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# SV660P Series Servo Drive

## Function Guide

Industrial Automation

Intelligent Elevator

New Energy Vehicle

Industrial Robot

Rail Transit

Data code19011393C00

# Preface

## Introduction

The SV660P series high-performance AC servo drive covers a power range from 50 W to 7.5 kW. The servo drive, which covers a power range from 0.05 kW to 7.5 kW, supports Modbus, CANopen and CANlink communication protocols and carries necessary communication interfaces to operate with the host controller for a networked operation of multiple servo drives. The SV680P series servo drive supports adaptive stiffness level setting, inertia auto-tuning, and vibration suppression for easy use. It allows a quiet and stable operation together with an MS1 series high-response servo motor (with low or high inertia) equipped with a 23-bit single-turn/multi-turn absolute encoder. The SV660P series servo drive serves to achieve quick and accurate position control, speed control, and torque control in automation equipment such as electronic manufacturing devices, manipulators, packing devices, and machine tools.

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

## More documents

| Name | Data Code | Description |
|---|---|---|
| SV660P Series Servo Drive Selection Guide | 19011390 | Provides instructions on product selection, including the list of supporting components, technical data on the drive and motor, and the selection guide of cables. |
| SV660P Series Servo Drive Hardware Guide | 19011391 | Presents electrical design guidance of the equipment, description of terminals, required certificates and standards and solutions to common EMC problems. |
| SV660P Series Servo Drive Commissioning Guide | 19011392 | Presents servo commissioning, parameter descriptions, including the operating panel, commissioning software, commissioning procedure and a parameter list. |
| SV660P Series Servo Drive Function Guide | 19011393 | Presents functions and parameters, including function overview, basic servo functions, adjustment and parameter list. |
| SV660P Series Servo Drive Communication Guide | 19012201 | Presents functions and parameters of the servo drive, including Modbus communication configuration, parameter descriptions, and communication application cases. |
| SV660P Series Servo Drive Troubleshooting Guide | 19011907 | Introduces faults and fault levels, the troubleshooting process, warning codes and fault codes. |

| Name | Data Code | Description |
|---|---|---|
| SV660P Series Servo Drive Safety Guide | 19011884 | Presents the safety function and related certifications and standards, wiring, commissioning process, troubleshooting, and functions. |
| SV660P Series Servo Drive Manual Package | PS00005513 | Provides information on selection, installation, commissioning, function, troubleshooting and parameters of the equipment. |

## Revision History

| Date | Version | Description |
|---|---|---|
| 2023-03 | C00 | • Optimized H0b.33 and H0b.63.<br>• Optimized the detailed description of H02.00 and H05.26. |
| 2023-01 | B03 | • Added warranty information in the preface.<br>• Deleted information on AI1.<br>• Modified the electronic gear ratio range:<br>• Added hexadecimal parameters in parameter description. |
| 2022-10 | B02 | Minor corrections. |
| 2022-09 | B01 | • Added a section on homing.<br>• Minor corrections. |
| 2022-08 | B00 | • Modified th example for setting the electronic gear ratio.<br>• Deleted section Faults.<br>• Updated the list of parameters and description of parameters. |
| 2022-03 | A05 | Modified the effective time of H00.08 to H00.35 to "-". |
| 2021-12 | A04 | • Added other safety precautions to the safety precautions.<br>• Changed the the default of H0A.30 to 2.<br>• Changed the range of H09.32 to -1000–1000.<br>• Changed the default value of H00.31 to 8388608.<br>• Changed the default value of H09.37 to 300.<br>• Changed the type of the power line breakage fault to No. 2 recoverable. |
| 2021-05 | A03 | • Updated descriptions for H05.16.<br>• Updated descriptions for Er.510. |
| 2021-01 | A02 | • Updated the descriptions for parameters including H02.06, H02.08, H03.65, H03.66, H05.16, H05.31, H05.41, H06.01, H07.17, H0A.26, H0C.02, and H0C.08.<br>• Updated the descriptions for Er.136 and Er.210.<br>• Added Appendix: CANlink Enhanced Axis Control Parameters. |

| Date | Version | Description |
|---|---|---|
| 2020-11 | A01 | Minor corrections. |
| 2020-08 | A00 | First release |

## Access to the Guide

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

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

## Warranty

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

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

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

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

For details, see the Product Warranty Card.

# Table of Contents

# Fundamental Safety Instructions

## Safety Precautions

1. This chapter presents essential safety instructions for a proper use of the equipment. Before operating the equipment, read through the guide and comprehend all the safety instructions. Failure to comply with the safety precautions may result in death, serious injury, or equipment damage.
2. "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.
3. Use this equipment according to the designated environment requirements. Damage caused by improper use is not covered by warranty.
4. Inovance shall take no responsibility for any personal injuries or property damage caused by improper usage.

## Safety Levels and Definitions

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

## Fundamental Safety Instructions

- Drawings in the 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.
- The drawings in the guide are shown for illustration only and may be different from the product you purchased.

| Unpacking |
|---|
| **WARNING**<br>• Do not install the equipment if you find damage, rust, or signs of use on the equipment or accessories upon unpacking.<br>• Do not install the equipment if you find water seepage or missing or damaged components upon unpacking.<br>• 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 must be operated only by professionals with electrical knowledge. 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 equipments with strong electromagnetic interference, such as a transformer, install a shielding equipment 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 all the power supplies of the equipment. and wait for at least the time designated on the equipment warning label before further operations because residual voltage still exists after power-off. After waiting for the designated time, measure the DC voltage in the main circuit to ensure the DC voltage is within the safe voltage range. Failure to comply will result in an 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 can result in electric shock.

WARNING

- Do not connect the input power supply to the output end of the equipment. Failure to comply can 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

- Follow the proper electrostatic discharge (ESD) procedure and wear an anti-static wrist strap to perform wiring. Failure to comply may result in damage to the equipment or to the internal circuit of the product.
- 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, check 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**<br>• Dispose of retired equipment in accordance with local regulations and standards. Failure to comply may result in property damage, personal injuries, or even death.<br>• Recycle retired equipment by observing industry waste disposal standards to avoid environmental pollution. |

## Safety label

For safe equipment operation and maintenance, comply with the safety labels on the equipment. Do not damage or remove the safety labels. The following table describes the meaning of the safety labels.

| Safety label | Description |
| --- | --- |
|   | • Read through the safety instructions before operating the equipment. Failure to comply may result in death, personal injuries, or equipment damage.<br>• Do not touch the terminals or remove the cover with power ON or within 10 min after power-off. Failure to comply will result in an electric shock. |

# 1 Function Overview

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

| Function | Description |
|---|---|
| Position control mode | Used to make the servo drive operate in the position control mode. |
| Speed Control Mode | Used to make the servo drive operate in the speed control mode. |
| Torque Control Mode | Used to make the servo drive operate in the torque control mode. |
| Position/Speed control switchover | Used to switch between position control and speed control through external input signals. |
| Position/Torque control switchover | Used to switch between speed control and torque control through external input signals. |
| Torque/Position control switchover | Used to switch between torque control and position control through external input signals. |
| Torque/Speed/Position control switchover | Used to switch among torque control, speed control and position control through external input signals. |
| High-resolution encoder | The servo drive is equipped with a high-performance encoder with resolution up to 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. |
| Electronic gear ratio | Decreasing or increasing the pulse input by: 0.001 x Encoder resolution/10000 to 4000 x Encoder resolution/10000. |
| Position ramp | Smooth acceleration at position reference response is implemented. |
| Position first-order low-pass filter | Used to achieve smooth acceleration and deceleration. |

| Function | Description |
|---|---|
| Homing | Used to search for the mechanical home automatically to locate the relative position between the mechanical home and mechanical zero |
| Interrupt positioning | Used to interrupt present position reference and execute the set displacement. |
| Zero Clamp | Used to keep the motor speed below a certain value in the speed control mode to lock the position. |
| Reference pulse selection | Four pulse string input types can be selected. |
| External regenerative resistor | Used in case of insufficient braking capacity of the built-in regenerative resistor. |
| DI signal assignment | Used to assign functions such as S-ON to corresponding pins. |
| Alarm history | The servo drive records the latest ten 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 | Outputting a three-digit warning code upon a warning event |

# 2 Basic Functions of the Servo Drive

## 2.1 Position control mode

### 2.1.1 Position control mode

★ Definition of terms:

- Reference unit: Refers to the minimum identifiable value input from the host controller to the servo drive.
- Encoder unit: Refers to the value of the input reference multiplied by the electronic gear ratio.

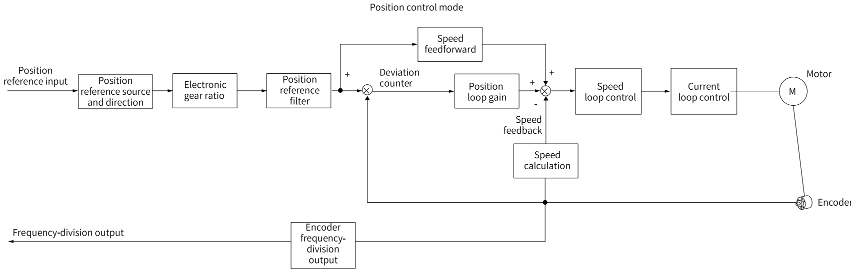



Figure 2-1 Position control diagram

Set H02.00 (Control mode selection) to 1 (Position control mode) through the keypad or Inovance software tool to make the servo drive operate in the position control mode. Set the drive parameters based on the mechanical structure and technical indicators.

The following describes basic parameter settings for the position control mode.

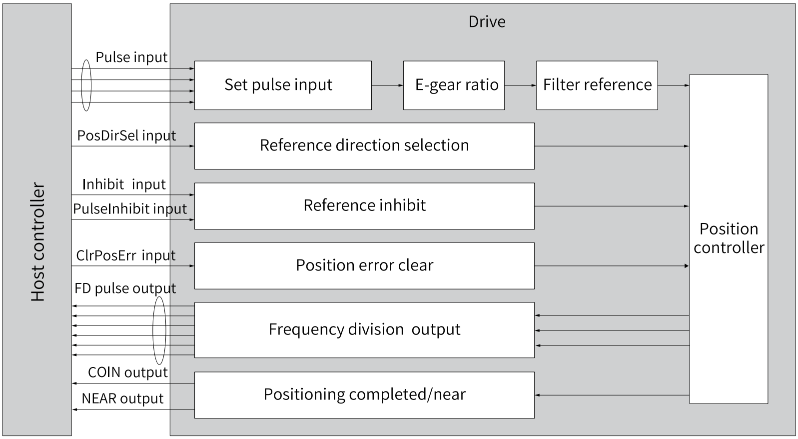



Figure 2-2 Signal exchange between the drive and the host controller

## 2.1.2 Block diagram of position control parameters

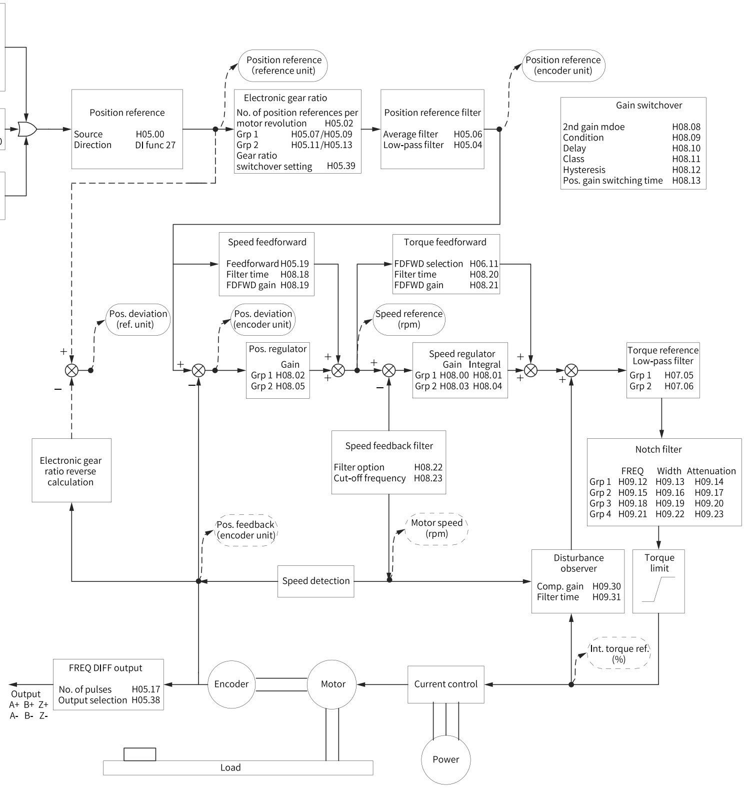



Figure 2-3 Block diagram of position control parameters

## 2.1.3 Position Reference Input Setting

The position reference input setting includes the position reference source, position reference direction, and FunIN.13 (Position reference inhibited).

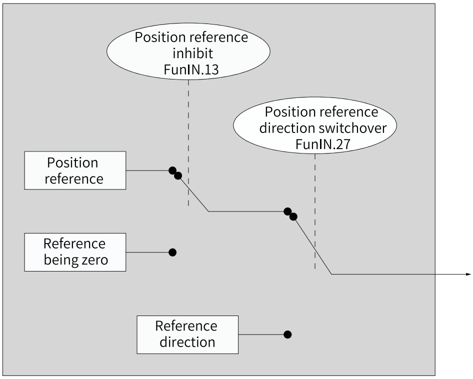



Figure 2-4 Position reference input setting

## Position reference source

In the position control mode, set the position reference source in H05.00 first.

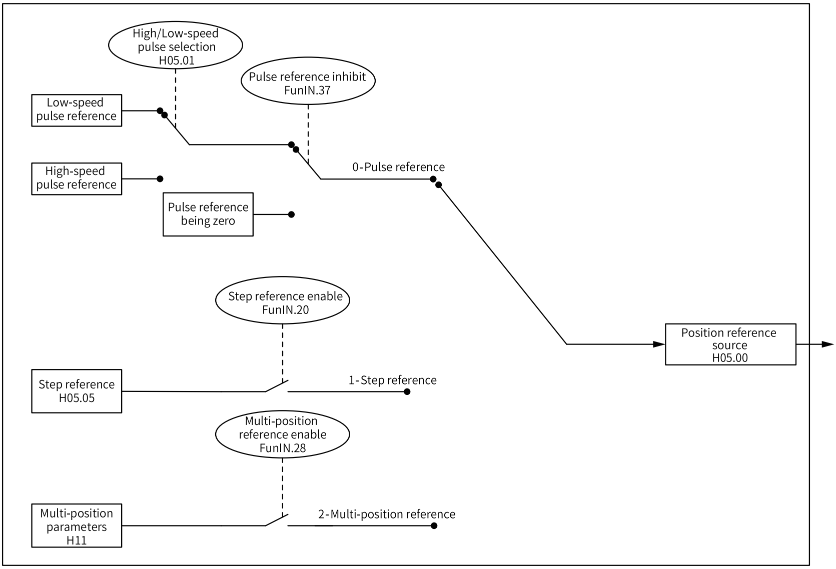



Figure 2-5 Setting the position reference source

☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H05.00 | 2005-01h | Primary position reference source | 0: Pulse reference<br>1: Step reference<br>2: Multi-position reference | 0 | - | At stop | " H05_en.00" on page 187 |

- Pulse reference as the source (H05.00 = 0)
  Perform the following operations to obtain the correct pulse reference form.

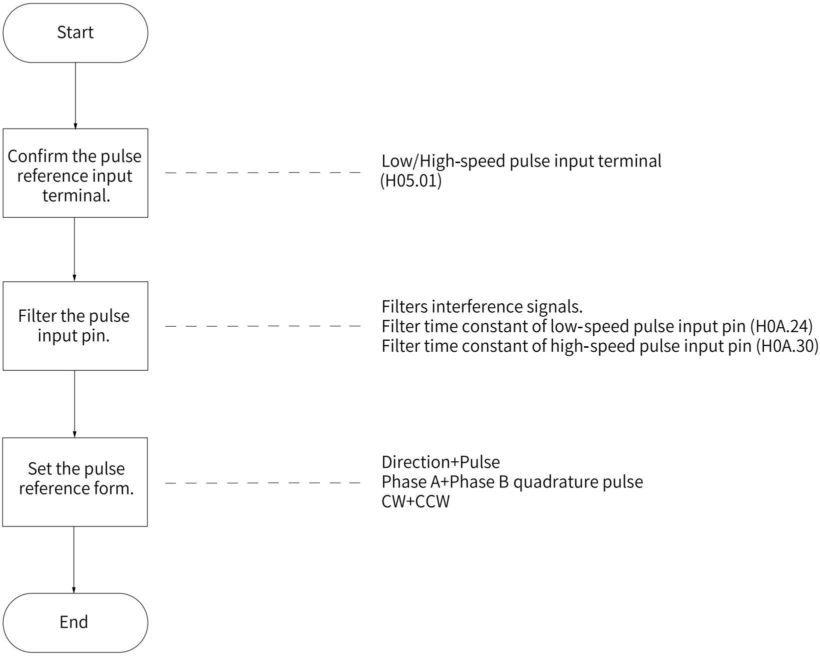
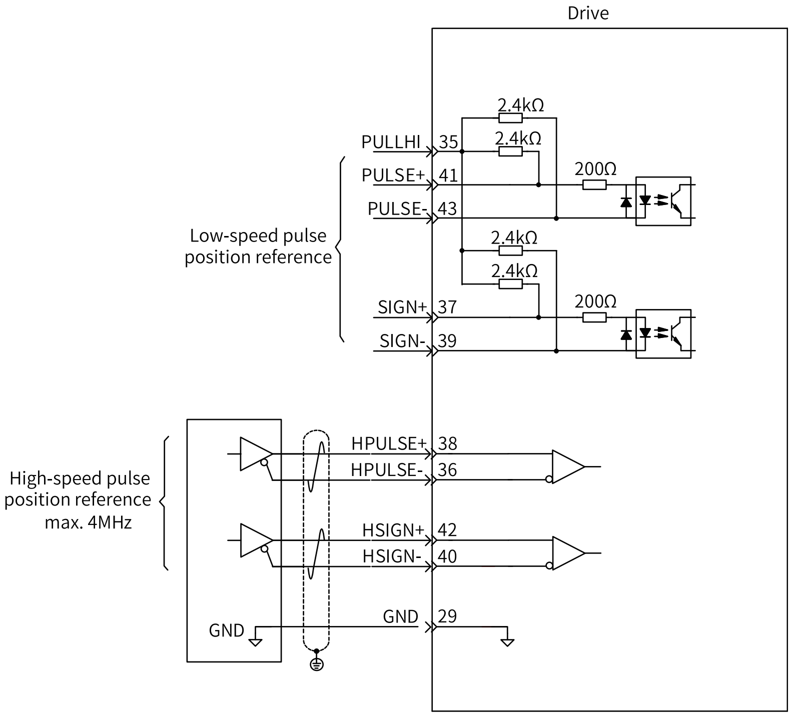



Figure 2-6 Flowchart for setting the pulse reference as the source

- Pulse reference input terminals
  The drive provides two groups of pulse input terminals.




The low-speed pulse input terminals (PULSE+, PULSE-, SIGN+, SIGN-) receive differential input (maximum frequency up to 200 kpps) and open-collector input (maximum frequency up to 200 kpps).

The high-speed pulse input terminals (HPULSE+, HPULSE-, HSIGN+, HSIGN-) receive differential input (maximum frequency up to 4 Mpps) only.

☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H05.01 | 2005-02h | Position pulse reference input terminal | 0: Low speed<br>1: High speed | 0 | - | At stop | " H05_en.01" on page 188 |

For details on the terminal circuit, see SV660P Series Servo Drive Hardware Guide.

Table 2–1 Specifications of pulse input

| Pulse Type | | Maximum Input Frequency | Voltage | Forward Current |
|---|---|---|---|---|
| High-speed pulse | Differential signal | 4M | 5V | < 25mA |
| Low-speed pulse | Differential signal | 200k | 5V | < 15 mA |
| | Open-collector signal | 200k | 24V | < 15 mA |

- Pulse input pin filter

Set the pin filter time for input terminals of low-speed and high-seed pulses. This is to prevent motor malfunction caused by interference signals.

☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H0A.24 | 200A-19h | Filter time constant of low-speed pulse input terminal | 0 to 255 | 30 | - | At stop | " H0A_en.24" on page 278 |
| H0A.30 | 200A-1Fh | Filter time constant of high-speed pulse input terminal | 0ns to 255ns | 2 | ns | At stop | " H0A_en.30" on page 280 |

If the filter time constant for pulse input pins is $t_F$, the minimum width of input signals is $t_{min}$, then the input signals before and after filtering are as follows. The filtered input signals will be delayed for $t_F$ over the unfiltered ones.

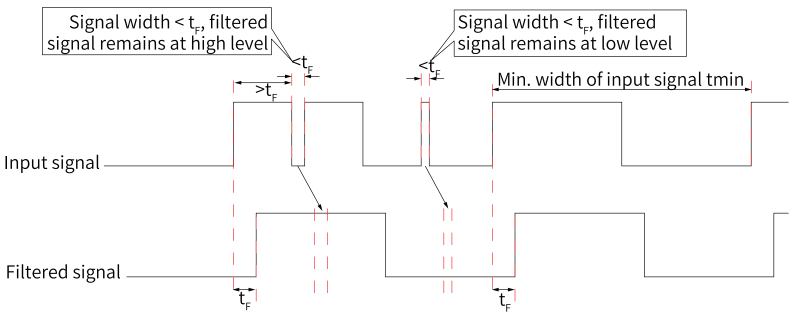



Figure 2-7 Example of filtered signal waveform

The pulse input pin filter time tF must meet the following requirement: $t_F \leqslant$ (20% to 25%) $t_{min}$

The recommended filter parameter setting based on the maximum frequency (minimum width) of input pulses is described in the following table.

Table 2–2 Recommended filter time constant

| Pulse Input Terminal | Related Parameters | Maximum Frequency of Input Pulses | Recommended Filter Time Constant (25 ns) |
|---|---|---|---|
| Low-speed pulse input terminal | H0A.24 | < 167 kbps | 30 |
| Low-speed pulse input terminal | H0A.24 | 167 kbps to 200 kbps | 20 |
| High-speed pulse input terminal | H0A.30 | 200 kpps to 1 M | 5 |
| High-speed pulse input terminal | H0A.30 | > 1 Mpps | 3 |

For example, if the filter time constant is set to 30, the actual filter time is 30 x 25 = 750 ns.

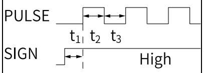
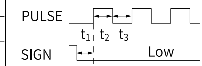
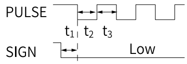
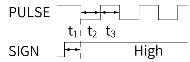
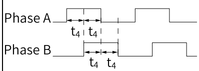
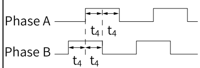
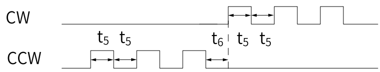
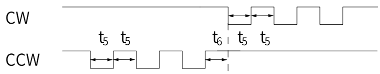
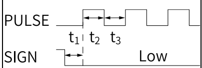
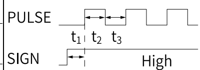
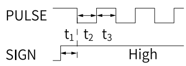
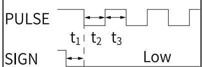
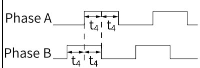
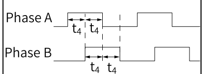
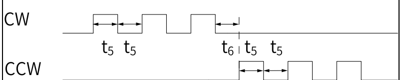
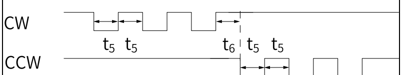
- Pulse reference form
  The drive supports the following three types of pulse references:
  - Direction + Pulse (positive or negative logic)
  - Phase A + Phase B quadrature pulse, quadrupled frequency
  - CW + CCW

  Select a pulse reference form appropriate for the host controller or other pulse generators.

  ☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H05.15 | 2005-10h | Pulse reference form | 0: Direction + Pulse, positive logic<br>1: Direction + Pulse, negative logic<br>2: Phase A + phase B quadrature pulse, quadrupled frequency<br>3: CW + CCW | 0 | - | At stop | *" H05_en.15" on page 193* |

Table 2–3 Descriptions of the pulse form

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

The following table describes the maximum frequencies and minimum time widths of position pulse references corresponding to different input terminals.

Table 2–4 Specifications of pulse references

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

The rising time and falling time of position pulse references must be shorter than 0.1 us.

- Pulse reference frequency
  Set the maximum position pulse frequency in H0A.09. If the actual input pulse frequency is higher than H0A.09, EB01.0 (excessive pulse increment) will occur.

☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H0A.09 | 200A-0Ah | Maximum position pulse frequency | 100kHz to 4000kHz | 4000 | kHz | At stop | *" H0A_en.09" on page 275* |

- Step reference as position reference source (H05.00 = 1)

**Caution**

When the S-ON (Servo ON) signal is active, the motor is locked when the step reference is disabled or in the rotational state when the step reference is enabled. After H05.05 (Step reference) is done executing, the motor stays locked when no step reference is triggered again.

The drive supports step operation, which means the drive can operate at a fixed speed until the set displacement is reached. The setting flowchart is as follows.

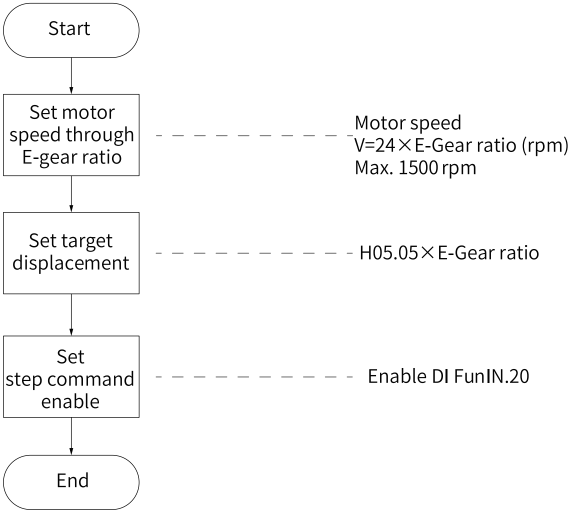



Figure 2-8 Flowchart for setting step reference as the position reference source

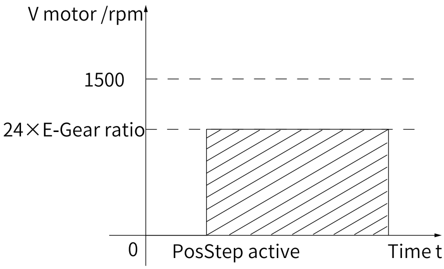



Figure 2-9 Motor operating curve (H05.00 = 1)

The hatched area in the preceding figure indicates the motor displacement: H05.05 x Electronic gear ratio (encoder unit).

- Relationship between the motor speed and electronic gear ratio
  When the step reference is used as the position reference source, the set motor speed will be converted based on the following formula. The motor speed in this case cannot exceed 1500 rpm.

$$V_{motor} = 24 \times \text{Electronic gear ratio (rpm)}$$

- Motor displacement
  When the step reference is used as the position reference source, the sum of position references (reference unit) is set in H05.05. The sign of the setpoint of H05.05 determines whether the motor speed is a positive or a negative value.

  ☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H05.05 | 2005-06h | Step amount | -9999 to +9999 | 50 | Reference unit | At stop | *" H05_en.05" on page 191* |

- Step reference

  To use the step reference as the position reference source, assign FunIN.20 (PosStep, step reference enable) to a certain DI of the servo drive, and set the active logic of this DI.

  ☆ Related parameters:

| Code | Parameter Name | Function Name | Function |
|---|---|---|---|
| FunIN.20 | PosStep | Step reference | S-ON:<br>Active: The position reference defined by H05.05 is input to the servo drive, driving the motor to run.<br>Invalid: Servo motor in locked state |

  FunIN.20 (Step reference enable) is edge-triggered. The motor is locked after the step reference is done executing. When FunIN.20 is triggered again, the motor executes the step reference defined by H05.05 again.

- Multi-position reference as the position reference source (H05.00 = 2)

  The servo drive supports multi-position operation. It stores 16 position references; the displacement, maximum running speed, and acceleration/deceleration time of each can be set. The interval time and switchover mode between positions can also be set according to actual requirements. The setting flowchart is as follows.

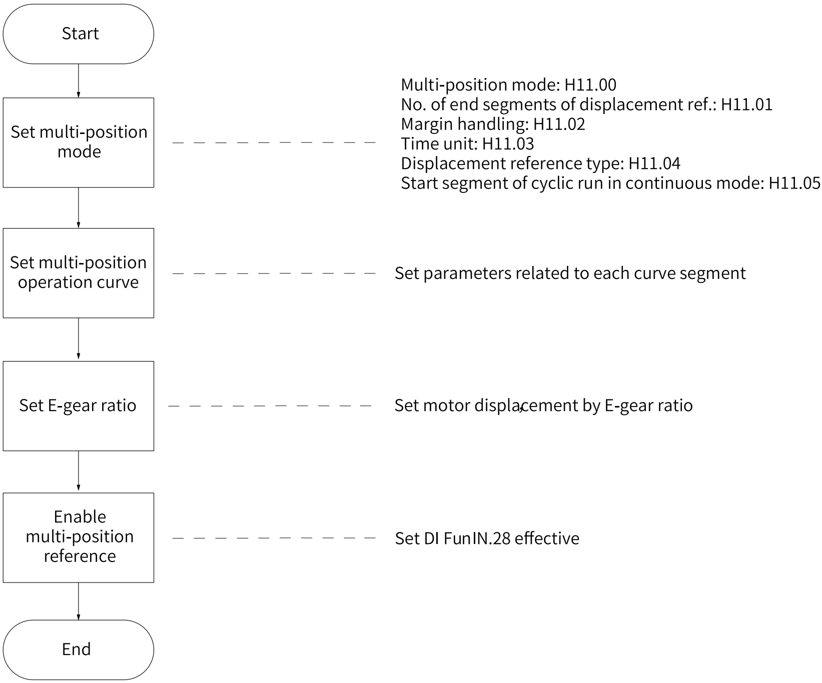



Figure 2-10 Flowchart for setting the multi-position reference as the source

- Setting the multi-position operation mode

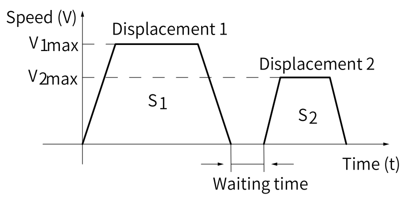
☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H11.00 | 2011-01h | Multi-position running mode | 0: Single run (number of displacements selected in H11.01)<br>1: Cyclic operation (number of displacement selected in H11.01)<br>2: DI-based operation (selected by DI)<br>3: Sequential operation<br>5: Axis-controlled continuous operation | 1 | - | At stop | *" H11_en.00" on page 317* |
| H11.01 | 2011-02h | End segments of displacement instruction | 1 to 16 | 1 | - | At stop | *" H11_en.01" on page 320* |
| H11.02 | 2011-03h | Starting displacement No. after pause | 0: Continue to execute the unexecuted displacements<br>1: Start from displacement 1 | 0 | - | At stop | *" H11_en.02" on page 320* |

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H11.03 | 2011-04h | Interval time unit | 0: ms<br>1: s | 0 | - | At stop | " H11_en.03" on page 321 |
| H11.04 | 2011-05h | Displacement reference type | 0: Relative displacement reference<br>1: Absolute displacement reference | 0 | - | Real-time | " H11_en.04" on page 322 |
| H11.05 | 2011-06h | Starting displacement No. in sequential operation | 0 to 16 | 0 | - | At stop | " H11_en.05" on page 323 |

(1) Individual operation (H11.00 = 0)

Table 2–5 Description of individual operation

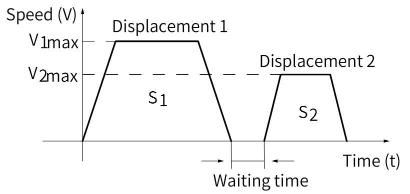
| Description | Operating Curve |
|---|---|
| • The drive stops after one cycle of operation.<br>• The drive switches to the next displacement automatically.<br>• The interval time between displacements can be set as needed.<br>• The PoslnSen (multi-position reference enable) signal is level-triggered. | <br>V1max, V2max: maximum operating speeds in displacement 1 and displacement 2<br>S1, S2: displacement 1 and displacement 2<br>• The positioning completed signal is active after each displacement is reached.<br>• If the PosInsen signal is switched off during operation, the drive abandons the unfinished displacement and stops. The COIN (positioning completed) signal is activated after the drive stops.<br>• After the PoslnSen signal is enabled again, the drive executes the displacement defined by H11.02.<br>• If the S-ON signal is switched off during operation, the motor stops as defined by H02.05 (Stop mode at S-ON OFF). The COIN (positioning completed) signal is deactivated after the motor stops.<br>• When a certain displacement is in progress, the logic change of the DI assigned with FunIN.27 (PosDirSel) does not affect the operating direction in this displacement. |

★ Definition of terms:

A complete operation cycle covers all the position references defined by H11.01.

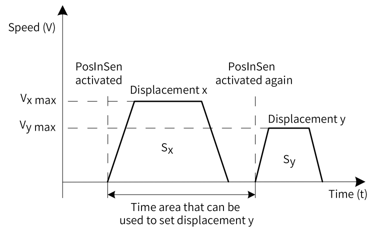
(2) Cyclic operation (H11.00 = 1)

Table 2–6 Descriptions of cyclic operation

| Description | Operating Curve |
| --- | --- |
| • The drive starts from displacement 1 again after each cycle of operation.<br>• The drive switches to the next displacement automatically.<br>• The interval time between displacements can be set as needed.<br>• The cyclic operation mode is kept when the FunIN.28 (Multi-position reference enable) is active.<br>• The PoslnSen (multi-position reference enable) signal is level-triggered. | <br>V1max, V2max: maximum operating speeds in displacement 1 and displacement 2<br>S1, S2: displacement 1 and displacement 2<br>• The positioning completed signal is active after each displacement is reached.<br>• If the PosInsen signal is switched off during operation, the drive abandons the unfinished displacement and stops. The COIN (positioning completed) signal is activated after the drive stops.<br>• After the PoslnSen signal is enabled again, the drive executes the displacement defined by H11.02.<br>• If the S-ON signal is switched off during operation, the motor stops as defined by H02.05 (Stop mode at S-ON OFF). The COIN (positioning completed) signal is deactivated after the motor stops.<br>• When a certain displacement is in progress, the logic change of the DI assigned with FunIN.27 (PosDirSel) does not affect the operating direction in this displacement. |

(3) DI-based operation (H11.00 = 2)

Table 2–7 Descriptions of DI-based operation

| Description | Operating Curve |
| --- | --- |
| • The displacement to be executed next can be set when the current displacement is in progress. The motor stops after current displacement is done executing. After the PoslnSen (position reference enable) signal is enabled again, the present displacement will be executed.<br>• The speed No. is determined by the DI logic.<br>• The interval time between displacements is determined by the command delay of the host controller.<br>• The PoslnSen (multi-position reference enable) signal is edge-triggered. | <br>Vxmax, Vymax: maximum operating speeds in displacement x and displacement y<br>Sx, Sy: displacement x and displacement y<br>• The positioning completed signal is active after each displacement is reached.<br>• If the PosInsen (multi-position reference enable) signal is switched off during operation, the drive continues to execute the unfinished displacement and outputs the COIN (positioning completed) signal.<br>• The displacements must be switched in the following sequence:<br>1. Wait until displacement x is done executing before switching the displacement no..<br>2. When displacement x is in progress or done, switch off the PoslnSen (multi-position reference enable) signal first, and then change the displacement No. from x to y (if x = y, the drive executes displacement x again).<br>3. After displacement x is done executing, switch on the PoslnSen (multi-position reference enable) signal again to make the drive execute displacement y.<br>• If the S-ON signal is switched off during operation, the motor stops as defined by H02.05 (Stop mode at S-ON OFF). The COIN (positioning completed) signal is deactivated after the motor stops.<br>• When a certain displacement is in progress, the logic change of the DI assigned with FunIN.27 (PosDirSel) does not affect the operating direction in this displacement. |

In the multi-position operation mode, assign four DIs with FunIN.6 to FunIN.9 respectively, and set the active logic of these DIs.

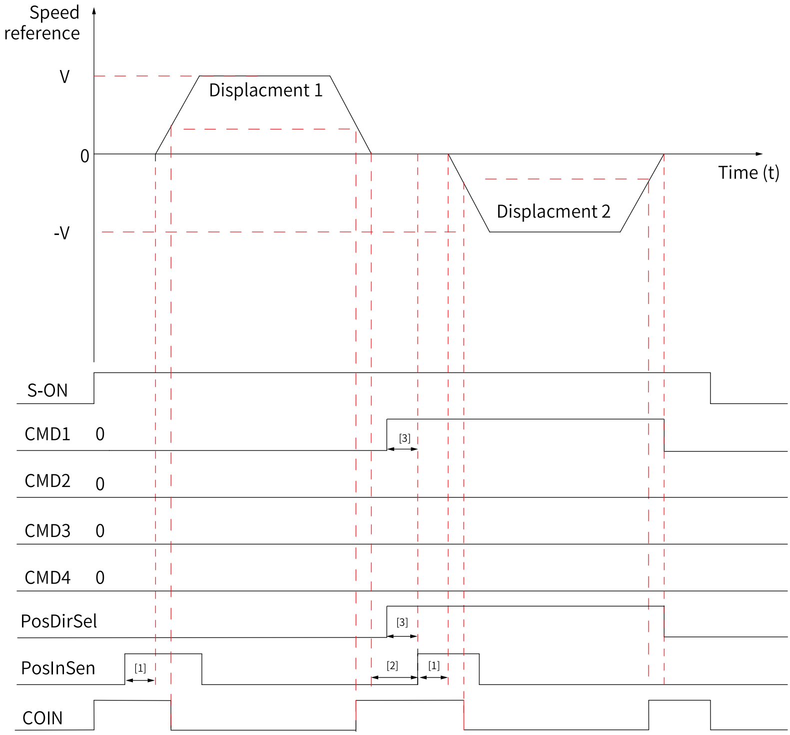



Figure 2-11 Multi-position sequence diagram

## Note

- [1] The PosInSen signal is edge-triggered. The minimum signal widths required by the normal DI and high-speed DI are 3 ms and 0.25 ms respectively.
- [2] Area for switching the displacement No.: Refers to the range that start from the moment the last position reference is done transmitting to the moment the next PosInSen (multi-position reference enable) signal is activated again.
- [3] When a normal DI is used, an effective signal width of 0.125 ms must be kept.

☆ Related parameters:

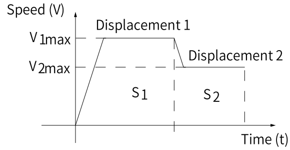
| Code | Parameter Name | Function Name | Function |
|---|---|---|---|
| FunIN.6 | CMD1 | Multi-reference switchover 1 | The displacement No. is a 4-bit binary. The relationship between the displacement No. and CMD1 to CMD4 is shown in *"Table 2–8 " on page 32*. The DI logic is level-triggered. The CMD value is 1 upon active level input or 0 upon inactive level input. |
| FunIN.7 | CMD2 | Multi-reference switchover 2 | |
| FunIN.8 | CMD3 | Multi-reference switchover 3 | |
| FunIN.9 | CMD4 | Multi-reference switchover 4 | |

Table 2–8 Relationship between the displacement No. and CMD1 to CMD4

| CMD4 | CMD3 | CMD2 | CMD1 | Segment No. |
|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 2 |
| ... | | | | |
| 1 | 1 | 1 | 1 | 16 |

**Sequential running (H11.00 = 3)**

Table 2–9 Descriptions of sequential operation

| Description | Operating Curve |
| --- | --- |
| • The drive stops after one cycle of operation.<br>• (H11.05 = 0 or H11.05 > H11.01).<br>• The starting displacement after the first cycle of operation is defined by H11.05.<br>• The drive switches to the next displacement automatically.<br>• There is no interval time between displacements.<br>• The PoslnSen (multi-position reference enable) signal is level-triggered. | <br>V1max, V2max: maximum operating speeds in displacement 1 and displacement 2<br>S1, S2: displacement 1 and displacement 2<br>• The positioning completed signal is active after each displacement is reached.<br>• If the PosInsen signal is switched off during operation, the drive abandons the unfinished displacement and stops. The COIN (positioning completed) signal is activated after the drive stops.<br>• After the PoslnSen signal is enabled again, the drive executes the displacement defined by H11.02.<br>• If the S-ON signal is switched off during operation, the motor stops as defined by H02.05 (Stop mode at S-ON OFF). The COIN (positioning completed) signal is deactivated after the motor stops.<br>• When a certain displacement is in progress, the logic change of the DI assigned with FunIN.27 (PosDirSel) does not affect the operating direction in this displacement. |

**Axis-controlled continuous operation (H11.00 = 5)**

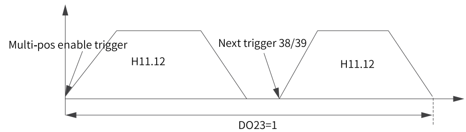
Table 2–10 Description of axis-controlled continuous operation

<table>
<tr><th>Description</th><th>Operating Curve</th></tr>
<tr><td>

- The drives executes one displacement only.
- The individual operation mode, sequential operation mode, and interrupted operation mode are included.
- The PoslnSen (multi-position reference enable) signal is level-triggered.

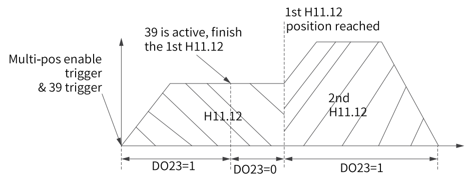
</td><td>

- Individual operation



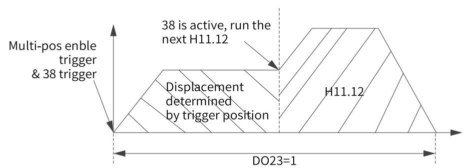

The PoslnSen (multi-position reference enable) signal is triggered only once (FunIN.39/38 triggered later). The drive stops after executing the distance defined by H11.12.

- Sequential operation




The PoslnSen (multi-position reference enable) signal is triggered only once. Write H11.12 again and activate FunIN.39 when the distance defined by the first H11.12 is still in progress.After receiving the new distance (or speed), which is the second H11.12, the drive continues executing the first H11.12 until the distance defined by the first H11.12 is done. Then it starts to execute the second H11.12 directly. The travel distance therefore is the sum of the first H11.12 and the second H11.12.

- Interrupted operation




The PoslnSen (Multi-position reference enable) signal is triggered only once. Write H11.12 (such as 1000000) again and activate FunIN.38 when the first H11.12 (such as 9000000) is still in progress. After receiving the new distance (or speed), which is the second H11.12, the servo drive stops executing the first H11.12 and turns to executing the second H11.12.

</td></tr>
</table>

☆ Related parameters:

| Code | Parameter Name | Function Name | Function |
|---|---|---|---|
| FunIN.38 | MultiBlockTrig | Write interrupt trigger signal | Active: Newly written command activated immediately<br>Inactive: Newly written command not activated |
| FunIN.39 | MultiBlockWr | Write non-interrupt trigger signal | Active: Newly written command activated after current displacement is done executing<br>Inactive: Newly written command not activated |
| FunOUT.23 | WrNextBlockEn | Next command input enable | Active: Next command input allowed<br>Inactive: Next command input inhibited |

- Setting multi-position operating curve
  A total of 16 position references can be set during multi-position operation. The displacement, maximum operating speed, acceleration/deceleration time, and interval time between displacements can be set separately. The following takes displacement 1 as an example.

☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H11.12 | 2011-0Dh | Displacement 1 | -1073741824 to 1073741824 | 10000 | Reference unit | Real-time | " H11_en.12" on page 325 |
| H11.14 | 2011-0Fh | Max. speed of displacement 1 | 1 rpm to 6000 rpm | 200 | RPM | Real-time | " H11_en.14" on page 325 |
| H11.15 | 2011-10h | Acc/Dec time of displacement 1 | 0ms to 65535ms | 10 | ms | Real-time | " H11_en.15" on page 325 |
| H11.16 | 2011-11h | Interval time after displacement 1 | 0 ms(s) to 10000 ms(s) | 10 | ms (s) | Real-time | " H11_en.16" on page 326 |

The actual operating curve of the motor based on preceding settings is shown in the following figure.

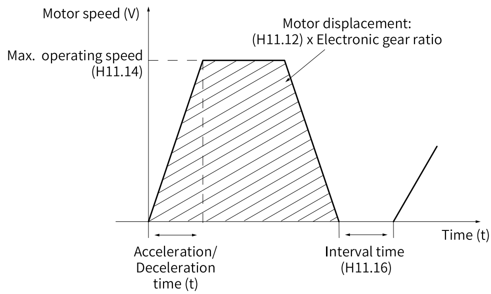



Figure 2-12 Motor operating curve in displacement 1

Actual time (t) taken to accelerate to H11.14:

$$t = \frac{(H11.14)}{1000} \text{ x } (H11.15)$$

For parameter settings of other 15 displacements, see Chapter "Parameter List".

- Setting multi-position reference enable mode
  To use the multi-position reference as the position reference source, assign FunIN.28 (PosInSen, multi-position reference enable) to a certain DI of the drive, and set the active logic of this DI.

  ☆Related function No.

| Code | Parameter Name | Function Name | Function |
|---|---|---|---|
| FunIN.28 | PosInSen | Multi-position reference enable | Active: The motor executes the multi-position reference.<br>Invalid: Servo motor in locked state<br>**Note:**<br>• When H11.00 is set to 0, 1, or 3, the logic of the DI assigned with the PosInSen signal is level-triggered.<br>• When H11.00 is set to 2, the logic of the DI assigned with the PosInSen signal is edge-triggered. |

## Position reference direction

A DI can be used to change the position reference direction, so as to change the motor direction of rotation. Assign FunIN.27 (PosDirSel, position reference direction) to a DI of the drive, and set the active logic of this DI.

☆ Related parameters:

| Code | Parameter Name | Function Name | Function |
|---|---|---|---|
| FunIN.27 | PosDirSel | Position reference direction | Inactive: Actual position reference direction same as the set direction<br>Active: Actual position reference direction opposite to the set direction |

The actual motor direction is related to the rotating direction in H02.02, positive/negative of position reference, position reference direction (FunIN.27).

Table 2–11 Motor direction of rotation

| H02.02 | Sign of Position Reference | FunIN.27 | Direction of Rotation |
|---|---|---|---|
| 0 | + | Inactive | CCW |
| 0 | + | Active | CW |
| 0 | - | Inactive | CW |
| 0 | - | Active | CCW |
| 1 | + | Inactive | CW |
| 1 | + | Active | CCW |
| 1 | - | Inactive | CCW |
| 1 | - | Active | CW |

## Position reference inhibited

FunIN.13 (Inhibit) and FunIN.37 (PulseInhibit) are used to inhibit position references and pulse references.

- Position reference inhibited

  The servo drive sets all the position references to 0, which means it does not respond to any internal or external position references, and the motor is in the locked state in the position control mode. In this case, the drive can switch to other control modes to continue operating.

  When position reference inhibition is activated, the input position reference counter (H0b.13) continues counting the position references in the position control mode, but the references counted in this case are not responded to by the servo drive after position reference inhibition is deactivated.

  To use FunIN.13 (Inhibit, position reference inhibited), assign FunIN.13 to a certain DI and set the active logic of this DI. It is recommended to use the high-speed DI (DI8 or DI9) terminal.

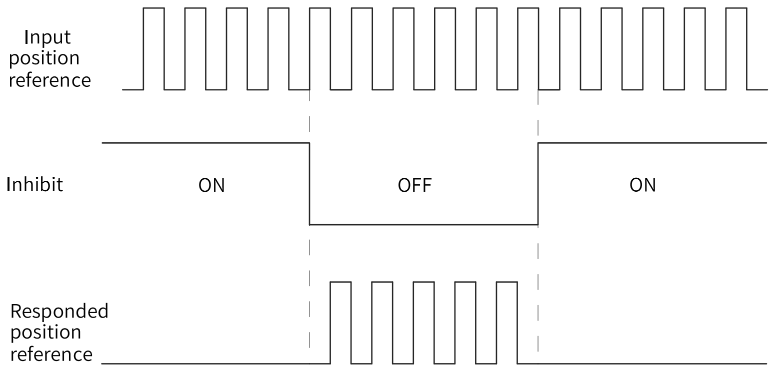



Figure 2-13 Waveform example for position reference inhibited

☆Related function No.:

| Code | Parameter Name | Function Name | Function |
|---|---|---|---|
| FunIN.13 | Inhibit | Position reference inhibited | Inactive: The drive responds to position references in the position control mode.<br>Active: The drive does not respond to any internal or external position references in the position control modes. |

- Pulse reference inhibited

  The servo drive sets all the pulse references to 0, which means it does not respond to any pulse references inputted from the pulse input terminal but it can respond to position references in other forms in the position control mode. In this case, the drive can be switched to other control modes to continue operating.

  When the pulse reference is inhibited in the position control mode and no other forms of position references are used, the input position reference counter (H0b.13) continues counting the pulse references inputted from the pulse input terminal, but the pulse references counted in this case are not responded to by the drive after the pulse reference is no longer inhibited.

  If position references in other forms are used in the position control mode, the input position reference counter (H0b.13) continues counting the these position references, and these references will be executed.

  To use FunIN.37 (PulseInhibit, pulse reference inhibit), assign FunIN.37 to a certain DI and set the active logic of this DI. It is recommended to use the high-speed DI (DI8 or DI9) terminal.

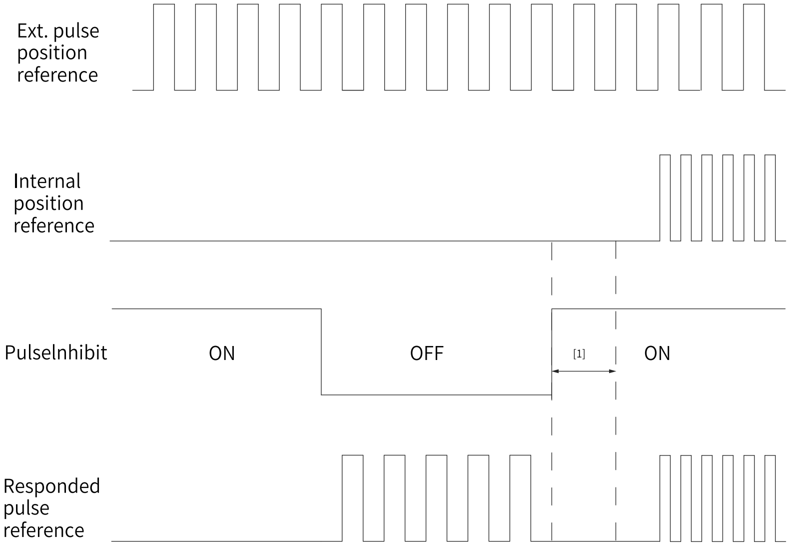



Figure 2-14 Waveform example for pulse reference inhibited

## *Note*

[1] When DI is used, keep an interval of at least 0.5 ms from the moment the DI logic is deactivated to the moment the internal position reference is inputted.

☆Related function No.:

| Code | Parameter Name | Function Name | Function |
|---|---|---|---|
| FunIN.37 | PulseInhibit | Pulse reference inhibited | When the position reference source is pulse reference (H05.00 = 0) in the position control mode:<br>Inactive: The drive responds to pulse references.<br>Active: The drive does not respond to pulse references. |

## 2.1.4 Reference Frequency Division/Multiplication (Electronic Gear Ratio)

**Caution**

- The electronic gear ratio must be within the following range:

$$\frac{0.001\times\text{Encoder resolution}}{10000} \leqslant \frac{B}{A} \leqslant \frac{4000\times\text{Encoder resolution}}{10000}$$

  Otherwise, EB03.0 (electronic gear ratio beyond the limit) will occur.
- In cases where an operation error occurs due to an improper electronic gear ratio, it is recommended to reset the electronic gear ratio after the servo drive stops.

### Definition of the electronic gear ratio

In the position control mode, the input position reference (reference unit) defines the load displacement; the motor position reference (encoder unit) defines the motor displacement. The electronic gear ratio is used to establish a proportional relationship between the input position reference and motor position reference.

The electronic gear ratio, which allows frequency division (electronic gear ratio < 1) or frequency multiplication (electronic gear ratio > 1), can be used to set the actual displacement corresponding to the input position reference per reference unit, or used to increase the position reference frequency when the motor speed needed cannot be fulfilled due to limited pulse output frequency of the host controller or limited parameter value range.

★ Definition of terms:

- Reference unit: Refers to the minimum identifiable value input from the host controller to the servo drive.
- Encoder unit: Refers to the value of the input reference multiplied/divided by the electronic gear ratio.

### Procedure for setting the electronic gear ratio

The electronic gear ratio varies with the mechanical structure. Set the electronic gear ratio according to the following flowchart.

