absolute value of filtered motor speed reaches the setpoint of H06.16.	-
FunOUT.5	COIN	Positioning completed	Inactive - positioning not completed Active - Positioning completed	-
FunOUT.9	BK	Brake output	Enabled - Brake signal outputted Disabled - Brake signal not outputted	-
FunOUT.10	WARN	Warning	Enabled: The servo drive issued a warning. Disabled: The servo drive issued no warning or the warning has been reset.	-
FunOUT.11	ALM	Fault	The servo drive is faulty. Inactive: No fault occurred on the servo drive or the fault has been reset.	-

Code	Parameter Name	Function Name	Description	Remarks
FunOUT.18	ToqReach	Torque reach	Active: Absolute value of torque reference reached setpoint Inactive: Absolute value of torque reference smaller than setpoint	-
FunOUT.25	CMP	Position compare DO	Enabled: The servo drive passed the target position comparison point. Inactive: The servo drive did not pass the target position comparison point.	-
FunOUT.31	EtherCAT forced DO in non-operational status		See "Table 7-1 Description of EtherCAT forced DO in non-operational status" on page 435	-
FunOUT.32	EDM	EDM output	Enabled - STO is triggered Disabled - STO is not triggered	The EDM outputs active signals only when both the 24 V input voltages for STO1 and STO2 are disconnected.

Table 7-1 Description of EtherCAT forced DO in non-operational status

Value	Description
0	Status of DO1, DO2, and DO3 unchanged in the non-operational status
1	No output in DO1 and status of DO2 and DO3 unchanged in the non-operational status
2	No output in DO2 and status of DO1 and DO3 unchanged in the non-operational status
3	No output in DO1 or DO3 and status of DO2 unchanged in the non-operational status
4	No output in DO3 and status of DO1 and DO2 unchanged in the non-operational status
5	No output in DO1 or DO3 and status of DO2 unchanged in the non-operational status
6	No output in DO2 or DO3 and status of DO1 unchanged in the non-operational status
7	No output in DO1, DO2, or DO3

This table describes the setpoints of H04.23 (ECAT communication forced DO logic in non-OP status).



19011434C00

Copyright © Shenzhen Inovance Technology Co., Ltd.

Shenzhen Inovance Technology Co., Ltd.

www.inovance.com

Add.: Inovance Headquarters Tower, High-tech Industrial Park,
Guanlan Street, Longhua New District, Shenzhen

Tel: (0755) 2979 9595

Fax: (0755) 2961 9897

Suzhou Inovance Technology Co., Ltd.

www.inovance.com

Add.: No. 16 Youxiang Road, Yuexi Town,
Wuzhong District, Suzhou 215104, P.R. China

Tel: (0512) 6637 6666

Fax: (0512) 6285 6720