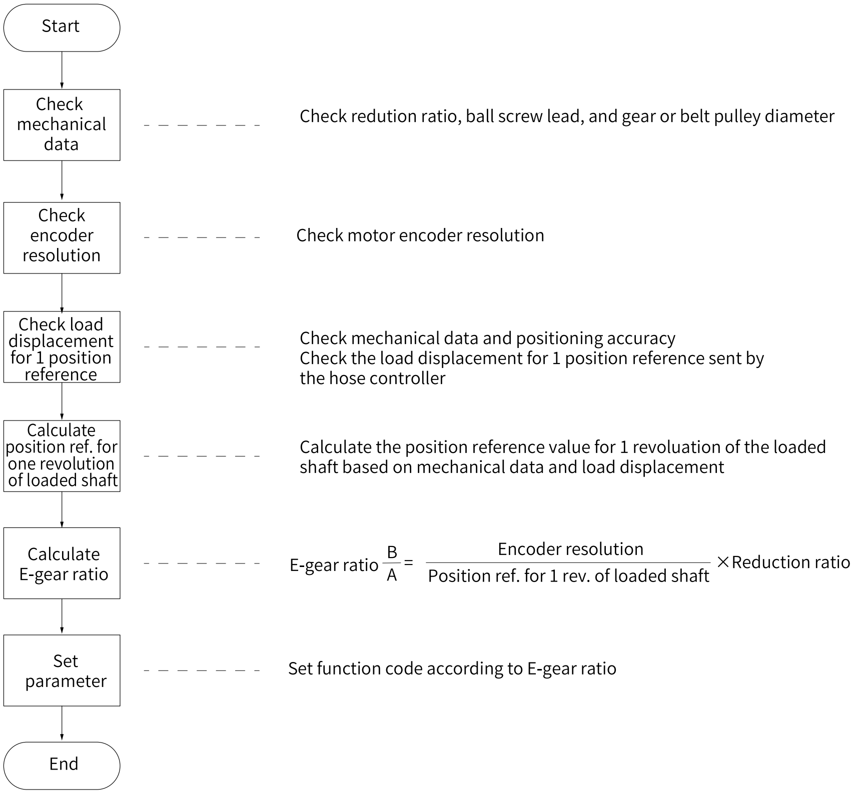



Figure 2-15 Procedure for setting the electronic gear ratio

See the following figure for how to set parameters.

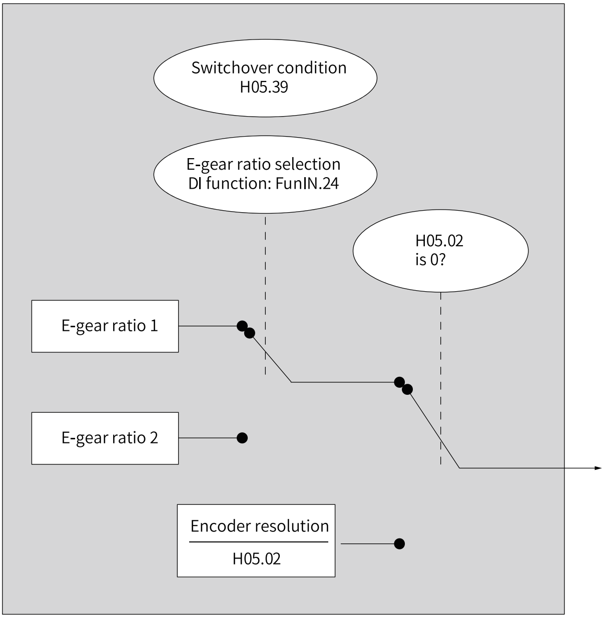



Figure 2-16 Procedure for setting the electronic gear ratio

## Note

When the setpoint of H05.02 (Pulses per revolution) is not 0, the following formula applies:

Electronic gear ratio $\frac{B}{A} = \frac{\text{Encoder resolution}}{\text{H05.02}}$. In this case, electronic gear ratios 1 and 2 are invalid.

## Related Parameters

- Setting the electronic gear ratio

  ☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H05.02 | 2005-03h | Pulses per revolution | 0 P/Rev–1048576 P/Rev | 0 | PPR | At stop | *" H05_en.02" on page 190* |
| H05.07 | 2005-08h | Electronic gear ratio 1 (numerator) | 1 to 1073741824 | 8388608 | - | Real-time | *" H05_en.07" on page 192* |
| H05.09 | 2005-0Ah | Electronic gear ratio 1 (denominator) | 1 to 1073741824 | 10000 | - | Real-time | *" H05_en.09" on page 192* |

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H05.11 | 2005-0Ch | Electronic gear ratio 2 (numerator) | 1 to 1073741824 | 8388608 | - | Real-time | *" H05_en.11" on page 193* |
| H05.13 | 2005-0Eh | Electronic gear ratio 2 (denominator) | 1 to 1073741824 | 10000 | - | Real-time | *" H05_en.13" on page 193* |

- Switching the electronic gear ratio

Caution

The motor speed may fluctuate significantly if the electronic gear ratio changes sharply in real time or electronic gear ratio 1 differs greatly from electronic gear ratio 2. In this case, set H05.04 (First-order low-pass filter time constant) properly to allow smooth switchover of position references.

- The electronic gear ratio can be switched when H05.02 (Pulses per revolution) is set to 0. Determine whether to switch between electronic gear ratios 1 and 2 based on mechanical conditions. Set the condition for switching the electronic gear ratio.
- Only one electronic gear ratio is effective at any moment.
- The effective time of real-time change in the electronic gear ratio is also restricted by the switchover condition.

☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H05.39 | 2005-28h | Electronic gear ratio switchover by DI | 0: Switch after position reference is kept 0 for 10ms<br>1: Switch in real time | 0 | - | At stop | *" " on page* |

Assign FunIN.24 (GEAR-SEL, electronic gear ratio selection) to a certain DI and set the active logic of this DI.

☆ Related parameters:

| Code | Parameter Name | Function Name | Function |
|---|---|---|---|
| FunIN.24 | GEAR_SEL | Electronic gear ratio selection | Inactive: Electronic gear ratio 1 used in the position control mode<br>Active: Electronic gear ratio 2 used in the position control mode |

See the following table for the electronic gear ratio used by the servo drive.

| H05.02 | H05.39 | Level of the DI Assigned with FunIN.24 | Electronic gear ratio |
|---|---|---|---|
| 0 | 0 | Inactive | $\frac{H05.07}{H05.09}$ |
| | | Active | $\frac{H05.11}{H05.13}$ |
| | 1 | Inactive | $\frac{H05.07}{H05.09}$ |
| | | Active | $\frac{H05.11}{H05.13}$ |
| 1 to 1048576 | - | | - |

The resolution of the serial encoder is 2n PPR, where "n" is the number of bits of the serial encoder.

For example, the resolution of a 23-bit serial encoder is 223 PPR, which is 8388608 PPR.

- Calculating the electronic gear ratio
  The following figure shows the relationship among the position reference (reference unit), load displacement, and electronic gear ratio.

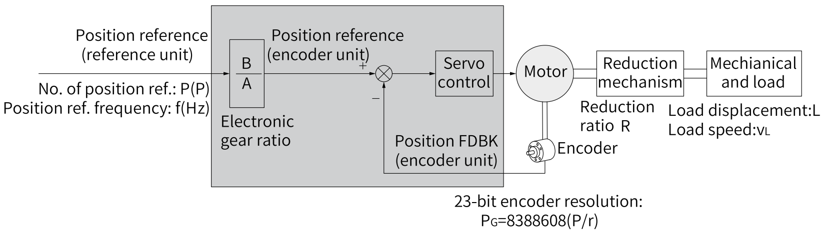



Figure 2-17 Relationship among the position reference (reference unit), load displacement, and electronic gear ratio

Take the ball screw in linear motion as an example, with PB (mm) as the screw lead, PG as the encoder resolution, and R as the reduction ratio of the reducer.

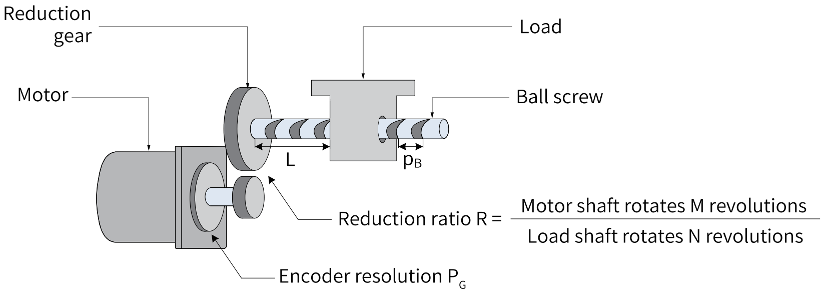



Figure 2-18 Ball screw

- When the load displacement per pulse ΔL (mm) is known:

  The load shaft rotates $\frac{\Delta L}{p_B}$ circles and the motor shaft rotates $\frac{\Delta L}{p_B} \times R$ circles when the mechanical displacement is ΔL. Then the following formula applies:

$$1 \times \frac{B}{A} = \frac{\Delta L}{p_B} \times R \times P_G$$

  Therefore, the electronic gear ratio is as follows.

$$\frac{B}{A} = \frac{\Delta L}{p_B} \times R \times P_G$$

- When the load displacement L (mm) and position reference sum P (P) are known:

  The load shaft rotates $\frac{L}{p_B}$ circles, and the motor shaft rotates $\frac{L}{p_B} \times R$ circles when the mechanical displacement is L. Then the following formula applies:

$$P \times \frac{B}{A} = \frac{L}{p_B} \times R \times P_G$$

  Therefore, the electronic gear ratio is as follows.

$$\frac{B}{A} = \frac{L}{p_B} \times R \times P_G \times \frac{1}{P}$$

- When the load moving speed VL (mm/s) and position reference frequency f (Hz) are known:

  Load shaft speed: $\frac{v_L}{p_B}$ (r/s)

  Motor speed: $v_M = \frac{v_L}{p_B} \times R$ (r/s)

The relationship among the position reference frequency, electronic gear ratio, and motor speed is as follows:

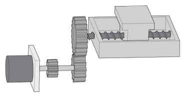
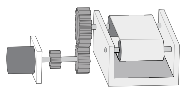
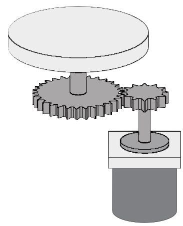
$$f \times \frac{B}{A} = v_M \times P_G$$

Therefore, the electronic gear ratio is as follows.

$$\frac{B}{A} = \frac{v_M \times P_G}{f}$$

- Example for setting the electronic gear ratio

Table 2–12 Example for setting electronic gear ratio

| Step | Parameter Name | Mechanical Structure | | |
|---|---|---|---|---|
| | | Transmission With Ball Screw | Transmission With Belt Pulley | Rotary Load |
| - | |  |  |  |
| 1 | Mechanical parameters | Reduction ratio (R): 1/1<br>Screw lead: 0.01 m | Reduction ratio (R): 5/1<br>Diameter of belt pulley: 0.2 m<br>(Circumference of belt pulley): 0.628 m | Reduction ratio (R): 10/1<br>Load angle of rotation per revolution of the load shaft: 360° |
| 2 | Resolution | 23-bit = 8388608P/r | 23-bit = 8388608P/r | 23-bit = 8388608P/r |
| 3 | Load displacement per position reference (reference unit) | 0.0001m | 0.000005m | 0.01° |
| 4 | Position references per revolution of the load shaft (reference unit) | $\frac{0.01}{0.0001} = 100$ | $\frac{0.628}{0.000005} = 125600$ | $\frac{360}{0.01} = 36000$ |
| 5 | Calculation | $\frac{B}{A} = \frac{8388608}{100} \times \frac{1}{1}$ | $\frac{B}{A} = \frac{8388608}{125600} \times \frac{5}{1}$ | $\frac{B}{A} = \frac{8388608}{36000} \times \frac{10}{1}$ |
| 6 | Setting | H05.07 = 8388608<br>H05.09 = 100 | H05.07 = 41943040<br>H05.09 = 125600 | H05.07 = 83886080<br>H05.09 = 36000 |

## 2.1.5 Position Reference Filter

Position reference filter serves to filter the position references (in encoder unit) multiplied or divided by the electronic gear ratio, which includes first-order low-pass filtering and moving average filtering. It involves the first-order filter and moving average filter.

It is applicable to the following conditions:

- The acceleration/deceleration process is not performed on the position references sent from the host controller.
- The pulse reference frequency is low.
- The electronic gear ratio is larger than 10.

☆ Related parameters:

| 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 190* |
| H05.06 | 2005-07h | Time constant of moving average filter | 0.0 ms to 128.0ms | 0.0 | ms | At stop | *" H05_en.06" on page 192* |

This function does not affect the displacement value (position reference sum).

An excessively high setpoint delays the responsiveness, so set a proper filter time constant based on actual conditions.

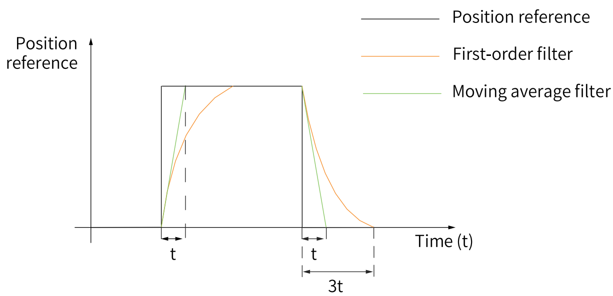



Figure 2-19 First-order filter and moving average filter for rectangular position references

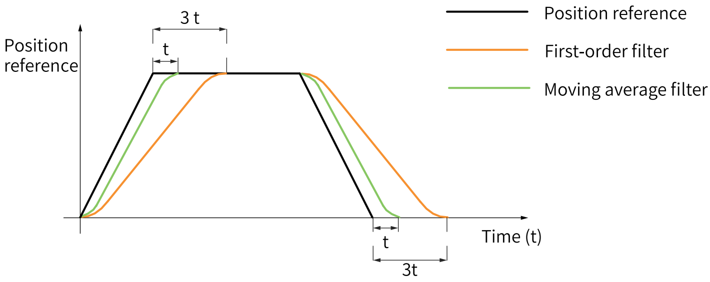



Figure 2-20 First-order filter and moving average filter for trapezoid position references

## 2.1.6 Position Deviation Clear

Position deviation = Position reference sum – Position feedback sum

This function serves to clear the position deviation when the condition defined by H05.16 (Clear action selection) is met.

☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H05.16 | 2005-11h | Clear action | 0: Clear position deviation upon S-OFF and fault<br>1: Clear position deviation pulses upon S-OFF and fault<br>2: Clear position deviation by ClrPosErr signal input from DI | 0 | - | At stop | " H05_en.16" on page 195 |

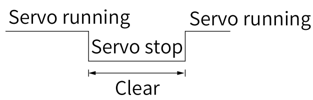
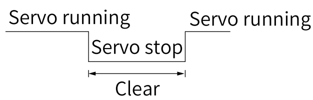
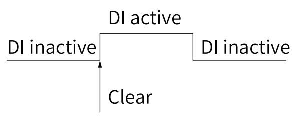
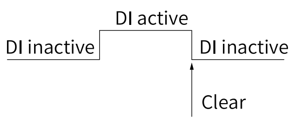
When H05.16 is set to 2, assign FunIN.35 (ClrPosErr, clear position deviation) to a certain DI and set the active logic of this DI.

☆ Related parameters:

| Code | Parameter Name | Function Name | Function |
|---|---|---|---|
| FunIN.35 | ClrPosErr | Position deviation cleared | Active: Position deviation cleared<br>Inactive: Position deviation not cleared |

The setting method is shown as follows.

Table 2–13 Position deviation clear

| Value | Clear Condition | Clear Time |
|---|---|---|
| H05.16 = 0 | Clear the position deviation when the S-ON signal is switched off or when a fault occurs. |  |
| H05.16 = 1 | Clear the position deviation when the S-ON signal is switched off or when the servo drive stops upon a fault event. |  |
| H05.16 = 2 | Clear the position deviation cleared when the S-ON signal is switched off or when a fault occurs. Clear the position deviation when ClrPosErr signal is inputted through a DI when the servo drive is in the RUN state. | <br>(Rising edge-triggered)<br><br>(Falling edge-triggered) |

## 2.1.7 Frequency-Division Output

**Caution**

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

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

The frequency-division output function outputs the position reference pulses or encoder feedback position references as A/B phase quadrature pulses.

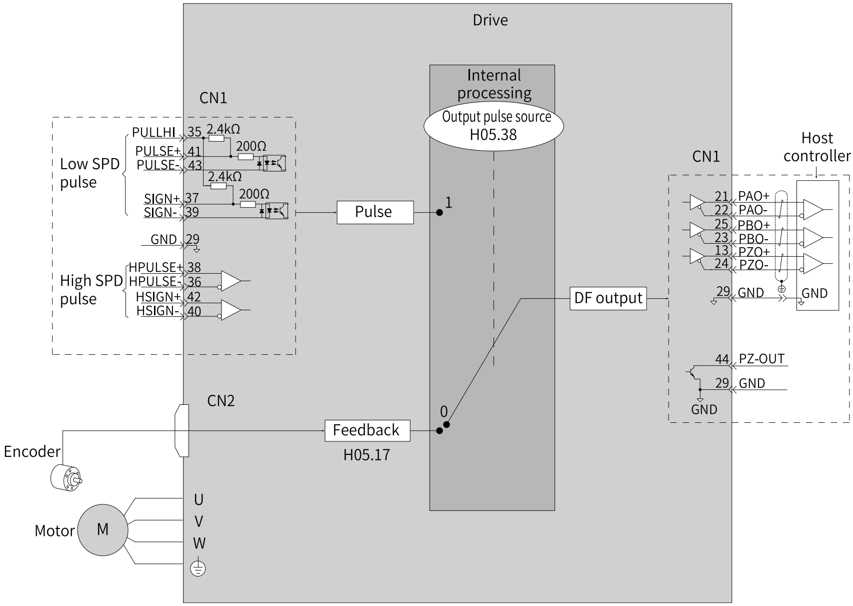



Figure 2-21 Schematic diagram of frequency-division output

It is recommended to use synchronous output (H05.38 = 1) of pulse references in case of synchronous tracing of multi-axis servo pulses. When the host controller is used for closed-loop feedback, it is recommended to use encoder frequency-division output (H05.38 = 0).

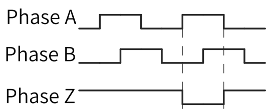
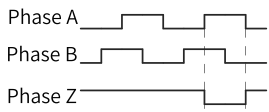
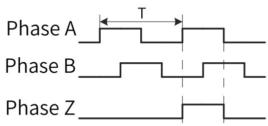
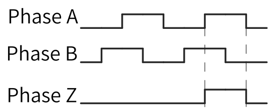
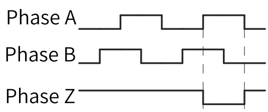
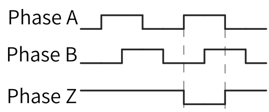
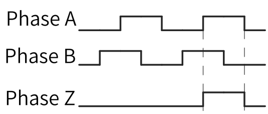
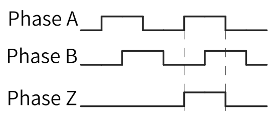
The drive offers one group of frequency-division terminals, as described below:

- Phase A pulses: PAO+ and PAO-, differential output, maximum output pulse frequency: 2 Mpps
- Phase B pulses: PBO+ and PBO-, differential output, maximum output pulse frequency: 2 Mpps
- Phase Z pulses: PZO+ and PZO-, differential output, maximum output pulse frequency: 2 Mpps
- PZ-OUT, GND, open-collector output, maximum output pulse frequency: 100 kpps

When using the frequency-division output function, set the output pulse source (H05.38), phase (H02.03), resolution (H05.17), and phase Z pulse polarity (H05.41) according to requirements.

When the output source is encoder frequency-division pulse (H05.38 = 0), the phase A/B output pulses per motor revolution are determined by H05.17 (Encoder frequency-division pulses) and H05.61 (Encoder frequency-division pulses). The pulse width (T) of phase A/B is determined by the motor speed. The phase Z, whose width is also T, is synchronized with phase A. Z signal is output once per motor revolution.

Table 2–14 Pulse diagrams of encoder frequency-division output (H05.38 = 0)

<table>
<tr><th>H02.03 (Output pulse phase)</th><th>H05.41 (Z pulse output polarity)</th><th>Pulse Output Diagram of Forward RUN</th><th>Pulse Output Diagram of Reverse RUN</th></tr>
<tr><td rowspan="2">0</td><td>0</td><td><br>Phase A leads phase B by 90°.</td><td><br>Phase B leads phase A by 90°.</td></tr>
<tr><td>1</td><td><br>Phase A leads phase B by 90°.</td><td><br>Phase B leads phase A by 90°.</td></tr>
<tr><td rowspan="2">1</td><td>0</td><td><br>Phase B leads phase A by 90°.</td><td><br>Phase A leads phase B by 90°.</td></tr>
<tr><td>1</td><td><br>Phase B leads phase A by 90°.</td><td><br>Phase A leads phase B by 90°.</td></tr>
</table>

☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H02.03 | 2002-04h | Output pulse phase | 0: Phase A leads phase B<br>1: Phase A lags behind phase B | 0 | - | At stop | *" H02_en.03" on page 160* |
| H05.17 | 2005-12h | Number of encoder frequency-division pulses | 35 P/Rev–32767 P/Rev | 2500 | PPR | At stop | *" H05_en.17" on page 196* |

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H05.38 | 2005-27h | Servo pulse output source | 0: Encoder frequency division output<br>1: Pulse reference synchronous output<br>2: Frequency division or synchronous output inhibited | 0 | - | At stop | " H05_en.38" on page 206 |
| H05.41 | 2005-2Ah | Z pulse output polarity | 0: Negative (Z pulse active low)<br>1: Positive (Z pulse active high) | 1 | - | At stop | " H05_en.41" on page 208 |
| H05.61 | 2005-3Eh | Encoder frequency-division pulse output (32-bit) | 0 P/Rev–262143 P/Rev | 0 | PPR | At stop | " H05_en.61" on page 213 |

### 2.1.8 Motion Control/Internal Command/Positioning Completed/Proximity Functions

- "Motion control completed" refers to the completion of command transmission and positioning in the position control mode. In this case, the servo drive outputs a McOK (motion control completed) signal, and the host controller, upon receiving the signal, acknowledges the motion control is done.
- "Internal command completed" refers to the completion of command transmission. In this case, the internal multi-position reference is zero. The servo drive therefore outputs a CmdOk (Internal command completed) signal, and the host controller, upon receiving the signal, acknowledges the internal command transmission is done.
- Positioning completed: When the position deviation fulfills the condition set by users (H05.20), it indicates the positioning in position control mode is completed. Meanwhile, the servo drive outputs positioning completed (COIN) signal, and the host controller, after receiving this signal, confirms the positioning is completed.

The following figure shows the schematic diagram.

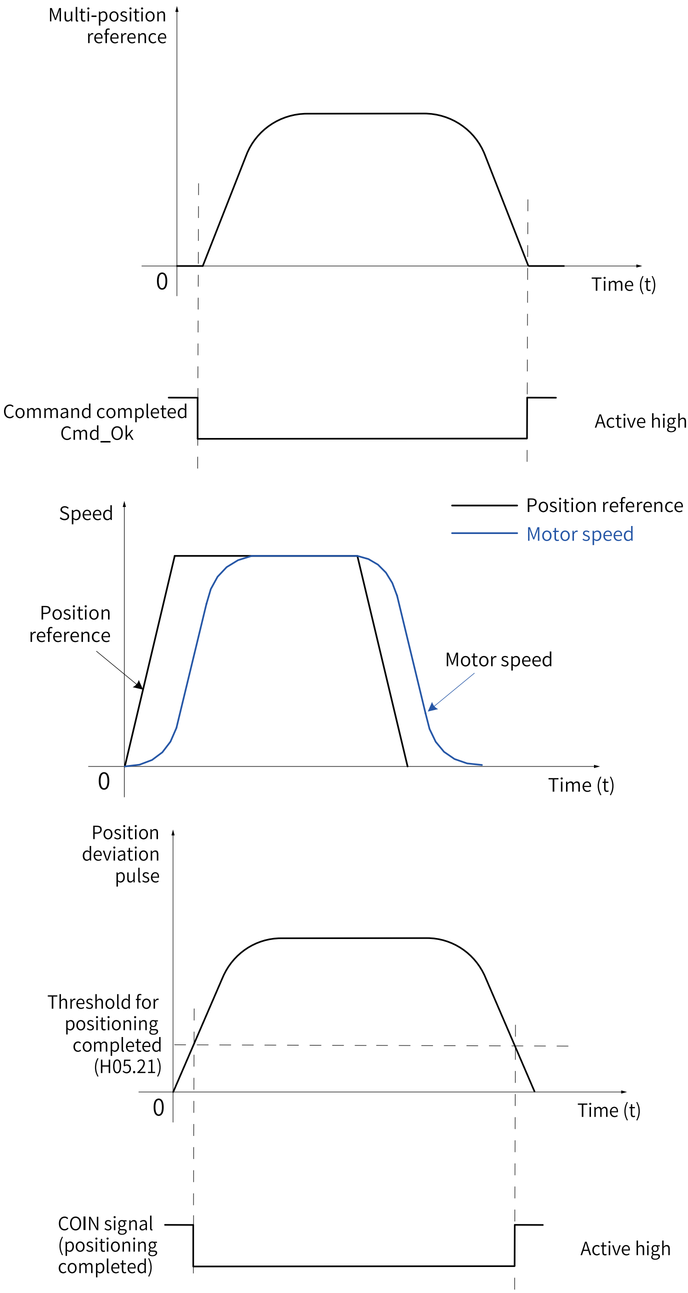



Figure 2-22 Description of positioning completed/proximity functions

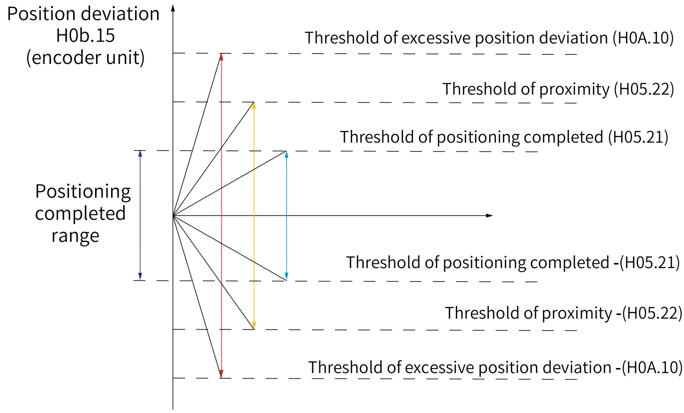
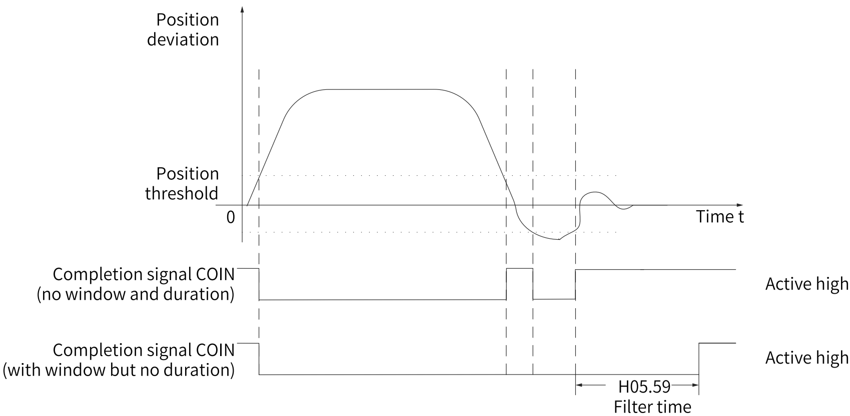



Figure 2-23 Signals related to position deviation

You can set the unit for positioning completed, proximity, and excessive position deviation in H0A.17. When position deviation meets the condition defined by H05.20, the servo drive outputs a NEAR signal to prepare for positioning completed.

Before applying the positioning completed/proximity function, set H05.20, H05.21, H05.22, H05.59, and H05.60 first. The schematic diagram for the window time (H05.59) and hold time (H05.60) of positioning completed signal is as follows.



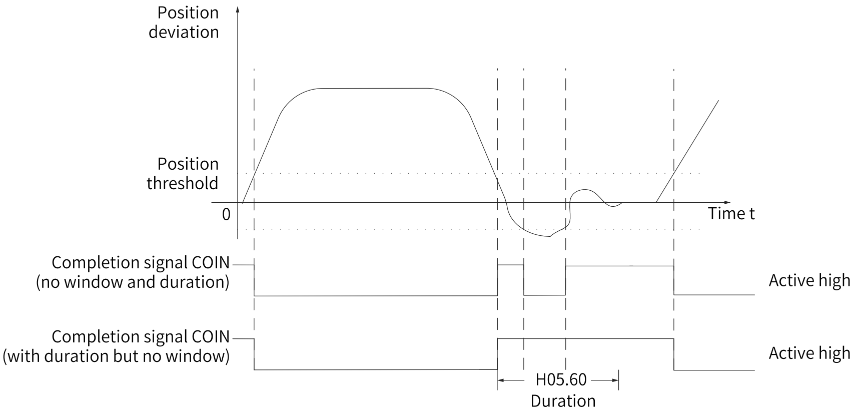



Figure 2-24 Schematic diagram for the window time (H05.59) and hold time (H05.60) of positioning completed signal

When the COIN (positioning completed) signal has a hold time of 0, it remains active until the next position reference is received.

☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H0A.17 | 200A-12h | Reference/ Pulse selection | 0: Pulse unit<br>1: Reference unit | 0 | - | At stop | " H0A_en.17" on page 276 |
| H05.20 | 2005-15h | Condition for positioning completed signal output | 0: Absolute position deviation below H05.21<br>1: Absolute position deviation below H05.21 and filtered position reference is 0<br>2: Absolute position deviation below H05.21 and unfiltered position reference is 0<br>3: Absolute position deviation kept below H05.21 within the time defined by H05.60 and unfiltered position reference is 0 | 0 | - | Real-time | " H05_en.20" on page 197 |
| H05.21 | 2005-16h | Threshold of positioning completed | 1 to 65535 | 5872 | Encoder unit | Real-time | " H05_en.21" on page 198 |
| H05.22 | 2005-17h | Proximity threshold | 1 to 65535 | 65535 | Encoder unit | Real-time | " H05_en.22" on page 199 |

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H05.59 | 2005-3Ch | Positioning window time | 0ms to 30000ms | 0 | ms | Real-time | " H05_en.59" on page 213 |
| H05.60 | 2005-3Dh | Hold time of positioning completed | 0ms to 30000ms | 0 | ms | Real-time | " H05_en.60" on page 213 |

Caution

- Set H05.22 to a value higher than H05.21 in general cases.
- H05.21 only reflects the absolute threshold when the positioning completed signal is active. It is not related to the positioning precision.
- An excessively high speed feedforward gain (H08.19) or low-speed operation reduces the absolute position deviation. In this case, the COIN (positioning completed) signal may keep active if H05.21 is set to an excessively high value. To improve the positioning accuracy, decrease the value of H05.21.
- When H05.21 is set to a low value along with small position deviation, you can change the condition for outputting the COIN (positioning completed) signal in H05.20.
- An inactive S-ON signal deactivates the COIN (positioning completed) signal and NEAR (proximity) signal output.
- The NEAR (proximity) signal output is not affected by H05.60 (Hold time of positioning completed) or H05.59 (Positioning window time)and requires no detection on the change of position references.

To apply motion control/internal command/positioning completion and the proximity function, allocate four DO terminals with FunOUT.24 (McOk, motion control completed), FunOUT.22 (CmdOk, internal command completed), FunOUT.5 (COIN, positioning completed), and FunOUT.6 (NEAR, proximity) respectively, and set the active logic of these terminals.

☆ Related parameters:

| Code | Parameter Name | Function Name | Function |
|---|---|---|---|
| FunOUT.5 | COIN | Positioning completed | Active: The absolute position deviation meets the threshold defined by H05.21 in the position control mode, indicating positioning is done.<br>Inactive: The servo drive is in the process of completion in the position control mode. |
| FunOUT.6 | NEAR | Proximity | Active: The absolute position deviation meets the condition defined by H05.22, indicating the servo drive is close to the target position.<br>Inactive: The servo drive is in the process of proximity in the position control mode. |
| FunOUT.22 | CmdOk | Internal command completed | Active: The transmission of the multi-position reference or interrupt positioning reference is done in the position control mode.<br>Inactive: The transmission of the multi-position reference or interrupt positioning reference is in progress in the position control mode. |
| FunOUT.24 | McOk | Motion control completed | Active: The transmission of the multi-position reference or interrupt positioning reference and the positioning process are done in the position control mode.<br>Inactive: The transmission of the multi-position reference or interrupt positioning reference or positioning is in progress in the position control mode. |

### 2.1.9 Interrupt Positioning

Caution

The interrupt positioning signal cannot be triggered during homing.

#### Description

If interrupt positioning is triggered in the position control mode, the servo drive halts current operation and turns to executing the pre-set fixed distance. To be specific, when the S-ON signal is active in the position control mode, if this function is enabled, the servo motor runs the position reference for interrupt positioning in the original direction (before the function is triggered).

When interrupt positioning is in progress, the servo drive does not respond to any other internal/external position references (including another interrupt positioning command). In this case, the input position reference counter (H0b.13) counts the interrupt positioning reference only. After the running of this function is complete, the servo drive keeps shielding or responds to position references according to the setting of H05.29 (Interrupt positioning unlock), but discards the position references input in the running process.

After interrupt positioning is done, the servo drive outputs the interrupt positioning completed (FunOUT.15: XintCoin) signal and positioning completed (FunOUT.5: COIN) signal, while the host controller, upon receiving XintCoin signal, acknowledges interrupt positioning is done. The XintCoin signal output is not related to the S-ON signal or the logic of DI9.

Interrupt positioning is effective only when the following conditions are met:

- The motor speed is higher than or equal to 10 rpm before interrupt positioning is triggered, or the setpoints of H05.26 (Constant operating speed in interrupt positioning) and H05.24 (Displacement of interrupt positioning) are not 0.
- The DI assigned with FunIN.33 (Interrupt positioning inhibited) is not used or the logic of this DI is inactive.

---

## *Note*

The moving average filter is inactive when interrupt positioning is in progress.

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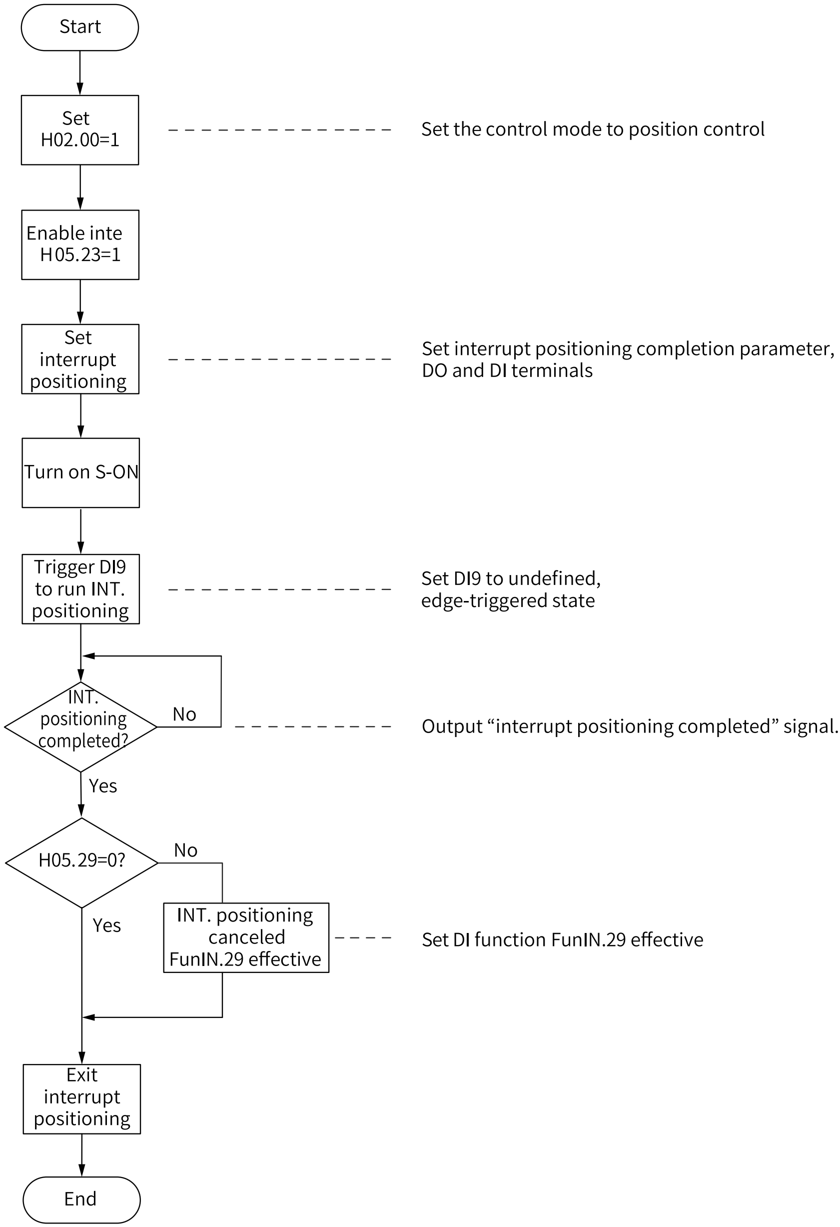



Figure 2-25 Flowchart of interrupt positioning signal

## Parameter Settings

☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H05.23 | 2005-18h | Interrupt positioning selection | 0: Disable<br>1: Enabled | 0 | - | At stop | " H05_en.23" on page 199 |
| H05.24 | 2005-19h | Interrupt positioning displacement | 0 to 1073741824 | 10000 | Reference unit | Real-time | " H05_en.24" on page 200 |
| H05.26 | 2005-1Bh | Constant operating speed in interrupt positioning | 0rpm to 6000rpm | 200 | RPM | Real-time | " H05_en.26" on page 200 |
| H05.27 | 2005-1Ch | Acc./Dec. time of interrupt positioning | 0ms to 1000ms | 10 | ms | Real-time | " H05_en.27" on page 201 |
| H05.29 | 2005-1Eh | Interruption fixed length unlock | 0: Disabled<br>1: Enabled | 1 | - | Real-time | " H05_en.29" on page 201 |

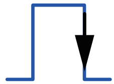
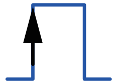
☆ Related parameters:

| Code | Parameter Name | Function Name | Function |
|---|---|---|---|
| FunIN.29 | XintFree | Interrupt positioning clear | Active: The interrupt positioning state is cleared, which means the servo drive can respond to other position references.<br>Inactive: The interrupt positioning state is locked, which means the servo drive cannot respond to other position references. |
| FunIN.33 | XintInHibit | Interrupt positioning inhibited | Active: Interrupt positioning inhibited<br>Inactive: Interrupt positioning allowed |
| Fun OUT.15 | XintCoin | Interrupt positioning completed | Active: Interrupt positioning completed in position control<br>Inactive: Displacement in interrupt positioning not completed in position control |

**Caution**

During interrupt positioning, DI9 is used to trigger interrupt positioning only, which means no other functions can be assigned to DI9 through H03.18 (DI9 function selection) and no other DIs can trigger interrupt positioning. The logic of DI9 (H03.18) is "edge-triggered".

Table 2–15 Active logic of DI9 during interrupt positioning

| H03.19 | Active Logic of DI9 | Waveform |
|---|---|---|
| 0 | Active low |  |
| 1 | Active high |  |

The constant operating speed during interrupt positioning is shown in the following figure.

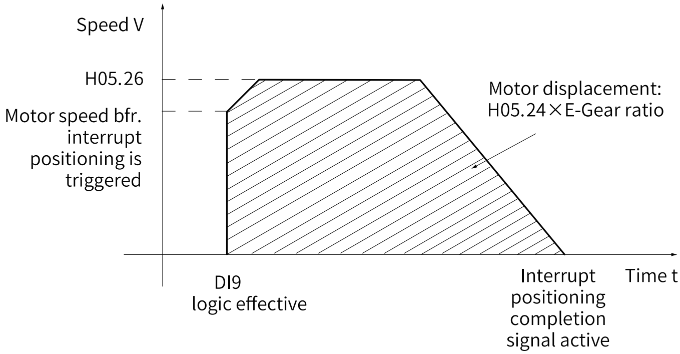



Figure 2-26 Motor operating curve during interrupt positioning

Table 2–16 Motor speed during interrupt positioning

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

## 2.1.10Homing

Caution

- The homing trigger signal is hidden when interrupt positioning or multi-position reference is in progress.
- To use the homing function, ensure H11.00 is not set to 5 as the setpoint 5 indicates enhanced axis control mode, in which the homing function is hidden.

### Description

- Home (or mechanical home): Indicates the position of the home switch or Z signal depending on the value of H05.31 (Homing mode).
- Zero: positioning target point, represented as home + offset (set in H05.36). When H05.36 (Mechanical home offset) is set to 0, the zero position coincides with the home.

In the position control mode, when homing is triggered after the S-ON signal is activated, the motor starts searching for the zero position.

When homing is in progress, the servo drive does not respond to other position references (including another homing trigger signal) until homing is done.

This function includes two actions:

- Home attaining: After receiving the homing signal, the servo drive proactively locates the relative position between the motor shaft and the preset mechanical home reference point; it finds the home and then moves through the offset from the home reference point to the zero point. The homing mode usually applies in initial searching for the zero position.
- Electrical homing: After determining the absolute zero position through homing, the drive takes current position as the start position to execute a relative displacement.

After the homing function (both homing and electrical homing) is executed, The absolute position of the motor (H0b.07) is consistent with the home offset (H05.36).

The servo drive outputs the homing completed signal (FunOUT.16：HomeAttain) or electrical homing completed signal (FunOUT.17：ElecHomeAttain), and the host controller, upon receiving these two signals, acknowledges the homing function is done executing. HomeAttain or ElecHomeAttain signal is not related to the operation mode or operation state of the servo drive.

Table 2–17 Comparison between homing and electrical homing

<table>
<tr><th>Mode</th><th>Homing trigger mode (H05.30)</th><th>Homing Direction, Deceleration Point, Home</th><th>Trigger Signal</th><th>Total Motor Displacement</th></tr>
<tr><td rowspan="6">Homing</td><td>0</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>1</td><td rowspan="3">Determined by H05.31</td><td>HomingStart signal</td><td rowspan="3">Determined by the mechanical home coordinate and offset displacement</td></tr>
<tr><td>3</td><td>Servo ON</td></tr>
<tr><td>4</td><td>Servo ON</td></tr>
<tr><td>6</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>8</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td rowspan="2">Electrical homing</td><td>2</td><td rowspan="2">The homing direction is consistent with the motor displacement sign (+/-). The deceleration point or home signal is not needed.</td><td>HomingStart signal</td><td rowspan="2">(H05.36 - H0b.07) x Electronic gear ratio</td></tr>
<tr><td>5</td><td>Servo ON</td></tr>
</table>

## *Note*

Both the moving average filtering and low-pass filtering are invalid during homing.

### Homing

## *Note*

- Set mechanical limit switches before enabling the homing function. For homing upon hit-and-stop, set the offset to a value within the travel range to prevent the machine from collision due to high-speed operation during homing.
- When the motor hits the limit switch during homing, the drive reports E950.0 (Forward overtravel) or E952.0 (Reverse overtravel), and the motor, if H05.40 is set to 0 or 1, stops in the stop mode defined by H02.07.

The following part takes an example to describe homing attaining:

- H05.31 = 0: Forward homing, home switch as the deceleration point and the home
- H05.31 = 2: Forward, Z signal as deceleration point and home
- H05.31 = 4: Forward homing, home switch as the deceleration point and Z signal as the home

- H05.31 = 6: Forward direction, deceleration point and home being forward limit switch signal
- Forward, positive limit switch as deceleration point and Z signal as home (H05.31 = 8)
- H05.31 = 10: Forward homing, mechanical limit position as the deceleration point and the home (H05-31 = 10)
- Forward, mechanical limit position as deceleration point and Z signal as home (H05.31 = 12)
- Forward single-turn homing (H05.31 = 14)
- Reverse single-turn homing (H05.31 = 15)
- Single-turn nearby homing (H05.31 = 16)

The other homing modes are the same as above, except the initial homing mode, which is contrary to the above.

- H05.31 = 0: Forward homing, home switch as the deceleration point and the home
  - The home switch (deceleration point) signal is inactive (0: inactive, 1: active) when the motor starts to run, and the forward limit switch is not sensed in the entire process.
    The motor starts searching for the deceleration point signal in the forward direction at a speed defined by H05.32. After reaching the rising edge of the deceleration point signal, it decelerates as defined by H05.34 to the setpoint of "-(H05.33)". After that, it starts searching for the falling edge of the deceleration point signal in the reverse direction at a speed defined by "-(H05.33)" After reaching this falling edge, it turns to searching for the rising edge of the home signal at the same speed but in the opposite direction. Finally it stops immediately after reaching the rising edge of the home signal during forward acceleration or forward operation at a constant speed.

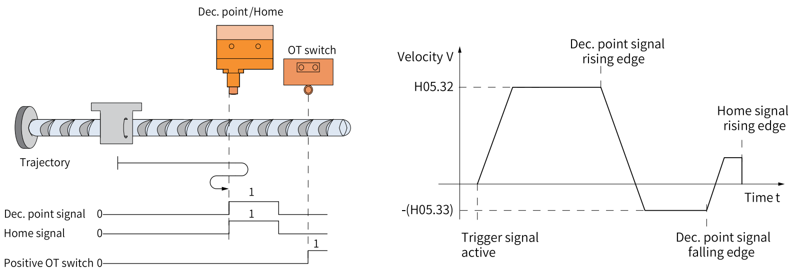



Figure 2-27 Motor running curve and speed in mode 0

  - The home switch (deceleration point) signal is active when the motor starts running, with the positive limit switch not triggered in the whole process.
    The motor starts searching for the falling edge of the deceleration point in the reverse direction at the speed defined by "-(H05.33)". After reaching this falling

edge, the motor turns to run in the forward direction and searches for the rising edge of the home signal at the same speed. During forward acceleration or forward operation at a constant speed, the motor stops immediately upon reaching the rising edge of the home signal.

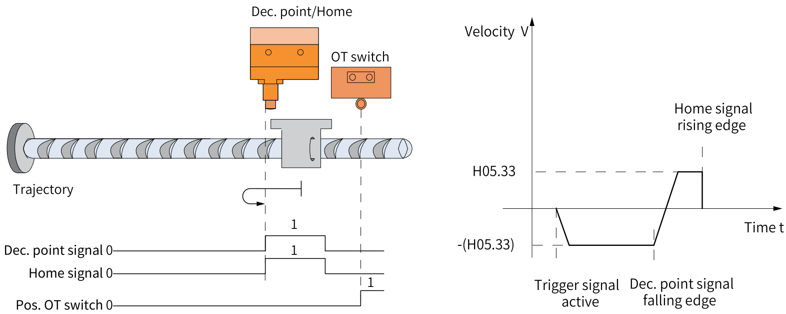



Figure 2-28 Motor running curve and speed in mode 0

- The home switch (deceleration point) signal is inactive when the motor starts to run, and the forward limit switch is sensed in the process.
  The motor starts searching for the deceleration point signal in the forward direction at a speed defined by H05.32. After reaching the positive limit switch, it changes to execute reverse homing (H05.40 = 2 or 3) or stops and waits for another homing trigger signal (H05.40 = 0 or 1). After receiving the signal, it starts searching for the falling edge of the deceleration point signal in the reverse direction at a speed defined by "-H05.32". After reaching this falling edge, it decelerates as defined by H05.34 and changes to search for the rising edge of the home signal in the forward direction as defined by H05.33. Finally, it stops immediately after reaching the rising edge of the home signal during forward acceleration or forward operation at a constant speed.

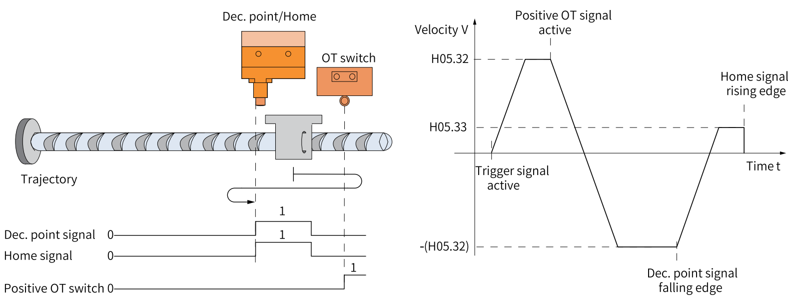



Figure 2-29 Motor running curve and speed in mode 0

- Mode 2: Forward homing, Z signal as the deceleration point and the home (H05.31 = 2)

**Caution**

Note: In Modes 2 and 3 (H05.31 = 2 or 3) where the motor Z signal acts as the home and deceleration point, the actual stop position of the motor may not be on the rising edge on the same side of the motor Z signal. A deviation of ±1 pulse (in encoder unit) may be present in the stop position.

- The Z signal is inactive (0: inactive, 1: active) when the motor starts to run, and the forward limit switch is not sensed in the entire process.
  The motor starts searching for the Z signal in the forward direction at the high speed defined by H05.32. After reaching the rising edge of the Z signal, the motor decelerates as defined by H05.34 and tuns to run in the reverse direction. Then it accelerates to the speed defined by "-(H05.33)". During reverse acceleration or reverse operation at a constant speed, the motor stops immediately after reaching rising edge of the Z signal on the other side.

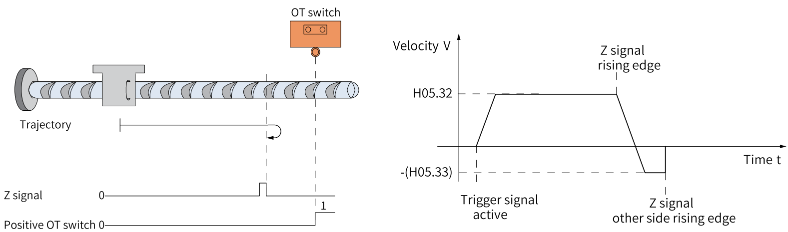



Figure 2-30 Motor running curve and speed in mode 2

- The Z signal is active when the motor starts to run, and the forward limit switch is not sensed in the entire process.
  The running process is as follows: The servo motor directly searches for the falling edge of Z signal in forward direction at the speed defined by H05.33 (speed for low-speed home switch signal searching). After reaching the falling edge of Z signal, the motor changes to reverse direction, and searches for the rising edge of Z signal at the speed of -(H05.33). During reverse acceleration or reverse constant speed running, the motor stops immediately after reaching the rising edge of Z signal.

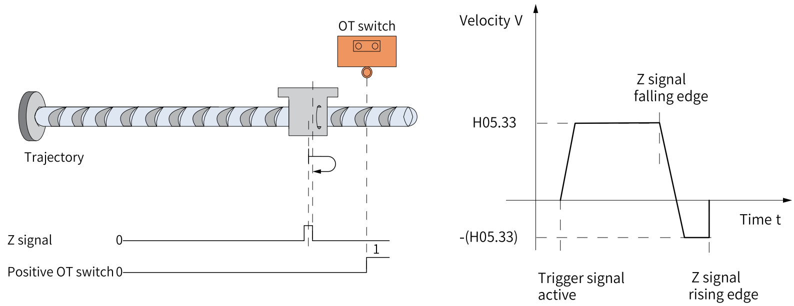



Figure 2-31 Motor running curve and speed in mode 2

- The Z signal is inactive when the motor starts to run, and the forward limit switch is sensed in the process.
  The motor starts searching for the Z signal in the forward direction at the high speed defined by H05.32. After hitting the positive limit switch, the motor turns to executing reverse homing (H05.40 = 2 or 3) or stops and waits for another homing trigger signal (H05.40 = 0 or 1) sent from the host controller. After the signal is sent, the motor starts searching for the Z signal in the reverse direction at the speed defined by "-(H05.32)" until reaching the rising edge of the Z signal, where it decelerates as defined by H05.34 in the forward direction and turns to searching for the rising edge of the Z signal on the other side at the low speed defined by H05.33. During forward acceleration or forward operation at a constant speed, the motor stops immediately after reaching rising edge of the Z signal on the other side.

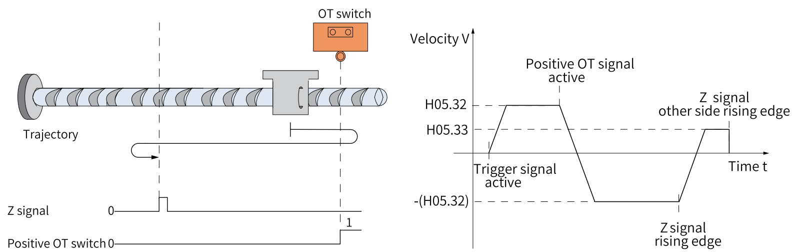



Figure 2-32 Motor running curve and speed in mode 2

- Mode 4: Forward homing, home switch as the deceleration point and Z signal as the home (H05.31 = 4)
  - The home switch signal is inactive (0: inactive, 1: active) when the motor starts running, with the positive limit switch not triggered in the whole process.
    The motor starts searching for the home switch signal in the forward direction at the speed defined by H05.32. After reaching the rising edge of the home switch signal, it decelerates as defined by H05.34 and changes to search for the

falling edge of the home switch signal at the speed defined by "-(H05.33)". After reaching this falling edge, it decelerates and changes to search for the rising edge of the home switch signal in the forward direction at the speed defined by "H05.33". After reaching this rising edge, it continues running and stops after reaching the first Z signal.

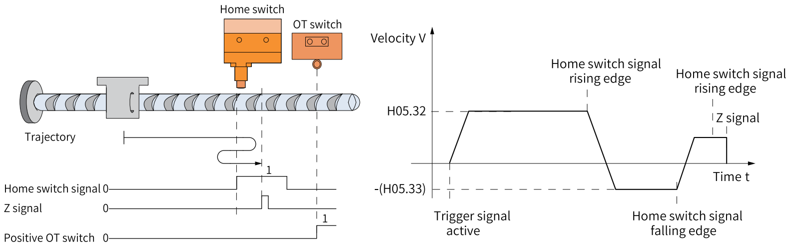



Figure 2-33 Motor running curve and speed in mode 4

- The home switch signal is active when the motor starts to run, and the forward limit switch is not sensed in the entire process.
  The motor starts searching for the falling edge of the home switch signal in the reverse direction at the speed defined by "-(H05.33)". After reaching this falling edge, the motor decelerates and turns to searching for the rising edge of the home switch signal in the forward direction at the low speed defined by "H05.33". After reaching this rising edge, the motor continues running in the forward direction at the speed defined by H05.33 until it stops upon reaching the rising edge of the Z signal for the first time.

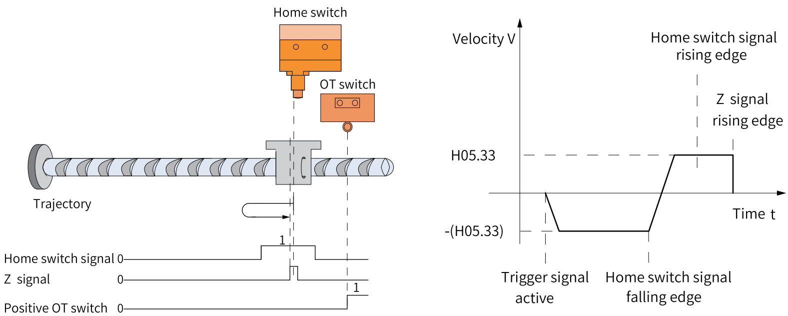



Figure 2-34 Motor running curve and speed in mode 4

- The home switch signal is inactive when the motor starts to run, and the forward limit switch is sensed in the process.
  The motor starts searching for the home switch in the forward direction at the high speed defined by H05.32. After hitting the positive limit switch, the motor executes reverse homing (H05.40 = 2 or 3) as defined by H05.40 or stops and

waits for another homing trigger signal (H05.40 = 0 or 1) sent from the host controller. After this signal is sent, the motor starts searching for the deceleration point in the reverse direction at the high speed defined by "-(H05.32)" until reaching the falling edge of the home switch signal, where it decelerates gradually as defined by H05.34 and turns to searching for the rising edge of the home switch signal in the forward direction at the low speed defined by H05.33. After reaching the rising edge of the home switch signal, the motor continues running until it stops at the first Z signal.

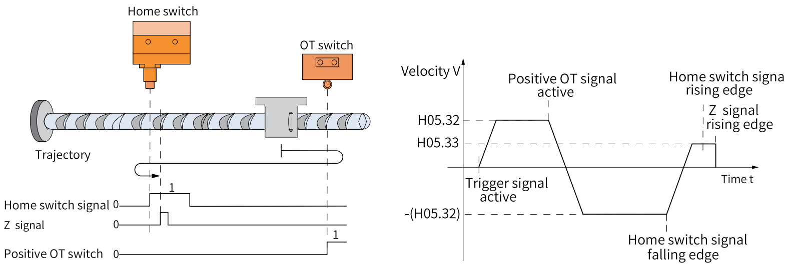



Figure 2-35 Motor running curve and speed in mode 4

- Mode 6: Forward homing, positive limit switch as the deceleration point and the home (H05.31 = 6)
  - The forward limit switch signal is inactive (0: inactive, 1: active) when the motor starts to run.
    The motor starts searching for the positive limit switch in the forward direction at the high speed defined by H05.32. After reaching the rising edge of the positive limit switch signal, the motor decelerates gradually as defined by H05.34 and turns to searching for the falling edge of the positive limit switch signal in the reverse direction at the low speed defined by "-(H05.33)". After reaching this falling edge, the motor decelerates and turns to searching for the rising edge of the positive limit switch signal in the forward direction at the low speed defined by H05.33. During forward acceleration or forward operation at a constant speed, the motor stops immediately after reaching the rising edge of the positive limit switch signal.

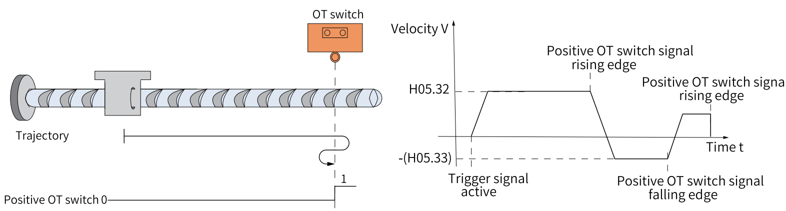



Figure 2-36 Motor running curve and speed in mode 6

- The forward limit switch signal is active when the motor starts to run.
  The motor starts searching for the falling edge of the positive limit switch signal in the reverse direction at the speed defined by "-(H05.33)". After reaching this falling edge, it decelerates and changes to search for the rising edge of the positive limit switch signal in the forward direction at the speed defined by H05.33. Finally, it stops immediately after reaching the rising edge of the positive limit switch signal during forward acceleration or forward operation at a constant speed.

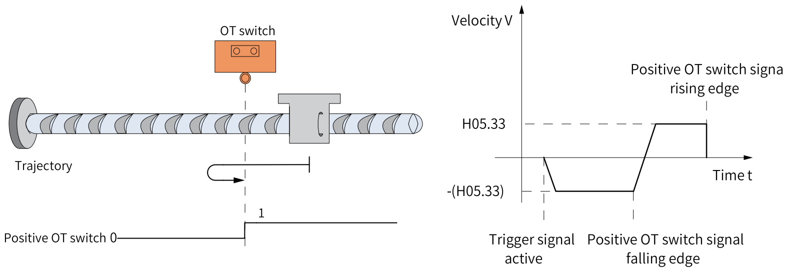



Figure 2-37 Motor running curve and speed in mode 6

- Mode 8: Forward homing, positive limit switch as the deceleration point and Z signal as the home (H05.31 = 8)
  - The forward limit switch signal is inactive (0: inactive, 1: active) when the motor starts to run.
    The motor starts searching for the positive limit switch in the forward direction at the high speed defined by H05.32. After reaching the rising edge of the positive limit switch signal, the motor decelerates gradually as defined by H05.34 and turns to searching for the falling edge of the positive limit switch signal in the reverse direction at the low speed defined by "-(H05.33)". After reaching this falling edge, the motor continues running until it stops upon reaching the Z signal for the first time.

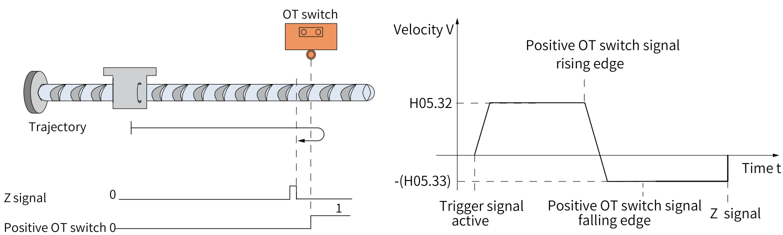



Figure 2-38 Motor running curve and speed in mode 8

  - The forward limit switch signal is active when the motor starts to run.

The motor starts searching for the falling edge of the positive limit switch signal in the reverse direction at a low speed defined by "-(H05.33)". After reaching the falling edge of the positive limit switch signal, the motor continues running until it stops at the first rising edge of the Z signal.

Figure 2-39 Motor running curve and speed in mode 8

- Mode 10: Forward homing, forward mechanical limit as the deceleration point and the home (H05.31 = 10)
  The motor starts running in the forward direction at the low speed defined by H05.33. After hitting the mechanical limit, the motor stops if the torque keeps reaching the upper limit (H05.58) and the speed keeps lower than H05.56 for a period of time.

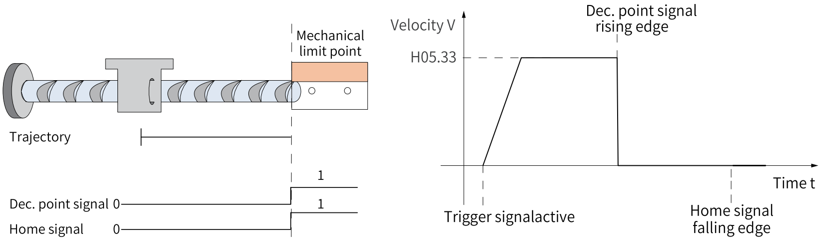



Figure 2-40 Motor running curve and speeds in Mode 10

- Mode 12: Forward homing, forward mechanical limit as the deceleration point and Z signal at the home (H05.31 = 12)
  The motor runs in the forward direction at the low speed defined by H05.33. After hitting the mechanical limit, the motor changes to run in the reverse direction at the speed defined by H05.33 if the torque keeps reaching the upper limit (H05.58) and the speed keeps lower than H05.56 for a period of time. Then the motor stops after reaching the rising edge of the Z signal for the first time.

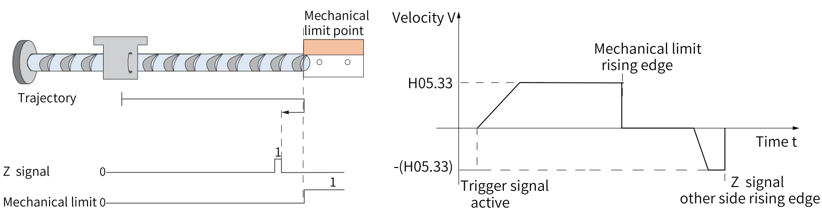



Figure 2-41 Motor running curve and speed in mode 12

- Forward single-turn homing (H05.31 = 14)
  - When H05.31 = 14, the motor performs forward homing. After you set H05.36, the servo motor can be moved from the current absolute position (H0b.07) to

the specified position (H05.36). Motor displacement = (H05.36–H0b.07) * Electronic gear ratio.

- If motor displacement is < 0, the actual motor displacement = (H05.36–H0b.07) * Electronic gear ratio + Encoder resolution. The motor stops immediately after the displacement command finishes.

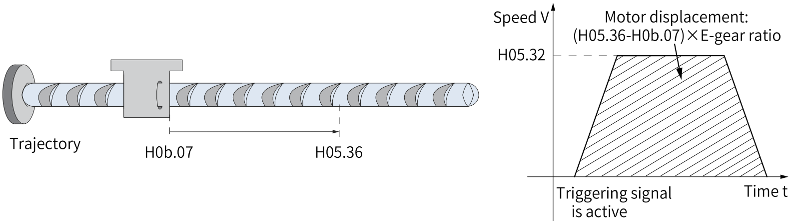



Figure 2-42 Motor running curve and speed in mode 14

- Reverse single-turn homing (H05.31 = 15)
  - When H05.31 = 15, the motor performs reverse homing. After you set H05.36, the servo motor can be moved from the current absolute position (H0b.07) to the specified position (H05.36). Motor displacement = (H05.36–H0b.07) * Electronic gear ratio.
  - If motor displacement is 0, the actual motor displacement = (H05.36–H0b.07) * Electronic gear ratio – Encoder resolution. The motor stops immediately after the displacement command finishes.

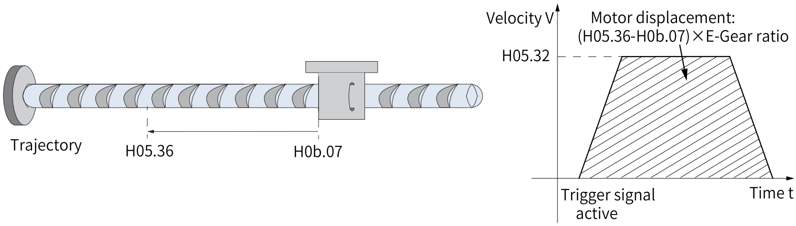



Figure 2-43 Motor running curve and speed in mode 15

- Single-turn nearby homing (H05.31 = 16)
  When H05.31 = 16, the motor performs nearby homing. The actual motor displacement is the distance from the current position to the specified position (H05.36). The direction of operation is determined by the distance. The motor stops immediately after the displacement command finishes.

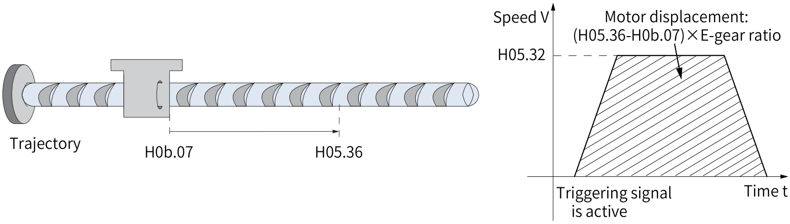



Figure 2-44 Motor running curve and speed in mode 16

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 %), the first Z signal in the reverse direction is searched for and regarded as the home after the motor stops.

## Electrical homing: starting electrical homing (H05.30 = 5)

The mechanical zero position is obtained after homing is done. In this case, you can make the motor move from current position (H0b.07) to the designated position (H05.36) by setting H05.36 (Mechanical home offset).

In the electrical homing mode, the motor runs at the speed defined by H05.32 in the direction defined by the sign (+/-) of the displacement value. The total displacement is determined by the difference between H05.36 and H0b.07. The motor stops immediately after the displacement reference is done executing.

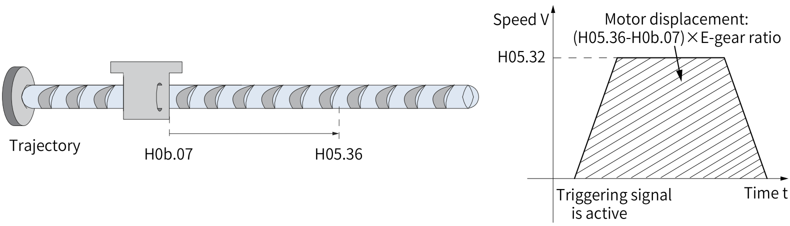
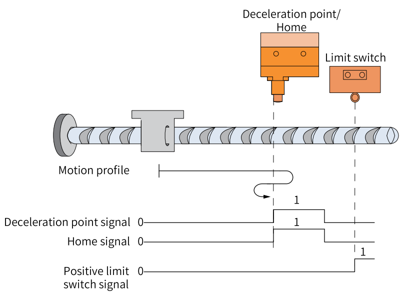
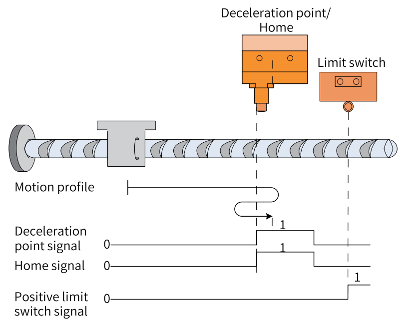
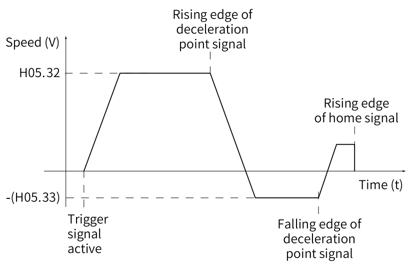
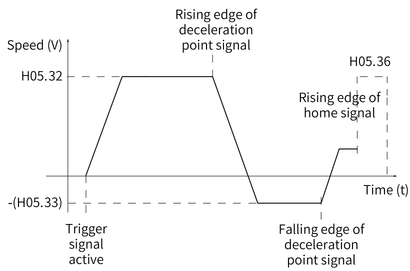



Figure 2-45 Motor running curve and speed in electrical homing

## Mechanical home and mechanical zero

The following takes "H05.30 = 0" as example to describe the difference between mechanical home and mechanical zero.

Table 2–18 Description of mechanical home and mechanical zero

<table>
<tr><th>Mechanical Zero Different From Mechanical Home Reference Point</th><th>Mechanical Zero Same As Mechanical Home Reference Point</th></tr>
<tr><td>If the home offset is present (H05.36 ≠ 0) and the mechanical home differs from the mechanical zero (H05.40 = 0 or 2), the motor stops immediately after reaching the rising edge of the home signal during acceleration or forward operation at constant speed. After stop, the motor absolute position (H0b.07) is changed to the setpoint of H05.36 (Mechanical home offset) forcibly.</td><td>If the home offset is present (H05.36 ≠ 0) and the mechanical home coincides with the mechanical zero (H05.40 = 1 or 3), the motor continues running after reaching the rising edge of the home switch signal during acceleration or forward operation at constant speed until the absolute position (H0b.07) reaches the setpoint of H05.36 (Mechanical home offset).</td></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td>
</td><td>
</td></tr>
</table>

## Parameter Settings

- Homing mode setting

  ☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H05.30 | 2005-1Fh | Homing enable selection | 0: Disabled<br>1: Homing enabled by ORGSET signal input from DI<br>2: Electrical homing enabled by ORGSET signal input from DI<br>3: Homing started immediately upon power-on<br>4: Homing executed immediately<br>5: Electrical homing started<br>6: Current position as home<br>8: D-triggered position as home | 0 | - | Real-time | *" " on page* |

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H05.31 | 2005-20h | Homing mode | 0: Forward, home switch as deceleration point and home<br>1: Reverse, home switch as deceleration point and home<br>2: Forward, Z signal as deceleration point and home<br>3: Reverse, motor Z signal as deceleration point and home<br>4: Forward, home switch as deceleration point and Z signal as home<br>5: Reverse, home switch as deceleration point and Z signal as home<br>6: Forward, positive limit switch as deceleration point and home<br>7: Reverse, negative limit switch as deceleration point and home<br>8: Forward, positive limit switch as deceleration point and Z signal as home<br>9: Reverse, negative limit switch as deceleration point and Z signal as home<br>10: Forward, mechanical limit position as deceleration point and home<br>11: Reverse, mechanical limit position as deceleration point and home<br>12: Forward, mechanical limit position as deceleration point and Z signal as home<br>13: Reverse, mechanical limit position as deceleration point and Z signal as home<br>14: Forward single-turn homing<br>15: Reverse single-turn homing<br>16: Nearby single-turn homing | 0 | - | Real-time | *" H05_en.31" on page 203* |

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H05.40 | 2005-29h | Mechanical home offset and action upon overtravel | 0: H05.36 as the coordinate after homing, reverse homing applied after homing triggered again on overtravel<br>1: H05.36 as the relative offset after homing, reverse homing applied after homing triggered again on overtravel<br>2: H05.36 as the coordinate after homing, reverse homing auto-applied on overtravel<br>3: H05.36 as the relative offset after homing, reverse homing auto-applied on overtravel | 0 | - | At stop | " H05_en.40" on page 207 |
| H05.69 | 2005-46h | Auxiliary homing function | 0: Disabled<br>1: Enable single-turn homing<br>2: Record deviation position<br>3: Start a new search for the Z signal (homing)<br>4: Clear the position deviation | 0 | - | At stop | " H05_en.69" on page 215 |

- Homing curve setting

  If the home signal is activated before the deceleration triggered by an active deceleration point signal is fully done executing, the final positioning may be unstable. Take the displacement required by deceleration into account before setting the deceleration point and homing signal input position. The acceleration/ deceleration time during homing (H05-34) also affect the positioning stability.

  ☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H05.32 | 2005-21h | Speed of high-speed search for home switch signal | 0 RPM to 3000 RPM | 100 | RPM | Real-time | " H05_en.32" on page 204 |
| H05.33 | 2005-22h | Speed of low-speed search for home switch signal | 0 rpm to 1000 rpm | 10 | RPM | Real-time | " H05_en.33" on page 204 |
| H05.34 | 2005-23h | Acceleration/ Deceleration time during homing | 0ms to 1000ms | 1000 | ms | Real-time | " H05_en.34" on page 205 |

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H05.35 | 2005-24h | Home search time limit | 0ms to 65535ms | 10000 | ms | Real-time | " H05_en.35" on page 205 |
| H05.36 | 2005-25h | Mechanical home offset | -1073741824 to 1073741824 | 0 | Reference unit | Real-time | " H05_en.36" on page 205 |

☆ Related parameters:

| Code | Parameter Name | Function Name | Function |
|---|---|---|---|
| FunIN.31 | HomeSwitch | Home switch | Active: Current position as home<br>Set the logic of the DI assigned with FunIN.31 to "active high" or "active low" based on the output of the host controller. See the following table for details. See the following table for details. |
| FunIN.32 | HomingStart | Homing enable | Active: Homing enabled (The HomingStart signal cannot be triggered repeatedly during homing.)<br>Inactive: Homing inhibited |
| FunIN.41 | HomingRecord | DI-triggered point as the home | The edge-triggered position is taken as the home. |
| FunOut.16 | HomeAttain | Homing is completed. | Active: Homing completed in the position control mode<br>Inactive: Homing not completed |
| FunOut.17 | ElecHomeAttain | Electrical homing completed | Active: Electrical homing completed in the position control mode<br>Inactive: Electrical homing not completed |

| DI Logic Set by HomeSwitch | Actual Active Level |
|---|---|
| 0 (low level) | Low level |
| 1 (high level) | High level |
| 3 (rising edge) | High level |
| 4 (falling edge) | Low level |
| 5 (edge-triggered) | Low level |

## Sequence

- H05.30 = 1 or 2

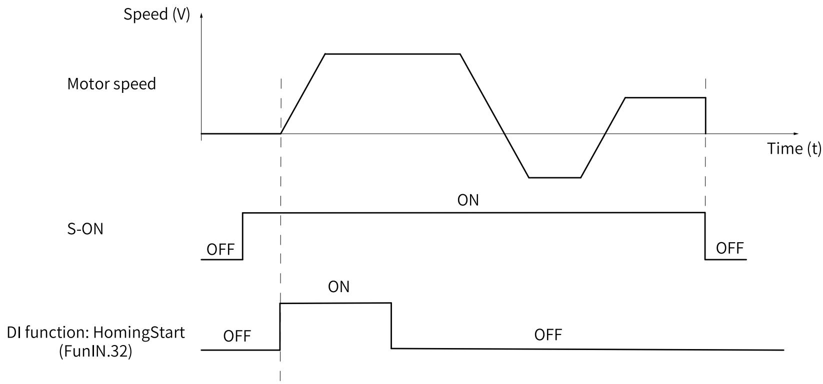



Figure 2-46 Sequence example

- Switch on the S-ON signal first and then the HomingStart signal.
- During homing, the S-ON signal remains active and the change of the HomingStart signal is shielded.
- During homing, the motor stops if the S-ON signal is switched off. To enable homing again, switch on the S-ON signal first and then the HomingStart signal.
- If E601.0 (Homing timeout) occurs, the motor stops, but the S-ON signal remains active. In this case, trigger the HomingStart signal again to reset E601.0, and execute homing again.
- The homing operation can be triggered repeatedly.

- H05.30 = 3
  - The homing operation is executed only when the S-ON signal is switched on for the first time after power-on.
  - The motor stops when E601.0 (Homing timeout) occurs. To reset E601.0, deactivate the S-ON signal.
  - The homing operation can only be triggered again at next power-on.
- H05.30 = 4 or 5
  - The homing operation is executed immediately after the S-ON signal is switched on upon power-on.
  - If the S-ON signal is deactivated during homing, the motor stops immediately. To trigger homing again, activate the S-ON signal again.
  - When E601.0 (Homing timeout) occurs, H05.30 is set to 0 and the motor stops. To reset E601.0, deactivate the S-ON signal. To perform homing again, reset H05.30. After homing is done, H05.30 is set to 0. To perform homing again, set H05.30 again.
- H05.30 = 6

- To take the current position as the home and achieve home offset (H05.40 = 0 or 2, H05.36 ≠ 0), set H05.36 and H05.40 first, and then set H05.30 to 6. Failing to do so will cause H0b.07 to keep the previous value of H05.36 rather than the one set currently.
- After homing is done, H05.30 will be set to 0. To enable homing again, re-write H05.36 and set H05.30 to 6.

● H05.30 = 8

- To take the DI-triggered position as the home, assign FunIN.41 to a DI first and set the current position as the home.
- To achieve home offset (H05.40 = 0 or 2, H05.36 ≠ 0), set H05.36 and H05.40 first, and then set H05.30 to 6. Failing to do so will cause H0b.07 to keep the previous value of H05.36 rather than the one set currently.

## 2.2 Speed Control Mode

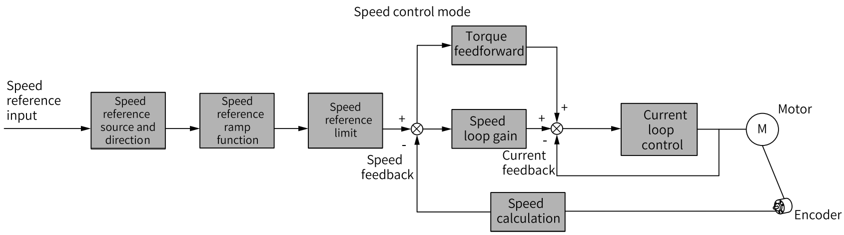



Figure 2-47 Block diagram of speed control

Set H02.00 (Control mode selection) to 0 (Speed control mode) through the keypad or Inovance software tool to make the servo drive operate in the speed control mode. Set the drive parameters based on the mechanical structure and technical indicators. The following part uses the basic parameter setting to describe the speed control mode.

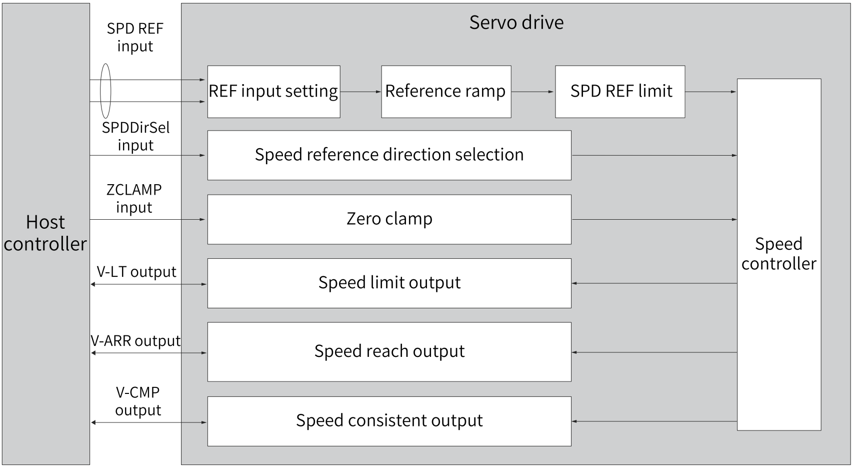



Figure 2-48 Signal exchange between the drive and the host controller

## 2.2.1 Block Diagram of Speed Control Parameters

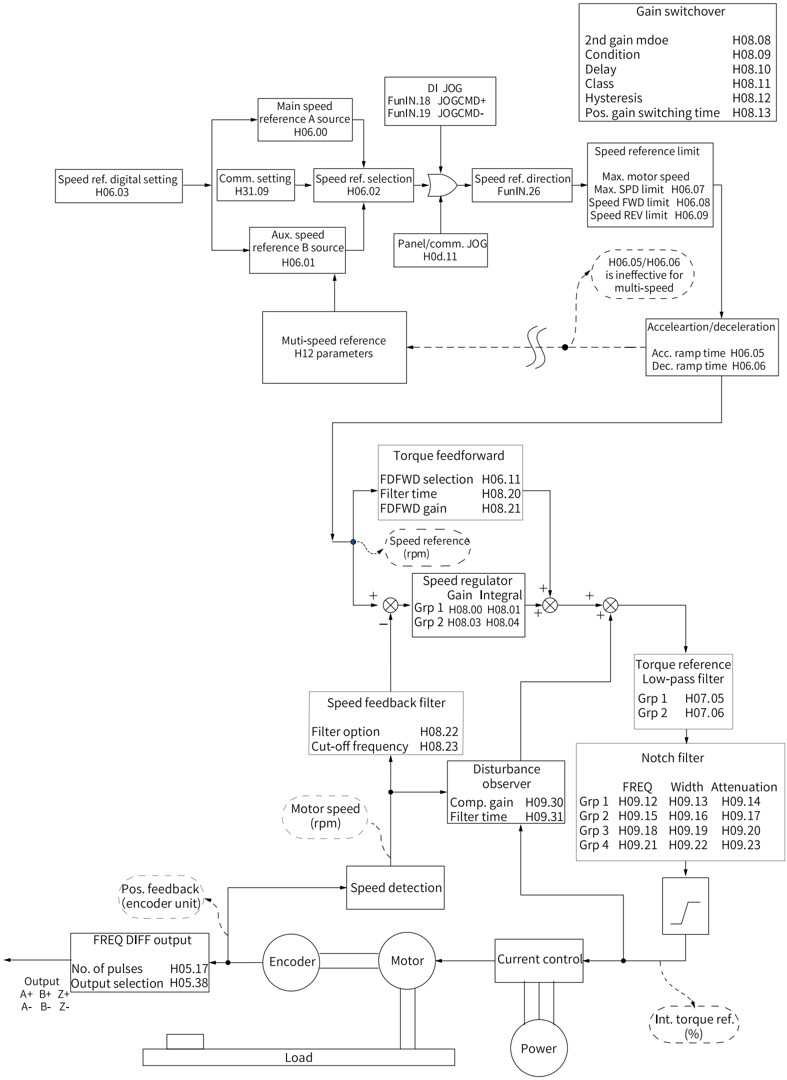



Figure 2-49 Block diagram of speed control parameters

## 2.2.2 Speed Reference Input Setting

### Speed reference source

Five speed reference sources are available in the speed control mode, which can be set in H06.02.

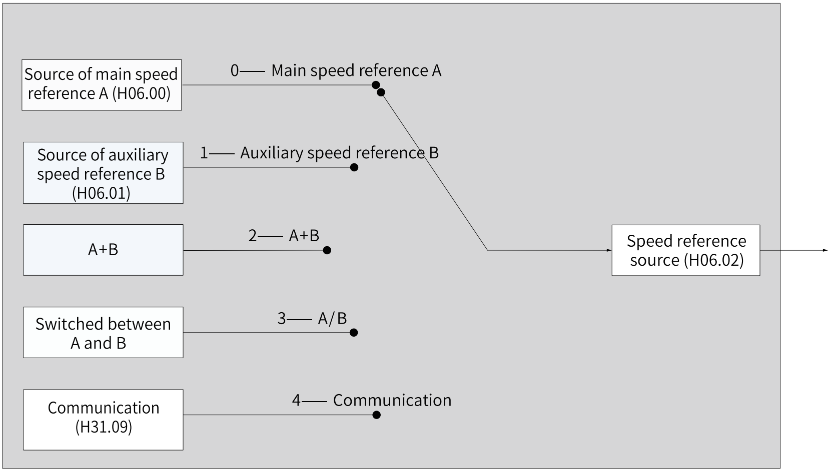



Figure 2-50 Speed reference source

☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H06.02 | 2006-03h | Speed reference source | 0: Source of main speed reference A<br>1: Source of auxiliary speed reference B<br>2: A+B<br>3: Switched between A and B<br>4: Communication | 0 | - | At stop | *" H06_en.02" on page 216* |

- Source of main speed reference A
  The main speed reference A is an internal speed reference that can be set through digital setting.

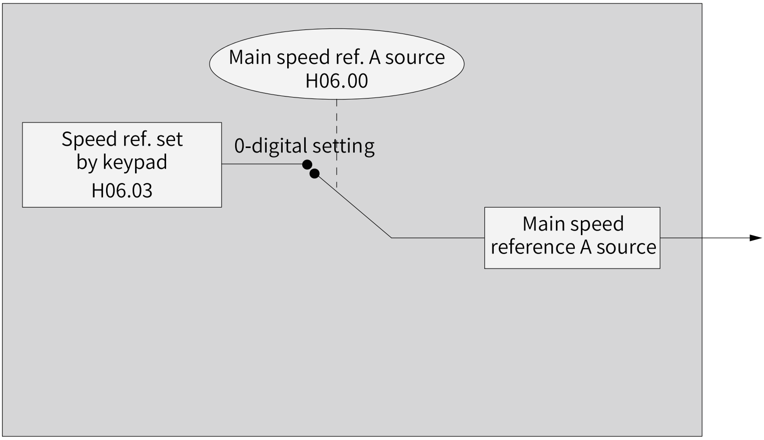



Figure 2-51 Source of main speed reference A

☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H06.00 | 2006-01h | Source of main speed reference A | 0: Digital setting (H06.03) | 0 | - | At stop | " H06_en.00" on page 215 |

The speed reference is set in H06.03.

☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H06.03 | 2006-04h | Speed reference set through keypad | –6000 rpm to +6000 rpm | 200 | RPM | Real-time | " H06_en.03" on page 217 |

- Source of auxiliary speed reference B

  The auxiliary speed reference B sources include digital setting and multi-speed references. Both are internal speed references.

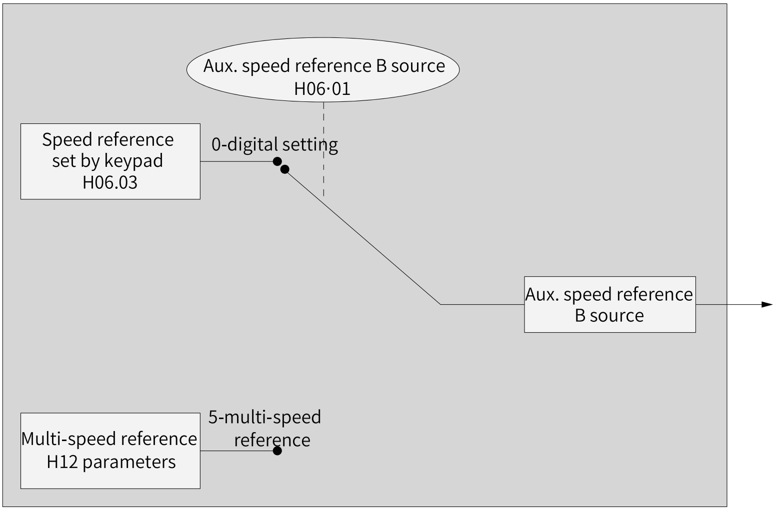



Figure 2-52 Source of auxiliary speed reference B

☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H06.01 | 2006-02h | Source of auxiliary speed reference B | 0: Digital setting (H06.03)<br>5: Multi-speed reference | 5 | - | At stop | *" H06_en.01" on page 216* |

The digital setting mode is the same as H06.00. The following describes multi-speed references.

The servo drive supports multi-speed operation. The servo drive stores 16 speed references, and the maximum running speed and running time of each can be set. Four groups of acceleration/deceleration time are optional. The setting flowchart is as follows.

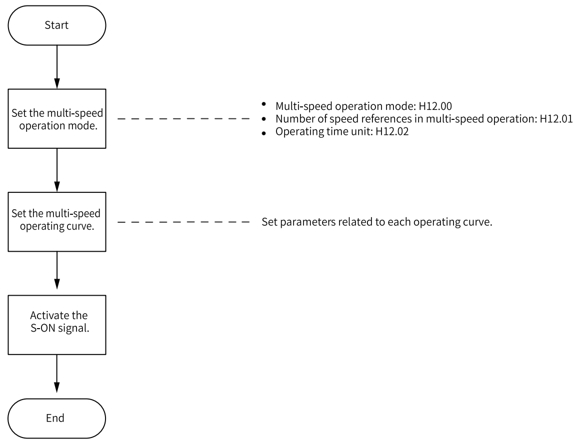



Figure 2-53 Flowchart for setting multi-speed operation

1. Set the multi-speed operation mode.

☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H12.00 | 2012-01h | Multi-speed operation mode | 0: Individual operation (number of speeds selected in H12.01)<br>1: Cyclic operation (number of speeds selected in H12.01)<br>2: DI-based operation | 1 | - | At stop | *" H12_en.00" on page 343* |
| H12.01 | 2012-02h | Number of speed references in multi-speed mode | 1 to 16 | 16 | - | At stop | *" H12_en.01" on page 345* |
| H12.02 | 2012-03h | Operating time unit | 0: sec<br>1: min | 0 | - | At stop | *" H12_en.02" on page 345* |

You can assign FunIN.5 (DIR- SEL) to an external DI to select the multi-speed reference direction.

☆ Related parameters:

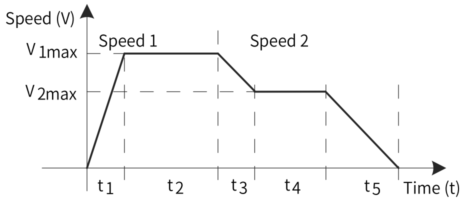
| Code | Parameter Name | Function Name | Function |
|---|---|---|---|
| FunIN.5 | DIR-SEL | Multi-reference direction | Inactive: Reference direction by default<br>Active: Opposite to the reference direction |

The following takes "H12.01 = 2" as an example to describe each mode.

- Individual operation (H12.00 = 0)
  Set H12.00 to 0 to select the individual operation mode.

  Set H12.01 and H12.02 as needed. Then set the reference value, operating time, and acceleration/deceleration time of each speed. The drive executes multi-speed references in a sequence from speed 1 to speed N. After all the speeds are executed, the drive stops.

Table 2–19 Description of individual operation

| Description | Operating Curve |
| --- | --- |
| • The drive stops after one cycle of operation.<br>• The drive switches to the next displacement automatically. | <br>• V1max, V2max: reference values of speed 1 and speed 2<br>• t1: actual acceleration/deceleration time of speed 1<br>• t3, t5: acceleration/deceleration time of speed 2<br>• Operating time = Time taken in switching from the last speed to current speed + Duration of constant-speed operation at current speed (For example, the operating time of speed 1 is the sum of t1 and t2; the operating time of speed 2 is the sum of t3 and t4.)<br>• Do not set the operating time of a certain speed to 0. Otherwise, the drive skips this speed and switches to the next speed directly.<br>• The speed reach signal is activated when the motor speed feedback reaches the maximum operating speed set for this speed.<br>• If the S-ON signal is switched off during operation, the motor stops in the mode defined by H02.05 (Stop mode at S-ON OFF). |

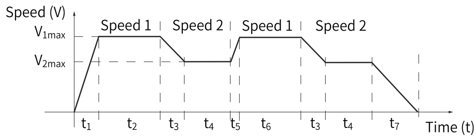
★ Definition of terms:

A complete operation cycle covers all the multi-speed references defined by H12.01.

- Cyclic running (H12.00 = 1)
  Set H12.00 to 1 to select the cyclic operation mode.

Set H12.01 and H12.02 based on the number of speeds and the operating time unit. Then set the reference value, operating time and acceleration/ deceleration time for each speed. The drive executes the set speeds in a sequence from speed 1 to speed N (last speed). After all the speeds are executed, the drive jumps to speed 1 and repeats the preceding process.

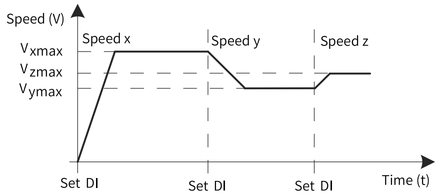
Table 2–20 Descriptions of cyclic operation

| Description | Operating Curve |
|---|---|
| • The drive starts from displacement 1 again after each cycle of operation.<br>• The drive switches to the next displacement automatically.<br>• The cyclic operation state remains active as long as the S-ON signal is active. | <br>• V1max, V2max: maximum operating speeds in displacement 1 and displacement 2<br>• Operating time = Time taken in switching from the last speed to current speed + Duration of constant-speed operation at this speed (For example, the operating time of speed 1 is the sum of t1 and t2; the operating time of speed 2 is the sum of t3 and t4.)<br>• Do not set the operating time of a certain speed to 0. Otherwise, the drive skips this speed and switches to the next speed directly.<br>• The speed reach signal is activated when the motor speed feedback reaches the maximum operating speed set for this speed.<br>• If the S-ON signal is switched off during operation, the motor stops in the mode defined by H02.05 (Stop mode at S-ON OFF). |

■ DI-based operation (H12.00 = 2)
Set H12.00 to 2 to select DI-based operation.

Set H12.01 and H12.02 based on the number of speeds to be executed and the operating time unit. Then set the reference value, operating time and acceleration/deceleration time for each speed. The drive executes the speed references according to ON/OFF combination of the external DIs (CMDx).

Table 2–21 Descriptions of DI-based operation

| Description | Operating Curve |
|---|---|
| • The drive operates continuously as long as the S-ON signal is active.<br>• The speed No. is determined by the DI logic.<br>• The interval time between displacements is determined by the command delay of the host controller.<br>• The multi-speed reference is edge-triggered. | <br><br>• x, y: speed No. (The relationship between the speed No. and the DI logic is described below.)<br>• The operating time is independent of the parameter setpoint. If the speed No. changes during operation, the drive switches to the new speed No. immediately.<br>• The speed reach signal is activated when the motor speed feedback reaches the maximum operating speed set for this speed.<br>• If the S-ON signal is switched off during operation, the motor stops in the mode defined by H02.05 (Stop mode at S-ON OFF). |

When the multi-speed operation mode is DI-based operation, assign DI functions 6...9 (multi-reference switchover) to four DIs and set the active logic of these DIs. In addition, assign FunIN.5 (DIR-SEL, direction selection in DI-based multi-speed operation) to a certain DI to switch the speed reference direction.

☆ Related parameters:

| Code | Parameter Name | Function Name | Function |
|---|---|---|---|
| FunIN.5 | DIR-SEL | Direction switchover through DI in multi-speed mode | Defines the speed reference direction in the DI-based operation mode.<br>Inactive: Reference direction<br>Active: Opposite to the reference direction |
| FunIN.6 | CMD1 | Multi-reference switchover 1 | The speed No. is a 4-bit binary value. The relationship between the speed no. and CMD1 to CMD4 is shown in *"Table 2–22 " on page 90*.<br>The value of CMD is 1 upon active DI level and 0 upon inactive DI level. |
| FunIN.7 | CMD2 | Multi-reference switchover 2 | |
| FunIN.8 | CMD3 | Multi-reference switchover 3 | |
| FunIN.9 | CMD4 | Multi-reference switchover 4 | |

Table 2–22 Relationship between the segment No. and CMD1 to CMD4

| CMD4 | CMD3 | CMD2 | CMD1 | Segment No. |
|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 2 |
| ... | | | | |
| 1 | 1 | 1 | 1 | 16 |

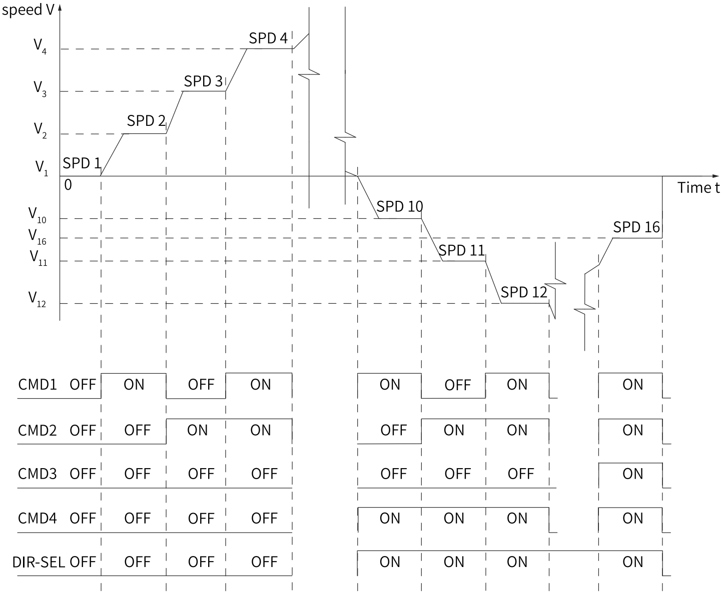



Figure 2-54 Example of multi-speed curve

2. Setting the multi-speed curve

The following takes speed 1 as an example.

☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H12.03 | 2012-04h | Acceleration time 1 | 0ms to 65535ms | 10 | ms | Real-time | *" H12_en.03" on page 346* |
| H12.04 | 2012-05h | Deceleration time 1 | 0ms to 65535ms | 10 | ms | Real-time | *" H12_en.04" on page 346* |
| H12.09 | 2012-0Ah | Acceleration time 4 | 0ms to 65535ms | 150 | ms | Real-time | *" H12_en.09" on page 348* |
| H12.10 | 2012-0Bh | Deceleration time 4 | 0ms to 65535ms | 150 | ms | Real-time | *" H12_en.10" on page 348* |
| H12.20 | 2012-15h | Speed reference 1 | –6000 rpm to +6000 rpm | 0 | RPM | Real-time | *" H12_en.20" on page 348* |

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H12.21 | 2012-16h | Operating time of speed 1 | 0.0s(m) to 6553.5s(m) | 5.0 | s (m) | Real-time | " H12_en.21" on page 348 |
| H12.22 | 2012-17h | Acc./dec. time of speed 1 | 0: Zero acceleration/ deceleration time<br>1: Acceleration/Deceleration time 1<br>2: Acceleration/Deceleration time 2<br>3: Acceleration/Deceleration time 3<br>4: Acceleration/Deceleration time 4 | 0 | - | Real-time | " H12_en.22" on page 349 |

For speed references in the multi-speed operation mode, besides the reference value and operating time, four groups of acceleration/ deceleration time options are also available. There is no acceleration/ deceleration time by default.

The following describes the actual acceleration/deceleration time and the operating time in cases where H12.00 (Multi-speed operation mode) is set to 1 (Individual operation).

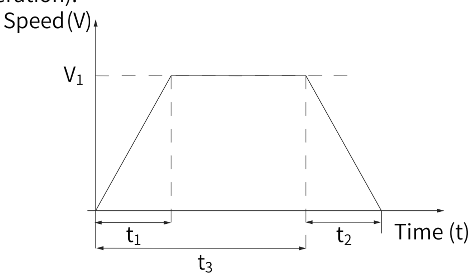



Figure 2-55 Example of multi-speed curve

As shown in the preceding figure, the speed reference is V1 and the actual acceleration time t1 is as follows.

$$t_1 = \frac{V_1}{1000} \times \text{Acc. time set for the speec}$$

The actual deceleration time $t_2$ is:

$$t_2 = \frac{V_1}{1000} \times \text{Dec. time set for the speed}$$

Operating time = Time taken in switching from the last speed to present speed + Duration of constant-speed operation at present speed (as shown by t3 in the preceding figure)

- Switched between A and B
  When setting H06.02 (speed reference source) to 3 (Switched between A and B), you need to assign FunIN.4 (DI-SEL) to the corresponding DI. The input signal of this DI determines which source (A or B) is active.

☆ Related parameters:

| Code | Parameter Name | Function Name | Description |
|---|---|---|---|
| FunIN.4 | CMD-SEL | Main/Auxiliary reference switchover | Inactive: Current reference being A<br>Active: Current reference being B |

- Communication
  When H06.02 (Speed reference source) is set to 4 (Communication), the speed reference is the setpoint of H31.09. H31.09 is not displayed on the keypad, it can be set through communication only.

☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H31.09 | 2031-0Ah | Speed reference set via communication | -6000.000 RPM to 6000.000 RPM | 0.000 | RPM | Real-time | *" H31_en.09" on page 391* |

## Speed reference direction setting

To switch the speed reference direction through DI, assign FunIN.26 to the corresponding DI. The input signal of this DI determines the speed reference direction.

☆ Related parameters:

| Code | Parameter Name | Function Name | Description |
|---|---|---|---|
| FunIN.26 | SPDDirSel | Speed reference direction | Inactive: Forward<br>Active: Reverse |

The actual direction of rotation is related to the setting of H02.02 (Direction of rotation), the sign (+/-) of the speed reference value, and the logic of FunIN.26.

Table 2–23 Actual direction of rotation in the speed control mode

| H02.02 | Sign of Speed Reference | FunIN.26 | Direction of Rotation |
|---|---|---|---|
| 0 | + | Inactive | CCW |
| 0 | + | Active | CW |
| 0 | - | Inactive | CW |
| 0 | - | Active | CCW |
| 1 | + | Inactive | CW |
| 1 | + | Active | CCW |
| 1 | - | Inactive | CCW |
| 1 | - | Active | CW |

### 2.2.3 Ramp Function Setting

The ramp function is used to smooth the acceleration rate of speed references through acceleration/deceleration time setting.

In the speed control mode, a high acceleration rate easily leads to motor jerk or intense vibration. In this case, increasing the acceleration/deceleration time smoothens the motor speed change, preventing mechanical damage caused by jerk or vibration.

Caution

- When the speed reference source is digital setting or jog speed, the acceleration time and deceleration time are set in H06.05 and H06.06.
- When the speed reference source is multi-speed reference, the acceleration time and deceleration time are set in parameter group H12. For details, see Chapter "Description of Parameters".

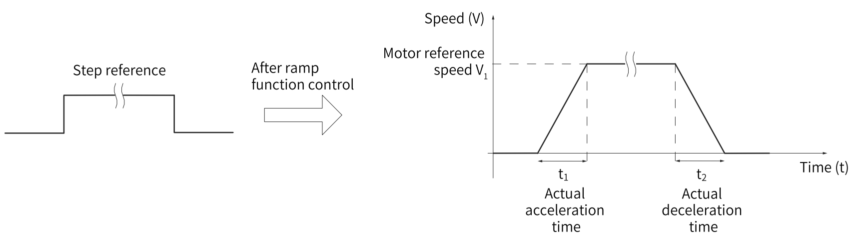



Figure 2-56 Ramp function definition

- H06.05 defines the time for the speed reference to change from 0 rpm to 1000 rpm.
- H06.06 defines the time for the speed reference to change from 1000 rpm to 0 rpm.

The formulas for calculating the actual acceleration/deceleration time are as follows:

$$\text{Actual acceleration time } t_1 = \frac{\text{Speed reference}}{1000} \times \text{Speed reference acceleration ramp time}$$

$$\text{Actual deceleration time } t_2 = \frac{\text{Speed reference}}{1000} \times \text{Speed reference deceleration ramp time}$$

☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H06.05 | 2006-06h | Acceleration ramp time constant of speed reference | 0ms to 65535ms | 0 | ms | Real-time | *" H06_en.05" on page 218* |
| H06.06 | 2006-07h | Deceleration ramp time constant of speed reference | 0ms to 65535ms | 0 | ms | Real-time | *" H06_en.06" on page 218* |

## 2.2.4 Zero Clamp

⚠ Caution

- Zero clamp is used in systems where position loop is unavailable in the speed control mode.
- If the motor oscillates in the zero clamp state, adjust the position loop gain.

In the speed control mode, if FunIN.12 (ZCLAMP) is enabled, and the speed reference amplitude is smaller than or equal to the value of H06.15, the motor enters zero position clamp state. In this case, a position loop is built inside the drive and the speed reference is invalid.

The motor is clamped within ±1 pulse of the position at which zero clamp is activated. Even if it rotates due to external force, it will return to the zero position and be clamped.

When the speed reference amplitude exceeds the value of H06.15, the motor exits from the zero clamp state and continues running according to the speed reference received. Zero clamp is deactivated when the ZCLAMP (FunIN.12) signal is inactive.

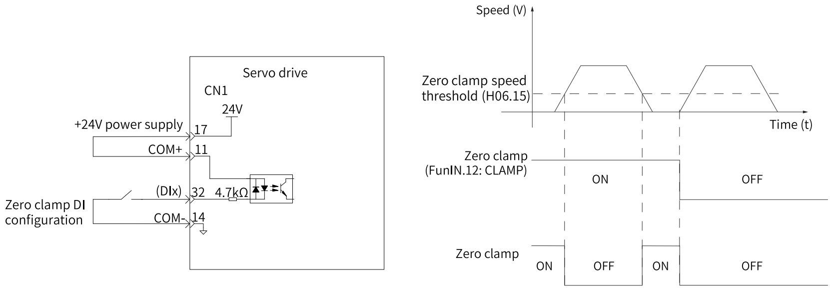



Figure 2-57 Wiring and waveform of zero clamp

☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H06.15 | 2006-10h | Zero clamp speed threshold | 0rpm to 6000rpm | 10 | RPM | Real-time | *" H06_en.15" on page 223* |

☆ Related parameters:

| Code | Parameter Name | Function Name | Description |
|---|---|---|---|
| FunIN.12 | ZCLAMP | Zero speed clamp | Inactive: Zero clamp disabled<br>Active: Zero clamp enabled |

## 2.2.5 Speed Reference Limit

**Caution**

When the actual speed of the motor exceeds H0A.08 (Overspeed threshold), E500.0 (Motor overspeed) occurs. For details of H0A.08, see Chapter "Parameter List". The speed reference limit must be lower than H0A.08.

In the speed control mode, the sources of speed reference limit include:

- H06.07 (Maximum speed limit): Defines the speed reference limit in both directions. The limit value applies when speed references exceed it.
- H06.08 (Forward speed limit): Defines the speed limit in the forward direction.The limit value applies when forward speed references exceed it.

- H06.09 (Reverse speed limit): Defines the speed limit in the reverse direction.The limit value applies when reverse speed references exceed it.
- Maximum speed of the motor (default threshold): Depends on the motor model.

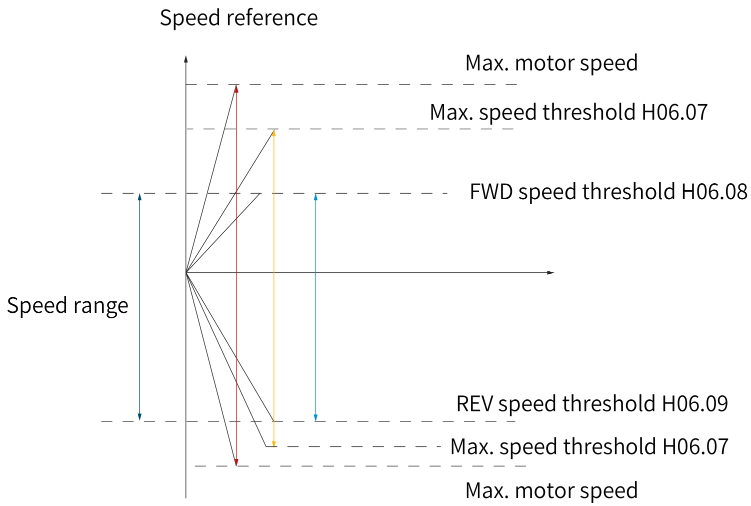



Figure 2-58 Example of speed reference limit

The actual motor speed limit meets the following requirements:

- |Forward speed limit| ⩽ min {maximum motor speed, H06.07, H06.08}
- |Reverse speed limit| ⩽ min {maximum speed of the motor, H06.07, H06.09}

☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H06.07 | 2006-08h | Maximum speed limit | 0rpm to 6000rpm | 6000 | RPM | Real-time | *" H06_en.07" on page 219* |
| H06.08 | 2006-09h | Forward speed threshold | 0rpm to 6000rpm | 6000 | RPM | Real-time | *" H06_en.08" on page 219* |
| H06.09 | 2006-0Ah | Reverse speed threshold | 0rpm to 6000rpm | 6000 | RPM | Real-time | *" H06_en.09" on page 220* |

## 2.2.6 Speed-Related DO

The filtered speed feedback can be compared with different thresholds, generating DO signals for use by the host controller. The filter time constant is set in H0A.27 (Speed DO filter time constant).

### Motor rotation DO signal

When the absolute value of the filtered actual motor speed reaches the value of H06.16 (Threshold of TGON (motor rotation) signal), the motor is acknowledged to be rotating. In this case, the drive outputs the motor rotation signal (FunOUT.2: TGON) to acknowledge that the motor is rotating. When the absolute value of the filtered actual motor speed is lower than the value of H06.16, the motor is not rotating.

Judgment on the motor rotation signal (FunOUT.2, TGON) is not affected by the operating state or control mode of the drive.

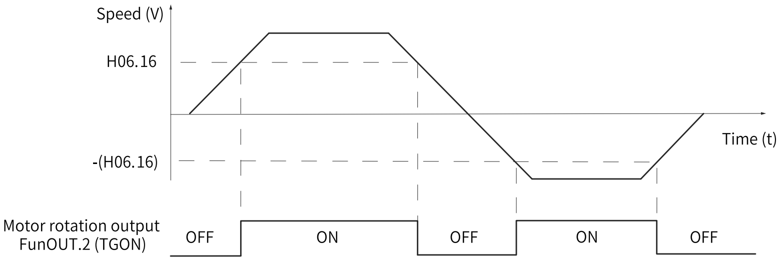



Figure 2-59 Waveform of motor rotation (TGON) signal

## *Note*

In the preceding figure, "ON" indicates the TGON (motor rotation) signal is active. "OFF" indicates the TGON (motor rotation) signal is inactive.

☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H06.16 | 2006-11h | Threshold of TGON (motor rotation) signal | 0 rpm to 1000 rpm | 20 | RPM | Real-time | *" H06_en.16" on page 223* |

To use the TGon signal, assign a DO with FunOUT.2 (TGon, motor rotation) and set the active logic of this DO.

☆ Related parameters:

| Code | Parameter Name | Function Name | Description |
|---|---|---|---|
| FunOUT.2 | TGon | Motor rotation | Inactive: The absolute value of filtered motor speed is lower than the setpoint of H06.16.<br>Active. The absolute value of filtered motor speed reaches the setpoint of H06.16. |

### Speed matching DO signal

In speed control, when the absolute value of the difference between the motor speed after filter and the speed reference satisfies the setting of H06.17, the actual motor speed is considered to reach the speed reference. At this moment, the servo drive outputs the speed matching signal (FunOUT.4: V-CMP). When the absolute value of the difference between the motor speed after filter and the speed reference exceeds the setting of H06-17, the speed matching signal is inactive.

If the drive is not in the operational state or the speed control mode, the speed matching signal (FunOUT.4: V-Cmp) is always inactive.

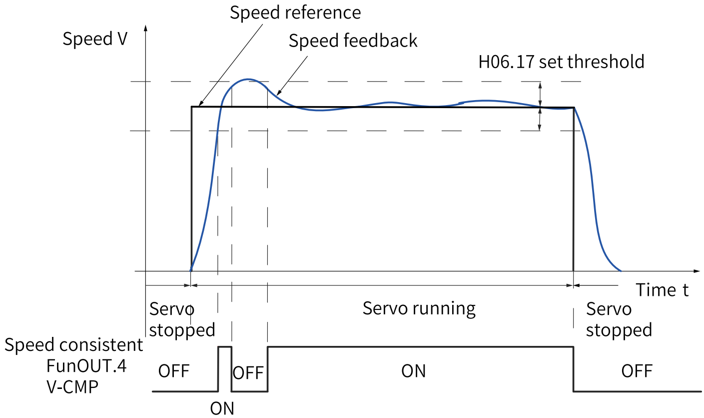



Figure 2-60 Waveform of speed matching (V-Cmp) signal

## Note

In the preceding figure, "ON" indicates the V-Cmp signal is active. "OFF" indicates the V-Cmp signal is inactive.

☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H06.17 | 2006-12h | Threshold of V-Cmp (speed matching) signal | 0 RPM –100 RPM | 10 | RPM | Real-time | " H06_en.17" on page 224 |

To use the V-Cmp (speed matching) signal, assign FunOUT.4 (V-Cmp, speed matching) to a certain DO and set the active logic of this DO.

☆ Related parameters:

| Code | Parameter Name | Function Name | Description |
|---|---|---|---|
| FunOUT.4 | V-Cmp | Speed matching | Inactive: The absolute difference between the filtered actual motor speed and the speed reference is higher than the value of H06.17.<br>Active: The absolute difference between the filtered actual motor speed and the speed reference is lower than or equal to the value of H06.17. |

### Speed reach DO signal

When the absolute value of the motor speed after filter exceeds the setting of H06.18 (Threshold of speed arrival signal), the motor speed is considered to reach the desired value. At this moment, the servo drive outputs the speed arrival signal (FunOUT.19: V-Arr). When the absolute value of the motor speed after filter is smaller than or equal to the setting of H06-18, the speed arrival signal is inactive.

Acknowledgment of the speed reach (FunOUT.19: V-Arr) signal is not affected by the operating state or control mode of the drive.

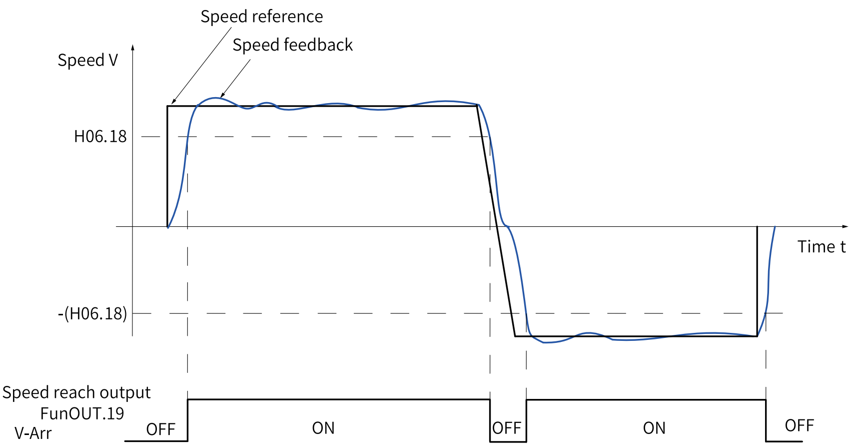



Figure 2-61 Waveform of the speed reach (V-Arr) signal

## Note

In the preceding figure, "ON" indicates the V-Arr (speed reached) signal is active. "OFF" indicates the V-Arr (speed reached) signal is inactive.

☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H06.18 | 2006-13h | Threshold of speed reach signal | 10rpm to 6000rpm | 1000 | RPM | Real-time | *" H06_en.18" on page 225* |

To use the V-Arr signal, assign FunOUT.19 (V-Arr, speed reach) to a DO and set the active logic of this DO.

☆ Related parameters:

| Code | Parameter Name | Function Name | Description |
|---|---|---|---|
| FunOUT.19 | V-Arr | Speed reach | Inactive: The absolute value of filtered motor speed feedback exceeds H06.18.<br>Active: The absolute value of filtered motor speed feedback is lower than or equal to the value of H06.18. |

## Zero speed DO signal

The servo drive outputs the V-Zero (FunOUT.3: zero speed) signal only when the absolute value of actual motor speed is lower than the threshold defined by H06.19. When the absolute value of the motor speed after filter is equal to or large than to the setting of H06-19, the zero speed signal is inactive.

Acknowledgment of the zero speed (FunOUT.3: V-Zero) signal is not affected by the operating state and control mode of the drive.

The interference in the speed feedback can be filtered by the speed feedback DO filter. You can set the corresponding filter time constant in H0A.27.

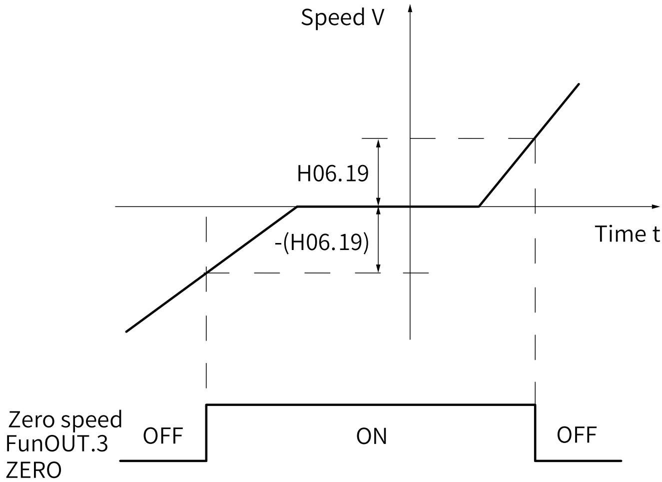



Figure 2-62 Waveform of the zero speed (V-Zero) signal

## Note

In the preceding figure, "ON" indicates the V-Zero signal is active. "OFF" indicates the V-Zero signal is inactive.

☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H06.19 | 2006-14h | Threshold of zero speed output signal | 1 rpm to 6000 rpm | 10 | RPM | Real-time | " H06_en.19" on page 226 |

To use the zero speed (V-Zero) signal, assign FunOUT.3 (V-Zero, zero speed) to a DO and set the active logic of this DO.

☆ Related parameters:

| Code | Parameter Name | Function Name | Description |
|---|---|---|---|
| FunOUT.3 | V-Zero | Zero speed signal | Inactive: The difference between motor speed feedback and the reference value is higher than the setpoint of H06.19.<br>Active: The difference between motor speed feedback and the reference value is lower than or equal to the value of H06.19. |

## 2.3 Torque Control Mode

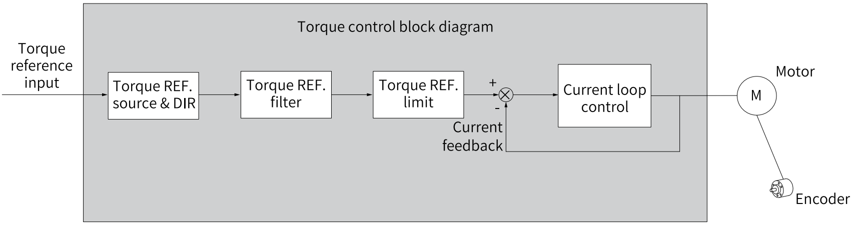



Figure 2-63 Block diagram of torque control mode

Set H02.00 (Control mode selection) to 2 (Torque control mode) through the keypad or the Inovance software tool to make the drive operate in the torque control mode. Set the drive parameters based on the mechanical structure and technical indicators. The following describes basic parameter settings in the torque control mode.

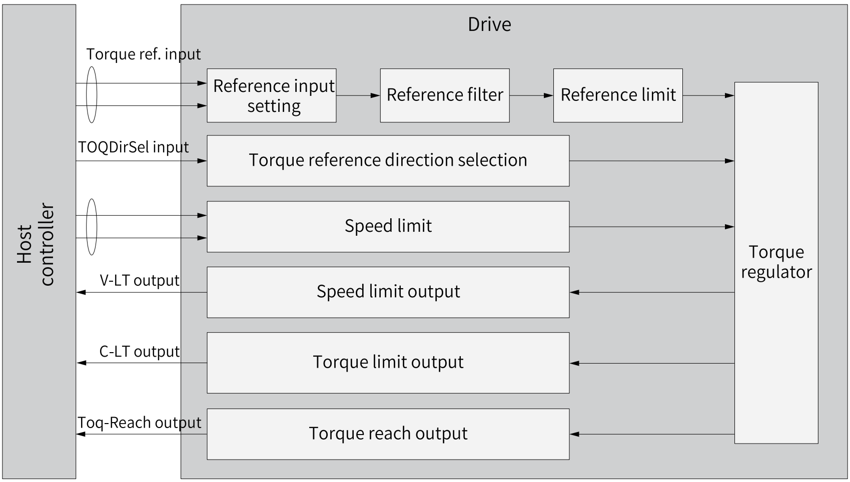



Figure 2-64 Signal exchange between the drive and the host controller

## 2.3.1 Block Diagram of Torque Control Parameters

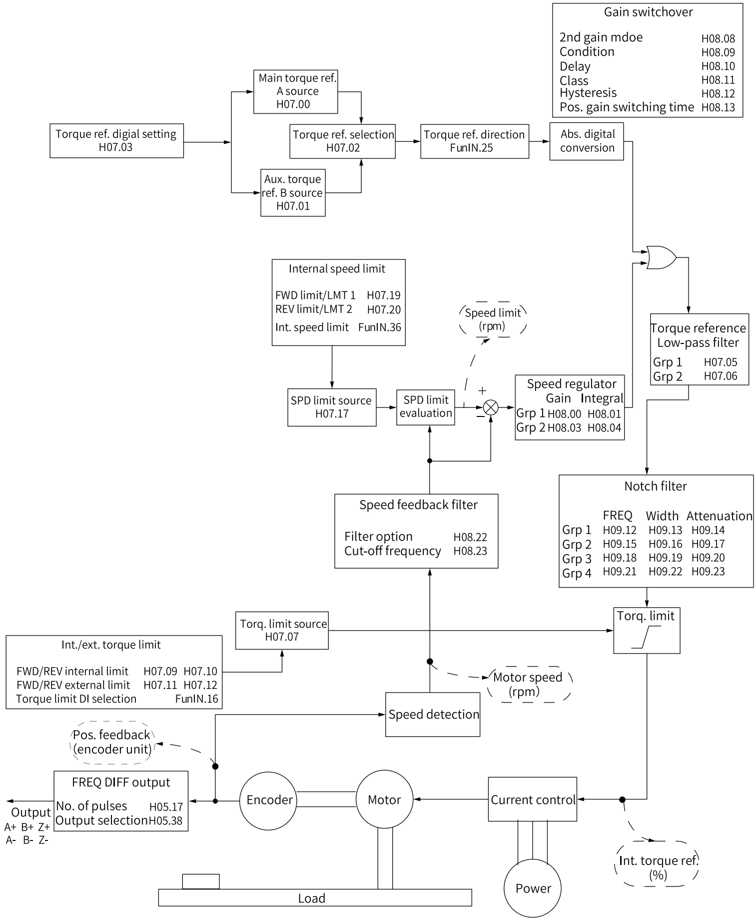



Figure 2-65 Block diagram of torque control parameters

## 2.3.2 Torque Reference Input Setting

### Torque reference source

Five torque reference sources are available in the torque control mode, which can be set in H07.02.

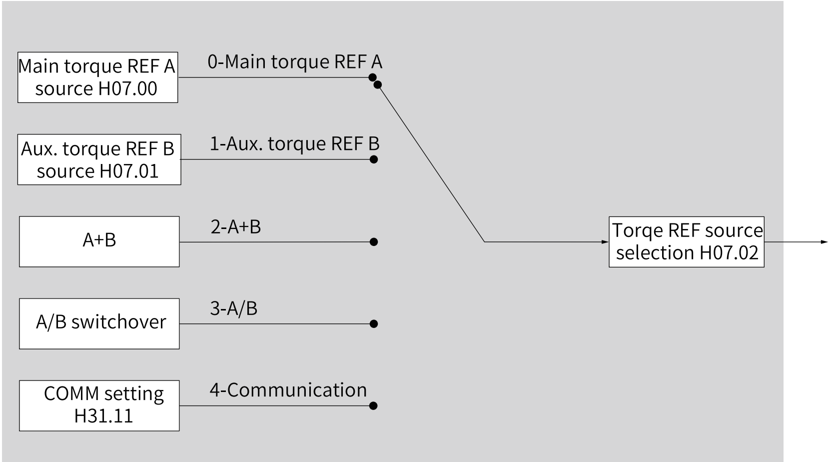



Figure 2-66 Torque reference sources

☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H07.02 | 2007-03h | Torque reference source | 0: Source of main torque reference A<br>1: Source of auxiliary torque reference B<br>2: Source of A+B<br>3: Switched between A and B<br>4: Communication | 0 | - | At stop | *" H07_en.02" on page 229* |

- **Source of main torque reference A**

  The main speed reference A is an internal speed reference that can be set through digital setting.

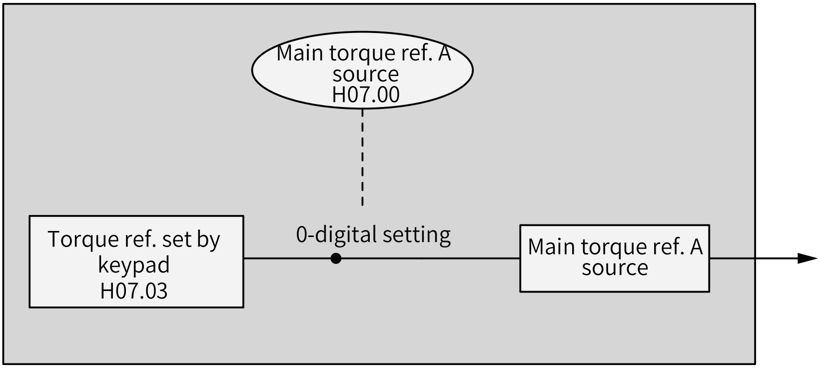



Figure 2-67 Description of source of main torque reference A

☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H07.00 | 2007-01h | Source of main torque reference A | 0: Keypad (H07.03) | 0 | - | At stop | " H07_en.00" on page 229 |

- **Digital setting**

  In digital setting, the torque reference is set in H07.03, which defines the percentage of the torque reference to the rated torque of the motor.

  ☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H07.03 | 2007-04h | Torque reference set through keypad | -400.0% to 400.0% | 0.0 | % | Real-time | " H07_en.03" on page 230 |

- **Source of auxiliary torque reference B**

  The source of auxiliary torque reference B is set in the same way as the main torque reference A. For the descriptions of related parameters, see Chapter "List of Parameters".

- **Switched between A and B**

  When setting H07.02 (Torque reference source) to 3 (Switched between A and B), you need to assign FunIN.4 (DI-SEL) to the corresponding DI. The input signal of this DI determines which source (A or B) is active.

  ☆ Related parameters:

| Code | Parameter Name | Function Name | Description |
|---|---|---|---|
| FunIN.4 | CMD-SEL | Reference switchover | OFF: Active reference being A<br>ON: Active reference being B |

- **Communication**

  When H07.02 (Torque reference source) is set to 4 (Communication), the torque reference is the value of H31.11. H31.11 is not displayed on the keypad, it can be set through communication only.

  ☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H31.11 | 2031-0Ch | Torque reference set via communication | -100.000% to 100.000% | 0.000 | % | Real-time | " H31_en.11" on page 391 |

## Torque reference direction

To switch the torque reference direction through DI, assign FunIN.25 (TorDirSel, torque reference direction) to the corresponding DI. The input signal of this DI determines the torque reference direction.

☆ Related parameters:

| Code | Parameter Name | Function Name | Description |
|---|---|---|---|
| FunIN.25 | ToqDirSel | Torque reference direction | Inactive: The actual torque reference direction is the same as the set direction.<br>Active: The actual torque reference direction is opposite to the set direction. |

The actual direction of rotation is related to the setting of H02.02 (Direction of rotation), the sign (+/-) of the torque reference value, and the logic of FunIN.25.

Table 2–24 Actual direction of rotation in the torque control mode

| H02.02 | Sign (+/-) of the Torque Reference Value | FunIN.25 | Direction of Rotation |
|---|---|---|---|
| 0 | + | Inactive | CCW |
| 0 | + | Active | CW |
| 0 | - | Inactive | CW |
| 0 | - | Active | CCW |
| 1 | + | Inactive | CW |

| H02.02 | Sign (+/-) of the Torque Reference Value | FunIN.25 | Direction of Rotation |
|---|---|---|---|
| 1 | + | Active | CCW |
| 1 | - | Inactive | CCW |
| 1 | - | Active | CW |

### 2.3.3 Torque Reference Filter

If the filter time constant is set to an excessively high value, the responsiveness will be degraded, so pay attention to the responsiveness when setting the filter time constant.

The servo drive smoothens torque references through the low-pass filter to reduce vibration in all the control modes.

The servo drive offers two low-pass filters for torque references, in which the low-pass filter 1 is used by default.

The servo drive switches to low-pass filter 2 when gain switchover is enabled (H08.08 = 1) and the condition defined by H08.09 (H08.09 ≠ 0) is met.

☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H07.05 | 2007-06h | Torque reference filter time constant | 0.00ms to 30.00ms | 0.50 | ms | Real-time | *" H07_en.05" on page 230* |
| H07.06 | 2007-07h | 2nd torque reference filter time constant | 0.00ms to 30.00ms | 0.27 | ms | Real-time | *" H07_en.06" on page 231* |

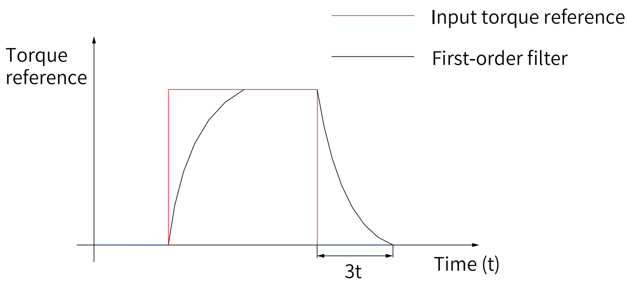



Figure 2-68 First-order filter for rectangular torque references

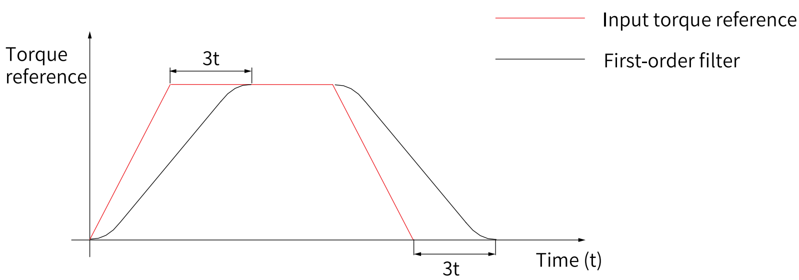



Figure 2-69 First-order filter for trapezoid torque references

### 2.3.4 Torque Reference Limit

**Caution**

Torque reference limit is active in and needed by all the control modes.

The torque reference limit is used to protect the servo drive and the motor.

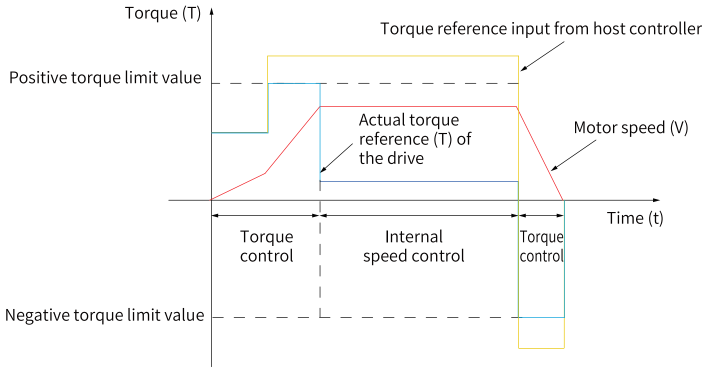



Figure 2-70 Torque reference and torque limit

When the absolute value of the torque reference input from the host controller or output by the speed regulator is higher than the absolute value of the torque reference limit, the actual torque reference of the drive is limited to the torque reference limit. Otherwise, the torque reference input from the host controller or output by the speed regulator is used.

Only one torque reference limit is valid at a moment. The positive/negative torque limit must be lower than or equal to the maximum torque of the drive and the motor and ±300.0% of the rated torque.

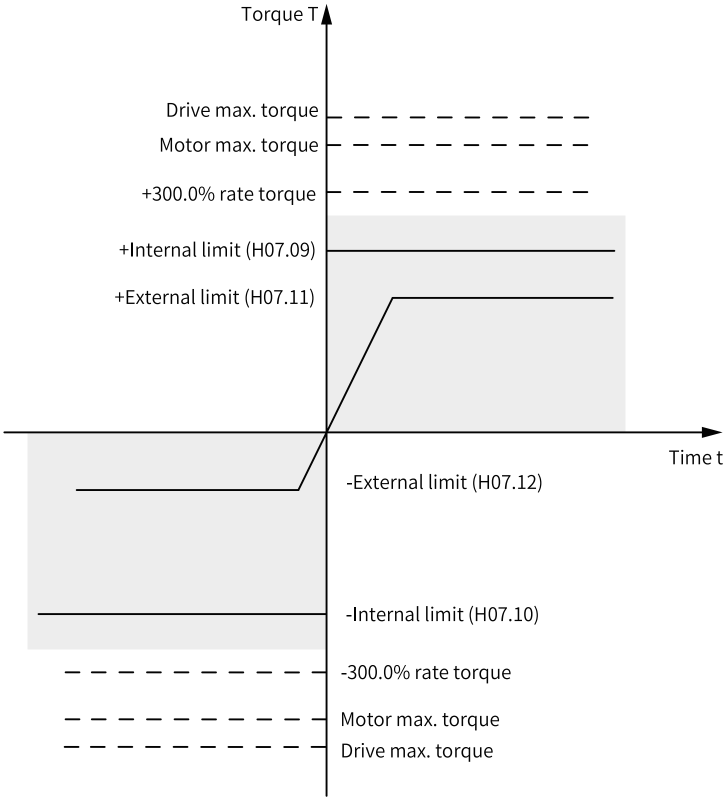



Figure 2-71 Example of torque limit

## Torque limit source

You can set the torque limit source in H07.07.

After the torque limit is set, the torque limit applies when the torque reference exceeds the limit. The torque limit must be set according to the load conditions. An excessively low limit may weaken the acceleration/deceleration ability of the motor, causing the actual motor speed to fall below the required value during operating at a constant torque.

☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H07.07 | 2007-08h | Torque Limit source | 0: Forward/Reverse internal torque limit (default)<br>1: Forward/Reverse external torque limit (selected through P-CL and N-CL) | 0 | - | At stop | " H07_en.07" on page 232 |

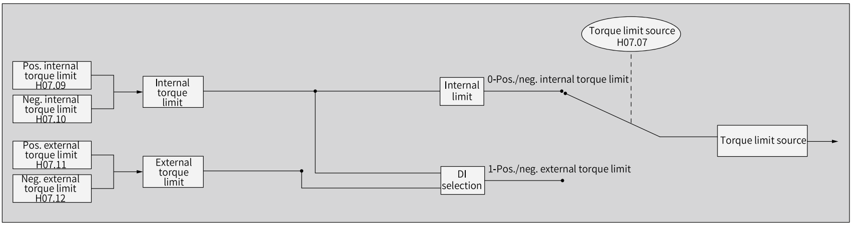



Figure 2-72 Torque Limit source

The following figures show examples in which absolute values of torque references input from the host controller exceed the absolute value of the torque limit in the torque control mode.

- H07.07 = 0 (Positive/Negative internal torque limit)
  The torque reference limit is determined only by H07.09 and H07.10.

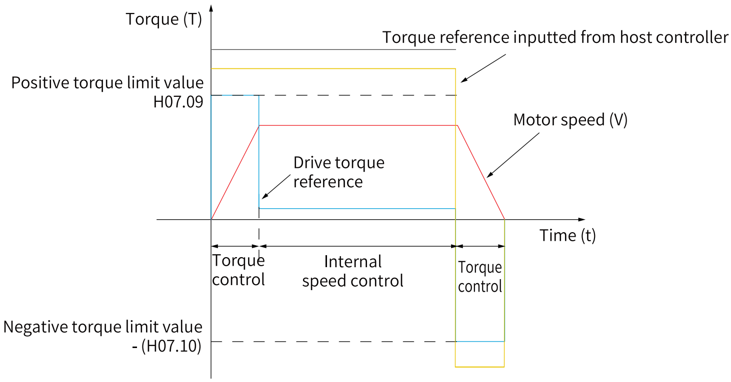



Figure 2-73 Torque limit curve (H07.07 = 0)

- H07.07 = 1 (Positive/Negative external torque limit)
  The torque reference limit is determined by the logic of the external DI signal. The positive torque limit is selected between H07.09 (Positive internal torque limit) and H07.11 (Positive external torque limit). The negative torque limit is selected between H07.10 (Negative internal torque limit) and H07.12 (Negative external torque limit).

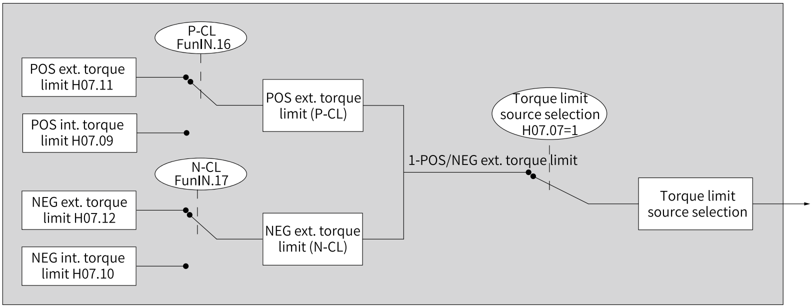
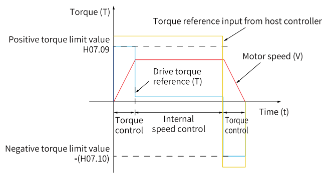
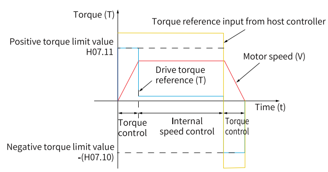
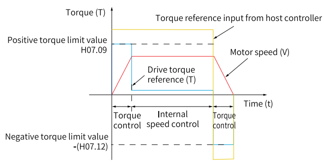
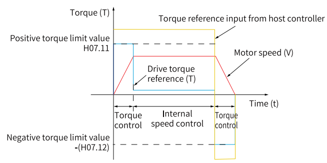



Figure 2-74 Torque limit source (H07.07 = 1)

Table 2–25 Description of H07.07 = 1

<table>
<tr><th colspan="2" rowspan="2">DI state</th><th colspan="2">P-CL</th></tr>
<tr><th>OFF</th><th>ON</th></tr>
<tr><td rowspan="2">N-CL</td><td>OFF</td><td>
</td><td>
</td></tr>
<tr><td>ON</td><td>
</td><td>
</td></tr>
</table>

Assign FunIN.16 (P-CL: Positive external torque limit) and FunIN.17 (N-CL: Negative external torque limit) to two DI of the drive and set the active logic of these DIs.

☆ Related parameters:

| Code | Parameter Name | Function Name | Description |
|---|---|---|---|
| FunIN.16 | P-CL | Positive external torque limit | The torque limit source is switched based on H07.07 (Torque limit source).<br>H07.07 = 1:<br>Active: Positive external torque limit activated<br>Inactive: Positive internal torque limit activated |
| FunIN.17 | N-CL | Negative external torque limit | The torque limit source is switched based on H07.07 (Torque limit source).<br>H07.07 = 1:<br>Active: Negative external torque limit activated<br>Inactive: Negative internal torque limit activated |

☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H07.09 | 2007-0Ah | Positive internal torque limit | 0.0% to 400.0% | 350.0 | % | Real-time | *" H07_en.09" on page 233* |
| H07.10 | 2007-0Bh | Negative internal torque limit | 0.0% to 400.0% | 350.0 | % | Real-time | *" H07_en.10" on page 233* |
| H07.11 | 2007-0Ch | Positive external torque limit | 0.0% to 400.0% | 350.0 | % | Real-time | *" H07_en.11" on page 233* |
| H07.12 | 2007-0Dh | Negative external torque limit | 0.0% to 400.0% | 350.0 | % | Real-time | *" H07_en.12" on page 234* |

## Setting torque limit DO signal

The drive outputs the C-LT (FunOUT.7: torque limit) signal to the host controller when the torque reference reaches the limit. In this case, assign FunOUT.7 to a DO of the drive and set the active logic of this DO.

☆ Related parameters:

| Code | Parameter Name | Function Name | Description |
|---|---|---|---|
| FunOUT.7 | C-LT | Torque limit signal | Active: The torque reference value reaches the torque limit and is limited by the torque limit.<br>Inactive: The torque reference does not reach the torque limit. |

## 2.3.5 Speed limit in Torque Control Mode

In the torque control mode, the motor accelerates continuously if the torque reference is higher than the load torque on the machine side, which may lead to overspeed and damage the machine. A speed limit therefore must be set to protect the machine.

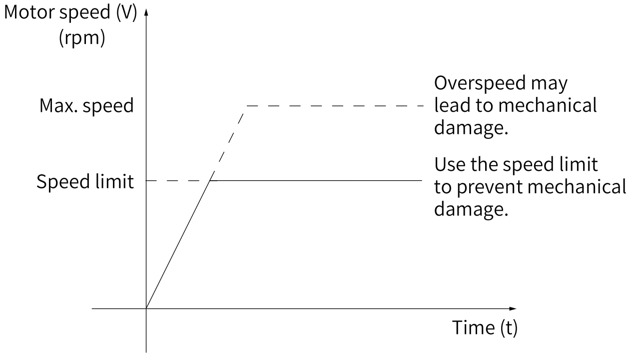



Figure 2-75 Speed limit in the torque control mode

### Setting the speed limit source

In the torque control mode, you can set the speed limit source in H07.17. After the speed limit is set, the actual motor speed will be limited. After reaching the speed limit, the motor keeps operating at the speed limit constantly. Set the speed limit based on the operating requirements of the load.

☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H07.17 | 2007-12h | Speed limit source | 0: Internal speed limit (in torque control)<br>1: V-LMT used as external speed limit<br>2: 1st or 2nd speed limit as defined by V-SEL | 0 | - | Real-time | " " on page |

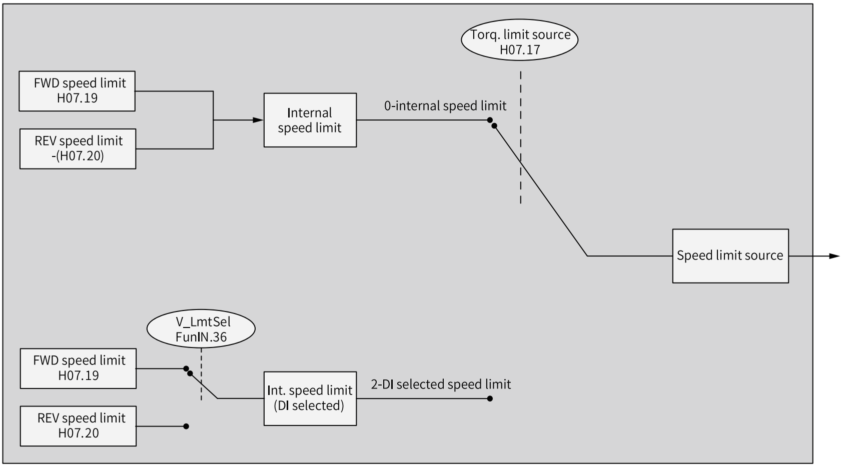



Figure 2-76 Speed limit source

- H07.17 = 0 (Internal speed limit)
  The speed limit is determined only by H07.19 (Positive speed limit) and H07.20 (Negative speed limit).

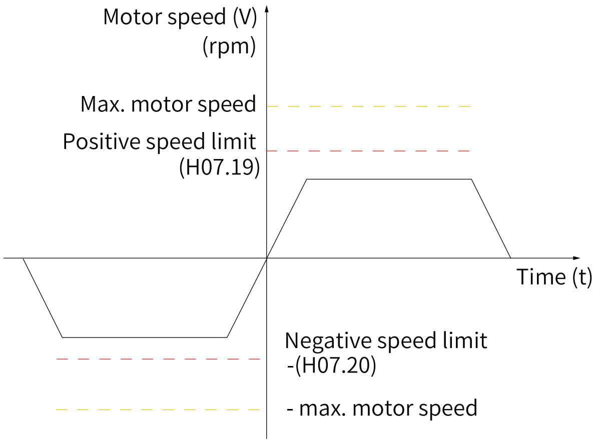



Figure 2-77 Speed limit curve (H07.17 = 0)

- H07.17 = 2 (1st or 2nd speed limit selected by DI)
  H07.19 or H07.20 is used as the speed limit based on the logic of the DI.

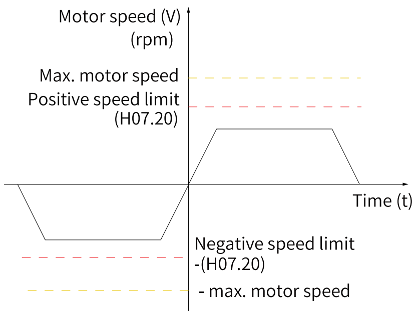
  Before setting H107.17 to 2, assign FunIN.36 (V-LmtSel: internal speed limit source) to a DI first, and then set the active logic of this DI.

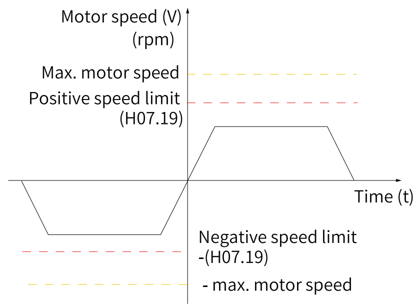
  ☆ Related parameters:

| Code | Parameter Name | Function Name | Description |
|---|---|---|---|
| FunIN.36 | V_LmtSel | Internal speed limit source | Inactive: H07.19 used as positive/ negative internal speed limit<br>Active: H07.20 used as positive/ negative internal speed limit |

Table 2–26 Descriptions of speed limit

| V_LmtSel | |
|---|---|
| ON | OFF |




☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H07.19 | 2007-14h | Forward speed limit/1st speed limit in torque control | 0rpm to 6000rpm | 3000 | RPM | Real-time | " H07_en.19" on page 235 |
| H07.20 | 2007-15h | Reverse speed limit/2nd speed limit in torque control | 0rpm to 6000rpm | 3000 | RPM | Real-time | " H07_en.20" on page 235 |

## Speed limit DO signal

In the torque control mode, the servo drive outputs the V- LT (FunOUT.8: speed limit) signal to the host controller when the absolute value of the motor speed keeps exceeding the speed limit in the period defined by H07.40. If either of the preceding two conditions is not satisfied, the speed limit signal will be deactivated.

Acknowledgment of the V-LT (Speed limit) signal is executed only during operation in the torque control mode.

To use the V-LT signal, assign FunOUT.8 to a DO of the drive and set DO active logic of this DO.

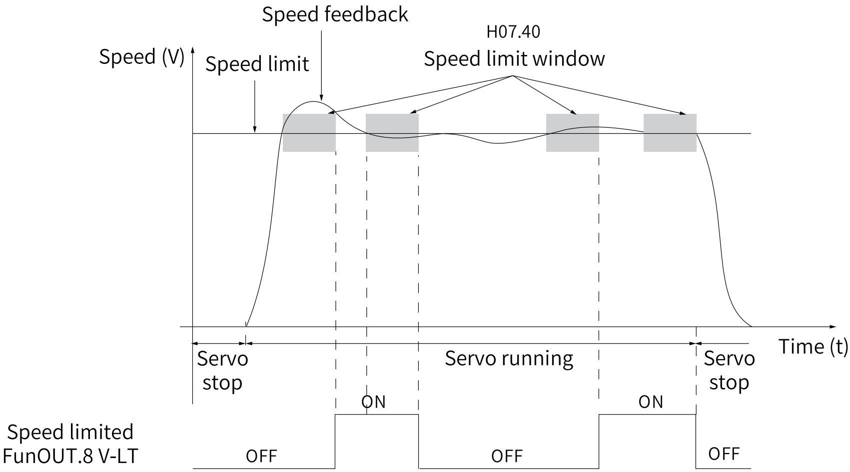



Figure 2-78 Example of speed limit DO waveform

☆ Related parameters:

| Code | Parameter Name | Function Name | Description |
|---|---|---|---|
| FunOUT.8 | V-LT | Speed limit | Inactive: The motor speed does not reach the speed limit.<br>Active: The motor speed reaches the speed limit and a speed loop is built based on this limit. |

## 2.3.6 Torque Reach Output

The torque reach output is used to determine whether the actual torque reference reaches the set range. The drive outputs TorReach (FunOUT.18: torque reach) signal to the host controller when the actual torque reference reaches the torque reference threshold.

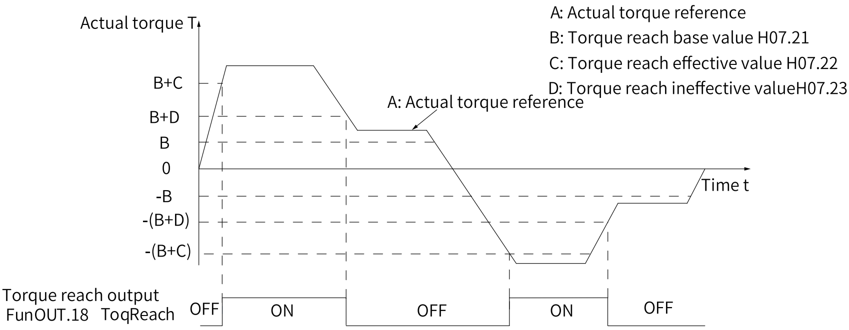



Figure 2-79 Example of TorReach signal waveform

- Actual torque reference (viewed in H0b.02): A
- Base value for torque reach (H07.21): B.
- Threshold of valid torque arrival (H07.22): C.
- Threshold of invalid torque reach (H07.23): D.

C and D are the offset based on B.

The torque reach DO signal can be activated only when the actual torque reference meets the following condition: $|A| \geqslant B + C$. Otherwise, the torque reach DO signal remains inactive.

For the torque reach DO signal to become inactive, the actual torque reference must meet the following condition: $|A| < B + D$. Otherwise, the torque reach signal remains active.

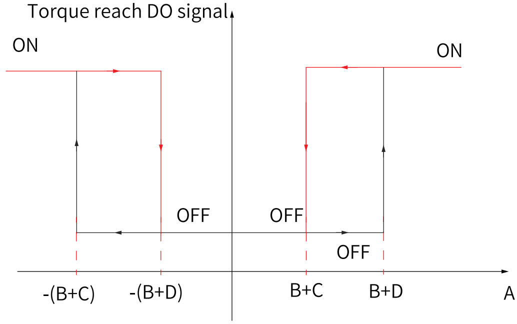



Figure 2-80 Description of torque reach output

☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H07.21 | 2007-16h | Torque reach base value | 0.0% to 300.0% | 0.0 | % | Real-time | " H07_en.21" on page 235 |
| H07.22 | 2007-17h | Torque reach valid value | 0.0% to 300.0% | 20.0 | % | Real-time | " H07_en.22" on page 235 |
| H07.23 | 2007-18h | Torque reach invalid value | 0.0% to 300.0% | 10.0 | % | Real-time | " H07_en.23" on page 236 |

To use the TorReach (Torque reach) signal, assign FunOUT.18 (ToqReach, torque reach) to a DO of the drive and set the active logic of this DO.

☆ Related parameters:

| Code | Parameter Name | Function Name | Description |
|---|---|---|---|
| FunOUT.18 | ToqReach | Torque reach | Active: The absolute value of the torque reference reaches the setpoint.<br>Inactive: The absolute value of the torque reference is lower than the setpoint. |

## 2.4 Mixed Control Mode

In the compound control mode, the control mode can be switched when the S-ON signal is switched on and the servo drive is in the "run" state. The following four compound control modes are available:

- Torque mode ↔ Speed mode
- Speed mode ↔ Position mode
- Torque mode ↔ Position mode
- Speed control mode ↔ Position control mode ↔ Torque control mode

You can enable the compound control mode by setting H02.00 through the keypad or the software tool.

☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H02.00 | 2002-01h | Mode selection | 0: Speed control mode<br>1: Position control mode<br>2: Torque control mode<br>3: Torque<->Speed control mode<br>4: Speed<->Position control mode<br>5: Torque<->Position control mode<br>6: Torque<->Speed<->Position compound mode<br>7: Process segment<br>8: CANopen mode | 8 | - | At stop | *" " on page* |

Set the parameters for different control modes based on the mechanical structure and technical indicators. See description of H02.00 for details.

When H02.00 is set to 3, 4, or 5, assign a DI with FunIN.10 (M1_SEL, mode switchover 1) and set the active logic of this DI. When H02.00 is set to 6, assign two DIs with FunIN.10 (Mode switchover 1) and FunIN.11 (Mode DI 2) and set the active logic of these two DIs.

☆ Related parameters:

| Code | Parameter Name | Function Name | Function |
|---|---|---|---|
| FunIN.10 | M1_SEL | Mode switchover 1 | Defines the present control mode during compound control when the servo drive is in the "run" state, as shown in *"Table 2–27 " on page 120*. |
| FunIN.11 | M2_SEL | Mode switchover 2 | Defines the present control mode during compound control when the servo drive is in the "run" state, as shown in *"Table 2–28 " on page 121*. |

Table 2–27 Drive control mode

| H02.00 | M1_SEL terminal logic | Control mode |
|---|---|---|
| 3 | Inactive | Torque control mode |
| | Active | Speed control mode |
| 4 | Inactive | Speed control mode |
| | Active | Position control mode |
| 5 | Inactive | Torque control mode |
| | Active | Position control mode |

Table 2–28 Drive control mode

| H02.00 | M2_SEL terminal logic | M1_SEL terminal logic | Control mode |
|---|---|---|---|
| 6 | - | Active | Position control mode |
| | Active | Inactive | Speed control mode |
| | Inactive | Inactive | Torque control mode |

## 2.5 Absolute Encoder System

### 2.5.1 Overview

The absolute encoder, which features a single-turn resolution of 8388608 (223), is used to detect the motor position within one turn and count the number of motor revolutions, with 16-bit multi-turn data recorded. The absolute system integrated with the absolute encoder works in absolute position linear mode or absolute position rotating mode. These modes apply to position control, speed control, and torque control modes. The absolute encoder with a battery can back up data when the servo drive is powered off. This enables the servo drive to calculate the absolute mechanical position upon power-on again. Therefore, the homing operation is not required.

To match the absolute encoder with the SV660P series servo drives, H00.00 (Motor code) to 14101 (Inovance 23-bit absolute encoder). Then set H02.01 (Absolute system selection) based on actual conditions. E731.0 (Encoder battery failure) will occur upon initial power-on of the battery. Set H0d.20 (Absolute encoder reset function) to 1 to reset E731.0 before performing the homing operation.

***Note***

When you change the value of H02.02 (Direction of rotation) or H0d.20 (Absolute encoder reset selection), the absolute position recorded by the encoder changes suddenly, causing the mechanical absolute position reference to change. In this case, perform the 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 drive.

## 2.5.2 Related Parameters

### Absolute encoder system settings

Set H00.00 (Motor code) to 14101 (Inovance motor with 23-bit absolute encoder), and select the absolute position mode in 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 136 |
| H00.08 | 2000-09h | Bus encoder type | 0 to 65535 | 0 | - | Real-time | " H00_en.08" on page 137 |
| H02.01 | 2002-02h | Absolute position detection system | 0: Incremental position mode<br>1: Absolute position linear mode<br>2: Absolute position rotation mode | 0 | - | At stop | " H02_en.01" on page 159 |

## *Note*

In the absolute position mode, the system detects the motor code automatically to check whether the motor used is configured with an absolute encoder. If not, E122.0 (multi-turn absolute encoder setting error) occurs.

### Absolute position linear mode

☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H0b.07 | 200b-08h | Absolute position counter | -2147483648 to 2147483647 | 0 | Reference unit | Unchangeable | " H0b_en.07" on page 289 |
| H0b.58 | 200b-3Bh | Mechanical absolute position (low 32 bits) | -2147483647 to 2147483647 | 0 | Encoder unit | Unchangeable | " H0b_en.58" on page 299 |
| H0b.60 | 200b-3Dh | Mechanical absolute position (high 32 bits) | -2147483647 to 2147483647 | 0 | Encoder unit | Unchangeable | " H0b_en.60" on page 299 |

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H0b.77 | 200b-4Eh | Absolute position fed back by the absolute encoder (low 32 bits) | -2147483647 to 2147483647 | 0 | Encoder unit | Unchangeable | *" H0b_en.77" on page 302* |
| H0b.79 | 200b-50h | Absolute position fed back by the absolute encoder (high 32 bits) | -2147483647 to 2147483647 | 0 | Encoder unit | Unchangeable | *" H0b_en.79" on page 302* |

This mode is mainly applicable to the scenario where the load traveling range is fixed and the encoder multi-turn data does not overflow, as shown by the following example of a ball screw transmission machine.

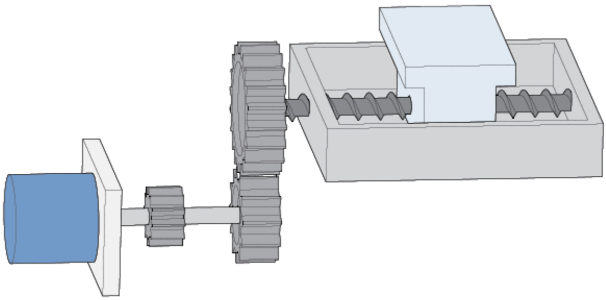


Figure 2-81 Ball screw transmission mechanism

In the formula PM = PE - PO:
PM: mechanical absolute position (H0b.58 and H0b.60)
PE [range: -238 to (238-1)]: absolute position fed back by the encoder
PO: position offset in the absolute position linear mode (H05.46 and H05.48)

If the electronic gear ratio is B/A, then the following formula applies: H0b.07 (Absolute position counter) = PM/(B/A) H0b.07 indicates present mechanical absolute position (in reference unit).

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.

The encoder multi-turn data range in the absolute position linear mode is -32768 to +32767. If the number of forward revolutions exceeds 32767 or the number of reverse revolutions is lower than -32768, E735.0 (encoder multi-turn count overflow) occurs. You can hide E735.0 by setting H0A.36 (encoder multi-turn overflow fault) to 1 (hide).

## Absolute position rotation mode

☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H05.50 | 2005-33h | Mechanical gear ratio in absolute position rotation mode (numerator) | 1 to 65535 | 1 | - | At stop | " H05_en.50" on page 211 |
| H05.51 | 2005-34h | Mechanical gear ratio in absolute position rotation mode (denominator) | 1 to 65535 | 1 | - | At stop | " H05_en.51" on page 211 |
| H05.52 | 2005-35h | Pulses per revolution of the load in absolute position rotation mode (low 32 bits) | 0 to 2147483647 | 0 | Encoder unit | At stop | " H05_en.52" on page 211 |
| H05.54 | 2005-37h | Pulses per revolution of the load in absolute position rotation mode (high 32 bits) | 0 to 127 | 0 | Encoder unit | At stop | " H05_en.54" on page 212 |
| H0b.58 | 200b-3Bh | Mechanical absolute position (low 32 bits) | -2147483647 to 2147483647 | 0 | Encoder unit | Unchangeable | " H0b_en.58" on page 299 |
| H0b.60 | 200b-3Dh | Mechanical absolute position (high 32 bits) | -2147483647 to 2147483647 | 0 | Encoder unit | Unchangeable | " H0b_en.60" on page 299 |
| H0b.77 | 200b-4Eh | Absolute position fed back by the absolute encoder (low 32 bits) | -2147483647 to 2147483647 | 0 | Encoder unit | Unchangeable | " H0b_en.77" on page 302 |

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H0b.79 | 200b-50h | Absolute position fed back by the absolute encoder (high 32 bits) | -2147483647 to 2147483647 | 0 | Encod er unit | Unchange able | " H0b_en.79" on page 302 |
| H0b.81 | 200b-52h | Load position within one turn in absolute position rotation mode (low 32 bits) | -2147483647 to 2147483647 | 0 | Encod er unit | Unchange able | " H0b_en.81" on page 303 |
| H0b.83 | 200b-54h | Load position within one turn in absolute position rotation mode (high 32 bits) | -2147483647 to 2147483647 | 0 | Encod er unit | Unchange able | " H0b_en.83" on page 303 |
| H0b.85 | 200b-56h | Load position within one turn in absolute position rotation mode | -2147483647 to 2147483647 | 0 | Refer ence unit | Unchange able | " H0b_en.85" on page 303 |

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.

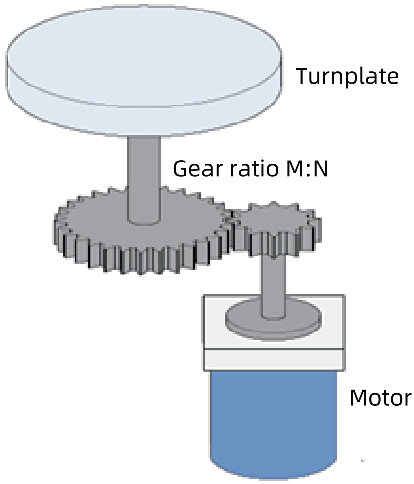



Figure 2-82 Rotating load

The servo drive calculates the absolute position upper limit of the machine based on H05.52 and H05.54 first. If H05.52 and H05.54 are 0, the servo drive turns to H05.50 and H05.51. When the encoder resolution (RE) is 223, and the encoder pulses per load revolution is represented by RM, the following formula applies: If H05.52 or H05.54 ≠ 0: RM = H05.54 x 232+ H05.52 if H05.52 and H05.54 = 0: RM = RE

If the electronic gear ratio is B/ A, then the following formula applies: H0b.07 (absolute position counter) = $R_M$ / (B ÷ A).

The following figure shows the relation between the single-turn position of the rotating load and the position of the rotary platen.

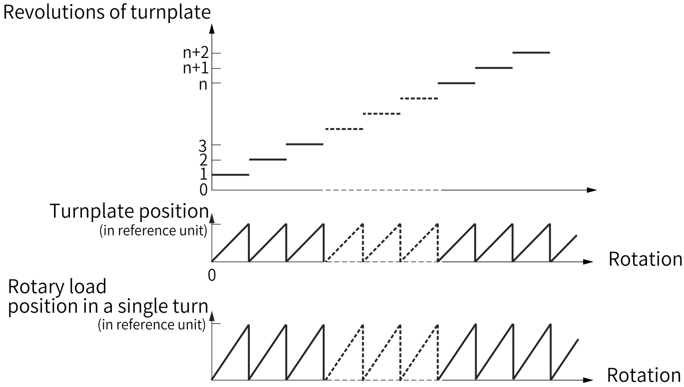



Figure 2-83 Relation between the single-turn position of the rotating load and the position of the rotating platform

The following figure shows the relation between the position fed back by the encoder and the single-turn position of the rotating load.

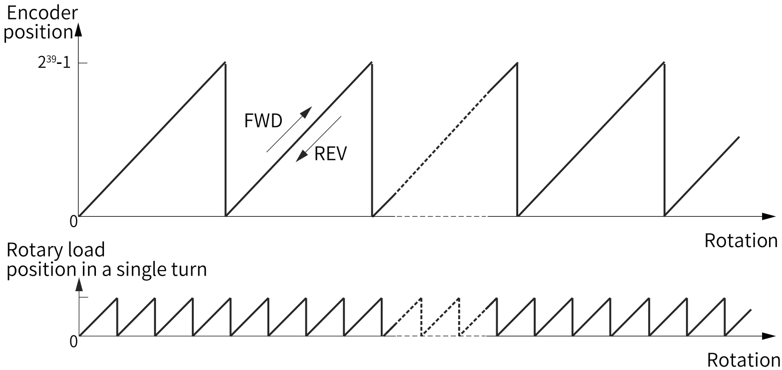



Figure 2-84 Relation between encoder feedback position and the single-turn position of the rotating load

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

## Encoder feedback data

The encoder feedback data is divided into the number of revolutions and the single-turn position. For the incremental position mode, the number of revolutions is not recorded.

☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H0b.70 | 200b-47h | Number of revolutions recorded in the absolute encoder | 0Rev to 65535Rev | 0 | Rev | Unchangeable | " H0b_en.70" on page 301 |
| 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 301 |

### Encoder multi-turn overflow fault

In the absolute position linear mode, you can hide the encoder multi-turn overflow fault by setting H0A.36.

☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H0A.36 | 200A-25h | Encoder multi-turn overflow fault | 0: Not hide<br>1: Hide | 0 | - | At stop | " H0A_en.36" on page 281 |

### Absolute encoder reset

You can reset the encoder error or the multi-turn data fed back by the encoder by setting H0d.20.

☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H0d.20 | 200d-15h | Multi-turn absolute encoder reset | 0: No operation<br>1: Reset<br>2: Reset the fault and multi-turn data | 0 | - | At stop | " H0d_en.20" on page 316 |

## *Note*

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

### 2.5.3 Precautions for Use of the Battery Box

E731.0 (Encoder battery failure) will occur at initial power-on of the battery. Set H0d.20 (Absolute encoder reset function) to 1 to reset E731.0 before further operations.

When the battery voltage detected is lower than 3.0 V, E730.0 (Encoder battery warning) occurs. In this case, replace the battery according to 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.

***Note***

- If you replace the battery after powering off the servo drive, E731.0 (Encoder battery failure) will occur at next power-on, leading to an abrupt change in the multi-turn data. In this case, set H0d.20 to 1 to reset the encoder fault. Then perform the homing operation 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.

## 2.6 Auxiliary Functions

The drive offers the following auxiliary functions to ensure a proper operation of the servo system.

### 2.6.1 Software position limit

Hardware position limit is implemented by inputting external sensor signals to CN1 of the servo drive.

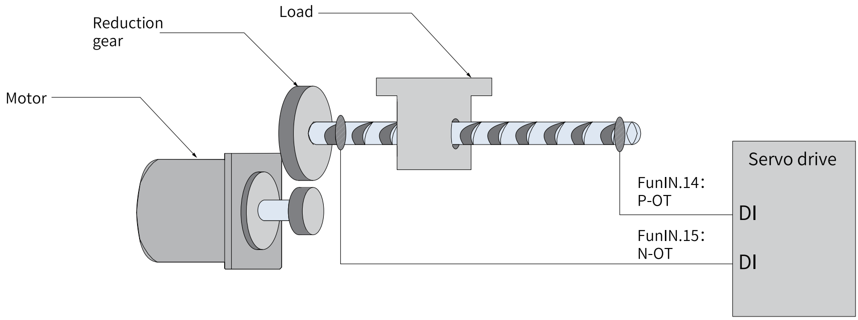



Figure 2-85 Installation of limit switches

Software position limit is implemented through a comparison between the internal position feedback and the set limit value. If the set limit value is exceeded, the servo drive reports a warning and stops immediately. 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 H0A.40 (Software position limit) to 2 (Enabled after homing) first, and then perform homing upon power-on before applying software position limit.

Table 2–29 Comparison between the hardware position limit and software position limit

| Hardware Position Limit | | Software position limit | |
|---|---|---|---|
| 1 | Restricted to linear motion and single-turn rotational motion. | 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 | Suffered from the risk of mechanical slip. | 3 | Prevents malfunction due to mechanical slip through internal position comparison. |
| 4 | Unable to sense or detect an overtravel fault after power-off. | | |

☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H0A.40 | 200A-29h | Software limit selection | 0: No operation<br>1: Activated immediately<br>2: Activated after homing is done | 0 | - | At stop | " H0A_en.40" on page 282 |
| H0A.41 | 200A-2Ah | Forward position of software limit | -2147483648 to 2147483647 | 2147483647 | - | At stop | " H0A_en.41" on page 283 |
| H0A.43 | 200A-2Ch | Reverse position of software limit | -2147483648 to 2147483647 | -2147483648 | - | At stop | " H0A_en.43" on page 283 |

- When H0A.40 is set to 0, software position limit is disabled.
- When H0A.40 is set to 1, software position limit is enabled immediately upon power-on. When the absolute position counter (H0b.07) is larger than H0A.41, the servo drive reports E950.0 (Forward limit switch warning) and executes stop at positive limit. When the absolute position counter (H0b.07) is smaller than H0A.43, the servo drive reports E952.0 (Reverse limit switch warning) and executes stop at negative limit.
- If H0A.40 is set to 2, soft limit is enabled after homing. When the value of the absolute position counter (H0b.07) is larger than the value of H0A.41 after homing, E950.0 (Forward overtravel warning) occurs and the servo drive stops at forward overtravel. When the value of the absolute position counter (H0b.07) is smaller than the value of H0A-42 after homing, E952.0 (Reverse overtravel warning) occurs and the servo drive stops at reverse overtravel.

## 2.6.2 Software reset

The software reset function comes into rescue when a restart of the servo drive in the non-operating state is not allowed because a No.1 non-resettable fault does not occur.

☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H0d.00 | 200d-01h | Software Reset | 0: No operation<br>1: Enable | 0 | - | At stop | " H0d_en.00" on page 311 |

## 2.6.3 Motor protection

### Motor overload protection

The motor generates heat continuously due to thermal effect of the current after power-on. The heat is then dissipated to the surroundings. When the heat generated exceeds the heat dissipated, the motor temperature will rise to a point that could damage the motor. To prevent such risks, the drive offers the motor overload protection function to prevent the motor from being damaged due to over-temperature.

The motor is compliant with NEC and CEC requirements and equipped with protective functions against overload and overtemperature.

Set the motor overload protection gain (H0A.04) to adjust the report time of fault E620.0. Use the default value of H0A.04 in general conditions, however, in case of one of the following situations, modify H0A.04 based on the actual heating condition.

- The motor works in environments with high temperature.
- The motor is in the cyclic motion featuring short motion cycle and frequent acceleration/deceleration.

You can also hide motor overload detection (H0A.26 = 1) when you are sure that the motor will not be damaged due to overtemperature.

**Caution**

Take caution when hiding motor overload detection as such operation may damage the motor.

☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H0A.04 | 200A-05h | Motor overload protection gain | 50% to 300% | 100 | % | At stop | " H0A_en.04" on page 274 |
| H0A.26 | 200A-1Bh | Motor overload detection | 0: Show motor overload warning (E909.0) and fault (E620.0)<br>1: Hide motor overload warning (E909.0) and fault (E620.0)<br>2: No meaning<br>3: Enabled for new motors | 3 | - | At stop | " H0A_en.26" on page 278 |

### Locked rotor over-temperature protection

When the motor is stalled, the motor speed is nearly 0 RPM while the current is large. In this case, the motor is overheated significantly. The motor is capable of operating upon stall in an allowable period of time, exceeding of which can damage the motor due to overtemperature. To prevent such a risk, the servo drive offers motor stall overtemperature protection to protect the motor from being damaged by overtemperature upon stall.

You can set the time for reporting E630.0 (Motor stall over-temperature fault) by setting the time threshold for motor overtemperature protection (H0A.32). The motor overtemperature protection function is enabled by default (H0A.33 = 1).

**Caution**

Take caution when disabling motor stall over-temperature protection as such operation may damage the motor.

Use a dedicated motor for the servo drive. Failure to comply will result in the risk of short circuit due to insulation deterioration.

☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H0A.32 | 200A-21h | Time threshold for locked motor overheat protection | 10ms to 65535ms | 200 | ms | Real-time | *" H0A_en.32" on page 280* |
| H0A.33 | 200A-22h | Locked motor overheat protection | 0: Disabled<br>1: Enable<br>2: Enabled for new over-temperature | 1 | - | Real-time | *" H0A_en.33" on page 280* |

### Motor overspeed protection

An excessively high speed may damage the motor or machine. Motor overspeed protection is used to protect the motor in case of overspeed, preventing the motor or machine from being damaged due to overtemperature.

$$\text{Overspeed threshold} = \begin{cases} \text{Max. motor speed x 1.2} & \text{H0A.08 = 0 or H0A.08 > Max. motor speed x 1.2} \\ \text{H0A.08} & \text{H0A.08} \neq 0 \text{ and H0A.08 < Max. motor speed x 1.2} \end{cases}$$

**Caution**

- The servo drive also offers motor runaway protection to prevent motor stall caused by lose of control.
- In applications where the motor drives a vertical axis or is driven by load, set H0A.12 to 0 to hide runaway fault detection. Use this function with caution.

☆ Related parameters:

| Param. | Hex | Name | Value | Default | Unit | Change Mode | Page |
|---|---|---|---|---|---|---|---|
| H0A.08 | 200A-09h | Overspeed threshold | 0 rpm to 10000 rpm | 0 | RPM | Real-time | *" H0A_en.08" on page 274* |
| H0A.12 | 200A-0Dh | Runaway protection enable | 0: Disabled<br>1: Enabled | 1 | - | Real-time | *" H0A_en.12" on page 276* |

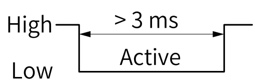
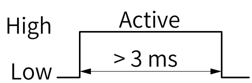
Besides runaway protection, the drive also allows you to set the speed limit in the speed/torque control mode to protect the motor and the machine.

## 2.6.4 DI Filter Time Setting

The servo drive provides seven DIs, in which DI1 to DI5 are normal low-speed DIs, and DI8 and DI9 are high-speed DIs.

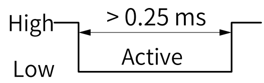
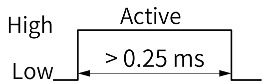
The following table describes the signal logic of low-speed DI terminals.

Table 2–30 Signal logic of low-speed DI terminals

| Value | DI Logic Upon Active DI Function | Remarks |
|---|---|---|
| 0 | Low level |  |
| 1 | High level |  |

The following table describes the signal logic of high-speed DI terminals.

Table 2–31 Signal logic of high-speed DI terminals

| Value | DI Logic Upon Active DI Function | Remarks |
|---|---|---|
| 0 | Low level |  |
| 1 | High level |  |

# 3 Description of Parameters

## 3.1 H00 Servo Motor Parameters

### H00.00 Motor code

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

**Value Range:**

0–65535

**Description**

14000: Inovance 20-bit incremental encoder motor

14101: Inovance 23-bit absolute encoder motor

### H00.02 Customized No.

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

**Value Range:**

0.00 to 42949672.95

**Description**

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

### H00.04 Encoder version

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

**Value Range:**

0.0 to 6553.5

**Description**

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

### H00.05 Serial-type motor code

| | | | |
|---|---|---|---|
| Hexadecimal: | 2000-06h | Effective Time: | - |

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

**Value Range:**

0 to 65535

**Description**

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

**H00.06 FPGA customized SN**

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

**Value Range:**

0.00 to 10485.75

**Description**

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

**H00.08 Serial encoder type**

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

**Value Range:**

0 to 65535

**Description**

14100: Multi-turn absolute encoder

Others: Single-turn absolute encoder

**H00.09 Rated voltage**

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

**Value Range:**

0: 220 V

1: 380 V

**Description**

0: 220 V

1: 380 V

### H00.10 Rated power

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

**Value Range:**

0.01 kW–655.35 kW

**Description**

-

### H00.11 Rated current

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

**Value Range:**

0.01 A to 655.35 A

**Description**

-

### H00.12 Rated torque

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

**Value Range:**

0.10N·m–655.35N·m

**Description**

-

### H00.13 Max. torque

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

| | | | |
|---|---|---|---|
| Default: | 0.10 | Change: | At stop |

**Value Range:**

0.10N · m–655.35N · m

**Description**

-

### H00.14 Rated speed

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

**Value Range:**

100rpm–9000rpm

**Description**

-

### H00.15 Maximum speed

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

**Value Range:**

100rpm–9000rpm

**Description**

-

### H00.16 Moment of inertia Jm

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

**Value Range:**

0.01 $kgcm^2$–655.35 $kgcm^2$

**Description**

-

**H00.17** **Number of PMSM pole pairs**

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

**Value Range:**

2 to 360

**Description**

-

**H00.18** **Stator resistance**

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

**Value Range:**

0.001 Ω to 65.535 Ω

**Description**

-

**H00.19** **Stator inductance Lq**

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

**Value Range:**

0.01mH–655.35mH

**Description**

-

**H00.20** **Stator inductance Ld**

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

**Value Range:**

0.01mH–655.35mH

**Description**

-

### H00.21 Linear back EMF coefficient

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

**Value Range:**

0.01 mV/rpm to 655.35 mV/rpm

**Description**

-

### H00.22 Torque coefficient Kt

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

**Value Range:**

0.01 N·m/Arms to 655.35 N·m/Arms

**Description**

-

### H00.23 Electrical constant Te

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

**Value Range:**

0.01 ms to 655.35 ms

**Description**

-

### H00.24 Mechanical constant Tm

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

| | | | |
|---|---|---|---|
| Default: | 0.01 | Change: | At stop |

**Value Range:**

0.01 ms to 655.35 ms

**Description**

-

### H00.27 Sine/Cosine number of serial encoder motor

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

**Value Range:**

0 to 65535

**Description**

-

### H00.28 Absolute encoder position offset

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

**Value Range:**

0P/Rev–1073741824P/Rev

**Description**

Saves the values obtained from angle auto-tuning.

### H00.30 Encoder selection (Hex)

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

**Value Range:**

0: Regular incremental encoder (UVW-ABZ)

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

2: Regular incremental encoder (ABZ, without UVW)

16: TAMAGAWA encoder

18: Nikon encoder

19: Inovance encoder

48: Optical scale

**Description**

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

**H00.31** **Encoder PPR**

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

**Value Range:**

1P/Rev–1073741824P/Rev

**Description**

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

**H00.35** **Motor code saved in the serial encoder**

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

**Value Range:**

0 to 65535

**Description**

-

**H00.37** **Encoder function setting bit**

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

**Value Range:**

0 to 255

**Description**

-

**H00.43** **Maximum Current**

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

**Value Range:**

0.00 A to 655.35 A

**Description**

-

## 3.2 H01 Servo Drive Parameters

**H01.00** **MCU software version**

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

**Value Range:**

0.0 to 6553.5

**Description**

Displays MCU software version (with one decimal place).

**H01.01** **FPGA software version**

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

**Value Range:**

0.0 to 6553.5

**Description**

Displays the FPGA software version, with 1 decimal place.

**H01.02** **Servo Drive Model**

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

**Value Range:**

0 to 65535

**Description**

-

### H01.04 Voltage class

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

**Value Range:**

0 V to 65535 V

**Description**

-

### H01.05 Rated power

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

**Value Range:**

0.01 kW–655.35 kW

**Description**

-

### H01.06 Max. output power

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

**Value Range:**

0.01 kW–655.35 kW

**Description**

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

### H01.07 Rated output current

| | | | |
|---|---|---|---|
| Hexadecimal: | 2001-08h | Effective Time: | - |

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

**Value Range:**

0.01 A to 655.35 A

**Description**

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

### H01.08 Max. output current

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

**Value Range:**

0.01 A to 655.35 A

**Description**

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

### H01.10 Carrier frequency

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

**Value Range:**

4000 to 20000

**Description**

Displays the carrier frequency, with no decimal place.

### H01.11 Current loop modulation frequency

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

**Value Range:**

0: Carrier frequency

1: 2 × carrier frequency

**Description**

-

### H01.12 Speed loop scheduling frequency-division coefficient

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

**Value Range:**

1: Current loop modulation frequency/1

2: Current loop modulation frequency/2

4: Current loop modulation frequency/4

8: Current loop modulation frequency/8

16: Current loop modulation frequency/16

32: Current loop modulation frequency/32

**Description**

-

### H01.13 Position loop scheduling frequency-division coefficient

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

**Value Range:**

2: Current loop modulation frequency/2

4: Current loop modulation frequency/4

8: Current loop modulation frequency/8

16: Current loop modulation frequency/16

32: Current loop modulation frequency/32

64: Current loop modulation frequency/64

128: Current loop modulation frequency/128

**Description**

-

### H01.14 Dead zone time

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

**Value Range:**

0.01us–20.00us

**Description**

Displays the dead zone time, with two decimal places.

### H01.15 DC bus overvoltage protection threshold

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

**Value Range:**

0 V to 2000 V

**Description**

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

### H01.16 DC bus voltage discharge threshold

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

**Value Range:**

0 V to 2000 V

**Description**

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

### H01.17 DC bus undervoltage threshold

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

**Value Range:**

0 V to 2000 V

**Description**

Displays DC bus undervoltage threshold, with no decimal place.

### H01.18 Servo drive overcurrent protection threshold

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

| | | | |
|---|---|---|---|
| Default: | 100 | Change: | Immediately |

**Value Range:**

10% to 100%

**Description**

-

### H01.19 Sampling coefficient of 7860

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

**Value Range:**

1 to 65535

**Description**

-

### H01.20 Dead zone compensation

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

**Value Range:**

0.00us–20.00us

**Description**

-

### H01.21 Minimum switch-on time of bootstrap circuit

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

**Value Range:**

1.0us–20.0us

**Description**

-

### H01.22 D-axis back EMF constant

| | | | |
|---|---|---|---|
| Hexadecimal: | 2001-17h | Effective Time: | - |

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

**Value Range:**

0.0% to 6553.5%

**Description**

-

## H01.23 Q-axis back EMF constant

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

**Value Range:**

0.0% to 6553.5%

**Description**

-

## H01.24 D-axis current loop gain

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

**Value Range:**

1 to 65535

**Description**

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

## H01.25 D-axis current loop integral compensation factor

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

**Value Range:**

0 to 65535

**Description**

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

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

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

**Value Range:**

0: Extraction rate 32

1: Extraction rate 64

2: Extraction rate 128

3: Extraction rate 256

**Description**

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

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

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

**Value Range:**

1 to 65535

**Description**

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

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

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

**Value Range:**

0 to 65535

**Description**

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

### H01.29 Control power voltage sampling coefficient

| | | | |
|---|---|---|---|
| Hexadecimal: | 2001-1Eh | Effective Time: | - |

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

**Value Range:**

50.0 to 150.0

**Description**

-

### H01.30 Bus voltage gain tuning

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

**Value Range:**

50.0% to 150.0%

**Description**

Displays bus voltage gain adjustment, with 1 decimal place.

### H01.31 FOC calculation time

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

**Value Range:**

1.00us–100.00us

**Description**

-

### H01.32 Relative gain of UV sampling

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

**Value Range:**

0 to 65535

**Description**

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

### H01.37 Model identification version

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

**Value Range:**

0 to 65535

**Description**

-

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

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

**Value Range:**

0: Extraction rate 32

1: Extraction rate 64

2: Extraction rate 128

3: Extraction rate 256

**Description**

-

### H01.45 Phase U duty cycle obtained upon voltage injection

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

**Value Range:**

0 to 65535

**Description**

-

### H01.47 MCU current reference processing time

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

**Value Range:**

0.00us–60.00us

**Description**

-

### H01.48 AD sampling delay

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

**Value Range:**

0.00us–20.00us

**Description**

-

### H01.49 Serial encoder data dissemination delay

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

**Value Range:**

0.00us–500.00us

**Description**

-

### H01.50 Interval version of DSP software

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

**Value Range:**

0.00 to 655.35

**Description**

-

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

| | | | |
|---|---|---|---|
| Hexadecimal: | 2001-35h | Effective Time: | - |

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

**Value Range:**

0 to 65535

**Description**

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

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

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

**Value Range:**

0.00 to 655.35

**Description**

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

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

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

**Value Range:**

0 to 65535

**Description**

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

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

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

**Value Range:**

0.00 to 655.35

**Description**

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

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

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

**Value Range:**

0.0% to 1000.0%

**Description**

-

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

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

**Value Range:**

0.0% to 1000.0%

**Description**

-

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

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

**Value Range:**

0.0% to 300.0%

**Description**

-

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

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

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

**Value Range:**

0.0% to 300.0%

**Description**

-

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

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

**Value Range:**

0.0% to 300.0%

**Description**

-

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

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

**Value Range:**

0.0% to 300.0%

**Description**

-

**H01.62 Phase U/V 7860 detection protection threshold**

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

**Value Range:**

0 to 320

**Description**

-

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

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

**Value Range:**

0.00 to 10.00

**Description**

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

## 3.3 H02 Basic Control Parameters

**H02.00 Control mode**

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

**Value Range:**

0: Speed control mode

1: Position control mode

2: Torque control mode

3: Torque<->Speed control mode

4: Speed<->Position control mode

5: Torque<->Position control mode

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

**Description**

Defines the control mode of the servo drive.

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

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

**H02.01** **Absolute position detection system**

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

**Value Range:**

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

**Description**

Used to set the absolute position function.

### H02.02 Forward direction

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

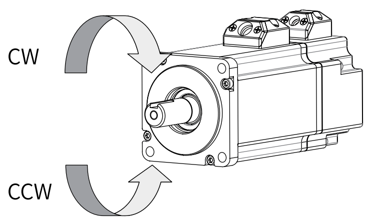
**Value Range:**

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

**Description**

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

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




### H02.03 Output pulse phase

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

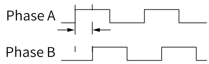
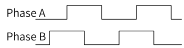
**Value Range:**

0: Phase A leads phase B

1: Phase A lags behind phase B

**Description**

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

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

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

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

**Value Range:**

0: Coast to stop, keeping de-energized state

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

2: Stop at zero speed, keeping dynamic braking state

3: Dynamic braking stop, keeping dynamic braking state

**Description**

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

**H02.06** **Stop mode at No.2 fault**

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

**Value Range:**

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

**Description**

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

**H02.07** **Stop mode at overtravel**

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

**Value Range:**

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

**Description**

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

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

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

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

**Value Range:**

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

**Description**

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

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

### H02.09 Delay from brake output ON to command received

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

**Value Range:**

0 ms to 500 ms

**Description**

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

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

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

**Value Range:**

1 ms to 1000 ms

**Description**

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

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

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

**Value Range:**

0rpm–3000rpm

**Description**

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

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

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

**Value Range:**

1 ms to 1000 ms

**Description**

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

### H02.14 Stop mode and state switching speed condition

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

**Value Range:**

10rpm–100rpm

**Description**

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

### H02.15 Warning display on the keypad

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

**Value Range:**

0: Output warning information immediately

1: Not output warning information

**Description**

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

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

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

**Value Range:**

0: Disabled

1: Enabled

**Description**

-

### H02.18 S-ON filter time constant

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

**Value Range:**

0 ms to 64 ms

**Description**

-

### H02.19 S-ON brake open delay

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

**Value Range:**

0 ms to 1000 ms

**Description**

-

### H02.20 Dynamic brake relay coil ON delay

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

**Value Range:**

10 ms to 30000 ms

**Description**

-

**H02.21** **Min. permissible resistance of regenerative resistor**

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

**Value Range:**

0 Ω to 65535 Ω

**Description**

-

**H02.22** **Power of built-in regenerative resistor**

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

**Value Range:**

0 W–65535 W

**Description**

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

**H02.23** **Resistance of built-in regenerative resistor**

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

**Value Range:**

0 Ω to 65535 Ω

**Description**

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

Table 3–1 Specifications of the regenerative resistor

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

**H02.24** **Resistor heat dissipation coefficient**

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

**Value Range:**

10 to 100

**Description**

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

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

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

Recommendations:

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

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

### H02.25 Regenerative resistor type

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

**Value Range:**

0: Built-in

1: External, natural ventilated

2: External, forced air cooling

3: Not needed

**Description**

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

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

### H02.26 Power capacity of external regenerative resistor

| | | | |
|---|---|---|---|
| Hexadecimal: | 2002-1Bh | Effective Time: | Real time |

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

**Value Range:**

1 W–65535 W

**Description**

Defines the power of external regenerative resistor.

## H02.27 Resistance of external regenerative resistor

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

**Value Range:**

1 Ω to 1000 Ω

**Description**

Defines the resistance of the external regenerative resistor.

## H02.28 220 V min. bus voltage

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

**Value Range:**

190 V to 260 V

**Description**

-

## H02.30 User password

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

**Value Range:**

0 to 65535

**Description**

-

### H02.31 System parameter initialization

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

**Value Range:**

0: No operation

1: Restore default settings

2: Clear fault records

**Description**

Used to restore default values or clear fault records.

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

### H02.32 Default keypad display

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

**Value Range:**

0–99

**Description**

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

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

### H02.34 CAN software version

| | | | |
|---|---|---|---|
| Hexadecimal: | 2002-23h | Effective Time: | - |

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

**Value Range:**

0.00 to 655.35

**Description**

-

### H02.35 Keypad display refresh frequency

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

**Value Range:**

0 Hz to 29 Hz

**Description**

-

### H02.41 Manufacturer password

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

**Value Range:**

0 to 65535

**Description**

-

## 3.4 H03 Terminal Input Parameters

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

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

**Value Range:**

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

**Description**

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

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

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

**Value Range:**

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

**Description**

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

**H03.02** **DI1 function selection**

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

**Value Range:**

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

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

**Description**

Defines the function of DI1.

**H03.03** **DI1 logic selection**

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

**Value Range:**

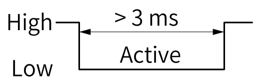
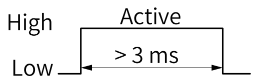
0: Active low

1: Active high

**Description**

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

Table 3–2 Signal logic of low-speed DI terminals

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

**H03.04** **DI2 function selection**

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

**Value Range:**

See H03.02.

**Description**

-

**H03.05** **DI2 logic selection**

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

**Value Range:**

0: Active low

1: Active high

**Description**

-

### H03.06 DI3 function selection

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

**Value Range:**

See H03.02.

**Description**

-

### H03.07 DI3 logic selection

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

**Value Range:**

0: Active low

1: Active high

**Description**

-

### H03.08 DI4 function selection

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

**Value Range:**

See H03.02.

**Description**

-

### H03.09 DI4 logic selection

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

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

**Value Range:**

0: Active low

1: Active high

**Description**

-

## H03.10 DI5 function selection

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

**Value Range:**

See H03.02.

**Description**

-

## H03.11 DI5 logic selection

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

**Value Range:**

0: Active low

1: Active high

**Description**

-

## H03.16 DI8 function selection

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

**Value Range:**

See H03.02.

**Description**

-

### H03.17 DI8 logic selection

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

**Value Range:**

0: Active low

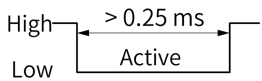
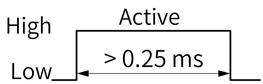
1: Active high

**Description**

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

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

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

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

### H03.18 DI9 function selection

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

**Value Range:**

See H03.02.

**Description**

-

### H03.19 DI9 logic selection

| | | | |
|---|---|---|---|
| Hexadecimal: | 2003-14h | Effective Time: | At stop |

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

**Value Range:**

0: Active low

1: Active high

**Description**

-

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

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

**Value Range:**

0: 0x0: Corresponding to null

1: 0x1: Corresponding to FunIN.33

2: 0x2: Corresponding to FunIN.34

4: 0x4: Corresponding to FunIN.35

8: 0x8: Corresponding to FunIN.36

16: 0x10: Corresponding to FunIN.37

32: 0x20: Corresponding to FunIN.38

64: 0x40: Corresponding to FunIN.39

128: 0x80: Corresponding to FunIN.40

256: 0x100: Corresponding to FunIN.41

512: 0x200: Corresponding to FunIN.42

1024: 0x400: Corresponding to FunIN.43

2048: 0x800: Corresponding to FunIN.44

4096: 0x1000: Corresponding to FunIN.45

8192: 0x2000: Corresponding to FunIN.46

16384: 0x4000: Corresponding to FunIN.47

**Description**

-

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

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

**Value Range:**

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

**Description**

-

**H03.60** **DI1 filter**

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

**Value Range:**

0.00 ms to 500.00 ms

**Description**

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

**H03.61** **DI2 filter**

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

**Value Range:**

0.00 ms to 500.00 ms

**Description**

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

**H03.62 DI3 filter**

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

**Value Range:**

0.00 ms to 500.00 ms

**Description**

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

**H03.63 DI4 filter**

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

**Value Range:**

0.00 ms to 500.00 ms

**Description**

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

**H03.64 DI5 filter**

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

**Value Range:**

0.00 ms to 500.00 ms

**Description**

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

**H03.65** **DI8 filter 1**

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

**Value Range:**

0.00 ms to 500.00 ms

**Description**

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

**H03.66** **DI9 filter 1**

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

**Value Range:**

0.00 ms to 500.00 ms

**Description**

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

## 3.5 H04 Terminal Output Parameters

**H04.00** **DO1 function selection**

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

**Value Range:**

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

**Description**

Defines the function of DO1.

**H04.01** **DO1 logic level**

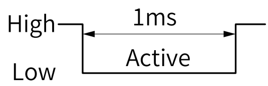
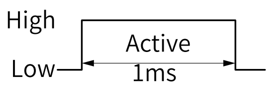
| | | | |
|---|---|---|---|
| Hexadecimal: | 2004-02h | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

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

**Description**

Defines the level logic of DO1 when the function assigned to DO1 is active.
DO1 to DO5 are normal DOs, requiring the minimum output signal width to be 1 ms. The host controller must be able to receive valid DO logic changes.

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

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

### H04.02 DO2 function selection

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

**Value Range:**

See H04.00.

**Description**

-

### H04.03 DO2 logic level

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

**Value Range:**

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

**Description**

-

### H04.04 DO3 function selection

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

**Value Range:**

See H04.00.

**Description**

-

### H04.05 DO3 logic level

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

**Value Range:**

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

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

**Description**

-

### H04.06 DO4 function selection

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

**Value Range:**

See H04.00.

**Description**

-

### H04.07 DO4 logic level

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

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

**Value Range:**

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

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

**Description**

-

### H04.08 DO5 function selection

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

**Value Range:**

See H04.00.

**Description**

-

### H04.09 DO5 logic level

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

**Value Range:**

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

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

**Description**

-

### H04.22 DO source selection

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

**Value Range:**

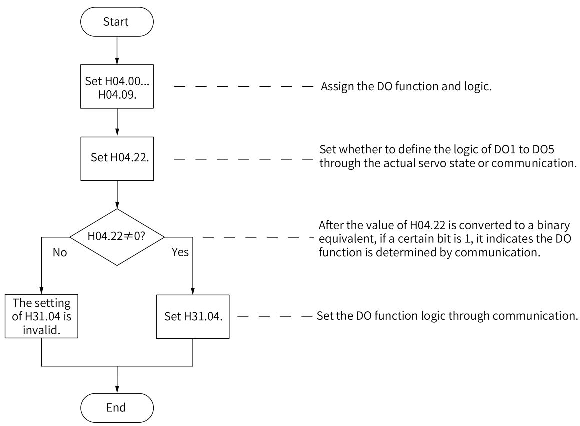
0–31

**Description**

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

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

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




## 3.6 H05 Position Control Parameters

### H05.00 Main position reference source

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

| | | | |
|---|---|---|---|
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Pulse reference

1: Step reference

2: Multi-position reference

**Description**

Defines the position reference source in position control mode.

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

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

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

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

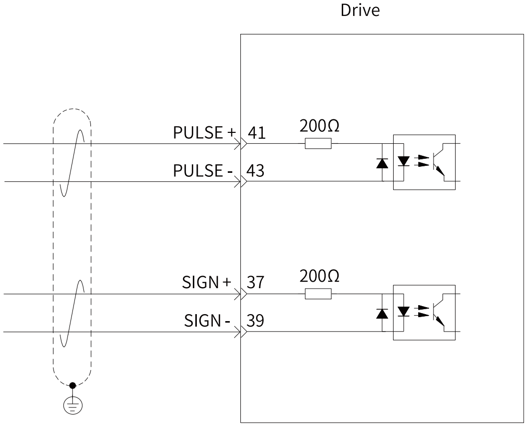
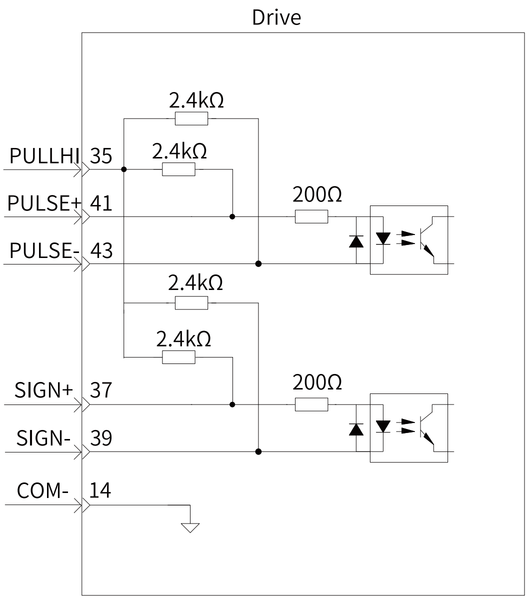
**Value Range:**

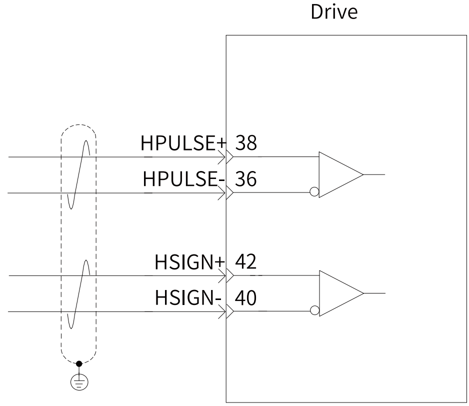
0: Low speed

1: High speed

**Description**

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

<table>
<tr><th>Setpoint</th><th>Input Terminal</th><th>Instruction receiving method</th></tr>
<tr><td rowspan="2">0</td><td rowspan="2">Low-speed</td><td>Differential input terminals: PULSE+, PULSE-, SIGN+, SIGN-<br><br><br>Max. pulse frequency: 500 kpps</td></tr>
<tr><td>Open-collector input terminals: PULLHI, PULSE+, PULSE-, SIGN+, SIGN-<br><br><br>Max. pulse frequency: 200 kbps</td></tr>
</table>

| Setpoint | Input Terminal | Instruction receiving method |
|---|---|---|
| 1 | High speed | Differential input terminals: HPULSE+, HPULSE-, HSIGN+, HSIGN-<br><br><br>Max. pulse frequency: $ Mbps. |

**H05.02** **Pulses per revolution**

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

**Value Range:**

0P/Rev–1048576P/Rev

**Description**

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

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

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

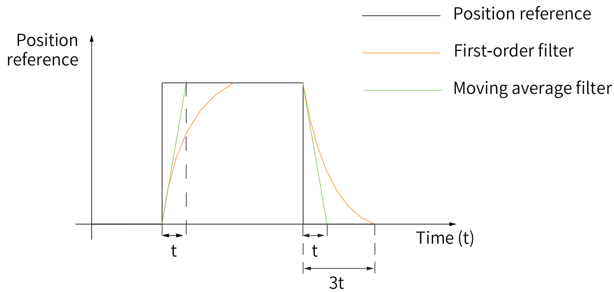
**Value Range:**

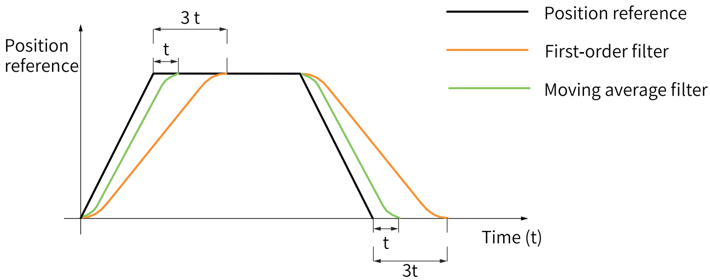
0.0 ms to 6553.5 ms

**Description**

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

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




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

**H05.05** **Step reference**

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

**Value Range:**

-9999 to +9999

**Description**

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

### H05.06 Moving average filtering time constant

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

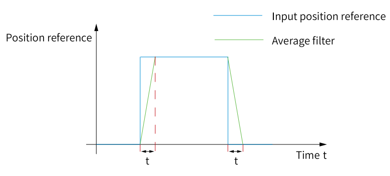
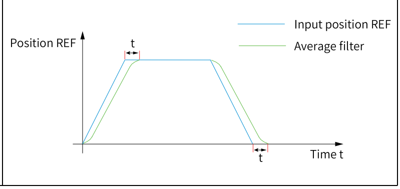
**Value Range:**

0.0 ms to 128.0 ms

**Description**

Defines the moving average filter time constant of position references.

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

| Position reference being rectangular wave | Position reference being trapezoidal wave |
|---|---|
|  |  |

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

### H05.07 Electronic gear ratio 1 (numerator)

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

**Value Range:**

1 to 1073741824

**Description**

Defines the numerator of electronic gear ratio 1.

### H05.09 Electronic gear ratio 1 (denominator)

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

| | | | |
|---|---|---|---|
| Default: | 10000 | Change: | Immediately |

**Value Range:**

1 to 1073741824

**Description**

Defines the denominator of electronic gear ratio 1.

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

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

**Value Range:**

1 to 1073741824

**Description**

Defines the numerator of electronic gear ratio 2.

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

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

**Value Range:**

1 to 1073741824

**Description**

Defines the denominator of electronic gear ratio 2.

**H05.15** **Pulse reference form**

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

**Value Range:**

0: Direction + Pulse, positive logic

1: Direction + Pulse, negative logic

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

3: CW + CCW

**Description**

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

Table 3–4 Descriptions of the pulse form

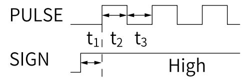
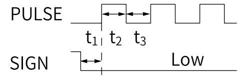
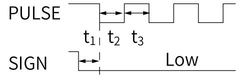
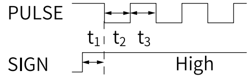
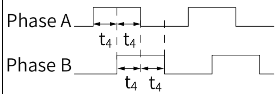
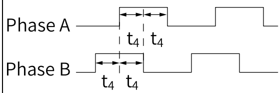
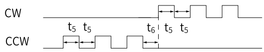
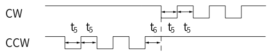
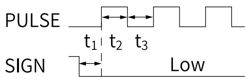
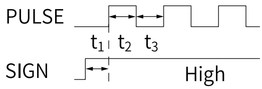
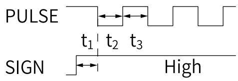
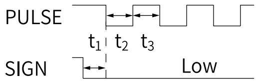
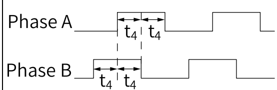
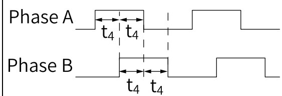
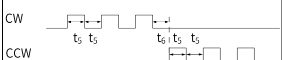
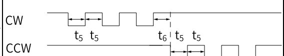
| H02.02 | H05.15 | Pulse form | Signal | Diagram of forward pulses | Diagram of reverse pulses |
|---|---|---|---|---|---|
| 0 | 0 | Pulse + Direction Positive Logic | PULSE<br>SIGN |  |  |
| | 1 | Pulse + Direction Negative Logic | PULSE<br>SIGN |  |  |
| | 2 | Phase A + Phase B Quadrature pulse Quadrupled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

Table 3–5 Specifications of pulse references

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

**H05.16** **Clear action**

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

**Value Range:**

0: Clear position deviation upon S-OFF and fault

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

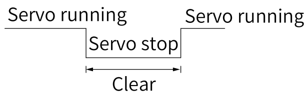
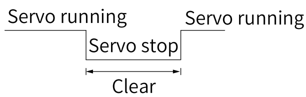
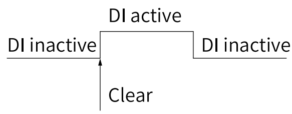
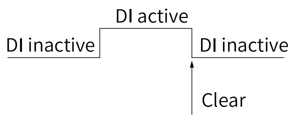
2: Clear position deviation by ClrPosErr signal input from DI

**Description**

Defines the condition for clearing the position deviation.

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

Table 3–6 Position deviation clear

| Setpoint | Clear Condition | Clear Time |
|---|---|---|
| H05.16 = 0 | Clear the position deviation when the S-ON signal is switched off or when a fault occurs. |  |
| H05.16 = 1 | Clear the position deviation when the S-ON signal is switched off or when the servo drive stops upon a fault event. |  |
| H05.16 = 2 | Clear the position deviation cleared when the S-ON signal is switched off or when a fault occurs. Clear the position deviation when ClrPosErr signal is inputted through a DI when the servo drive is in the RUN state. | <br>(Rising edge-triggered)<br><br>(Falling edge-triggered) |

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

## H05.17 Number of encoder frequency-division pulses

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

**Value Range:**

35P/Rev–32767P/Rev

**Description**

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

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

## H05.19 Speed feedforward control

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

**Value Range:**

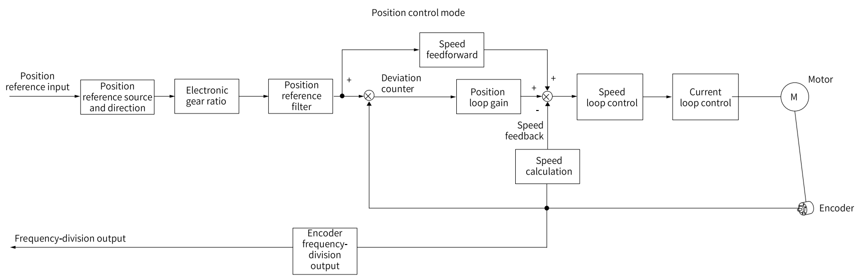
0: No speed feedforward

1: Internal speed feedforward

**Description**

Defines the source of the speed loop feedforward signal.

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




## H05.20 Condition for positioning completed signal output

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

**Value Range:**

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

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

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

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

**Description**

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

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

**H05.21** **Threshold of positioning completed**

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

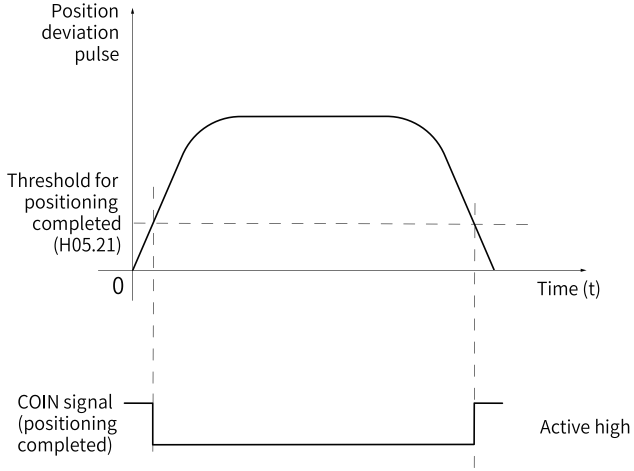
**Value Range:**

1 to 65535

**Description**

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

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




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

**H05.22** **Proximity threshold**

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

**Value Range:**

1 to 65535

**Description**

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

**H05.23** **Interrupt positioning selection**

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

**Value Range:**

0: Disable

1: Enabled

**Description**

| Setpoint | Interrupt Positioning |
|---|---|
| 0 | Prohibit |
| 1 | Working |

**H05.24** **Displacement of interrupt positioning**

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

**Value Range:**

0 to 1073741824

**Description**

Defines the position reference value during interrupt positioning.

**H05.26** **Constant operating speed in interrupt positioning**

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

**Value Range:**

0rpm–6000rpm

**Description**

Defines the maximum speed during interrupt positioning.

Table 3–7 Motor speed during interrupt positioning

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

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

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

**Value Range:**

0 ms to 1000 ms

**Description**

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

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

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

### H05.29 Interrupt positioning cancel signal

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

**Value Range:**

0: Disabled

1: Enabled

**Description**

Defines whether to unlock the interrupt positioning signal.

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

**H05.30** **Homing selection**

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

**Value Range:**

0: Disabled

1: Homing enabled through the HomingStart signal input from DI

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

3: Homing started immediately upon power-on

4: Homing executed immediately

5: Electrical homing started

6: Current position as home

8: D-triggered position as home

**Description**

Defines the homing mode and the trigger signal source.

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

**H05.31** **Homing mode**

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

**Value Range:**

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

**Description**

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

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

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

**Value Range:**

0rpm–3000rpm

**Description**

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

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

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

**Value Range:**

0rpm–1000rpm

**Description**

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

**H05.34** **Acceleration/Deceleration time during homing**

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

**Value Range:**

0 ms to 1000 ms

**Description**

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

**H05.35** **Home search time limit**

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

**Value Range:**

0 ms to 65535 ms

**Description**

Defines the maximum homing time.

**H05.36** **Mechanical home offset**

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

**Value Range:**

-1073741824 to 1073741824

**Description**

Defines the absolute position of the motor after homing.

## H05.38 Servo pulse output source

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

**Value Range:**

0: Encoder frequency division output

1: Pulse reference synchronous output

2: Frequency division or synchronous output inhibited

**Description**

Defines the output source of the pulse output terminal.

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

The pulse output terminals are as follows:

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

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

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

**H05.39** **Electronic gear ratio switchover condition**

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

**Value Range:**

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

1: Switched in real time

**Description**

Defines the condition for switching the electronic gear ratio.

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

**H05.40** **Mechanical home offset and action upon overtravel**

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

**Value Range:**

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

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

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

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

**Description**

Defines the offset relationship between the mechanical home and mechanical zero point, and the action upon overtravel during homing.
Note: The following logic takes effect when H11.00 is not 5.

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

After homing (including homing and electrical homing), the absolute motor position (H0b.07) is consistent with H05.36.
Homing completed signal (FunOUT.16: HomeAttain) or electrical homing completed signal (FunOUT.17: ElecHomeAttain) will be output only after H0b.07 = H05.36. Regardless of S-ON signal state.

**H05.41 Z pulse output polarity**

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

Default: 1 Change: At stop

**Value Range:**

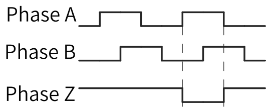
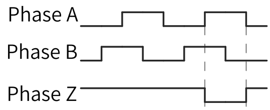
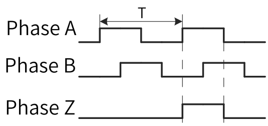
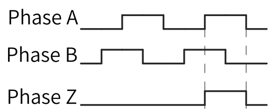
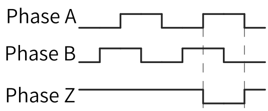
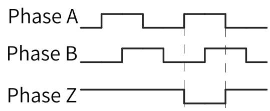
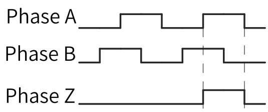
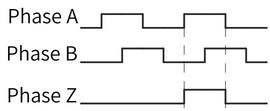
0: Negative (Z pulse active low)

1: Positive (Z pulse active high)

**Description**

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

Table 3–8 Pulse diagrams of encoder frequency-division output (H05.38 = 0)

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

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

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

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

### H05.43 Position pulse edge

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

**Value Range:**

0: Falling edge-triggered

1: Rising edge-triggered

**Description**

-

### H05.44 Encoder multi-turn data offset

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

**Value Range:**

0 to 65535

**Description**

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

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

**Value Range:**

-2147483648 to 2147483647

**Description**

-

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

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

**Value Range:**

-2147483648 to 2147483647

**Description**

-

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

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

**Value Range:**

1 to 65535

**Description**

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

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

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

**Value Range:**

1 to 65535

**Description**

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

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

| | | | |
|---|---|---|---|
| Hexadecimal: | 2005-35h | Effective Time: | Real time |
| Min.: | 0 | Unit: | Encoder unit |
| Max.: | 2147483647 | Data Type: | UInt32 |

| | | | |
|---|---|---|---|
| Default: | 0 | Change: | At stop |

**Value Range:**

0 to 2147483647

**Description**

Defines the number of pulses per revolution of the rotary load in the absolute position rotation mode.

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

| | | | |
|---|---|---|---|
| Hexadecimal: | 2005-37h | Effective Time: | Real time |
| Min.: | 0 | Unit: | Encoder unit |
| Max.: | 127 | Data Type: | UInt32 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0 to 127

**Description**

Defines the number of pulses per revolution of the rotary load in the absolute position rotation mode.

**H05.56 Speed threshold in homing upon hit-and-stop**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2005-39h | Effective Time: | Real time |
| Min.: | 0 | Unit: | rpm |
| Max.: | 1000 | Data Type: | UInt16 |
| Default: | 2 | Change: | Immediately |

**Value Range:**

0rpm–1000rpm

**Description**

-

**H05.57 Mechanical limit times threshold**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2005-3Ah | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 20 | Change: | Immediately |

**Value Range:**

0 to 65535

**Description**

-

## H05.58 Torque threshold in homing upon hit-and-stop

| | | | |
|---|---|---|---|
| Hexadecimal: | 2005-3Bh | Effective Time: | Real time |
| Min.: | 0.0 | Unit: | % |
| Max.: | 300.0 | Data Type: | UInt16 |
| Default: | 100.0 | Change: | Immediately |

**Value Range:**

0.0% to 300.0%

**Description**

Defines the maximum positive/negative torque limit in homing upon hit-and-stop.

## H05.59 Positioning window time

| | | | |
|---|---|---|---|
| Hexadecimal: | 2005-3Ch | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms |
| Max.: | 30000 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0 ms to 30000 ms

**Description**

If the positioning deviation is less than the time threshold of positioning completed, the positioning completed signal is active only if the set time threshold is exceeded.

## H05.60 Hold time of positioning completed

| | | | |
|---|---|---|---|
| Hexadecimal: | 2005-3Dh | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms |
| Max.: | 30000 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0 ms to 30000 ms

**Description**

Defines the hold time of an active positioning completed signal.

## H05.61 Encoder frequency-division pulse output (32-bit)

| | | | |
|---|---|---|---|
| Hexadecimal: | 2005-3Eh | Effective Time: | Upon the next power-on |
| Min.: | 0 | Unit: | PPR |
| Max.: | 262143 | Data Type: | UInt32 |

| | | | |
|---|---|---|---|
| Default: | 0 | Change: | At stop |

**Value Range:**

0P/Rev–262143P/Rev

**Description**

When the capacity of H05.17 is insufficient, defines the number of pulses output by PAO or PBO per revolution.

Pulse output resolution per revolution = (H05.61) x 4

### H05.63 Real time update of position reference source

| | | | |
|---|---|---|---|
| Hexadecimal: | 2005-40h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0 to 1

**Description**

-

### H05.66 Homing time unit

| | | | |
|---|---|---|---|
| Hexadecimal: | 2005-43h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 2 | Data Type: | Int32 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: 1 ms

1: 10 ms

2: 100 ms

**Description**

Defines the homing time unit. The actual timeout time is H05.35 x H05.66 ms.

### H05.67 Offset between zero point and single-turn absolute position

| | | | |
|---|---|---|---|
| Hexadecimal: | 2005-44h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 2147483648 | Data Type: | UInt32 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0 to 2147483648

**Description**

-

**H05.69** **Auxiliary homing function**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2005-46h | Effective Time: | Upon the next power-on |
| Min.: | 0 | Unit: | - |
| Max.: | 4 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Disabled

1: Enable single-turn homing

2: Record deviation position

3: Start a new search for the Z signal (homing)

4: Clear the position deviation

**Description**

Single-turn homing mode setting

0: Disabled

1: Enable single-turn homing

2: Record deviation position

3: Start a new search for the Z signal (homing)

4: Clear the position deviation

## 3.7 H06 Speed Control Parameters

**H06.00** **Source of main speed reference A**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2006-01h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 0 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Digital setting (H06.03)

**Description**

Defines the source of main speed reference A.

| Setpoint | Reference source | Instruction receiving method |
|---|---|---|
| 0 | Digital setting | The source of speed reference A is set by H06.03. |

### H06.01 Source of auxiliary speed reference B

| | | | |
|---|---|---|---|
| Hexadecimal: | 2006-02h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 5 | Data Type: | UInt16 |
| Default: | 5 | Change: | At stop |

**Value Range:**

0: Digital setting (H06.03)

5: Multi-speed reference

**Description**

Defines the source of auxiliary speed reference B.

| Setpoint | Reference source | Instruction receiving method |
|---|---|---|
| 0 | Digital setting | The source of speed reference A is set by H06.03. |
| 1 | - | - |
| 2 | - | - |
| 3 | - | - |
| 4 | - | - |
| 5 | Multi-speed reference | The source of auxiliary speed reference B is defined by internal multi-speed references. For details on multi-speed, see parameters in group H12. |

### H06.02 Speed reference source

| | | | |
|---|---|---|---|
| Hexadecimal: | 2006-03h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 4 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Source of main speed reference A

1: Source of auxiliary speed reference B

2: A+B

3: Switched between A and B

4: Communication

**Description**

Defines the source of speed references.

<table>
<tr><th>Setpoint</th><th>Control mode</th><th>Remarks</th></tr>
<tr><td>0</td><td>Source of main speed reference A</td><td>The reference source is defined by H06.00.</td></tr>
<tr><td>1</td><td>Source of auxiliary speed reference B</td><td>The reference source is defined by H06.01.</td></tr>
<tr><td>2</td><td>A+B</td><td>The reference source is the product of A+B (H06.00+H06.01).</td></tr>
<tr><td>3</td><td>Switched between A and B</td><td>The reference source is switched between A and B as defined by FunIN.4 (Cmd_SEL).<br><table>
<tr><th>State of FunIN.4 (Cmd_SEL)</th><th>Reference Source</th></tr>
<tr><td>Inactive</td><td>Source of main speed reference A</td></tr>
<tr><td>Active</td><td>Source of auxiliary speed reference B</td></tr>
</table></td></tr>
<tr><td>4</td><td>Communication</td><td>The speed reference is defined by operating on H31.09 through communication (unit: 0.001 RPM).</td></tr>
</table>

### H06.03 Speed reference set through keypad

| | | | |
|---|---|---|---|
| Hexadecimal: | 2006-04h | Effective Time: | Real time |
| Min.: | -6000 | Unit: | rpm |
| Max.: | 6000 | Data Type: | Int16 |
| Default: | 200 | Change: | Immediately |

**Value Range:**

–6000 rpm to 6000 rpm

**Description**

Defines the speed reference value set through the keypad.

### H06.04 Jog speed setpoint

| | | | |
|---|---|---|---|
| Hexadecimal: | 2006-05h | Effective Time: | Real time |
| Min.: | 0 | Unit: | rpm |
| Max.: | 6000 | Data Type: | UInt16 |
| Default: | 100 | Change: | Immediately |

**Value Range:**

0rpm–6000rpm

**Description**

Defines the DI jog speed reference.

## H06.05 Acceleration ramp time constant of speed reference

| | | | |
|---|---|---|---|
| Hexadecimal: | 2006-06h | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0 ms to 65535 ms

**Description**

Sets acceleration ramp time of speed reference. The acceleration/deceleration time constant of multi-speed references are defined only by parameters in group H12.

H06.05 defines the time for the speed reference to change from 0 rpm to 1000 rpm.

H06.06 defines the time for the speed reference to change from 1000 rpm to 0 rpm.

The formulas for calculating the actual acceleration/deceleration time are as follows:

Actual acceleration time t1= Speed reference ÷ 1000 x Acceleration ramp time of speed reference

Actual deceleration time t2= Speed reference ÷ 1000 x Deceleration ramp time of speed reference

## H06.06 Deceleration ramp time constant of speed reference

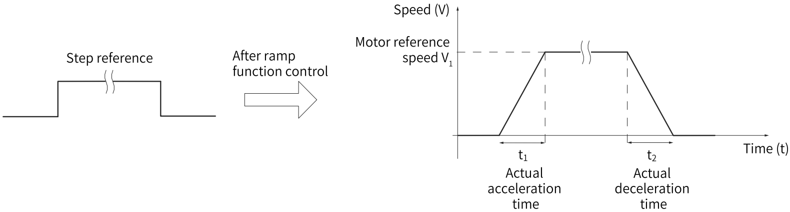
| | | | |
|---|---|---|---|
| Hexadecimal: | 2006-07h | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0 ms to 65535 ms

**Description**

Set the acceleration/deceleration ramp time constant of speed reference. The acceleration/deceleration ramp time constant is determined by parameters in group H12.




H06.05 defines the time for the speed reference to change from 0 rpm to 1000 rpm.
H06.06 defines the time for the speed reference to change from 1000 rpm to 0 rpm.
The formulas for calculating the actual acceleration/deceleration time are as follows:

$$\text{Actual acceleration time } t_1 = \frac{\text{Speed reference}}{1000} \times \text{Speed reference acceleration ramp time}$$

$$\text{Actual deceleration time } t_2 = \frac{\text{Speed reference}}{1000} \times \text{Speed reference deceleration ramp time}$$

## H06.07 Maximum speed limit

| | | | |
|---|---|---|---|
| Hexadecimal: | 2006-08h | Effective Time: | Real time |
| Min.: | 0 | Unit: | rpm |
| Max.: | 6000 | Data Type: | UInt16 |
| Default: | 6000 | Change: | Immediately |

**Value Range:**

0rpm–6000rpm

**Description**

Defines the maximum speed limit.

## H06.08 Forward speed limit

| | | | |
|---|---|---|---|
| Hexadecimal: | 2006-09h | Effective Time: | Real time |
| Min.: | 0 | Unit: | rpm |
| Max.: | 6000 | Data Type: | UInt16 |

| | | | |
|---|---|---|---|
| Default: | 6000 | Change: | Immediately |

**Value Range:**

0rpm–6000rpm

**Description**

Defines the forward speed threshold.

**H06.09** **Reverse speed limit**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2006-0Ah | Effective Time: | Real time |
| Min.: | 0 | Unit: | rpm |
| Max.: | 6000 | Data Type: | UInt16 |
| Default: | 6000 | Change: | Immediately |

**Value Range:**

0rpm–6000rpm

**Description**

Defines the reverse speed threshold.

In the speed control mode, the sources of speed reference limit include:

- H06.07 (Maximum speed limit): Defines the speed reference limit in both directions. The limit value applies when speed references exceed it.
- H06.08 (Forward speed limit): Defines the speed limit in the forward direction. The limit value applies when forward speed references exceed it.
- H06.09 (Reverse speed limit): Defines the speed limit in the reverse direction. The limit value applies when reverse speed references exceed it.
- Maximum speed of the motor (default threshold): Depends on the motor model.

The actual motor speed limit complies with the following range:

- |Forward speed limit| ⩽ min {maximum motor speed, H06.07, H06.08}
- |Reverse speed limit| ⩽ min {maximum motor speed, H06.07, H06.09}

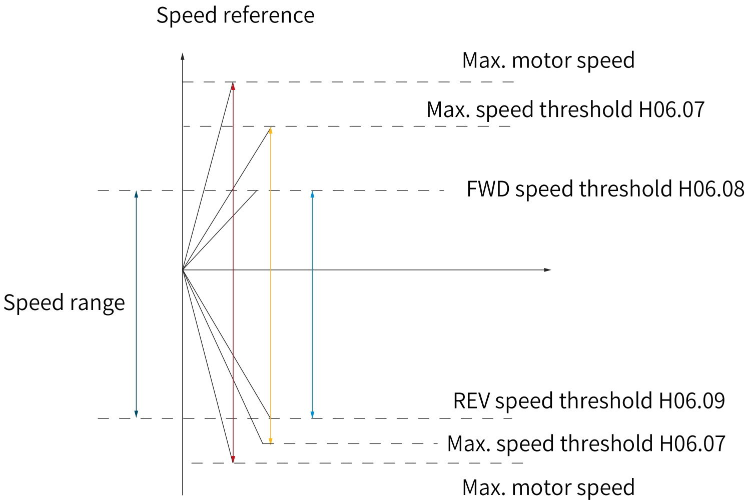



Figure 3-1 Example of speed reference limit

**H06.11** **Torque feedforward control**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2006-0Ch | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 1 | Change: | Immediately |

**Value Range:**

0: No torque feedforward

1: Internal torque feedforward

**Description**

Defines the source for torque feedforward control.

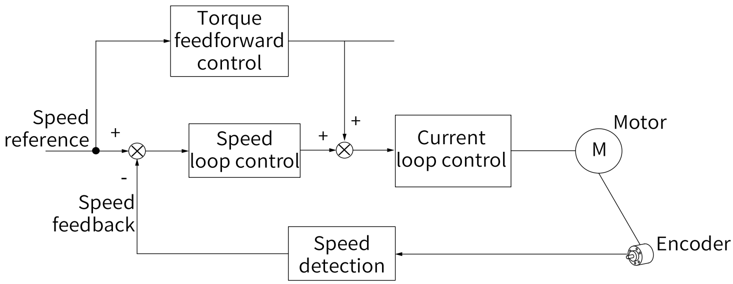
Defines whether to enable internal torque feedforward in the control modes other than torque control.

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

| Setpoint | Torque feedforward control | Remarks |
|---|---|---|
| 0 | / | - |
| 1 | Internal torque feedforward | The speed reference is used as the torque feedforward signal source, which is further divided into the following two situations:<br>• In the position control mode, the speed reference refers to that output from the position controller.<br>• In the speed control mode, the speed reference refers to that set by the user. |

Parameters of the torque feedforward function include H08.20 (Torque feedforward filter time constant) and H08.21 (Torque feedforward gain).

The block diagram for torque feedforward control in control modes other than torque control is as follows:




## H06.13 Speed smoothing time

| | | | |
|---|---|---|---|
| Hexadecimal: | 2006-0Eh | Effective Time: | Real time |
| Min.: | 0 | Unit: | us |
| Max.: | 20000 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0us–20000us

**Description**

Defines the speed feedforward smoothing filter time.

## H06.15 Zero clamp speed threshold

| | | | |
|---|---|---|---|
| Hexadecimal: | 2006-10h | Effective Time: | Real time |
| Min.: | 0 | Unit: | rpm |
| Max.: | 6000 | Data Type: | UInt16 |
| Default: | 10 | Change: | Immediately |

**Value Range:**

0rpm–6000rpm

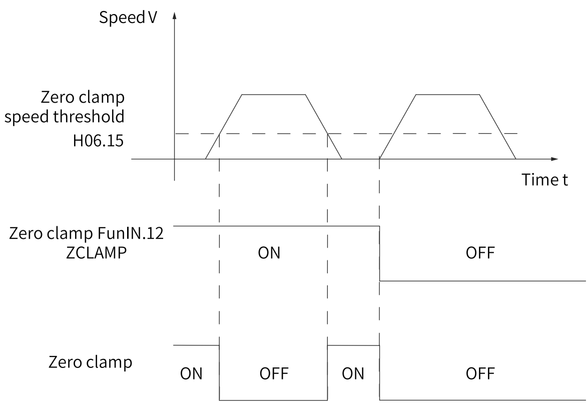
**Description**

Defines the zero clamp speed threshold.

In the speed control mode, if FunIN.12 (ZCLAMP) is enabled, and the speed reference amplitude is smaller than or equal to the value of H06.15, the motor enters zero position clamp state. In this case, a position loop is built inside the drive and the speed reference is invalid.

The motor is clamped within ±1 pulse of the position at which zero clamp is activated. Even if it rotates due to external force, it will return to the zero position and be clamped.

When the speed reference amplitude exceeds the value of H06.15, the motor exits from the zero clamp state and continues running according to the speed reference received. Zero clamp is deactivated when the ZCLAMP (FunIN.12) signal is inactive.




## H06.16 Threshold of TGON (motor rotation) signal

| | | | |
|---|---|---|---|
| Hexadecimal: | 2006-11h | Effective Time: | Real time |

| | | | |
|---|---|---|---|
| Min.: | 0 | Unit: | rpm |
| Max.: | 1000 | Data Type: | UInt16 |
| Default: | 20 | Change: | Immediately |

**Value Range:**

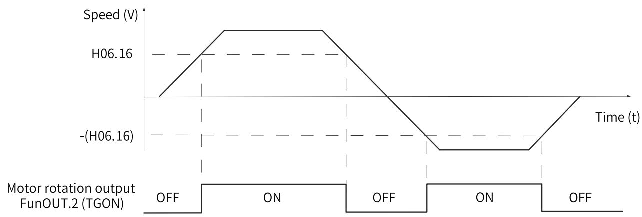
0rpm–1000rpm

**Description**

Sets the threshold of TGON (motor rotation) signal.

When the absolute value of the filtered actual motor speed reaches the value of H06.16 (Threshold of TGON (motor rotation) signal), the motor is acknowledged to be rotating. In this case, the drive outputs the motor rotation signal (FunOUT.2: TGON) to acknowledge that the motor is rotating. When the absolute value of the filtered actual motor speed is lower than the value of H06.16, the motor is not rotating.

Judgment on the motor rotation signal (FunOUT.2, TGON) is not affected by the operating state or control mode of the drive.




Note: In the preceding figure, ON indicates that the motor rotation DO signal is active. OFF indicates that the motor rotation DO signal is inactive.

The filter time constant of the motor speed can be set in H0A.27 (Speed DO filter time constant).

## H06.17 Threshold of V-Cmp (speed matching) signal

| | | | |
|---|---|---|---|
| Hexadecimal: | 2006-12h | Effective Time: | Real time |
| Min.: | 0 | Unit: | rpm |
| Max.: | 100 | Data Type: | UInt16 |
| Default: | 10 | Change: | Immediately |

**Value Range:**

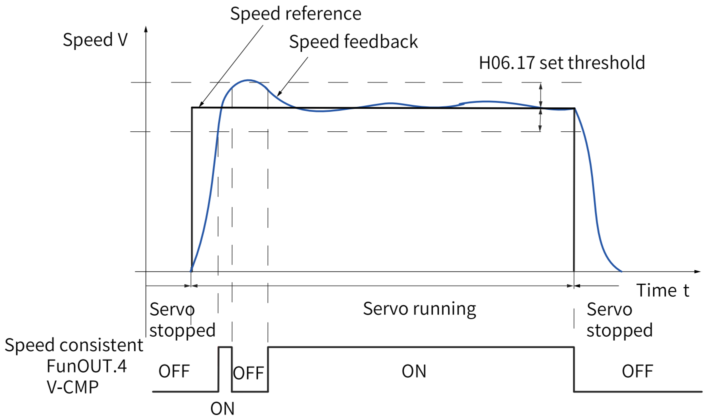
0rpm–100rpm

**Description**

Defines the threshold of speed match signal.

In speed control, when the absolute value of the difference between the motor speed after filter and the speed reference satisfies the setting of H06.17, the actual motor speed is considered to reach the speed reference. At this moment, the servo drive outputs the speed matching signal (FunOUT.4: V-CMP). When the absolute value of the difference between the motor speed after filter and the speed reference exceeds the setting of H06-17, the speed matching signal is inactive.

If the drive is not in the operational state or the speed control mode, the speed matching signal (FunOUT.4: V-Cmp) is always inactive.




In the preceding figure, "ON" indicates the the V-Cmp (speed matching) signal is active. "OFF" indicates the V-Cmp signal is inactive.

The filter time constant of the motor speed can be set in H0A.27 (Speed DO filter time constant).

**H06.18** **Threshold of speed reach signal**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2006-13h | Effective Time: | Real time |
| Min.: | 10 | Unit: | rpm |
| Max.: | 6000 | Data Type: | UInt16 |
| Default: | 1000 | Change: | Immediately |

**Value Range:**

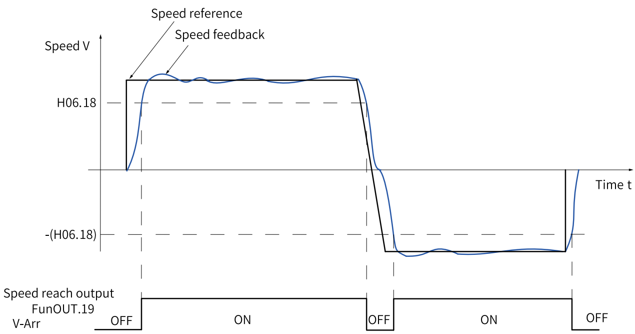
10rpm–6000rpm

**Description**

Defines the threshold of speed reached signal.

When the absolute value of the motor speed after filter exceeds the setting of H06.18 (Threshold of speed arrival signal), the motor speed is considered to reach the desired value. At this moment, the servo drive outputs the speed arrival signal (FunOUT.19: V-Arr). When the absolute value of the motor speed after filter is smaller than or equal to the setting of H06-18, the speed arrival signal is inactive.

Acknowledgment of the speed reach (FunOUT.19: V-Arr) signal is not affected by the operating state or control mode of the drive.




Note: In the preceding figure, "ON" indicates the V-Arr (speed reached) signal is active. "OFF" indicates the V-Arr (speed reached) signal is inactive.

The filter time constant of the motor speed can be set in H0A.27 (Speed DO filter time constant).

## H06.19 Threshold of zero speed output signal

| | | | |
|---|---|---|---|
| Hexadecimal: | 2006-14h | Effective Time: | Real time |
| Min.: | 1 | Unit: | rpm |
| Max.: | 6000 | Data Type: | UInt16 |
| Default: | 10 | Change: | Immediately |

**Value Range:**

1 rpm to 6000 rpm

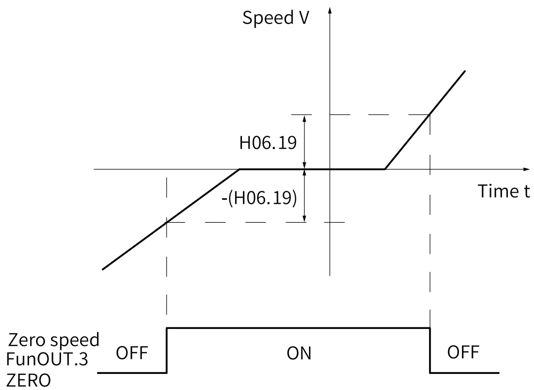
**Description**

Defines the threshold of zero speed output signal.

The servo drive outputs the V-Zero (FunOUT.3: zero speed) signal only when the absolute value of actual motor speed is lower than the threshold defined by H06.19. When the absolute value of the motor speed after filter is equal to or large than to the setting of H06-19, the zero speed signal is inactive.

Acknowledgment of the zero speed (FunOUT.3: V-Zero) signal is not affected by the operating state and control mode of the drive.

The interference in the speed feedback can be filtered by the speed feedback DO filter. You can set the corresponding filter time constant in H0A.27.




Note: In the preceding figure, "ON" indicates the V-Zero (zero speed) signal is active. "OFF" indicates the V-Zero (zero speed) signal is inactive.

The filter time constant of the motor speed can be set in H0A.27 (Speed DO filter time constant).

## H06.28 Cogging torque ripple compensation

| | | | |
|---|---|---|---|
| Hexadecimal: | 2006-1Dh | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 1 | Change: | Immediately |

**Value Range:**

0 to 1

**Description**

Used to enable the cogging torque fluctuation compensation function.

## H06.31 Sine frequency

| | | | |
|---|---|---|---|
| Hexadecimal: | 2006-20h | Effective Time: | Real time |

| | | | |
|---|---|---|---|
| Min.: | 0 | Unit: | - |
| Max.: | 16000 | Data Type: | UInt16 |
| Default: | 50 | Change: | Immediately |

**Value Range:**

0 to 16000

**Description**

-

**H06.32** **Sine amplitude**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2006-21h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 30000 | Data Type: | UInt16 |
| Default: | 30 | Change: | Immediately |

**Value Range:**

0 to 30000

**Description**

-

**H06.33** **Sine amplitude**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2006-22h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 3 | Data Type: | UInt16 |
| Default: | 30 | Change: | Immediately |

**Value Range:**

0: Disabled

1: Position reference sine

2: Speed reference sine

3: Torque reference sine

**Description**

-

**H06.35** **Sine offset**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2006-24h | Effective Time: | Real time |
| Min.: | -9900 | Unit: | - |
| Max.: | 9900 | Data Type: | Int16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

-9900 to 9900

**Description**

-

## 3.8 H07 Torque Control Parameters

### H07.00 Source of main torque reference A

| | | | |
|---|---|---|---|
| Hexadecimal: | 2007-01h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 0 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Keypad (H07.03)

**Description**

Defines the source of the main torque reference A.

| Setpoint | Reference source | Instruction receiving method |
|---|---|---|
| 0 | Keypad (H07.03) | Torque reference A is set by H07.03. |

### H07.01 Source of auxiliary torque reference B

| | | | |
|---|---|---|---|
| Hexadecimal: | 2007-02h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 2 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Keypad (H07.03)

**Description**

Defines the source of auxiliary torque references.

| Setpoint | Reference source | Instruction receiving method |
|---|---|---|
| 0 | Keypad (H07.03) | Torque reference A is set by H07.03. |

### H07.02 Torque reference source

| | | | |
|---|---|---|---|
| Hexadecimal: | 2007-03h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 4 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Source of main torque reference A
1: Source of auxiliary torque reference B
2: Source of A+B
3: Switched between A and B
4: Communication

**Description**

Selects torque reference.

<table>
<tr><th>Setpoint</th><th>Control mode</th><th colspan="2">Remarks</th></tr>
<tr><td>0</td><td>Source of main torque reference A</td><td colspan="2">The reference source is defined by H07.00.</td></tr>
<tr><td>1</td><td>Source of auxiliary torque reference B</td><td colspan="2">The reference source is defined by H07.01.</td></tr>
<tr><td>2</td><td>A+B</td><td colspan="2">The reference source is the product of A+B (H07.00+H07.01).</td></tr>
<tr><td rowspan="4">3</td><td rowspan="4">Switched between A and B</td><td colspan="2">The reference source is switched between A and B as defined by FunIN.4 (Cmd_SEL).</td></tr>
<tr><td>State of FunIN.4 (Cmd_SEL)</td><td>Reference Source</td></tr>
<tr><td>Inactive</td><td>Source of main torque reference A</td></tr>
<tr><td>Active</td><td>Source of auxiliary torque reference B</td></tr>
<tr><td>4</td><td>Communication</td><td colspan="2">The torque reference is defined by operating on H31.11 through communication.</td></tr>
</table>

### H07.03 Torque reference set through keypad

| | | | |
|---|---|---|---|
| Hexadecimal: | 2007-04h | Effective Time: | Real time |
| Min.: | -400.0 | Unit: | % |
| Max.: | 400.0 | Data Type: | Int16 |
| Default: | 0.0 | Change: | Immediately |

**Value Range:**

-400.0% to 400.0%

**Description**

Sets torque reference set through keypad.

### H07.05 Torque reference filter time constant

| | | | |
|---|---|---|---|
| Hexadecimal: | 2007-06h | Effective Time: | Real time |
| Min.: | 0.00 | Unit: | ms |

| | | | |
|---|---|---|---|
| Max.: | 30.00 | Data Type: | UInt16 |
| Default: | 0.50 | Change: | Immediately |

**Value Range:**

0.00 ms to 30.00 ms

**Description**

Defines the torque reference filter time constant 1.

**H07.06** **2nd torque reference filter time constant**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2007-07h | Effective Time: | Real time |
| Min.: | 0.00 | Unit: | ms |
| Max.: | 30.00 | Data Type: | UInt16 |
| Default: | 0.27 | Change: | Immediately |

**Value Range:**

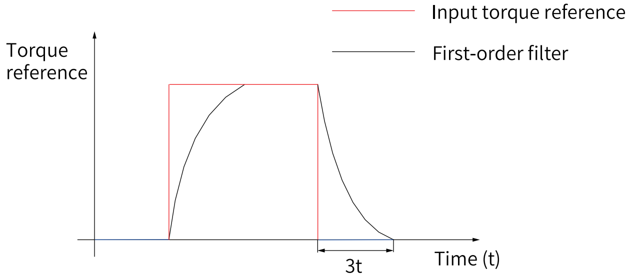
0.00 ms to 30.00 ms

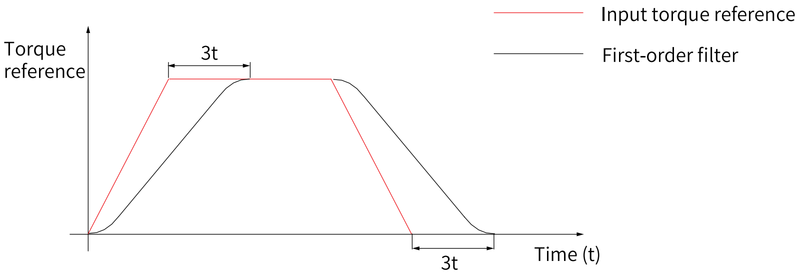
**Description**

Defines the torque reference filter time constant 2.

Low-pass filtering of torque references helps smoothen torque references and reduce vibration.

Pay attention to the responsiveness during setting as an excessively high setpoint lowers down the responsiveness.




***Note***

- The servo drive offers two low-pass filters for torque references, in which the low-pass filter 1 is used by default.
- The gain switchover function can be used In the position or speed control mode. Once certain conditions are satisfied, you can switch to low-pass filter 2.

**H07.07** **Torque limit source**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2007-08h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Forward/Reverse internal torque limit (default)

1: Forward/Reverse external torque limit (selected through P-CL and N-CL)

**Description**

Sets the torque limit source.

| Setpoint | Torque limit source |
|---|---|
| 0 | Positive/Negative internal torque limit |
| 1 | Forward/Reverse external torque limit (selected through P-CL and N-CL) |

### H07.09 Positive internal torque limit

| | | | |
|---|---|---|---|
| Hexadecimal: | 2007-0Ah | Effective Time: | Real time |
| Min.: | 0.0 | Unit: | % |
| Max.: | 400.0 | Data Type: | UInt16 |
| Default: | 350.0 | Change: | Immediately |

**Value Range:**

0.0% to 400.0%

**Description**

Sets the forward run internal torque limit.

### H07.10 Negative internal torque limit

| | | | |
|---|---|---|---|
| Hexadecimal: | 2007-0Bh | Effective Time: | Real time |
| Min.: | 0.0 | Unit: | % |
| Max.: | 400.0 | Data Type: | UInt16 |
| Default: | 350.0 | Change: | Immediately |

**Value Range:**

0.0% to 400.0%

**Description**

Sets the reverse run internal torque limit.

### H07.11 Positive external torque limit

| | | | |
|---|---|---|---|
| Hexadecimal: | 2007-0Ch | Effective Time: | Real time |
| Min.: | 0.0 | Unit: | % |
| Max.: | 400.0 | Data Type: | UInt16 |
| Default: | 350.0 | Change: | Immediately |

**Value Range:**

0.0% to 400.0%

**Description**

Sets the positive external torque limit.

### H07.12 Negative external torque limit

| | | | |
|---|---|---|---|
| Hexadecimal: | 2007-0Dh | Effective Time: | Real time |
| Min.: | 0.0 | Unit: | % |
| Max.: | 400.0 | Data Type: | UInt16 |
| Default: | 350.0 | Change: | Immediately |

**Value Range:**

0.0% to 400.0%

**Description**

Sets the negative external torque limit.

### H07.15 Emergency-stop torque

| | | | |
|---|---|---|---|
| Hexadecimal: | 2007-10h | Effective Time: | Real time |
| Min.: | 0.0 | Unit: | % |
| Max.: | 300.0 | Data Type: | UInt16 |
| Default: | 100.0 | Change: | At stop |

**Value Range:**

0.0% to 300.0%

**Description**

-

### H07.17 Speed limit source

| | | | |
|---|---|---|---|
| Hexadecimal: | 2007-12h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 2 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0: Internal speed limit (in torque control)

1: 0 (no action)

2: 1st or 2nd speed limit input selected by FunIN.36

**Description**

Sets the speed limit source.

| Setpoint | Reference source | Description |
|---|---|---|
| 0 | Internal speed limit | The speed limit is defined by both H07.19 and H07.20. |
| 1 | - | - |
| 2 | H07.19 or H07.20 used as speed limit as defined by DI | DI (FunIN.36) inactive: H07.19 used as positive/ negative speed limit<br>DI (FunIN.36) active: H07.20 used as positive/ negative speed limit |

**H07.19** **Forward speed limit/1st speed limit in torque control**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2007-14h | Effective Time: | Real time |
| Min.: | 0 | Unit: | rpm |
| Max.: | 6000 | Data Type: | UInt16 |
| Default: | 3000 | Change: | Immediately |

**Value Range:**

0rpm–6000rpm

**Description**

Defines the positive speed limit in torque control.

**H07.20** **Reverse speed limit/2nd speed limit in torque control**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2007-15h | Effective Time: | Real time |
| Min.: | 0 | Unit: | rpm |
| Max.: | 6000 | Data Type: | UInt16 |
| Default: | 3000 | Change: | Immediately |

**Value Range:**

0rpm–6000rpm

**Description**

Defines the negative speed limit in torque control.

**H07.21** **Base value for torque reach**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2007-16h | Effective Time: | Real time |
| Min.: | 0.0 | Unit: | % |
| Max.: | 300.0 | Data Type: | UInt16 |
| Default: | 0.0 | Change: | Immediately |

**Value Range:**

0.0% to 300.0%

**Description**

Defines the torque reference of the base value for torque reach.

**H07.22** **Torque reach valid value**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2007-17h | Effective Time: | Real time |
| Min.: | 0.0 | Unit: | % |
| Max.: | 300.0 | Data Type: | UInt16 |
| Default: | 20.0 | Change: | Immediately |

**Value Range:**

0.0% to 300.0%

**Description**

Defines the torque reference for torque reach DO active.

## H07.23 Torque reach invalid value

| | | | |
|---|---|---|---|
| Hexadecimal: | 2007-18h | Effective Time: | Real time |
| Min.: | 0.0 | Unit: | % |
| Max.: | 300.0 | Data Type: | UInt16 |
| Default: | 10.0 | Change: | Immediately |

**Value Range:**

0.0% to 300.0%

**Description**

Defines the torque reference for torque reach DO inactive.

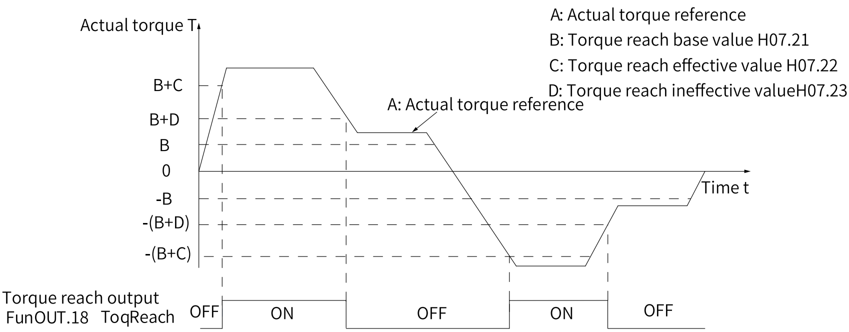
The torque reach output is used to determine whether the actual torque reference reaches the set range. The drive outputs TorReach (FunOUT.18: torque reach) signal to the host controller when the actual torque reference reaches the torque reference threshold.

- Actual torque reference (viewed in H0b.02): A
- Base value for torque reach (H07.21): B.
- Threshold of valid torque arrival (H07.22): C.
- Threshold of invalid torque reach (H07.23): D.

C and D are the offset based on B.

The torque reach DO signal can be activated only when the actual torque reference meets the following condition: |A| ⩾ B + C for 10 ms. Otherwise, the torque reach DO signal remains inactive.

For the torque reach DO signal to become inacive, the actual torque reference must meet the following condition: |A| < B + D. Otherwise, the torque reach signal remains active.



### H07.24 Field weakening depth

| | | | |
|---|---|---|---|
| Hexadecimal: | 2007-19h | Effective Time: | Real time |
| Min.: | 60 | Unit: | % |
| Max.: | 120 | Data Type: | UInt16 |
| Default: | 115 | Change: | Immediately |

**Value Range:**

60% to 120%

**Description**

Set the flux eakening depth.

### H07.25 Max. permissible demagnetizing current

| | | | |
|---|---|---|---|
| Hexadecimal: | 2007-1Ah | Effective Time: | Real time |
| Min.: | 0 | Unit: | % |
| Max.: | 200 | Data Type: | UInt16 |
| Default: | 100 | Change: | Immediately |

**Value Range:**

0% to 200%

**Description**

Set the maximum allowable demagnetization current value.

### H07.26 Field weakening selection

| | | | |
|---|---|---|---|
| Hexadecimal: | 2007-1Bh | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 1 | Change: | Immediately |

**Value Range:**

0 to 1

**Description**

Disable or enable field weakening.

### H07.27 Flux weakening gain

| | | | |
|---|---|---|---|
| Hexadecimal: | 2007-1Ch | Effective Time: | Real time |
| Min.: | 1 | Unit: | Hz |
| Max.: | 1000 | Data Type: | UInt16 |
| Default: | 30 | Change: | Immediately |

**Value Range:**

1 Hz to 1000 Hz

**Description**

Set the gain of flux weakening.

## H07.40 Speed limit window in the torque control mode

| | | | |
|---|---|---|---|
| Hexadecimal: | 2007-29h | Effective Time: | Real time |
| Min.: | 0.5 | Unit: | ms |
| Max.: | 30.0 | Data Type: | UInt16 |
| Default: | 1.0 | Change: | Immediately |

**Value Range:**

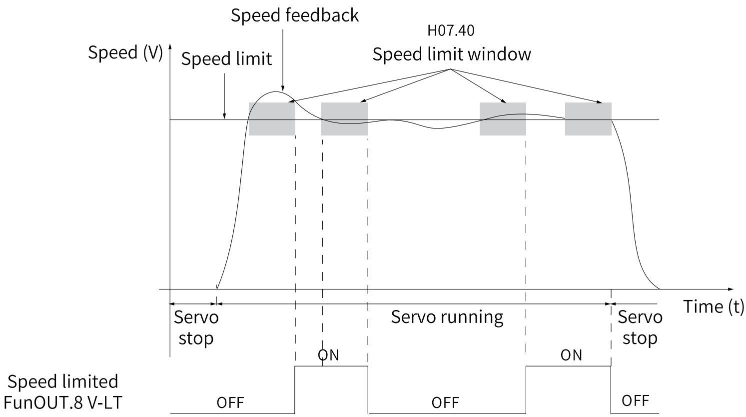
0.5 ms to 30.0 ms

**Description**

Sets speed limit window in the torque control mode.

In the torque control mode, the servo drive outputs the V- LT (FunOUT.8: speed limit) signal to the host controller when the absolute value of the motor speed keeps exceeding the speed limit in the period defined by H07.40. If either of the preceding two conditions is not satisfied, the speed limit signal will be deactivated.

Acknowledgment of the V-LT (Speed limit) signal is executed only during operation in the torque control mode.




### *Note*

In the preceding figure, ON indicates that the speed limit DO signal is valid. OFF indicates that the speed limit DO signal is invalid.

## 3.9 H08 Gain Parameters

**H08.00** **Speed loop gain**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-01h | Effective Time: | Real time |
| Min.: | 0.1 | Unit: | Hz |
| Max.: | 2000.0 | Data Type: | UInt16 |
| Default: | 40.0 | Change: | Immediately |

**Value Range:**

0.1 Hz to 2000.0 Hz

**Description**

Defines the responsiveness of the speed loop. The higher the setpoint, the faster the speed loop response is. Note that an excessively high setpoint may cause vibration.

In the position control mode, the position loop gain must be increased together with the speed loop gain.

**H08.01** **Speed loop integral time constant**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-02h | Effective Time: | Real time |
| Min.: | 0.15 | Unit: | ms |
| Max.: | 512.00 | Data Type: | UInt16 |
| Default: | 19.89 | Change: | Immediately |

**Value Range:**

0.15 ms to 512.00 ms

**Description**

Defines the integral time constant of the speed loop.

The lower the setpoint, the better the integral action, and the quicker will the deviation value be close to 0.

Note:

There is no integral action when H08.01 is set to 512.00.

**H08.02** **Position loop gain**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-03h | Effective Time: | Real time |
| Min.: | 0.0 | Unit: | Hz |
| Max.: | 2000.0 | Data Type: | UInt16 |
| Default: | 64.0 | Change: | Immediately |

**Value Range:**

0.0 Hz to 2000.0 Hz

**Description**

Defines the proportional gain of the position loop.

Defines the responsiveness of the position loop. A high setpoint shortens the positioning time. Note that an excessively high setpoint may cause vibration. The 1st group of gain parameters include H08.00 (Speed loop gain), H08.01 (Speed loop integral time constant), H08.02, and H07.05 (Filter time constant of torque reference).

**H08.03** **2nd speed loop gain**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-04h | Effective Time: | Real time |
| Min.: | 0.1 | Unit: | Hz |
| Max.: | 2000.0 | Data Type: | UInt16 |
| Default: | 75.0 | Change: | Immediately |

**Value Range:**

0.1 Hz to 2000.0 Hz

**Description**

-

**H08.04** **2nd speed loop integral time constant**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-05h | Effective Time: | Real time |
| Min.: | 0.15 | Unit: | ms |
| Max.: | 512.00 | Data Type: | UInt16 |
| Default: | 10.61 | Change: | Immediately |

**Value Range:**

0.15 ms to 512.00 ms

**Description**

-

**H08.05** **2nd position loop gain**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-06h | Effective Time: | Real time |
| Min.: | 0.0 | Unit: | Hz |
| Max.: | 2000.0 | Data Type: | UInt16 |
| Default: | 120.0 | Change: | Immediately |

**Value Range:**

0.0 Hz to 2000.0 Hz

**Description**

Defines the second gain set of the position loop and speed loop. The 2nd group of gain parameters include H08.03 (Speed loop gain), H08.04 (Speed loop integral time constant), H08.05, and H07.06 (Torque reference filter time constant 2).

## H08.08 2nd gain mode setting

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-09h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 1 | Change: | Immediately |

**Value Range:**

0: Fixed to the 1st group of gains, P/PI switched through external

DI1:Switched between the 1st and 2nd group of gains as defined by H08.09

**Description**

Defines the mode for switching to the 2nd gain set.

| Setpoint | Mode |
|---|---|
| 0 | Fixed at 1st gain. P/PI of speed control is switched through DI function 3 (FunIN.3: GAIN_SEL, gain switchover).<br>• GAIN_SEL invalid: PI control<br>• GAIN_SEL valid: P control |
| 1 | Switchover between the 1st gain and the 2nd gain, determined by H08.09. The 1st gain includes H08.00 (Speed loop gain), H08-01 (Speed loop integral time constant), H08.02 (Position loop gain), and H07.05 (Filter time constant of torque reference). The 2nd gain includes H08.03 (2nd speed loop gain), H08-04 (2nd speed loop integral time constant), H08.05 (2nd position loop gain), and H07.06 (Filter time constant of 2nd torque reference). |

## H08.09 Gain switchover condition

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-0Ah | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 10 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0: Fixed to the 1st gain set (PS)

1: Switch with external DI (PS)

2: Torque reference too large (PS)

3: Speed reference too large (PS)

4: Speed reference change rate too large (PS)

5: Speed reference low/high speed threshold (PS)

6: Position deviation too large (P)

7: Position reference available (P)

8: Positioning unfinished (P)

9: Actual speed (P)

10: Position reference + Actual speed (P)

**Description**

Used to set the condition for gain switchover.

| Set point | Gain switchover condition | Remarks |
|---|---|---|
| 0 | Fixed to the 1st gain set | The 1st gain set applies. |
| 1 | Switched as defined by bit26 of 60FEh | - |
| 2 | Torque reference too large | If the torque reference absolute value exceeds (Level + Dead time) [%] in the last 1st gain set, the drive switches to the 2nd gain set.<br>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.<br>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<br>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.<br>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.<br>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.<br>If the speed reference absolute value is lower than (Level + Dead time) [rpm] in the last 2nd gain set, the drive starts to return to the 1st gain set, with gains changed gradually. When the speed reference absolute value reaches (Level - Dead time) [rpm], the 1st gain set applies. |
| 6 | Position deviation too large | Active only in position control and full closed-loop control.<br>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.<br>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.<br>If the drive is not in position control or full closed-loop control, the 1st gain set always applies. |
| 7 | Position reference available | Active only in position control and full closed-loop control.<br>If the position reference is not 0 in the last 1st gain set, the drive switches to the 2nd gain set.<br>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.<br>If the drive is not in position control or full closed-loop control, the 1st gain set always applies. |

| Set point | Gain switchover condition | Remarks |
|---|---|---|
| 8 | Positioning uncompleted | Active only in position control and full closed-loop control.<br>If positioning has not been completed in the last 1st gain set, the drive switches to the 2nd gain set.<br>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.<br>If the drive is not in position control or full closed-loop control, the 1st gain set always applies. |
| 9 | Actual speed too high | Active only in position control and full closed-loop control.<br>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.<br>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.<br>If the drive is not in position control or full closed-loop control, the 1st gain set always applies. |
| 10 | Position reference + Actual speed | Active only in position control and full closed-loop control.<br>If the position reference is not 0 in the last 1st gain set, the drive switches to the 2nd gain set.<br>If the position reference is 0 and such status lasts within the delay defined by H08.10 (Gain switchover delay) in the 2nd gain set, the 2nd gain set applies. When the position reference is 0 and the delay defined by (H08.10) is reached, if the absolute value of actual speed is lower than (Level) [rpm], the speed loop integral time constant is fixed to the setpoint of H08.04 (2nd speed loop integral time constant), and others return to the 1st gain set; if the absolute value of actual speed does not reach (Level - Dead time) [rpm], the speed integral also returns to the setpoint of H08.01 (Speed loop integral time constant).<br>If the drive is not in position control or full closed-loop control, the 1st gain set always applies. |

### H08.10 Gain switchover delay

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-0Bh | Effective Time: | Real time |
| Min.: | 0.0 | Unit: | ms |
| Max.: | 1000.0 | Data Type: | UInt16 |
| Default: | 5.0 | Change: | At stop |

**Value Range:**

0.0 ms to 1000.0 ms

**Description**

Defines the delay when the drive switches from the 2nd gain set to the 1st gain set.

### H08.11 Gain switchover level

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-0Ch | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 20000 | Data Type: | UInt16 |
| Default: | 50 | Change: | Immediately |

**Value Range:**

0 to 20000

**Description**

Defines the gain switchover level.

Gain switchover is affected by both the level and the dead time, as defined by H08.09. The unit of gain switchover level varies with the switchover condition.

### H08.12 Gain switchover dead time

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-0Dh | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 20000 | Data Type: | UInt16 |
| Default: | 30 | Change: | At stop |

**Value Range:**

0 to 20000

**Description**

Defines the dead time for gain switchover.

Gain switchover is affected by both the level and the dead time, as defined by H08.09. The unit of gain switchover hysteresis varies with the switchover condition.

Note:

The set value of H08.11 (Gain switchover level) must be no less than that of H08.12; otherwise, the H08.11 will be set to a value equal to H08.12 automatically.

### H08.13 Position gain switchover time

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-0Eh | Effective Time: | Real time |
| Min.: | 0.0 | Unit: | ms |
| Max.: | 1000.0 | Data Type: | UInt16 |
| Default: | 3.0 | Change: | At stop |

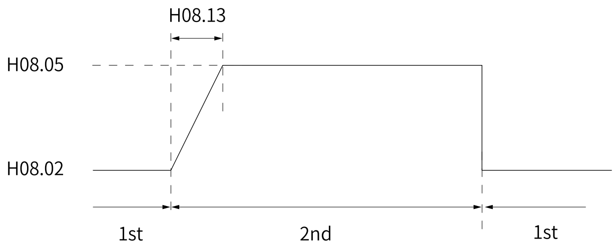
**Value Range:**

0.0 ms to 1000.0 ms

**Description**

In position control, if H08.05 (2nd position loop gain) is much higher than H08.02 (Position loop gain), set the time for switching from H08.02 to H08.05. This parameter can be used to reduce the impact caused by an increase in the position loop gain.

Position gain switching time




If the set value of H08.05 is no more than that of H08.02, H08-13 will be invalid and the servo drive switches to the 2nd gain immediately.

**H08.14** **Auto-tuned inertia value**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-0Fh | Effective Time: | - |
| Min.: | 0.00 | Unit: | - |
| Max.: | 200.00 | Data Type: | UInt16 |
| Default: | 0.00 | Change: | Unchangeable |

**Value Range:**

0.00 to 200.00

**Description**

-

**H08.15** **Load moment of inertia ratio**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-10h | Effective Time: | Real time |
| Min.: | 0.00 | Unit: | - |
| Max.: | 120.00 | Data Type: | UInt16 |
| Default: | 2.00 | Change: | Immediately |

**Value Range:**

0.00 to 120.00

**Description**

Defines the mechanical load inertia ratio relative to the motor moment of inertia.

$$\text{Load moment of inertia ratio} = \frac{\text{Moment of inertia of mechanical load}}{\text{Moment of inertia of the motor}}$$

When H08.15 is set to 0, it indicates the motor carries no load; if it is set to 1.00, it indicates the mechanical load inertia is the same as the motor moment of inertia.

**H08.18** **Speed feedforward filter time constant**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-13h | Effective Time: | Real time |
| Min.: | 0.00 | Unit: | ms |
| Max.: | 64.00 | Data Type: | UInt16 |
| Default: | 0.50 | Change: | Immediately |

**Value Range:**

0.00 ms to 64.00 ms

**Description**

Defines the filter time constant of speed feedforward.

**H08.19** **Speed feedforward gain**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-14h | Effective Time: | Real time |
| Min.: | 0.0 | Unit: | % |
| Max.: | 100.0 | Data Type: | UInt16 |
| Default: | 0.0 | Change: | Immediately |

**Value Range:**

0.0% to 100.0%

**Description**

In position control and full closed-loop control, speed feedforward is the product of speed feedforwad signal multiplied by H08.19 and is part of the speed reference.

Increasing the setpoint improves the responsiveness to position references and reduces the position deviation during operation at a constant speed.

Set H08.18 to a fixed value first, and then increase the value of H08.19 gradually from 0 to a certain value at which speed feedforward achieves the desired effect.

Adjust H08.18 and H08.19 repeatedly until a balanced performance is achieved.

Note:

For how to enable the speed feedforward function and select the speed feedforward signal, see H05.19 (Speed feedforward control).

### H08.20 Torque feedforward filter time constant

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-15h | Effective Time: | Real time |
| Min.: | 0.00 | Unit: | ms |
| Max.: | 64.00 | Data Type: | UInt16 |
| Default: | 0.50 | Change: | Immediately |

**Value Range:**

0.00 ms to 64.00 ms

**Description**

Defines the filter time constant of torque feedforward.

### H08.21 Torque feedforward gain

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-16h | Effective Time: | Real time |
| Min.: | 0.0 | Unit: | % |
| Max.: | 200.0 | Data Type: | UInt16 |
| Default: | 0.0 | Change: | Immediately |

**Value Range:**

0.0% to 200.0%

**Description**

In control modes other than torque control, torque feedforward is the product of torque feedforwad signal multiplied by H08.21 and is part of the torque reference.

Increasing the setpoint improves the responsiveness to variable speed references.

Increasing the setpoint improves the responsiveness to position references and reduces the position deviation during operation at a constant speed.

During parameter adjustment, set H08.20 (Torque feedforward filter time constant) to the default value first, and then increase H08.21 gradually to enhance the effect of torque feedforward. When speed overshoot occurs, keep H08.21 unchanged and increase the value of H08.20. Adjust H08.20 and H08.21 repeatedly until a balanced performance is achieved.

Note:

For how to enable the torque feedforward function and select the torque feedforward signal, see H06.11 (Torque feedforward control).

### H08.22 Speed feedback filtering option

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-17h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 4 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Inhibited
1: 2 times
2: 4 times
3: 8 times
4: 16 times

**Description**

Defines the moving average filtering times for speed feedback.

The higher the setpoint, the weaker the speed feedback fluctuation, but the longer the feedback delay will be.

| Setpoint | Setting of speed feedback filter |
| --- | --- |
| 0 | Moving average filtering of speed feedback inhibited |
| 1 | 2 times of moving average filtering on speed feedback |
| 2 | 4 times of moving average filtering on speed feedback |
| 3 | 8 times of moving average filtering on speed feedback |
| 4 | 16 times of moving average filtering on speed feedback |

### H08.23 Cutoff frequency of speed feedback low-pass filter

| | | | |
| --- | --- | --- | --- |
| Hexadecimal: | 2008-18h | Effective Time: | Real time |
| Min.: | 100 | Unit: | Hz |
| Max.: | 4000 | Data Type: | UInt16 |
| Default: | 4000 | Change: | Immediately |

**Value Range:**

100 Hz to 4000 Hz

**Description**

Defines the cutoff frequency for first-order low-pass filtering on the speed feedback.

Note:

The lower the setpoint, the weaker the speed feedback fluctuation, and the longer the feedback delay will be.

Setting this parameter to 4000 Hz negates the filtering effect.

### H08.24 PDFF control coefficient

| | | | |
| --- | --- | --- | --- |
| Hexadecimal: | 2008-19h | Effective Time: | Real time |
| Min.: | 0.0 | Unit: | % |
| Max.: | 1000.0 | Data Type: | UInt16 |
| Default: | 100.0 | Change: | Immediately |

**Value Range:**

0.0% to 1000.0%

**Description**

Defines the control mode of the speed loop.

When this parameter is set to 100.0, the speed loop adopts PI control (default) with quick dynamic response.

When this parameter is set to 0.0, speed loop integral action is enhanced, which filters out low-frequency interference but also slows down the dynamic response.

H08.24 can be used to keep a good responsiveness of the speed loop, with the anti-interference capacity in low-frequency bands improved and the speed feedback overshoot unaffected.

**H08.27** **Cutoff frequency of speed observer**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-1Ch | Effective Time: | Real time |
| Min.: | 10 | Unit: | Hz |
| Max.: | 2000 | Data Type: | UInt16 |
| Default: | 170 | Change: | Immediately |

**Value Range:**

10 Hz to 2000 Hz

**Description**

Defines the cutoff frequency of the speed observer. Note that an excessively high setpoint may incur resonance. Decrease the setpoint properly in case of large speed feedback noise.

**H08.28** **Speed inertia correction coefficient**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-1Dh | Effective Time: | Real time |
| Min.: | 10 | Unit: | % |
| Max.: | 10000 | Data Type: | UInt16 |
| Default: | 100 | Change: | Immediately |

**Value Range:**

10% to 10000%

**Description**

Defines the speed observer inertia correction coefficient. If H08.15 is set based on the actual inertia, there is no need to adjust this parameter.

**H08.29** **Speed observer filter time**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-1Eh | Effective Time: | Real time |
| Min.: | 0.02 | Unit: | ms |

| | | | |
|---|---|---|---|
| Max.: | 20.00 | Data Type: | UInt16 |
| Default: | 0.80 | Change: | Immediately |

**Value Range:**

0.02 ms to 20.00 ms

**Description**

Defines the speed observer filter time. It is recommended to set this parameter to a value equal to the sum of H07.05 plus 0.2 ms.

### H08.31 Disturbance observer cutoff frequency

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-20h | Effective Time: | Real time |
| Min.: | 1 | Unit: | Hz |
| Max.: | 1700 | Data Type: | UInt16 |
| Default: | 600 | Change: | Immediately |

**Value Range:**

1 Hz to 1700 Hz

**Description**

-

### H08.32 Disturbance observer compensation coefficient

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-21h | Effective Time: | Real time |
| Min.: | 0 | Unit: | % |
| Max.: | 100 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0% to 100%

**Description**

-

### H08.33 Disturbance inertia correction coefficient

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-22h | Effective Time: | Real time |
| Min.: | 1 | Unit: | % |
| Max.: | 10000 | Data Type: | UInt16 |
| Default: | 100 | Change: | Immediately |

**Value Range:**

1% to 10000%

**Description**

-

**H08.34** **Medium- and high-frequency jitter suppression phase modulation 1**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-23h | Effective Time: | Real time |
| Min.: | 0 | Unit: | % |
| Max.: | 1600 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0% to 1600%

**Description**

-

**H08.35** **Medium- and high-frequency jitter suppression frequency 1**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-24h | Effective Time: | Real time |
| Min.: | 0 | Unit: | Hz |
| Max.: | 1000 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0 Hz to 1000 Hz

**Description**

-

**H08.36** **Medium- and high-frequency jitter suppression compensation 1**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-25h | Effective Time: | Real time |
| Min.: | 0 | Unit: | % |
| Max.: | 200 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0% to 200%

**Description**

-

**H08.37** **Phase modulation for medium-frequency jitter suppression 2**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-26h | Effective Time: | Real time |
| Min.: | -90 | Unit: | - |
| Max.: | 90 | Data Type: | Int16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

-90 to 90

**Description**

-

## H08.38 Frequency of medium-frequency jitter suppression 2

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-27h | Effective Time: | Real time |
| Min.: | 0 | Unit: | Hz |
| Max.: | 1000 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0 Hz to 1000 Hz

**Description**

-

## H08.39 Compensation gain of medium-frequency jitter suppression 2

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-28h | Effective Time: | Real time |
| Min.: | 0 | Unit: | % |
| Max.: | 300 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0% to 300%

**Description**

-

## H08.40 Speed observer selection

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-29h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0 to 1

**Description**

Used to set the enable bit for speed observer.

## H08.42 Model control selection

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-2Bh | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |

| | | | |
|---|---|---|---|
| Default: | 0 | Change: | At stop |

**Value Range:**

0 to 1

**Description**

Used to enable model tracking control.

### H08.43 Model gain

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-2Ch | Effective Time: | Real time |
| Min.: | 0.0 | Unit: | - |
| Max.: | 2000.0 | Data Type: | UInt16 |
| Default: | 40.0 | Change: | Immediately |

**Value Range:**

0.0 to 2000.0

**Description**

Defines the single inertia model gain. The higher the gain, the faster the position response. Note that an excessively high setpoint may incur excessive overshoot.

### H08.45 Feedforward position

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-2Eh | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0 to 1

**Description**

-

### H08.46 Model feedforward

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-2Fh | Effective Time: | Real time |
| Min.: | 0.0 | Unit: | - |
| Max.: | 102.4 | Data Type: | UInt16 |
| Default: | 95.0 | Change: | Immediately |

**Value Range:**

0.0 to 102.4

**Description**

-

### H08.51 Model filtering time 2

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-34h | Effective Time: | Real time |
| Min.: | 0.00 | Unit: | ms |
| Max.: | 20.00 | Data Type: | UInt16 |
| Default: | 0.00 | Change: | Immediately |

**Value Range:**

0.00 ms to 20.00 ms

**Description**

-

### H08.53 Medium- and low-frequency jitter suppression frequency 3

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-36h | Effective Time: | Real time |
| Min.: | 0.0 | Unit: | Hz |
| Max.: | 600.0 | Data Type: | UInt16 |
| Default: | 0.0 | Change: | Immediately |

**Value Range:**

0.0 Hz to 600.0 Hz

**Description**

-

### H08.54 Medium- and low-frequency jitter suppression compensation 3

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-37h | Effective Time: | Real time |
| Min.: | 0 | Unit: | % |
| Max.: | 200 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0% to 200%

**Description**

-

### H08.56 Medium- and low-frequency jitter suppression phase modulation 3

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-39h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 1600 | Data Type: | UInt16 |
| Default: | 100 | Change: | Immediately |

**Value Range:**

0 to 1600

**Description**

-

### H08.58 Er.660 (Vibration too strong) switch

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-3Bh | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 2 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0 to 2

**Description**

-

### H08.59 Medium- and low-frequency jitter suppression frequency 4

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-3Ch | Effective Time: | Real time |
| Min.: | 0.0 | Unit: | Hz |
| Max.: | 600.0 | Data Type: | UInt16 |
| Default: | 0.0 | Change: | Immediately |

**Value Range:**

0.0 Hz to 600.0 Hz

**Description**

-

### H08.60 Medium- and low-frequency jitter suppression compensation 4

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-3Dh | Effective Time: | Real time |
| Min.: | 0 | Unit: | % |
| Max.: | 200 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0% to 200%

**Description**

-

### H08.61 Medium- and low-frequency jitter suppression phase modulation 4

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-3Eh | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 1600 | Data Type: | UInt16 |

| | | | |
|---|---|---|---|
| Default: | 100 | Change: | Immediately |

**Value Range:**

0 to 1600

**Description**

-

### H08.62 Position loop integral time constant

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-3Fh | Effective Time: | Real time |
| Min.: | 0.15 | Unit: | ms |
| Max.: | 512.00 | Data Type: | UInt16 |
| Default: | 512.00 | Change: | Immediately |

**Value Range:**

0.15 ms to 512.00 ms

**Description**

Defines the position loop integral time constant.

### H08.63 2nd position loop integral time constant

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-40h | Effective Time: | Real time |
| Min.: | 0.15 | Unit: | ms |
| Max.: | 512.00 | Data Type: | UInt16 |
| Default: | 512.00 | Change: | Immediately |

**Value Range:**

0.15 ms to 512.00 ms

**Description**

-

### H08.64 Speed observer feedback selection

| | | | |
|---|---|---|---|
| Hexadecimal: | 2008-41h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0 to 1

**Description**

-

## 3.10 H09 Gain auto-tuning parameters

**H09.00** **Gain auto-tuning mode**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-01h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 7 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0: Disabled, manual gain tuning required

1: Enabled, gain parameters generated automatically based on the stiffness level

2: Positioning mode, gain parameters generated automatically based on the stiffness level

3: Interpolation mode+Inertia auto-tuning

4: Standard mode+Inertia auto-tuning

6: Quick positioning mode+Inertia auto-tuning

**Description**

Defines different gain tuning modes. Related gain parameters can be set manually or automatically according to the stiffness level.

| Setpoint | Auto | Remarks |
|---|---|---|
| 0 | Disabled<br>Gain parameters set manually | - |
| 1 | Standard stiffness level mode, gain parameters tuned automatically based on the stiffness level. | The 2nd gain does not follow the stiffness table to change automatically. |
| 2 | Positioning mode,<br>gain parameters tuned automatically based on stiffness table | It is one stiffness level higher than the 1st gain but does not exceed the highest stiffness level. |
| 3 | Interpolation mode + Inertia auto-tuning | In this mode, gain and inertia is auto-tuned and vibration is suppressed automatically according to the rigidity level. This mode is applicable to multi-axis interpolation. |
| 4 | Standerd mode + Inertia auto-tuning | The gain and inertia is auto-tuned and vibration is suppressed automatically according to the rigidity level. |
| 6 | Quick positioning mode + Inertia auto-tuning | In this mode, gain and inertia is auto-tuned and vibration is suppressed automatically according to the rigidity level. This mode is applicable to applications requiring quick positioning. |

**H09.01** **Stiffness level**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-02h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 41 | Data Type: | UInt16 |
| Default: | 15 | Change: | Immediately |

**Value Range:**

0 to 41

**Description**

Defines the stiffness level of the servo system. The higher the stiffness level, the stronger the gains and the quicker the response will be. But an excessively high stiffness level will cause vibration.
The setpoint 0 indicates the weakest stiffness and 41 indicates the strongest stiffness.

### H09.02 Adaptive notch mode

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-03h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 4 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0: Adaptive notch no longer updated;

1: One adaptive notch activated (3rd notch)

2: Two adaptive notches activated (3rd and 4th notches)

3: Resonance point tested only (displayed in H09.24)

4: Adaptive notch cleared, values of 3rd and 4th notches restored to default

**Description**

Defines the operation mode of the adaptive notch.

| Setpoint | Defines the operation mode of the adaptive notch. |
|---|---|
| 0 | Parameters not updated |
| 1 | Only one notch (3rd notch) valid, parameters updated in real time |
| 2 | Both notches (3rd and 4th notches) valid, parameters updated in real time |
| 3 | Only detect resonance frequency (displayed in H09.24) |
| 4 | Clear 3rd and 4th notches, restore parameters to default setting |

### H09.03 Online inertia auto-tuning mode

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-04h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 3 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0: Disabled

1: Enabled, changing slowly

2: Enabled, changing normally

3: Enabled, changing quickly

**Description**

Defines whether to enable online inertia auto-tuning and the inertia ratio update speed during online inertia auto-tuning.

| Setpoint | Online inertia auto-tuning mode | Remarks |
|---|---|---|
| 0 | Online auto-tuning disabled | - |
| 1 | Enabled, changing slowly | Applicable to the scenario where the inertia ratio almost does not change. |
| 2 | Enabled, changing normally | Applicable to the scenario where the inertia ratio changes slowly. |
| 3 | Enabled, changing quickly | Applicable to the scenario where the inertia ratio changes quickly. |

## H09.04 Low-frequency resonance suppression mode

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-05h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0: Set vibration frequency manually

1: Identify vibration frequency

**Description**

-

## H09.05 Offline inertia auto-tuning mode

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-06h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 3 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Positive/Negative triangular wave mode

1: JOG mode

2: Bidirectional auto-tuning mode

3: Unidirectional auto-tuning mode

**Description**

Defines the offline inertia auto-tuning mode. The offline inertia auto-tuning function can be enabled through H0d.02.

| Setpoint | Offline inertia auto-tuning mode | Remarks |
|---|---|---|
| 0 | Positive and negative triangular wave | Applicable to the scenario where the motor movement travel is short. |
| 1 | Jog | Applicable to the scenario where the motor movement travel is long. |
| 2 | 0: Bidirectional auto-tuning. | No pre-set ratio of inertia is required, suitable for applications where the motor can rotate in both directions. |
| 3 | 1: Unidirectional auto-tuning | No preset ratio of inertia is required, suitable for applications where the motor can only rotate in one direction. |

**H09.06** **Max. speed of inertia auto-tuning**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-07h | Effective Time: | Real time |
| Min.: | 100 | Unit: | rpm |
| Max.: | 1000 | Data Type: | UInt16 |
| Default: | 500 | Change: | At stop |

**Value Range:**

100rpm–1000rpm

**Description**

Defines the maximum permissible speed reference in offline inertia auto-tuning mode.

During inertia auto-tuning, the higher the speed, the more accurate the auto-tuned values. Use the default setpoint in general cases.

**H09.07** **Time constant for accelerating to max. speed during inertia auto-tuning**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-08h | Effective Time: | Real time |
| Min.: | 20 | Unit: | ms |
| Max.: | 800 | Data Type: | UInt16 |
| Default: | 125 | Change: | At stop |

**Value Range:**

20 ms to 800 ms

**Description**

Defines the time for the motor to accelerate from 0 rpm to the maximum speed of inertia auto-tuning (H09.06) during offline inertia auto-tuning.

### H09.08 Interval time after an individual inertia auto-tuning

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-09h | Effective Time: | Real time |
| Min.: | 50 | Unit: | ms |
| Max.: | 10000 | Data Type: | UInt16 |
| Default: | 800 | Change: | At stop |

**Value Range:**

50 ms to 10000 ms

**Description**

Defines the interval time between two consecutive speed references when H09.05 (Offline inertia auto-tuning mode) is set to 1 (Positive/Negative triangular wave mode).

### H09.09 Motor revolutions per inertia auto-tuning

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-0Ah | Effective Time: | Real time |
| Min.: | 0.00 | Unit: | - |
| Max.: | 100.00 | Data Type: | UInt16 |
| Default: | 1.00 | Change: | Immediately |

**Value Range:**

0.00 to 100.00

**Description**

Defines the motor revolutions per inertia auto-tuning when H09.05 (Offline inertia auto-tuning mode) is set to 1 (Positive/Negative triangular wave mode).

Note:

When using the offline inertia auto-tuning function, check that the travel distance of the motor at the stop position is larger than the value of H09.09. If not, decrease the value of H09.06 (Maximum speed for inertia auto-tuning) or H09.07 (Time constant of accelerating to max. speed during inertia auto-tuning) properly until the motor travel distance fulfills the requirement.

### H09.11 Vibration threshold

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-0Ch | Effective Time: | Real time |
| Min.: | 0.0 | Unit: | % |
| Max.: | 100.0 | Data Type: | UInt16 |
| Default: | 5.0 | Change: | Immediately |

**Value Range:**

0.0% to 100.0%

**Description**

Defines the warning threshold for current feedback vibration.

### H09.12 Frequency of the 1st notch

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-0Dh | Effective Time: | Real time |
| Min.: | 50 | Unit: | Hz |
| Max.: | 4000 | Data Type: | UInt16 |
| Default: | 4000 | Change: | Immediately |

**Value Range:**

50 Hz to 4000 Hz

**Description**

Defines the center frequency of the notch, which is the mechanical resonance frequency.

In the torque control mode, setting the notch frequency to 4000 Hz deactivates the notch function.

### H09.13 Width level of the 1st notch

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-0Eh | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 40 | Data Type: | UInt16 |
| Default: | 2 | Change: | Immediately |

**Value Range:**

0 to 40

**Description**

Defines the width level of the notch. Use the default setpoint in general cases.

Width level is the ratio of the notch width to the notch center frequency.

### H09.14 Depth level of the 1st notch

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-0Fh | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 99 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0 to 99

**Description**

Defines the depth level of the notch.

The depth level of the notch is the ratio between the input to the output at the notch center frequency.
The higher the setpoint, the lower the notch depth and the weaker the mechanical resonance suppression will be. Note that an excessively high setpoint may cause system instability.

**H09.15** **Frequency of the 2nd notch**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-10h | Effective Time: | Real time |
| Min.: | 50 | Unit: | Hz |
| Max.: | 4000 | Data Type: | UInt16 |
| Default: | 4000 | Change: | Immediately |

**Value Range:**
50 Hz to 4000 Hz
**Description**
-

**H09.16** **Width level of the 2nd notch**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-11h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 20 | Data Type: | UInt16 |
| Default: | 2 | Change: | Immediately |

**Value Range:**
0 to 20
**Description**
-

**H09.17** **Depth level of the 2nd notch**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-12h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 99 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**
0 to 99
**Description**
-

**H09.18** **Frequency of the 3rd notch**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-13h | Effective Time: | Real time |

| | | | |
|---|---|---|---|
| Min.: | 50 | Unit: | Hz |
| Max.: | 4000 | Data Type: | UInt16 |
| Default: | 4000 | Change: | Immediately |

**Value Range:**

50 Hz to 4000 Hz

**Description**

-

### H09.19 Width level of the 3rd notch

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-14h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 20 | Data Type: | UInt16 |
| Default: | 2 | Change: | Immediately |

**Value Range:**

0 to 20

**Description**

-

### H09.20 Depth level of the 3rd notch

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-15h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 99 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0 to 99

**Description**

-

### H09.21 Frequency of the 4th notch

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-16h | Effective Time: | Real time |
| Min.: | 50 | Unit: | Hz |
| Max.: | 4000 | Data Type: | UInt16 |
| Default: | 4000 | Change: | Immediately |

**Value Range:**

50 Hz to 4000 Hz

**Description**

-

### H09.22 Width level of the 4th notch

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-17h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 20 | Data Type: | UInt16 |
| Default: | 2 | Change: | Immediately |

**Value Range:**

0 to 20

**Description**

-

### H09.23 Depth level of the 4th notch

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-18h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 99 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0 to 99

**Description**

-

### H09.24 Auto-tuned resonance frequency

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-19h | Effective Time: | - |
| Min.: | 0 | Unit: | - |
| Max.: | 2000 | Data Type: | UInt16 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

0 to 2000

**Description**

When H09.02 (Adaptive notch mode) is set to 3, the current mechanical resonance frequency is displayed.

### H09.30 Torque disturbance compensation gain

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-1Fh | Effective Time: | Real time |
| Min.: | -100.0 | Unit: | % |
| Max.: | 100.0 | Data Type: | UInt16 |
| Default: | 0.0 | Change: | Immediately |

**Value Range:**

-100.0% to 100.0%

**Description**

-

### H09.31 Filter time constant of torque disturbance observer

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-20h | Effective Time: | Real time |
| Min.: | 0.00 | Unit: | ms |
| Max.: | 25.00 | Data Type: | UInt16 |
| Default: | 0.50 | Change: | Immediately |

**Value Range:**

0.00 ms to 25.00 ms

**Description**

-

### H09.32 Gravity compensation value

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-21h | Effective Time: | Real time |
| Min.: | -100.0 | Unit: | - |
| Max.: | 100.0 | Data Type: | UInt16 |
| Default: | 0.0 | Change: | Immediately |

**Value Range:**

-100.0 to 100.0

**Description**

Defines the gravity compensation value. Setting this parameter properly in vertical axis applications can reduce the falling amplitude upon start.

### H09.33 Positive friction compensation

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-22h | Effective Time: | Real time |
| Min.: | -100.0 | Unit: | % |
| Max.: | 100.0 | Data Type: | Int16 |
| Default: | 0.0 | Change: | Immediately |

**Value Range:**

-100.0% to 100.0%

**Description**

Defines the forward friction compensation value.

### H09.34 Negative friction compensation

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-23h | Effective Time: | Real time |
| Min.: | -100.0 | Unit: | % |

| | | | |
|---|---|---|---|
| Max.: | 100.0 | Data Type: | Int16 |
| Default: | 0.0 | Change: | Immediately |

**Value Range:**

-100.0% to 100.0%

**Description**

Defines the reverse direction friction compensation value.

### H09.35 Friction compensation speed threshold

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-24h | Effective Time: | Real time |
| Min.: | 0.1 | Unit: | rpm |
| Max.: | 30.0 | Data Type: | UInt16 |
| Default: | 2.0 | Change: | Immediately |

**Value Range:**

0.1rpm–30.0rpm

**Description**

-

### H09.36 Friction compensation speed

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-25h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 2 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0: Speed reference

1: Model tracking speed

2: Speed feedback

**Description**

-

### H09.38 Low-frequency resonance suppression frequency at the mechanical end

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-27h | Effective Time: | Real time |
| Min.: | 1.0 | Unit: | Hz |
| Max.: | 100.0 | Data Type: | UInt16 |
| Default: | 100.0 | Change: | At stop |

**Value Range:**

1.0 Hz to 100.0 Hz

**Description**

-

### H09.39 Low-frequency resonance suppression at the mechanical end

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-28h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 3 | Data Type: | UInt16 |
| Default: | 2 | Change: | At stop |

**Value Range:**

0 to 3

**Description**

-

### H09.41 Frequency of the 5th notch

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-2Ah | Effective Time: | Real time |
| Min.: | 50 | Unit: | Hz |
| Max.: | 8000 | Data Type: | UInt16 |
| Default: | 4000 | Change: | At stop |

**Value Range:**

50 Hz to 8000 Hz

**Description**

-

### H09.42 Width level of the 5th notch

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-2Bh | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 20 | Data Type: | UInt16 |
| Default: | 2 | Change: | Immediately |

**Value Range:**

0 to 20

**Description**

-

### H09.43 Depth level of the 5th notch

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-2Ch | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 99 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0 to 99

**Description**

-

## H09.44 Frequency of low-frequency resonance suppression 1 at mechanical load end

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-2Dh | Effective Time: | Real time |
| Min.: | 0.0 | Unit: | Hz |
| Max.: | 200.0 | Data Type: | UInt16 |
| Default: | 0.0 | Change: | Immediately |

**Value Range:**

0.0 Hz to 200.0 Hz

**Description**

-

## H09.45 Responsiveness of low-frequency resonance suppression 1 at mechanical load end

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-2Eh | Effective Time: | Real time |
| Min.: | 0.01 | Unit: | - |
| Max.: | 10.00 | Data Type: | UInt16 |
| Default: | 1.00 | Change: | Immediately |

**Value Range:**

0.01 to 10.00

**Description**

-

## H09.47 Width of low-frequency resonance suppression 1 at mechanical load end

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-30h | Effective Time: | Real time |
| Min.: | 0.00 | Unit: | - |
| Max.: | 2.00 | Data Type: | UInt16 |
| Default: | 1.00 | Change: | Immediately |

**Value Range:**

0.00 to 2.00

**Description**

-

## H09.49 Frequency of low-frequency resonance suppression 2 at mechanical load end

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-32h | Effective Time: | Real time |

| | | | |
|---|---|---|---|
| Min.: | 0.0 | Unit: | Hz |
| Max.: | 200.0 | Data Type: | UInt16 |
| Default: | 0.0 | Change: | Immediately |

**Value Range:**

0.0 Hz to 200.0 Hz

**Description**

Set this parameter based on the actual jitter frequency.

### H09.50 Responsiveness of low-frequency resonance suppression 2 at mechanical load end

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-33h | Effective Time: | Real time |
| Min.: | 0.01 | Unit: | - |
| Max.: | 10.00 | Data Type: | UInt16 |
| Default: | 1.00 | Change: | Immediately |

**Value Range:**

0.01 to 10.00

**Description**

Use the default setpoint in general cases. To increase the setpoint, reduce the delay time.

### H09.52 Width of low-frequency resonance suppression 2 at mechanical load end

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-35h | Effective Time: | Real time |
| Min.: | 0.00 | Unit: | - |
| Max.: | 2.00 | Data Type: | UInt16 |
| Default: | 1.00 | Change: | Immediately |

**Value Range:**

0.00 to 2.00

**Description**

Use the default setpoint in general cases. To increase the setpoint, increase the delay time.

### H09.57 STune resonance suppression switchover frequency

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-3Ah | Effective Time: | Real time |
| Min.: | 0 | Unit: | Hz |
| Max.: | 4000 | Data Type: | UInt16 |
| Default: | 850 | Change: | Immediately |

**Value Range:**

0 Hz to 4000 Hz

**Description**

If the resonance frequency is lower than the setpoint, use medium-frequency resonance suppression 2 to suppress resonance. Otherwise, use the notch to suppress resonance.

**H09.58** **STune resonance suppression reset selection**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2009-3Bh | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0: Disable

1: Enable

**Description**

Used to enable STune resonance suppression reset to clear parameters related to resonance suppression, medium-frequency resonance suppression 2 and notches 3 and 4.

## 3.11 H0A Fault and Protection

**H0A.00** **Power input phase loss protection**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200A-01h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 2 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0: Enable phase loss fault and inhibit phase loss warning

1: Enable phase loss fault and warning

2: Disable phase loss fault and warning

**Description**

The main circuit power specifications vary according to the servo drive model. Servo drives supporting single-phase/three-phase 220 V and three-phase 380 V power supplies Objects available. When voltage fluctuation or phase loss occurs on the power supply, the drive triggers power input phase loss protection based on H0A.00.

| Setpoint | Phase loss protection method | Remarks |
|---|---|---|
| 0 | Enable faults and inhibit warnings | If the main circuit input voltage is single phase for the drive with rated power of 1 kW and above (H01.02 ⩾ 6), E420.0 occurs. |
| 1 | Enable faults and warnings | • If the main circuit input voltage is single phase for the drive with rated power of 1 kW and above (H01.02 ⩾ 6), E420.0 occurs.<br>• If the main circuit input voltage is single phase for the servo drive with 0.75 kW rated power (H01.02 = 5), E990.0 (Power input phase loss warning) occurs. |
| 2 | Inhibit faults and warnings | Er.420 and E990.0 will not be detected.<br>In common bus mode, set H0A.00 to 2. Otherwise, the servo drive cannot enter "rdy" state after power-on. Note that power-off discharge and power-off retentive are not supported when H0A.00 is set to 2. |

## H0A.02 Vibration alarm switch

| | | | |
|---|---|---|---|
| Hexadecimal: | 200A-03h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0: On

1: Off

**Description**

-

## H0A.03 Power-off memory

| | | | |
|---|---|---|---|
| Hexadecimal: | 200A-04h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |

| | | | |
|---|---|---|---|
| Default: | 0 | Change: | Immediately |

**Value Range:**

0: Disabled

1: Enabled

**Description**

It sets whether to enable the function of retentive at power failure.

| Setpoint | Function | Instruction receiving method |
|---|---|---|
| 0 | Disabled | The function of retentive at power failure is disabled. |
| 1 | Enabled | The function of retentive at power failure is enabled. The servo drive automatically stores the encoder feedback pulse count (H0b.17) at power failure, which can be viewed in the corresponding function code after power-on again. |

**H0A.04** **Motor overload protection gain**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200A-05h | Effective Time: | Real time |
| Min.: | 50 | Unit: | % |
| Max.: | 300 | Data Type: | UInt16 |
| Default: | 100 | Change: | At stop |

**Value Range:**

50% to 300%

**Description**

Determines the motor overload duration before E620.0 (Motor overload) is reported.

You can change the setpoint to advance or delay the time when overload protection is triggered based on the motor temperature. The setpoint 50% indicates the time is cut by half; 150% indicates the time is increased by 50%. Set this parameter based on the actual temperature of the motor.

**H0A.08** **Overspeed threshold**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200A-09h | Effective Time: | Real time |
| Min.: | 0 | Unit: | rpm |
| Max.: | 10000 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0rpm–10000rpm

**Description**

Defines the overspeed threshold of the motor.

<table>
<tr><th>Setpoint</th><th>Overspeed Threshold</th><th>Condition for Reporting E500.0</th></tr>
<tr><td>0</td><td>Maximum motor speed x 1.2</td><td rowspan="3">If the speed feedback exceeds the overspeed threshold several times, the drive reports E500.0 (Motor overspeed).</td></tr>
<tr><td rowspan="2">1 to 10000</td><td>If H0A-08 ⩾ (Maximum motor speed x 1.2):<br>Overspeed threshold = Maximum motor speed x 1.2</td></tr>
<tr><td>If H0A-08 < (Maximum motor speed x 1.2):<br>Overspeed threshold = H0A.08</td></tr>
</table>

**H0A.09** **Maximum position pulse frequency**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200A-0Ah | Effective Time: | Real time |
| Min.: | 100 | Unit: | kHz |
| Max.: | 4000 | Data Type: | UInt16 |
| Default: | 4000 | Change: | At stop |

**Value Range:**

100 kHz–4000 kHz

**Description**

Defines the maximum frequency of input pulses when the position reference source is pulse reference (H05.00 = 0) in the position control mode.

When the actual pulse input frequency exceeds the value of H0A.09, the drive reports EB01.0 (excessive position reference increment).

**H0A.10** **Threshold of excessive position deviation**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200A-0Bh | Effective Time: | Real time |
| Min.: | 1 | Unit: | Encoder unit |
| Max.: | 1073741824 | Data Type: | UInt32 |
| Default: | 27486951 | Change: | Immediately |

**Value Range:**

1 to 1073741824

**Description**

Defines the threshold for excessive position deviation in the position control mode.

When the position deviation exceeds this threshold, the drive reports EB00.0 (Position deviation too large).

### H0A.12 Runaway protection

| | | | |
|---|---|---|---|
| Hexadecimal: | 200A-0Dh | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 1 | Change: | Immediately |

**Value Range:**

0: Disabled

1: Enabled

**Description**

Defines whether to enable runaway protection.

0: Disables E234.0 detection when the motor drives a vertical axis or is driven by the load

1: Enables runaway protection

### H0A.16 Threshold of low-frequency resonance position deviation

| | | | |
|---|---|---|---|
| Hexadecimal: | 200A-11h | Effective Time: | Real time |
| Min.: | 1 | Unit: | - |
| Max.: | 1000 | Data Type: | UInt16 |
| Default: | 5 | Change: | Immediately |

**Value Range:**

1 to 1000

**Description**

-

### H0A.17 Reference/Pulse selection

| | | | |
|---|---|---|---|
| Hexadecimal: | 200A-12h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Pulse unit

1: Reference unit

**Description**

Defines the unit for the position settings in H05.21, H05.22, and H0A.10.

| Setpoint | Description |
|---|---|
| 0 | Pulse unit |
| 1 | Reference unit |

**H0A.19** **DI8 filter time constant**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200A-14h | Effective Time: | Upon the next power-on |
| Min.: | 0 | Unit: | - |
| Max.: | 255 | Data Type: | UInt16 |
| Default: | 80 | Change: | At stop |

**Value Range:**

0 to 255

**Description**

-

**H0A.20** **DI9 filter time constant**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200A-15h | Effective Time: | Upon the next power-on |
| Min.: | 0 | Unit: | - |
| Max.: | 255 | Data Type: | UInt16 |
| Default: | 80 | Change: | At stop |

**Value Range:**

0 to 255

**Description**

-

**H0A.22** **Sigma_Delta filter time**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200A-17h | Effective Time: | Upon the next power-on |
| Min.: | 0 | Unit: | - |
| Max.: | 3 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0 to 3

**Description**

-

**H0A.23** **Tz signal filter time**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200A-18h | Effective Time: | Upon the next power-on |
| Min.: | 0 | Unit: | - |
| Max.: | 31 | Data Type: | UInt16 |
| Default: | 15 | Change: | At stop |

**Value Range:**

0 to 31

**Description**

-

## H0A.24 Filter time constant of low-speed pulse input pin

| | | | |
|---|---|---|---|
| Hexadecimal: | 200A-19h | Effective Time: | Upon the next power-on |
| Min.: | 0 | Unit: | - |
| Max.: | 255 | Data Type: | UInt16 |
| Default: | 30 | Change: | At stop |

**Value Range:**

0–255

**Description**

Defines the filter time constant of low-speed pulse input terminal which is enabled (H05.01 = 0) when the position reference source is pulse input (H05.00 = 0) in the position control mode.

When peak interference exists in the low-speed pulse input terminal, set this parameter to suppress peak interference and prevent motor malfunction due to interference signal inputted to the servo drive.

| Maximum Frequency of Input Pulses | Recommended filter value (25 ns) |
|---|---|
| < 167 kbps | 30 |
| 167k–250k | 20 |
| 250k–500k | 10 |

## H0A.25 Filter time constant of speed feedback display value

| | | | |
|---|---|---|---|
| Hexadecimal: | 200A-1Ah | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms |
| Max.: | 5000 | Data Type: | UInt16 |
| Default: | 200 | Change: | At stop |

**Value Range:**

0 ms to 5000 ms

**Description**

Defines the low-pass filter time constant of the speed information for speed feedback and position references.

## H0A.26 Motor overload detection

| | | | |
|---|---|---|---|
| Hexadecimal: | 200A-1Bh | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |

| | | | |
|---|---|---|---|
| Max.: | 3 | Data Type: | UInt16 |
| Default: | 3 | Change: | At stop |

**Value Range:**

0: Show motor overload warning (E909.0) and fault (E620.0)

1: Hide motor overload warning (E909.0) and fault (E620.0)

2: No meaning

3: Enabled for new motors

**Description**

Defines whether to enable motor overload detection.

| Setpoint | Function |
|---|---|
| 0 | Not hide |
| 1 | Hide motor overload warning (E909.0) and motor overload fault (E620.0) |
| 2 | No assignment |
| 3 | Enabled for new motors |

### H0A.27 Speed DO filter time constant

| | | | |
|---|---|---|---|
| Hexadecimal: | 200A-1Ch | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms |
| Max.: | 5000 | Data Type: | UInt16 |
| Default: | 10 | Change: | At stop |

**Value Range:**

0 ms to 5000 ms

**Description**

Defines the the average filter time constant of the speed information for speed feedback and position references.

### H0A.28 Quadrature encoder filter time constant

| | | | |
|---|---|---|---|
| Hexadecimal: | 200A-1Dh | Effective Time: | Upon the next power-on |
| Min.: | 0 | Unit: | ns |
| Max.: | 255 | Data Type: | UInt16 |
| Default: | 30 | Change: | At stop |

**Value Range:**

0 ns to 255 ns

**Description**

-

## H0A.30 Filter time constant of high-speed pulse input pin

| | | | |
|---|---|---|---|
| Hexadecimal: | 200A-1Fh | Effective Time: | Upon the next power-on |
| Min.: | 0 | Unit: | ns |
| Max.: | 255 | Data Type: | UInt16 |
| Default: | 2 | Change: | At stop |

**Value Range:**

0 ns to 255 ns

**Description**

Defines the filter time constant of high-speed pulse input terminal which is enabled (H05.01 = 1) when the position reference source is pulse reference (H05.00 = 0) in the position control mode.

When peak interference exists in the high-speed pulse input terminal, set this parameter to suppress peak interference and prevent motor malfunction due to interference signal inputted to the servo drive.

| Maximum Frequency of Input Pulses | Recommended Filter Time Constant (Unit: 25 ns) |
|---|---|
| 500k–1M | 5 |
| > 1 Mpps | 3 |

## H0A.32 Motor stall over-temperature protection time window

| | | | |
|---|---|---|---|
| Hexadecimal: | 200A-21h | Effective Time: | Real time |
| Min.: | 10 | Unit: | ms |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 200 | Change: | Immediately |

**Value Range:**

10 ms to 65535 ms

**Description**

Defines the overtemperature duration before E630.0 (Motor stall) is detected by the servo drive.

H0A.32 can be used to adjust the sensitivity of motor stall overtemperature detection.

## H0A.33 Motor stall over-temperature detection

| | | | |
|---|---|---|---|
| Hexadecimal: | 200A-22h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 1 | Change: | Immediately |

**Value Range:**

0: Disabled

1: Enable

2: Enabled for new over-temperature

**Description**

Enables or disables the detection for E630.0 (Motor stall overtemperature protection).

| Setpoint | Function |
|---|---|
| 0 | Shield |
| 1 | Enabled |
| 2 | New over-temperature protection |

### H0A.35 Inhibit reading encoder EEPRROM on power-on (for third-party encoders)

| | | | |
|---|---|---|---|
| Hexadecimal: | 200A-24h | Effective Time: | Upon the next power-on |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0: Allow

1: Inhibit

**Description**

-

### H0A.36 Encoder multi-turn overflow fault

| | | | |
|---|---|---|---|
| Hexadecimal: | 200A-25h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Not hide

1: Hide

**Description**

Defines whether to hide the encoder multi-turn overflow fault in the absolute position linear mode (H02.01 = 1).

| Setpoint | Function |
|---|---|
| 0 | Not hide |
| 1 | Shield |

### H0A.38 IGBT over-temperature threshold

| | | | |
|---|---|---|---|
| Hexadecimal: | 200A-27h | Effective Time: | Upon the next power-on |
| Min.: | 0 | Unit: | °C |
| Max.: | 175 | Data Type: | UInt16 |
| Default: | 135 | Change: | At stop |

**Value Range:**

0°C to 175°C

**Description**

-

### H0A.39 IGBT over-temperature protection switch

| | | | |
|---|---|---|---|
| Hexadecimal: | 200A-28h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Disabled

1: Enabled

**Description**

-

### H0A.40 Software limit selection

| | | | |
|---|---|---|---|
| Hexadecimal: | 200A-29h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 2 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: No operation

1: Activated immediately

2: Activated after homing is done

**Description**

| Setpoint | Function |
|---|---|
| 0 | No operation |
| 1 | At once |
| 2 | Activated after homing is done |

**H0A.41** **Forward position of software limit**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200A-2Ah | Effective Time: | Real time |
| Min.: | -2147483648 | Unit: | - |
| Max.: | 2147483647 | Data Type: | Int32 |
| Default: | 2147483647 | Change: | At stop |

**Value Range:**

-2147483648 to 2147483647

**Description**

When the absolute position counter (H0b.07) is larger than H0A.41, the servo drive reports E950.0 (Forward limit switch warning) and executes stop at forward limit.

**H0A.43** **Reverse position of software limit**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200A-2Ch | Effective Time: | Real time |
| Min.: | -2147483648 | Unit: | - |
| Max.: | 2147483647 | Data Type: | Int32 |
| Default: | -2147483648 | Change: | At stop |

**Value Range:**

-2147483648 to 2147483647

**Description**

When the absolute position counter (H0b.07) is smaller than H0A.43, the servo drive reports warning E952.0 (Reverse limit switch warning) and executes stop at reverse limit.

**H0A.47** **Brake protection**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200A-30h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0 to 1

**Description**

-

**H0A.48** **Gravity load**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200A-31h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 3000 | Data Type: | UInt16 |

| | | | |
|---|---|---|---|
| Default: | 300 | Change: | Immediately |

**Value Range:**

0 to 3000

**Description**

-

### H0A.49 Regenerative wafer over-temperature threshold

| | | | |
|---|---|---|---|
| Hexadecimal: | 200A-32h | Effective Time: | Upon the next power-on |
| Min.: | 0 | Unit: | °C |
| Max.: | 175 | Data Type: | UInt16 |
| Default: | 115 | Change: | At stop |

**Value Range:**

0°C to 175°C

**Description**

Defines the temperature threshold for regenerative resistor overload.

### H0A.50 Torque reference display filter time

| | | | |
|---|---|---|---|
| Hexadecimal: | 200A-33h | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms |
| Max.: | 5000 | Data Type: | UInt16 |
| Default: | 200 | Change: | At stop |

**Value Range:**

0 ms to 5000 ms

**Description**

-

### H0A.51 Encoder fault tolerance count

| | | | |
|---|---|---|---|
| Hexadecimal: | 200A-34h | Effective Time: | Upon the next power-on |
| Min.: | 0 | Unit: | - |
| Max.: | 31 | Data Type: | UInt16 |
| Default: | 31 | Change: | Immediately |

**Value Range:**

0 to 31

**Description**

-

**H0A.52** **Defines the temperature threshold for encoder overtemperature protection.**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200A-35h | Effective Time: | Real time |
| Min.: | 0 | Unit: | ° |
| Max.: | 175 | Data Type: | UInt16 |
| Default: | 105 | Change: | Immediately |

**Value Range:**

0° to 175°

**Description**

When the number of communication failures between the encoder and the drive exceeds H0A.50, the communication between the encoder and the drive fails.

**H0A.55** **Runaway current threshold**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200A-38h | Effective Time: | Real time |
| Min.: | 100.0 | Unit: | % |
| Max.: | 400.0 | Data Type: | UInt16 |
| Default: | 200.0 | Change: | Immediately |

**Value Range:**

100.0% to 400.0%

**Description**

Defines the current threshold for runaway protection detection.

**H0A.57** **Runaway speed threshold**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200A-3Ah | Effective Time: | Real time |
| Min.: | 1 | Unit: | rpm |
| Max.: | 1000 | Data Type: | UInt16 |
| Default: | 10 | Change: | Immediately |

**Value Range:**

1rpm–1000rpm

**Description**

Defines the overspeed threshold for runaway protection detection.

**H0A.58** **Speed feedback filtering time**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200A-3Bh | Effective Time: | Upon the next power-on |
| Min.: | 0.1 | Unit: | ms |
| Max.: | 100.0 | Data Type: | UInt16 |

| | | | |
|---|---|---|---|
| Default: | 2.0 | Change: | Immediately |

**Value Range:**

0.1 ms to 100.0 ms

**Description**

Defines the speed feedback filter time for runaway protection detection.

### H0A.59 Runaway protection detection time

| | | | |
|---|---|---|---|
| Hexadecimal: | 200A-3Ch | Effective Time: | Real time |
| Min.: | 10 | Unit: | ms |
| Max.: | 1000 | Data Type: | UInt16 |
| Default: | 30 | Change: | Immediately |

**Value Range:**

10 ms to 1000 ms

**Description**

The runaway fault will be reported when runaway keeps active for a period longer than H0A.59.

### H0A.61 Phase loss detection time threshold

| | | | |
|---|---|---|---|
| Hexadecimal: | 200A-3Eh | Effective Time: | Real time |
| Min.: | 30 | Unit: | ms |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 50 | Change: | Immediately |

**Value Range:**

30 ms to 65535 ms

**Description**

-

### H0A.85 Wire breakage detection torque threshold

| | | | |
|---|---|---|---|
| Hexadecimal: | 200A-56h | Effective Time: | Real time |
| Min.: | 4.0 | Unit: | % |
| Max.: | 400.0 | Data Type: | UInt16 |
| Default: | 5.0 | Change: | At stop |

**Value Range:**

4.0% to 400.0%

**Description**

-

**H0A.86** **Wire breakage detection filter time**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200A-57h | Effective Time: | Real time |
| Min.: | 5 | Unit: | ms |
| Max.: | 1000 | Data Type: | UInt16 |
| Default: | 30 | Change: | At stop |

**Value Range:**

5 ms to 1000 ms

**Description**

-

## 3.12 H0B Display Parameters

**H0b.00** **Motor speed actual value**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-01h | Effective Time: | - |
| Min.: | -9999 | Unit: | rpm |
| Max.: | 9999 | Data Type: | Int16 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

-9999rpm to 9999rpm

**Description**

Indicates the round actual motor speed, which is accurate to 1 rpm.

Set in H0A.25 (Filter time constant of speed feedback display) the filter time constant for H0b.00.

**H0b.01** **Speed reference**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-02h | Effective Time: | - |
| Min.: | -9999 | Unit: | rpm |
| Max.: | 9999 | Data Type: | Int16 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

-9999rpm to 9999rpm

**Description**

Indicates the present speed reference (accurate to 1rpm) of the drive in the position and speed control modes.

**H0b.02** **Internal torque reference**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-03h | Effective Time: | - |

| | | | |
|---|---|---|---|
| Min.: | -300.0 | Unit: | % |
| Max.: | 300.0 | Data Type: | Int16 |
| Default: | 0.0 | Change: | Unchangeable |

**Value Range:**

-300.0% to 300.0%

**Description**

Displays present torque reference (accurate to 0.1%). The value 100.0% corresponds to the rated torque of the motor.

**H0b.03 Monitored DI status**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-04h | Effective Time: | - |
| Min.: | 0 | Unit: | - |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

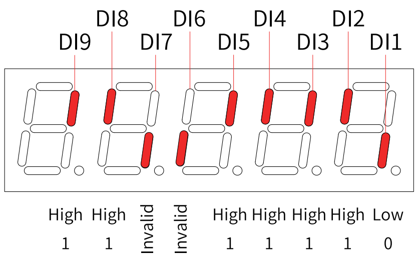
0–65535

**Description**

Displays the level status of 8 DI terminals without filtering.

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

Assume that the DI1 terminal is low level and DI2 to DI9 terminals are high level, and the corresponding binary number is "110011110". In this case, the value of H0b.03 (Monitored DO signal) read by the software tool is 414 (decimal). See the following figure.




**H0b.05 Monitored DO status**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-06h | Effective Time: | - |
| Min.: | 0 | Unit: | - |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

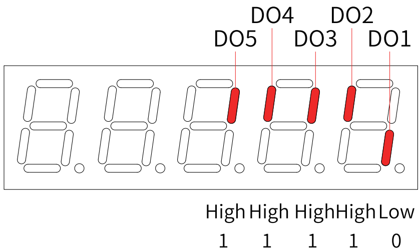
0–65535

**Description**

Displays the level status of 5 DO terminals without filtering.

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

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




### H0b.07 Absolute position counter

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-08h | Effective Time: | - |
| Min.: | -2147483648 | Unit: | Reference unit |
| Max.: | 2147483647 | Data Type: | Int32 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

-2147483648 to 2147483647

**Description**

Indicates present absolute position (reference unit) of the motor in the position control mode.

This parameter is a 32-bit integer, which is displayed as a decimal on the keypad.

### H0b.09 Mechanical angle

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-0Ah | Effective Time: | - |
| Min.: | 0 | Unit: | - |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

0 to 65535

**Description**

Displays present mechanical angle (encoder unit) of the motor. The setpoint 0 indicates the mechanical angle is 0°.
Actual mechanical angle = 360° x H0b.09/(Maximum value of H0b.09 + 1)

Maximum value of H0b.09 for an absolute encoder: 65535

**H0b.10** **Electrical angle**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-0Bh | Effective Time: | - |
| Min.: | 0.0 | Unit: | ° |
| Max.: | 360.0 | Data Type: | UInt16 |
| Default: | 0.0 | Change: | Unchangeable |

**Value Range:**

0.0° to 360.0°

**Description**

Indicates the present electrical angle of the motor, which is accurate to 0.1°. The electrical angle variation range is ±360.0° during rotation. If the motor has four pairs of poles, each revolution generates four rounds of angle change from 0° to 359°. Similarly, if the motor has five pairs of poles, each revolution generates five rounds of angle change from 0° to 359°.

**H0b.11** **Speed corresponding to the input position reference**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-0Ch | Effective Time: | - |
| Min.: | -9999 | Unit: | rpm |
| Max.: | 9999 | Data Type: | Int16 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

-9999rpm to 9999rpm

**Description**

-

**H0b.12** **Average load rate**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-0Dh | Effective Time: | - |
| Min.: | 0.0 | Unit: | % |
| Max.: | 6553.5 | Data Type: | UInt16 |
| Default: | 0.0 | Change: | Unchangeable |

**Value Range:**

0.0% to 6553.5%

**Description**

Displays the percentage of the average load torque to the rated torque of the motor, which is accurate to 0.1%. The value 100.0% corresponds to the rated torque of the motor.

### H0b.13 Input position reference counter

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-0Eh | Effective Time: | - |
| Min.: | -2147483648 | Unit: | Reference unit |
| Max.: | 2147483647 | Data Type: | Int32 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

-2147483648 to 2147483647

**Description**

-

### H0b.15 Encoder position deviation counter

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-10h | Effective Time: | - |
| Min.: | -2147483648 | Unit: | Encoder unit |
| Max.: | 2147483647 | Data Type: | Int32 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

-2147483648 to 2147483647

**Description**

-

### H0b.17 Feedback pulse counter

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-12h | Effective Time: | - |
| Min.: | -2147483648 | Unit: | Encoder unit |
| Max.: | 2147483647 | Data Type: | Int32 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

-2147483648 to 2147483647

**Description**

Used to count the position pulses fed back by the encoder in any control mode. This parameter is a 32-bit integer, which is displayed as a decimal on the keypad.

**H0b.19 Total power-on time**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-14h | Effective Time: | - |
| Min.: | 0.0 | Unit: | s |
| Max.: | 214748364.7 | Data Type: | UInt32 |
| Default: | 0.0 | Change: | Unchangeable |

**Value Range:**

0.0s–214748364.7s

**Description**

Used to record the total operating time of the servo drive.

This parameter is a 32-bit integer, which is displayed as a decimal on the keypad.

Note:

If the servo drive is switched on and off repeatedly within a short period of time, a deviation within 1h may be present in the total power-on time record.

**H0b.24 RMS value of phase current**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-19h | Effective Time: | - |
| Min.: | 0.00 | Unit: | A |
| Max.: | 655.35 | Data Type: | UInt16 |
| Default: | 0.00 | Change: | Unchangeable |

**Value Range:**

0.00 A to 655.35 A

**Description**

Displays the RMS value of the phase current of the motor, accurate to 0.01 A.

**H0b.26 Bus voltage**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-1Bh | Effective Time: | - |
| Min.: | 0.0 | Unit: | V |
| Max.: | 6553.5 | Data Type: | UInt16 |
| Default: | 0.0 | Change: | Unchangeable |

**Value Range:**

0.0 V to 6553.5 V

**Description**

Displays the DC bus voltage of the main circuit input voltage after rectification, which is accurate to 0.01 V.

**H0b.27 Module temperature**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-1Ch | Effective Time: | - |

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

**Value Range:**

0°C to 65535°C

**Description**

Indicates the temperature of the module inside the servo drive, which can be used as a reference for estimating the actual temperature of the drive.

### H0b.28 Absolute encoder fault information given by FPGA

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-1Dh | Effective Time: | - |
| Min.: | 0 | Unit: | - |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

0 to 65535

**Description**

-

### H0b.29 System status information given by FPGA

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-1Eh | Effective Time: | - |
| Min.: | 0 | Unit: | - |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

0 to 65535

**Description**

-

### H0b.30 System fault information given by FPGA

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-1Fh | Effective Time: | - |
| Min.: | 0 | Unit: | - |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

0 to 65535

**Description**

-

**H0b.33** **Fault log**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-22h | Effective Time: | - |
| Min.: | 0 | Unit: | - |
| Max.: | 19 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0: Present fault

1: Last fault2: 2nd to last fault3: 3rd to last fault4: 4th to last fault

5: 5th to last fault 6: 6th to last fault7: 7th to last fault8: 8th to last fault9: 9th to last fault10: 10th to last fault11: 11th to last fault12: 12th to last fault13: 13th to last fault14: 14th to last fault15: 15th to last fault16: 16th to last fault17: 17th to last fault18: 18th to last fault19: 19th to last fault

**Description**

Used to view the latest 20 faults of the drive.

**H0b.34** **Fault code of the selected fault**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-23h | Effective Time: | - |
| Min.: | 0 | Unit: | - |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

0 to 65535

**Description**

-

**H0b.35** **Time stamp upon occurrence of the selected fault**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-24h | Effective Time: | - |
| Min.: | 0.0 | Unit: | s |
| Max.: | 214748364.7 | Data Type: | UInt32 |
| Default: | 0.0 | Change: | Unchangeable |

**Value Range:**

0.0s–214748364.7s

**Description**

-

**H0b.37** **Motor speed upon occurrence of the selected fault**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-26h | Effective Time: | - |
| Min.: | -32767 | Unit: | rpm |

| | | | |
|---|---|---|---|
| Max.: | 32767 | Data Type: | Int16 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

-32767rpm to 32767rpm

**Description**

-

### H0b.38 Motor phase U current upon occurrence of the selected fault

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-27h | Effective Time: | - |
| Min.: | -327.67 | Unit: | A |
| Max.: | 327.67 | Data Type: | Int16 |
| Default: | 0.00 | Change: | Unchangeable |

**Value Range:**

-327.67 A to 327.67 A

**Description**

-

### H0b.39 Motor phase V current upon occurrence of the selected fault

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-28h | Effective Time: | - |
| Min.: | -327.67 | Unit: | A |
| Max.: | 327.67 | Data Type: | Int16 |
| Default: | 0.00 | Change: | Unchangeable |

**Value Range:**

-327.67 A to 327.67 A

**Description**

-

### H0b.40 Bus voltage upon occurrence of the selected fault

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-29h | Effective Time: | - |
| Min.: | 0.0 | Unit: | V |
| Max.: | 6553.5 | Data Type: | UInt16 |
| Default: | 0.0 | Change: | Unchangeable |

**Value Range:**

0.0 V to 6553.5 V

**Description**

-

### H0b.41 DI status upon occurrence of the selected fault

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-2Ah | Effective Time: | - |
| Min.: | 0 | Unit: | - |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

0 to 65535

**Description**

-

### H0b.42 DO status upon occurrence of the selected fault

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-2Bh | Effective Time: | - |
| Min.: | 0 | Unit: | - |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

0 to 65535

**Description**

-

### H0b.43 Group No. of the abnormal parameter

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-2Ch | Effective Time: | - |
| Min.: | 0 | Unit: | - |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

0 to 65535

**Description**

-

### H0b.44 Offset of the abnormal parameter within the parameter group

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-2Dh | Effective Time: | - |
| Min.: | 0 | Unit: | - |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

0 to 65535

**Description**

-

### H0b.45 Internal fault code

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-2Eh | Effective Time: | - |
| Min.: | 0 | Unit: | - |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

0 to 65535

**Description**

-

### H0b.46 Absolute encoder fault information given by FPGA upon occurrence of the selected fault

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-2Fh | Effective Time: | - |
| Min.: | 0 | Unit: | - |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

0 to 65535

**Description**

-

### H0b.47 System status information given by FPGA upon occurrence of the selected fault

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-30h | Effective Time: | - |
| Min.: | 0 | Unit: | - |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

0 to 65535

**Description**

-

### H0b.48 System fault information given by FPGA upon occurrence of the selected fault

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-31h | Effective Time: | - |

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

**Value Range:**

0 to 65535

**Description**

-

**H0b.51 Internal fault code upon occurrence of the selected fault**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-34h | Effective Time: | - |
| Min.: | 0 | Unit: | - |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

0 to 65535

**Description**

-

**H0b.52 Timeout fault flat bit given by FPGA upon occurrence of the selected fault**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-35h | Effective Time: | - |
| Min.: | 0 | Unit: | - |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

0 to 65535

**Description**

-

**H0b.53 Position deviation counter**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-36h | Effective Time: | - |
| Min.: | -2147483648 | Unit: | Reference unit |
| Max.: | 2147483647 | Data Type: | Int32 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

-2147483648 to 2147483647

**Description**

-

### H0b.55 Motor speed actual value

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-38h | Effective Time: | - |
| Min.: | -6000.0 | Unit: | rpm |
| Max.: | 6000.0 | Data Type: | Int32 |
| Default: | 0.0 | Change: | Unchangeable |

**Value Range:**

-6000.0rpm to 6000.0rpm

**Description**

Indicates the round actual motor speed, which is accurate to 1 rpm.

Set in H0A.25 (Filter time constant of speed feedback display) the filter time constant for H0b.00.

### H0b.57 Bus voltage of the control circuit

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-3Ah | Effective Time: | - |
| Min.: | 0.0 | Unit: | V |
| Max.: | 65535.0 | Data Type: | UInt16 |
| Default: | 0.0 | Change: | Unchangeable |

**Value Range:**

0.0 V to 65535.0 V

**Description**

Displays the bus voltage of the control circuit.

### H0b.58 Mechanical absolute position (low 32 bits)

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-3Bh | Effective Time: | - |
| Min.: | -2147483647 | Unit: | Encoder unit |
| Max.: | 2147483647 | Data Type: | Int32 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

-2147483647 to 2147483647

**Description**

Displays the low 32-bit value (encoder unit) of the mechanical position feedback when the absolute encoder is used.

### H0b.60 Mechanical absolute position (high 32 bits)

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-3Dh | Effective Time: | - |
| Min.: | -2147483647 | Unit: | Encoder unit |
| Max.: | 2147483647 | Data Type: | Int32 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

-2147483647 to 2147483647

**Description**

Displays the high 32-bit value (encoder unit) of the mechanical position feedback when the absolute encoder is used.

### H0b.64 Real-time input position reference counter

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-41h | Effective Time: | - |
| Min.: | -2147483648 | Unit: | Reference unit |
| Max.: | 2147483647 | Data Type: | Int32 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

-2147483648 to 2147483647

**Description**

Displays the value of the pulse reference counter before being divided or multiplied by the electronic gear ratio. This value is independent of the servo drive status and the control mode.

### H0b.63 NotRdy state

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-22h | Effective Time: | - |
| Min.: | 0 | Unit: | - |
| Max.: | 7 | Data Type: | UInt16 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

1: Control circuit error

2: Main circuit power input error

3: Bus undervoltage

4: Soft start failed

5: Encoder initialization undone

6: Short circuit to ground failed

7: Others

**Description**

-

### H0b.66 Encoder temperature

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-43h | Effective Time: | - |
| Min.: | -32768 | Unit: | °C |
| Max.: | 32767 | Data Type: | Int16 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

-32768°C to 32767°C

**Description**

-

## H0b.70 Number of revolutions recorded in the absolute encoder

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-47h | Effective Time: | - |
| Min.: | 0 | Unit: | Rev |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

0Rev–65535Rev

**Description**

-

## H0b.71 Single-turn position fed back by the absolute encoder

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-48h | Effective Time: | - |
| Min.: | 0 | Unit: | Encoder unit |
| Max.: | 2147483647 | Data Type: | UInt32 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

0 to 2147483647

**Description**

Displays the position feedback of the absolute encoder within one turn.

## H0b.73 Single-turn offset position of absolute encoder

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-4Ah | Effective Time: | - |
| Min.: | 0 | Unit: | Encoder unit |
| Max.: | 2147483647 | Data Type: | UInt32 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

0 to 2147483647

**Description**

-

## H0b.75 Load inertia ratio in online inertia auto-tuning

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-4Ch | Effective Time: | - |

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

**Value Range:**

0.00 to 655.35

**Description**

-

### H0b.76 External load in online inertia auto-tuning

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-4Dh | Effective Time: | - |
| Min.: | 0.0 | Unit: | - |
| Max.: | 6553.5 | Data Type: | UInt16 |
| Default: | 0.0 | Change: | Unchangeable |

**Value Range:**

0.0 to 6553.5

**Description**

-

### H0b.77 Absolute position fed back by the absolute encoder (low 32 bits)

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-4Eh | Effective Time: | - |
| Min.: | -2147483647 | Unit: | Encoder unit |
| Max.: | 2147483647 | Data Type: | Int32 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

-2147483647 to 2147483647

**Description**

-

### H0b.79 Absolute position fed back by the absolute encoder (high 32 bits)

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-50h | Effective Time: | - |
| Min.: | -2147483647 | Unit: | Encoder unit |
| Max.: | 2147483647 | Data Type: | Int32 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

-2147483647 to 2147483647

**Description**

-

**H0b.81 Load position within one turn in absolute position rotation mode (low 32 bits)**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-52h | Effective Time: | - |
| Min.: | -2147483647 | Unit: | Encoder unit |
| Max.: | 2147483647 | Data Type: | Int32 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

-2147483647 to 2147483647

**Description**

-

**H0b.83 Load position within one turn in absolute position rotation mode (high 32 bits)**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-54h | Effective Time: | - |
| Min.: | -2147483647 | Unit: | Encoder unit |
| Max.: | 2147483647 | Data Type: | Int32 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

-2147483647 to 2147483647

**Description**

-

**H0b.85 Load position within one turn in absolute position rotation mode**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200b-56h | Effective Time: | - |
| Min.: | -2147483647 | Unit: | Reference unit |
| Max.: | 2147483647 | Data Type: | Int32 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

-2147483647 to 2147483647

**Description**

-

## 3.13 H0C Communication Parameters

**H0C.00 Drive axis address**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200C-01h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |

| | | | |
|---|---|---|---|
| Max.: | 247 | Data Type: | UInt16 |
| Default: | 1 | Change: | Immediately |

**Value Range:**

0 to 247

**Description**

CAN Indicates the slave node address. Ensure this parameter is consistent with the configuration of the host controller.

### H0C.02 Serial baud rate

| | | | |
|---|---|---|---|
| Hexadecimal: | 200C-03h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 6 | Data Type: | UInt16 |
| Default: | 5 | Change: | Immediately |

**Value Range:**

0: 2400bps
1: 4800bps
2: 9600bps
3: 19200bps
4: 38400bps
5: 57600bps
6: 115200bps

**Description**

| Setpoint | Baud rate |
|---|---|
| 0 | 2400bps |
| 1 | 4800bps |
| 2 | 9600bps |
| 3 | 19200bps |
| 4 | 38400bps |
| 5 | 57600bps |
| 6 | 115200bps |

### H0C.03 Modbus data format

| | | | |
|---|---|---|---|
| Hexadecimal: | 200C-04h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 3 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0: No parity, 2 stop bits
1: Even parity, 1 stop bit
2: Odd parity, 1 stop bit
3: No parity, 1 stop bit

**Description**

Defines the data check mode between the servo drive and the host controller during communication.

| Setpoint | Data format |
|---|---|
| 0 | No check, 2 stop bits |
| 1 | Even parity check, 1 stop bit |
| 2 | Odd parity check, 1 stop bit |
| 3 | No check, 1 stop bits |

The data format set in the servo drive must be the same as that in the host controller. Otherwise, communication will fail.

**H0C.08** **CAN communication rate**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200C-09h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 8 | Data Type: | UInt16 |
| Default: | 5 | Change: | Immediately |

**Value Range:**

0: 20K
1: 50K
2: 100K
3: 125K
4: 250K
5: 500K
6: 1M
7: 1M

**Description**

It sets the CAN (CANlink or CANopen) communication rate between the servo drive and the host controller. The communication rate set in the servo drive must be the same as that in the host controller. Otherwise, communication will fail. If H0C.08 is set to 6, the baud rate is 1 Mbps. 80% sampling points are used to match most PLCs with a 1M standard baud rate.
If H0C.08 is set to 7, the baud rate is 1 Mbps. 70% sampling points are used to match most PLCs with a 1M non-standard (deviated) baud rate. Reducing sampling points can also reduce error frames.

| Setpoint | Baud rate |
|---|---|
| 0 | 20K |
| 1 | 50K |
| 2 | 100K |
| 3 | 125K |
| 4 | 250K |
| 5 | 500K |
| 6 | 1M |
| 7 | 1M |

**H0C.09** **Communication VDI**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200C-0Ah | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Disabled

1: Enabled

**Description**

To use the VDI function:

1. Set H0C.09 to enable VDI.
2. Set the default level after power-on through H0C.10.
3. Set the DI function of the VDI terminal through parameters in group H17.
4. Set VDI output through H31.00.

**H0C.10** **VDI default value upon power-on**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200C-0Bh | Effective Time: | Upon the next power-on |
| Min.: | 0 | Unit: | - |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0–65535

**Description**

Configures the initial value of VDI upon power-on.

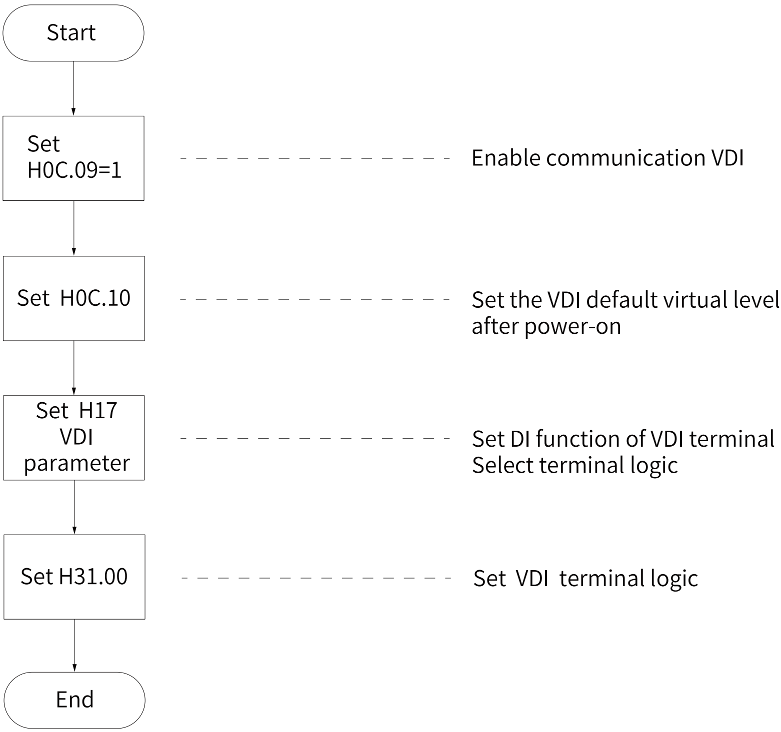
Bit 0 corresponds to VDI1.

Bit 1 corresponds to VDI2.

…

bit15 corresponds to VDI16.

Use the VDI according to the following procedure:




**H0C.11** **Communication VDO**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200C-0Ch | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Disabled

1: Enabled

**Description**

To use the VDO function:
1. Enable VDO through H0C.11.
2. Set the default level after power-on through H0C.12.
3. Set the DO function of the VDO terminal through parameters in group H17.
4: Read the output level of the VDO terminal through H17.32.

**H0C.12** **Default level of the VDO allocated with function 0**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200C-0Dh | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0 to 65535

**Description**

Used to configure the initial values of VDO upon power-on.

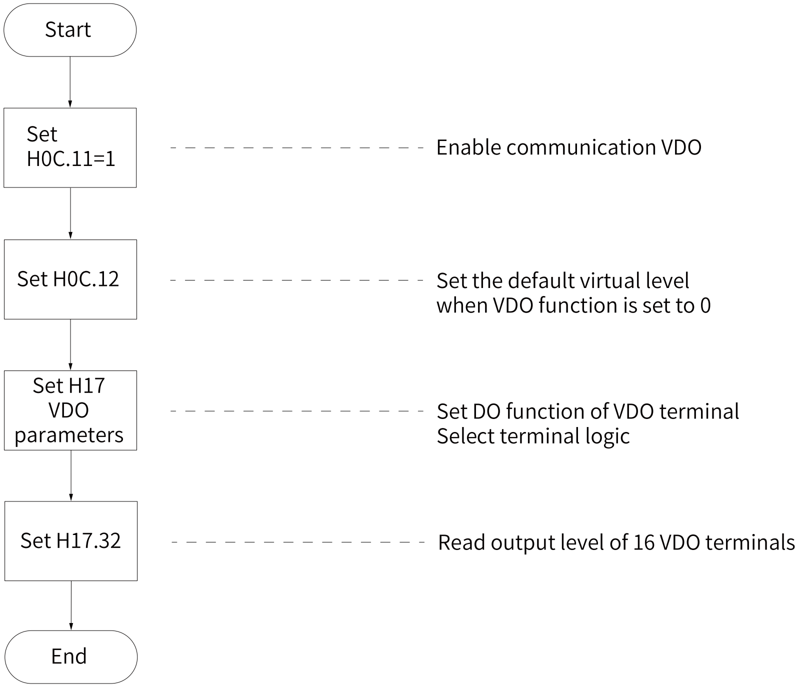
bit0 corresponds to VDO1.

bit1 corresponds to VDO2.

…

bit15 corresponds to VDO16.

Use the VDO according to the following procedure:




**H0C.13** **Update parameter values written through communication to EEPROM**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200C-0Eh | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 1 | Change: | Immediately |

**Value Range:**

0: Not update EEPROM

1: Update EEPROM

**Description**

-

**H0C.14** **Modbus error code**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200C-0Fh | Effective Time: | - |
| Min.: | 0 | Unit: | - |

| | | | |
|---|---|---|---|
| Max.: | 4 | Data Type: | UInt16 |
| Default: | 2 | Change: | Unchangeable |

**Value Range:**

0: N/A

1: Illegal parameter (command code)

2: Command code data address

3: Illegal data

4: Slave device fault

**Description**

-

### H0C.16 Update parameter values written through CAN communication to EEPROM

| | | | |
|---|---|---|---|
| Hexadecimal: | 200C-11h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0: Not update EEPROM

1: Update EEPROM

**Description**

-

### H0C.25 Modbus command response delay

| | | | |
|---|---|---|---|
| Hexadecimal: | 200C-1Ah | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms |
| Max.: | 20 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0 ms to 20 ms

**Description**

Defines the delay from the moment when the slave receives a command from the host controller to the moment when the slave returns a response.

### H0C.26 Modbus communication data sequence

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

**Value Range:**

0: High 16 bits before low 16 bits

1: Low 16 bits before high 16 bits

**Description**

-

**H0C.30** **Modbus error frame format**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200C-1Fh | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 1 | Change: | Immediately |

**Value Range:**

0: Old protocol

1: New protocol (standard)

**Description**

-

**H0C.31** **Modbus receiving selection**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200C-20h | Effective Time: | Upon the next power-on |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0: Receiving interrupt enabled

1: Current loop interrupt inquiry

**Description**

-

## 3.14 H0d Auxiliary Parameters

**H0d.00** **Software Reset**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200d-01h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: No operation

1: Enable

**Description**

Programs in the drive are reset automatically (similar to the program reset upon power-on) after the software reset function is enabled, without the need for a power cycle.

## H0d.01 Fault Reset

| | | | |
|---|---|---|---|
| Hexadecimal: | 200d-02h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: No operation

1: Enable

**Description**

When a No. 1 or No. 2 resettable fault occurs, you can enable the fault reset function in the non-operational state after rectifying the fault cause, stopping the keypad from displaying the fault and allowing the drive to enter the "rdy" state.

When a No. 3 warning occurs, you can enable the fault reset function directly, regardless of the servo drive status.

Defines whether to enable fault reset.

| Setpoint | Function | Remarks |
|---|---|---|
| 0 | No operation | - |
| 1 | Fault Reset | • When a No. 1 or No. 2 resettable fault occurs, you can enable the fault reset function in the non-operational state after rectifying the fault cause, stopping the keypad from displaying the fault and allowing the drive to enter the "rdy" state.<br>• When a No. 3 warning occurs, you can enable the fault reset function directly, regardless of the servo drive status. |

## H0d.02 Inertia auto-tuning selection

| | | | |
|---|---|---|---|
| Hexadecimal: | 200d-03h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 65 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0 to 65

**Description**

-

## H0d.03 Initial angle auto-tuning

| | | | |
|---|---|---|---|
| Hexadecimal: | 200d-04h | Effective Time: | - |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: No operation

1: Enabled

**Description**

-

## H0d.04 Read/write in encoder ROM

| | | | |
|---|---|---|---|
| Hexadecimal: | 200d-05h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 2 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: No operation

1: Write ROM

2: Read ROM

**Description**

-

## H0d.05 Emergency stop

| | | | |
|---|---|---|---|
| Hexadecimal: | 200d-06h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0: No operation

1: Emergency stop

**Description**

| Setpoint | Function |
|---|---|
| 0 | No operation |
| 1 | Emergency stop |

### H0d.06 Current loop parameter auto-tuning

| | | | |
|---|---|---|---|
| Hexadecimal: | 200d-07h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 2 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: No operation

1: Save parameters

2: Do not save parameters

**Description**

-

### H0d.12 Phase U/V current balance correction

| | | | |
|---|---|---|---|
| Hexadecimal: | 200d-0Dh | Effective Time: | - |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

0 to 1

**Description**

-

### H0d.17 Forced DI/DO selection

| | | | |
|---|---|---|---|
| Hexadecimal: | 200d-12h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 3 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0: No operation

1: Forced DI enabled, forced DO disabled

2: Forced DO enabled, forced DI disabled

3: Forced DI and DO enabled

**Description**

Forced DI/DO selection.

### H0d.18 Forced DI setting

| | | | |
|---|---|---|---|
| Hexadecimal: | 200d-13h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |

| | | | |
|---|---|---|---|
| Max.: | 511 | Data Type: | UInt16 |
| Default: | 511 | Change: | Immediately |

**Value Range:**

0–511

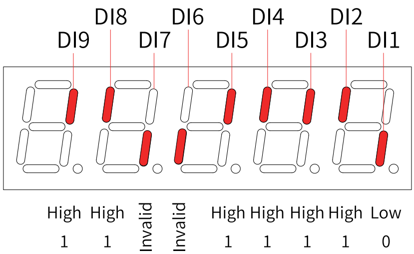
**Description**

Defines whether the DI functions set in group H03 is active when forced DI is activated (H0d.17 = 1 or 3).

The value of H0d.18 is displayed as a hexadecimal on the keypad. When it is converted to a binary value, "bit(n) = 1" indicates the level logic of DI function is high level; "bit(n) = 0" indicates the level logic of the DI function is low level.

Example:

H0d.18 value is 414 (decimal), and the corresponding binary value is 110011110, indicating that DI1 is low level and DI2 to DI9 are high level. The nine DI levels can also be monitored through H0b.03 (Monitored DI states).




View also the DI terminal logic in group H03 when checking whether a DI function is valid.

## H0d.19 Forced DO setting

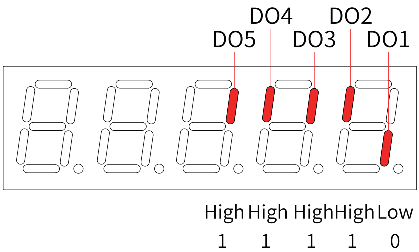
| | | | |
|---|---|---|---|
| Hexadecimal: | 200d-14h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 31 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0–31

**Description**

Defines whether the DO functions assigned in group H04 are active when forced DO is active (H0d.17 = 2 or 3).
The value of H0d.19 is displayed as a hexadecimal on the keypad. When it is converted to a binary value, "bit(n) = 1" indicates the DO function is active; "bit (n) = 0" indicates the DO function is inactive.
Example:
If H0d.19 value is 30 (decimal), the corresponding binary is 11110, indicating that the DO1 function is invalid and functions of DO2 to DO5 are valid. The DO levels obtained based on the DO logics in group H04 and viewed in H0b.05 are shown as below:Assume that DO1 to DO5 logics in group H04 use 0 to indicate low level output at function valid.




**H0d.20** **Multi-turn absolute encoder reset**

| | | | |
|---|---|---|---|
| Hexadecimal: | 200d-15h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 2 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: No operation

1 Reset

2: Reset the fault and multi-turn data

**Description**

You can reset the encoder error or the multi-turn data fed back by the encoder by setting H0d.20.

| Setpoint | Function |
|---|---|
| 0 | No operation |
| 1 | Reset encoder fault |
| 2 | Reset encoder fault and multi-turn data |

# 3.15 H11 Multi-Position Function Parameters

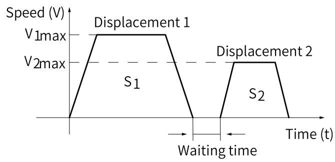
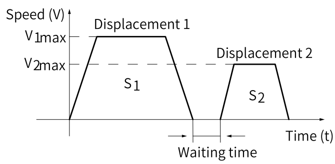
**H11.00** **Multi-position operation mode**

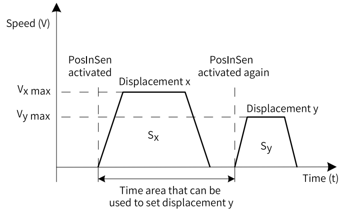
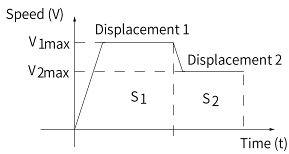
| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-01h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 5 | Data Type: | UInt16 |
| Default: | 1 | Change: | At stop |

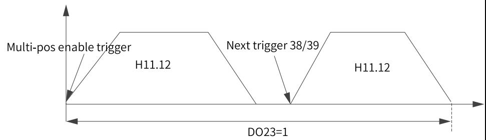
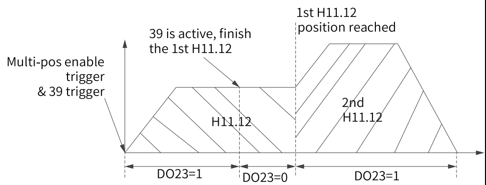
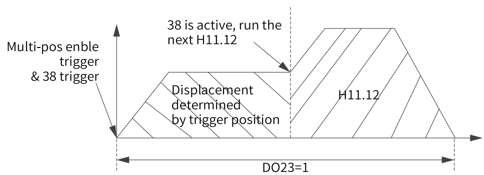
**Value Range:**

0: Single run (number of displacements selected in H11.01)
1: Cyclic operation (number of displacement selected in H11.01)
2: DI-based operation (selected by DI)
3: Sequential operation
5: Axis-controlled continuous operation

**Description**

| Set point | Operation Mode | Remarks | Operation Curve |
|---|---|---|---|
| 0 | Individual operation | • The drive stops after one cycle of operation.<br>• The drive switches to the next displacement automatically.<br>• The interval time between displacements can be set as needed.<br>• The PoslnSen (multi-position reference enable) signal is level-triggered. | <br>$V_{1max}$, $V_{2max}$ : maximum operating speeds in displacement 1 and displacement 2<br>$S_1$, $S_2$ : displacement 1 and displacement 2 |
| 1 | Cyclic operation | • The drive starts from displacement 1 again after each cycle of operation.<br>• The drive switches to the next displacement automatically.<br>• The interval time between displacements can be set as needed.<br>• The cyclic operation mode is kept when the FunIN.28 (Multi-position reference enable) is active.<br>• The PoslnSen (multi-position reference enable) signal is level-triggered. | <br>$V_{1max}$, $V_{2max}$ : maximum operating speeds in displacement 1 and displacement 2<br>$S_1$, $S_2$ : displacement 1 and displacement 2 |

| Set point | Operation Mode | Remarks | Operation Curve |
|---|---|---|---|
| 2 | DI-based operation | • The displacement to be executed next can be set when the current displacement is in progress. The motor stops after current displacement is done executing. After the PoslnSen (position reference enable) signal is enabled again, the present displacement will be executed.<br>• The speed No. is determined by the DI logic.<br>• The interval time between displacements is determined by the command delay of the host controller.<br>• The PoslnSen (multi-position reference enable) signal is edge-triggered. | <br><br>$V_{xmax}$ , $V_{ymax}$ : maximum operating speeds in displacement x and displacement y<br>$S_x$ , $S_y$ : displacement x and displacement y |
| 3 | Sequential operation | • The drive stops after one cycle of operation.<br>• (H11.05 = 0 or H11.05 > H11.01).<br>• The starting displacement after the first cycle of operation is defined by H11.05.<br>• The drive switches to the next displacement automatically.<br>• There is no interval time between displacements.<br>• The PoslnSen (multi-position reference enable) signal is level-triggered. | <br><br>$V_{1max}$ , $V_{2max}$ : maximum operating speeds in displacement 1 and displacement 2<br>$S_1$ , $S_2$ : displacement 1 and displacement 2 |

| Set point | Operation Mode | Remarks | Operation Curve |
|---|---|---|---|
| 5 | Axis-controlled continuous operation | • The drives executes one displacement only.<br>• The individual operation mode, sequential operation mode, and interrupted operation mode are included.<br>• The PoslnSen (multi-position reference enable) signal is level-triggered. | • Individual operation<br><br><br>The PoslnSen (multi-position reference enable) signal is triggered only once (FunIN.39/38 triggered later). The drive stops after executing the distance defined by H11.12.<br>• Sequential operation<br><br><br>The PoslnSen (multi-position reference enable) signal is triggered only once. Write H11.12 again and activate FunIN.39 when the distance defined by the first H11.12 is still in progress.After receiving the new distance (or speed), which is the second H11.12, the drive continues executing the first H11.12 until the distance defined by the first H11.12 is done. Then it starts to execute the second H11.12 directly. The travel distance therefore is the sum of the first H11.12 and the second H11.12.<br>• Interrupted operation<br><br><br>The PoslnSen (Multi-position reference enable) signal is triggered only once. Write H11.12 (such as 1000000) again and activate FunIN.38 when the first H11.12 (such as 9000000) is still in progress. After receiving the new distance (or speed), which is the second H11.12, the servo drive stops executing the first H11.12 and turns to executing the second H11.12. |

To use the multi-position function, assign FunIN.28 (PosInSen, multi-position reference enable) to a DI first. See "Group H03: Terminal input parameters" for the setting mode.

The positioning completed (COIN) signal is activated each time upon completion of a displacement. To determine whether a certain displacement is done executing, use FunOUT.5 (COIN, positioning completed). See "Group H04: Terminal output parameters" for details.

Ensure the S-ON signal is active during operation of each displacement. Otherwise, the drive stops immediately as defined by H02.05 (Stop mode at S-ON OFF) and the positioning completed (COIN) signal in inactive. In modes other than DI-based operation, if the S-ON signal is active but multi-position is disabled during operation of a certain displacement, the drive abandons the unsent displacement reference and stops, with the positioning completed (COIN) signal being active. If the multi-position function is enabled again, the displacement to be executed is defined by H11.02.

### H11.01 Number of displacement references in multi-position mode

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-02h | Effective Time: | Real time |
| Min.: | 1 | Unit: | - |
| Max.: | 16 | Data Type: | UInt16 |
| Default: | 1 | Change: | At stop |

**Value Range:**

1 to 16

**Description**

Defines the total number of displacement references in the multi-position mode. You can set different displacements, operating speeds, and acceleration/deceleration time for each displacement.

H11.00 ≠ 2: Displacements are switched automatically in a sequence from 1, 2... H11.01.

H11.00 = 2: Assign four DIs (hardware DI or VDI) with DI functions 6 to 9 (FunIN.6: CMD1 to FunIN.9: CMD4) and you can switch between different speeds by controlling the DI logic through the host controller. The segment No. is a 4-bit binary value. Bit0 to bit 3 correspond to CMD1 to CMD4.

The displacement No. is a 4-bit binary value. The relationship between the displacement numbers and CMD1...CMD4 is shown in the following table.

| FunIN.9 | FunIN.8 | FunIN.7 | FunIN.6 | Segment No. |
|---|---|---|---|---|
| CMD4 | CMD3 | CMD2 | CMD1 | |
| 0 | 0 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 2 |
| ... | | | | |
| 1 | 1 | 1 | 1 | 16 |

### H11.02 Starting displacement No. after pause

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-03h | Effective Time: | Real time |

| | | | |
|---|---|---|---|
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Continue to execute the unexecuted displacements

1: Start from displacement 1

**Description**

Defines the starting displacement No. when the multi-position operation recovers from a pause.

Pause:

1. The servo drive switches to another control mode or the interrupt positioning function is enabled during multi-position operation.
2. The internal multi-position enable signal (FunIN.28:PosInSen) changes from "active" to "inactive".

| Setpoint | Starting displacement No. after pause | Remarks |
|---|---|---|
| 0 | Complete the remaining distance | For example, if H11.01 = 16 and the servo drive pauses when running to the 2nd position, it starts running from the 3rd position after restoring the multi-position running. |
| 1 | Start running again from 1st position | For example, if H11.01 = 16 and the servo drive pauses when running to the 2nd position, it starts running from the 1st position after restoring the multi-position running. |

**H11.03** **Interval time unit**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-04h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

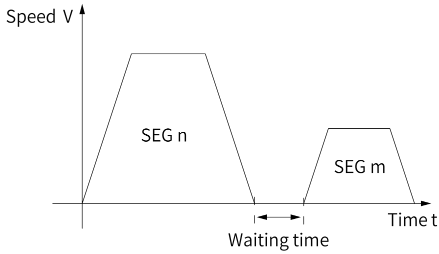
0: ms

1: s

**Description**

Defines the unit of acceleration/deceleration time and the interval time during multi-position operation.

Acceleration/Deceleration time: time for the motor to change from 0 rpm to 1000 rpm at a constant speed.
Interval time: interval time that starts from the end of the last reference to the beginning of the next reference

| Setpoint | Interval time unit | Remarks |
|---|---|---|
| 0 | ms |  |
| 1 | s | |



When H11.00 = 3 (Sequential running), H11.03 is invalid, and there is no waiting time between positions.
When H11.00 = 2 (DI switchover), H11.03 is invalid, and the time interval between positions is determined by the delay time command from the host controller.

**H11.04** **Displacement reference type**

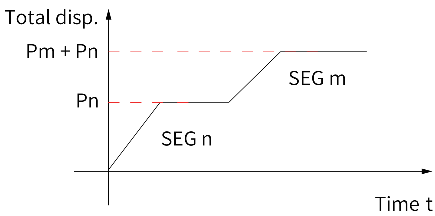
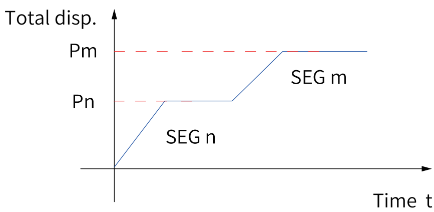
| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-05h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0: Relative displacement reference
1: Absolute displacement reference

**Description**

Relative displacement: position increment of the target position relative to the current motor position
Absolute displacement: position increment of the target position relative to the motor home.
It sets the displacement reference type when the multi-position function is used.
Displacement reference: sum of position references in a certain period.
Relative displacement: position increment of the target position relative to the current motor position. Absolute displacement: position increment of the target position relative to motor home position. For example, the displacements of the nth position and mth position are Pn (Pn > 0) and Pm (Pm > 0) respectively. Suppose Pm is larger than Pn, the comparison diagram will be as follows.

| Setpoint | Displacement instruction type | Remarks |
|---|---|---|
| 0 | Relative displacement reference | <br>mth actual displacement: Pm |
| 1 | Absolute displacement reference | <br>mth actual displacement: Pm |

When the actual displacement is a negative value, the motor runs in the reverse direction.

### H11.05 Starting displacement No. in sequential operation

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-06h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 16 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0–16

**Description**

Defines whether to perform cyclic operation and the starting displacement No. after the first cycle of operation in the sequential operation mode (H11.00 = 3).

| Setpoint | Starting displacement No. in sequential operation | Remarks |
|---|---|---|
| 0 | Not cyclic | The servo drive runs positions set in H11.01 only once, and stops after the running is completed. Then, the motor becomes in locked state. |
| 1–16 | 1–16 | The drive operates cyclically, with the starting displacement No. defined by H11.05 after the first cycle of operation. The value of H11.05 should be lower than or equal to H11.01. |

## H11.09 Deceleration upon axis control OFF

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-0Ah | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 65535 | Change: | Immediately |

**Value Range:**

0 ms to 65535 ms

**Description**

-

## H11.10 Start speed of the 1st displacement

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-0Bh | Effective Time: | Real time |
| Min.: | 0 | Unit: | rpm |
| Max.: | 6000 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0rpm–6000rpm

**Description**

-

### H11.11 Stop speed of the 1st displacement

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-0Ch | Effective Time: | Real time |
| Min.: | 0 | Unit: | rpm |
| Max.: | 6000 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0rpm–6000rpm

**Description**

-

### H11.12 Displacement 1

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-0Dh | Effective Time: | Real time |
| Min.: | -1073741824 | Unit: | Reference unit |
| Max.: | 1073741824 | Data Type: | Int32 |
| Default: | 10000 | Change: | Immediately |

**Value Range:**

-1073741824 to 1073741824

**Description**

Defines displacement 1 (reference unit) in multi-position operation.

### H11.14 Max. speed of displacement 1

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-0Fh | Effective Time: | Real time |
| Min.: | 1 | Unit: | rpm |
| Max.: | 6000 | Data Type: | UInt16 |
| Default: | 200 | Change: | Immediately |

**Value Range:**

1 rpm to 6000 rpm

**Description**

Defines the maximum speed of displacement 1 in multi-position operation. The maximum speed is the average operating speed when the motor is not in the acceleration/deceleration process. If H11.12 is set to a too low value, the actual motor speed will be lower than H11.14.

### H11.15 Acc/Dec time of displacement 1

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-10h | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms |
| Max.: | 65535 | Data Type: | UInt16 |

| | | | |
|---|---|---|---|
| Default: | 10 | Change: | Immediately |

**Value Range:**

0 ms to 65535 ms

**Description**

Defines the time for the motor to change from 0 rpm 1000 rpm at a constant speed during displacement 1.

Actual time needed for accelerating to H11.14 (Max. speed of displacement 1):

$$t = \frac{(H11.14) \times (H11.15)}{1000}$$

Note: The rigidity must be good, and the speed loop can follow the position command.

**H11.16** **Interval time after displacement 1**

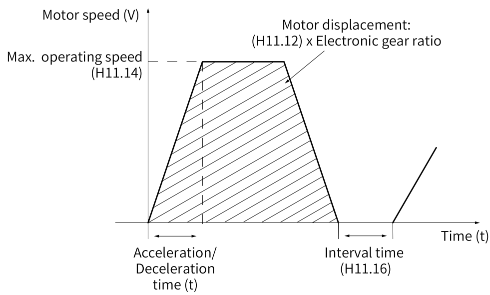
| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-11h | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms (s) |
| Max.: | 10000 | Data Type: | UInt16 |
| Default: | 10 | Change: | Immediately |

**Value Range:**

0 ms(s) to 10000 ms(s)

**Description**

Defines the interval time that starts from the end of displacement 1 to the beginning of the next displacement.




**H11.17** **Displacement 2**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-12h | Effective Time: | Real time |
| Min.: | -1073741824 | Unit: | Reference unit |
| Max.: | 1073741824 | Data Type: | Int32 |
| Default: | 10000 | Change: | Immediately |

**Value Range:**

-1073741824 to 1073741824

**Description**

-

### H11.19 Max. speed of displacement 2

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-14h | Effective Time: | Real time |
| Min.: | 1 | Unit: | rpm |
| Max.: | 6000 | Data Type: | UInt16 |
| Default: | 200 | Change: | Immediately |

**Value Range:**

1 rpm to 6000 rpm

**Description**

-

### H11.20 Acc/Dec time of displacement 2

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-15h | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 10 | Change: | Immediately |

**Value Range:**

0 ms to 65535 ms

**Description**

-

### H11.21 Interval time after displacement 2

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-16h | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms (s) |
| Max.: | 10000 | Data Type: | UInt16 |
| Default: | 10 | Change: | Immediately |

**Value Range:**

0 ms(s) to 10000 ms(s)

**Description**

-

### H11.22 Displacement 3

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-17h | Effective Time: | Real time |

| | | | |
|---|---|---|---|
| Min.: | -1073741824 | Unit: | Reference unit |
| Max.: | 1073741824 | Data Type: | Int32 |
| Default: | 10000 | Change: | Immediately |

**Value Range:**

-1073741824 to 1073741824

**Description**

-

### H11.24 Max. speed of displacement 3

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-19h | Effective Time: | Real time |
| Min.: | 1 | Unit: | rpm |
| Max.: | 6000 | Data Type: | UInt16 |
| Default: | 200 | Change: | Immediately |

**Value Range:**

1 rpm to 6000 rpm

**Description**

-

### H11.25 Acc/Dec time of displacement 3

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-1Ah | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 10 | Change: | Immediately |

**Value Range:**

0 ms to 65535 ms

**Description**

-

### H11.26 Interval time after displacement 3

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-1Bh | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms (s) |
| Max.: | 10000 | Data Type: | UInt16 |
| Default: | 10 | Change: | Immediately |

**Value Range:**

0 ms(s) to 10000 ms(s)

**Description**

-

### H11.27 Displacement 4

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-1Ch | Effective Time: | Real time |
| Min.: | -1073741824 | Unit: | Reference unit |
| Max.: | 1073741824 | Data Type: | Int32 |
| Default: | 10000 | Change: | Immediately |

**Value Range:**

-1073741824 to 1073741824

**Description**

-

### H11.29 Max. speed of displacement 4

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-1Eh | Effective Time: | Real time |
| Min.: | 1 | Unit: | rpm |
| Max.: | 6000 | Data Type: | UInt16 |
| Default: | 200 | Change: | Immediately |

**Value Range:**

1 rpm to 6000 rpm

**Description**

-

### H11.30 Acc/Dec time of displacement 4

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-1Fh | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 10 | Change: | Immediately |

**Value Range:**

0 ms to 65535 ms

**Description**

-

### H11.31 Interval time after displacement 4

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-20h | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms (s) |
| Max.: | 10000 | Data Type: | UInt16 |
| Default: | 10 | Change: | Immediately |

**Value Range:**

0 ms(s) to 10000 ms(s)

**Description**

-

**H11.32** **Displacement 5**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-21h | Effective Time: | Real time |
| Min.: | -1073741824 | Unit: | Reference unit |
| Max.: | 1073741824 | Data Type: | Int32 |
| Default: | 10000 | Change: | Immediately |

**Value Range:**

-1073741824 to 1073741824

**Description**

-

**H11.34** **Max. speed of displacement 5**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-23h | Effective Time: | Real time |
| Min.: | 1 | Unit: | rpm |
| Max.: | 6000 | Data Type: | UInt16 |
| Default: | 200 | Change: | Immediately |

**Value Range:**

1 rpm to 6000 rpm

**Description**

-

**H11.35** **Acc/Dec time of displacement 5**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-24h | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 10 | Change: | Immediately |

**Value Range:**

0 ms to 65535 ms

**Description**

-

**H11.36** **Interval time after displacement 5**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-25h | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms (s) |
| Max.: | 10000 | Data Type: | UInt16 |

| | | | |
|---|---|---|---|
| Default: | 10 | Change: | Immediately |

**Value Range:**

0 ms(s) to 10000 ms(s)

**Description**

-

### H11.37 Displacement 6

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-26h | Effective Time: | Real time |
| Min.: | -1073741824 | Unit: | Reference unit |
| Max.: | 1073741824 | Data Type: | Int32 |
| Default: | 10000 | Change: | Immediately |

**Value Range:**

-1073741824 to 1073741824

**Description**

-

### H11.39 Max. speed of displacement 6

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-28h | Effective Time: | Real time |
| Min.: | 1 | Unit: | rpm |
| Max.: | 6000 | Data Type: | UInt16 |
| Default: | 200 | Change: | Immediately |

**Value Range:**

1 rpm to 6000 rpm

**Description**

-

### H11.40 Acc/Dec time of displacement 6

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-29h | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 10 | Change: | Immediately |

**Value Range:**

0 ms to 65535 ms

**Description**

-

### H11.41 Interval time after displacement 6

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-2Ah | Effective Time: | Real time |

| | | | |
|---|---|---|---|
| Min.: | 0 | Unit: | ms (s) |
| Max.: | 10000 | Data Type: | UInt16 |
| Default: | 10 | Change: | Immediately |

**Value Range:**

0 ms(s) to 10000 ms(s)

**Description**

-

## H11.42 Displacement 7

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-2Bh | Effective Time: | Real time |
| Min.: | -1073741824 | Unit: | Reference unit |
| Max.: | 1073741824 | Data Type: | Int32 |
| Default: | 10000 | Change: | Immediately |

**Value Range:**

-1073741824 to 1073741824

**Description**

-

## H11.44 Max. speed of displacement 7

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-2Dh | Effective Time: | Real time |
| Min.: | 1 | Unit: | rpm |
| Max.: | 6000 | Data Type: | UInt16 |
| Default: | 200 | Change: | Immediately |

**Value Range:**

1 rpm to 6000 rpm

**Description**

-

## H11.45 Acc/Dec time of displacement 7

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-2Eh | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 10 | Change: | Immediately |

**Value Range:**

0 ms to 65535 ms

**Description**

-

### H11.46 Interval time after displacement 7

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-2Fh | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms (s) |
| Max.: | 10000 | Data Type: | UInt16 |
| Default: | 10 | Change: | Immediately |

**Value Range:**

0 ms(s) to 10000 ms(s)

**Description**

-

### H11.47 Displacement 8

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-30h | Effective Time: | Real time |
| Min.: | -1073741824 | Unit: | Reference unit |
| Max.: | 1073741824 | Data Type: | Int32 |
| Default: | 10000 | Change: | Immediately |

**Value Range:**

-1073741824 to 1073741824

**Description**

-

### H11.49 Max. speed of displacement 8

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-32h | Effective Time: | Real time |
| Min.: | 1 | Unit: | rpm |
| Max.: | 6000 | Data Type: | UInt16 |
| Default: | 200 | Change: | Immediately |

**Value Range:**

1 rpm to 6000 rpm

**Description**

-

### H11.50 Acc/Dec time of displacement 8

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-33h | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 10 | Change: | Immediately |

**Value Range:**

0 ms to 65535 ms

**Description**

-

**H11.51** **Interval time after displacement 8**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-34h | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms (s) |
| Max.: | 10000 | Data Type: | UInt16 |
| Default: | 10 | Change: | Immediately |

**Value Range:**

0 ms(s) to 10000 ms(s)

**Description**

-

**H11.52** **Displacement 9**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-35h | Effective Time: | Real time |
| Min.: | -1073741824 | Unit: | Reference unit |
| Max.: | 1073741824 | Data Type: | Int32 |
| Default: | 10000 | Change: | Immediately |

**Value Range:**

-1073741824 to 1073741824

**Description**

-

**H11.54** **Max. speed of displacement 9**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-37h | Effective Time: | Real time |
| Min.: | 1 | Unit: | rpm |
| Max.: | 6000 | Data Type: | UInt16 |
| Default: | 200 | Change: | Immediately |

**Value Range:**

1 rpm to 6000 rpm

**Description**

-

**H11.55** **Acc/Dec time of displacement 9**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-38h | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms |
| Max.: | 65535 | Data Type: | UInt16 |

| | | | |
|---|---|---|---|
| Default: | 10 | Change: | Immediately |

**Value Range:**

0 ms to 65535 ms

**Description**

-

### H11.56 Interval time after displacement 9

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-39h | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms (s) |
| Max.: | 10000 | Data Type: | UInt16 |
| Default: | 10 | Change: | Immediately |

**Value Range:**

0 ms(s) to 10000 ms(s)

**Description**

-

### H11.57 Displacement 10

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-3Ah | Effective Time: | Real time |
| Min.: | -1073741824 | Unit: | Reference unit |
| Max.: | 1073741824 | Data Type: | Int32 |
| Default: | 10000 | Change: | Immediately |

**Value Range:**

-1073741824 to 1073741824

**Description**

-

### H11.59 Max. speed of displacement 10

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-3Ch | Effective Time: | Real time |
| Min.: | 1 | Unit: | rpm |
| Max.: | 6000 | Data Type: | UInt16 |
| Default: | 200 | Change: | Immediately |

**Value Range:**

1 rpm to 6000 rpm

**Description**

-

### H11.60 Acc/Dec time of displacement 10

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-3Dh | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 10 | Change: | Immediately |

**Value Range:**

0 ms to 65535 ms

**Description**

-

### H11.61 Interval time after displacement 10

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-3Eh | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms (s) |
| Max.: | 10000 | Data Type: | UInt16 |
| Default: | 10 | Change: | Immediately |

**Value Range:**

0 ms(s) to 10000 ms(s)

**Description**

-

### H11.62 Displacement 11

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-3Fh | Effective Time: | Real time |
| Min.: | -1073741824 | Unit: | Reference unit |
| Max.: | 1073741824 | Data Type: | Int32 |
| Default: | 10000 | Change: | Immediately |

**Value Range:**

-1073741824 to 1073741824

**Description**

-

### H11.64 Max. speed of displacement 11

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-41h | Effective Time: | Real time |
| Min.: | 1 | Unit: | rpm |
| Max.: | 6000 | Data Type: | UInt16 |
| Default: | 200 | Change: | Immediately |

**Value Range:**

1 rpm to 6000 rpm

**Description**

-

### H11.65 Acc/Dec time of displacement 11

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-42h | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 10 | Change: | Immediately |

**Value Range:**

0 ms to 65535 ms

**Description**

-

### H11.66 Interval time after displacement 11

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-43h | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms (s) |
| Max.: | 10000 | Data Type: | UInt16 |
| Default: | 10 | Change: | Immediately |

**Value Range:**

0 ms(s) to 10000 ms(s)

**Description**

-

### H11.67 Displacement 12

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-44h | Effective Time: | Real time |
| Min.: | -1073741824 | Unit: | Reference unit |
| Max.: | 1073741824 | Data Type: | Int32 |
| Default: | 10000 | Change: | Immediately |

**Value Range:**

-1073741824 to 1073741824

**Description**

-

### H11.69 Max. speed of displacement 12

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-46h | Effective Time: | Real time |
| Min.: | 1 | Unit: | rpm |
| Max.: | 6000 | Data Type: | UInt16 |

| | | | |
|---|---|---|---|
| Default: | 200 | Change: | Immediately |

**Value Range:**

1 rpm to 6000 rpm

**Description**

-

### H11.70 Acc/Dec time of displacement 12

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-47h | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 10 | Change: | Immediately |

**Value Range:**

0 ms to 65535 ms

**Description**

-

### H11.71 Interval time after displacement 12

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-48h | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms (s) |
| Max.: | 10000 | Data Type: | UInt16 |
| Default: | 10 | Change: | Immediately |

**Value Range:**

0 ms(s) to 10000 ms(s)

**Description**

-

### H11.72 Displacement 13

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-49h | Effective Time: | Real time |
| Min.: | -1073741824 | Unit: | Reference unit |
| Max.: | 1073741824 | Data Type: | Int32 |
| Default: | 10000 | Change: | Immediately |

**Value Range:**

-1073741824 to 1073741824

**Description**

-

### H11.74 Max. speed of displacement 13

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-4Bh | Effective Time: | Real time |
| Min.: | 1 | Unit: | rpm |
| Max.: | 6000 | Data Type: | UInt16 |
| Default: | 200 | Change: | Immediately |

**Value Range:**

1 rpm to 6000 rpm

**Description**

-

### H11.75 Acc/Dec time of displacement 13

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-4Ch | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 10 | Change: | Immediately |

**Value Range:**

0 ms to 65535 ms

**Description**

-

### H11.76 Interval time after displacement 13

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-4Dh | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms (s) |
| Max.: | 10000 | Data Type: | UInt16 |
| Default: | 10 | Change: | Immediately |

**Value Range:**

0 ms(s) to 10000 ms(s)

**Description**

-

### H11.77 Displacement 14

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-4Eh | Effective Time: | Real time |
| Min.: | -1073741824 | Unit: | Reference unit |
| Max.: | 1073741824 | Data Type: | Int32 |
| Default: | 10000 | Change: | Immediately |

**Value Range:**

-1073741824 to 1073741824

**Description**

-

### H11.79 Max. speed of displacement 14

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-50h | Effective Time: | Real time |
| Min.: | 1 | Unit: | rpm |
| Max.: | 6000 | Data Type: | UInt16 |
| Default: | 200 | Change: | Immediately |

**Value Range:**

1 rpm to 6000 rpm

**Description**

-

### H11.80 Acc/Dec time of displacement 14

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-51h | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 10 | Change: | Immediately |

**Value Range:**

0 ms to 65535 ms

**Description**

-

### H11.81 Interval time after displacement 14

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-52h | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms (s) |
| Max.: | 10000 | Data Type: | UInt16 |
| Default: | 10 | Change: | Immediately |

**Value Range:**

0 ms(s) to 10000 ms(s)

**Description**

-

### H11.82 Displacement 15

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-53h | Effective Time: | Real time |
| Min.: | -1073741824 | Unit: | Reference unit |
| Max.: | 1073741824 | Data Type: | Int32 |

| | | | |
|---|---|---|---|
| Default: | 10000 | Change: | Immediately |

**Value Range:**

-1073741824 to 1073741824

**Description**

-

### H11.84 Max. speed of displacement 15

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-55h | Effective Time: | Real time |
| Min.: | 1 | Unit: | rpm |
| Max.: | 6000 | Data Type: | UInt16 |
| Default: | 200 | Change: | Immediately |

**Value Range:**

1 rpm to 6000 rpm

**Description**

-

### H11.85 Acc/Dec time of displacement 15

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-56h | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 10 | Change: | Immediately |

**Value Range:**

0 ms to 65535 ms

**Description**

-

### H11.86 Interval time after displacement 15

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-57h | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms (s) |
| Max.: | 10000 | Data Type: | UInt16 |
| Default: | 10 | Change: | Immediately |

**Value Range:**

0 ms(s) to 10000 ms(s)

**Description**

-

**H11.87 Displacement 16**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-58h | Effective Time: | Real time |
| Min.: | -1073741824 | Unit: | Reference unit |
| Max.: | 1073741824 | Data Type: | Int32 |
| Default: | 10000 | Change: | Immediately |

**Value Range:**

-1073741824 to 1073741824

**Description**

-

**H11.89 Max. speed of displacement 16**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-5Ah | Effective Time: | Real time |
| Min.: | 1 | Unit: | rpm |
| Max.: | 6000 | Data Type: | UInt16 |
| Default: | 200 | Change: | Immediately |

**Value Range:**

1 rpm to 6000 rpm

**Description**

-

**H11.90 Acc/Dec time of displacement 16**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-5Bh | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 10 | Change: | Immediately |

**Value Range:**

0 ms to 65535 ms

**Description**

-

**H11.91 Interval time after displacement 16**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2011-5Ch | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms (s) |
| Max.: | 10000 | Data Type: | UInt16 |
| Default: | 10 | Change: | Immediately |

**Value Range:**

0 ms(s) to 10000 ms(s)

**Description**

-

## 3.16 H12 Multi-Speed Operation References

**H12.00** **Multi-speed operation mode**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-01h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 2 | Data Type: | UInt16 |
| Default: | 1 | Change: | At stop |

**Value Range:**

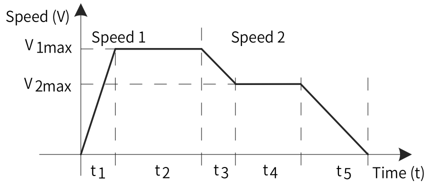
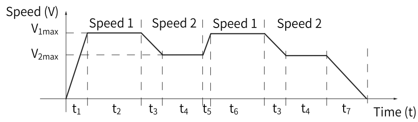
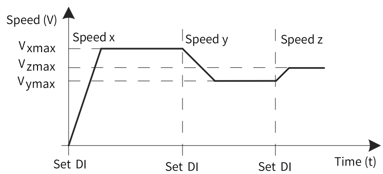
0: Stop after running for one cycle (number of speeds defined by H12.01)

1: Cyclic operation (number of speeds defined by H12.01)

2: DI-based operation

**Description**

Defines the multi-speed operation mode when the speed reference source is multi-speed reference (H06.01 = 5, H06.02 = 1/2/3) in the speed control mode. Speed arrival (FunOUT.19: V-Arr) signal is valid when a certain speed reference reaches the set value.

| Setpoint | Operation Mode | Remarks | Operation Curve |
|---|---|---|---|
| 0 | Individual operation | The drive stops after one cycle of operation.<br>The drive switches to the next displacement automatically. | <br>$V_{1max}$ , $V_{2max}$ : reference values of speed 1 and speed 2<br>$t_1$ : actual acceleration/deceleration time of speed 1<br>$t_3$ , $t_5$ : acceleration/deceleration time of speed 2 |
| 1 | Cyclic operation | The drive starts from speed 1 after each cycle of operation.<br>The drive automatically switches to the next speed.<br>The cyclic operation state remains active as long as the S-ON signal is active. | <br>$V_{1max}$ , $V_{2max}$ : maximum operating speeds in displacement 1 and displacement 2 |
| 2 | External DI signal | The drive operates continuously as long as the S-ON signal is active.<br>The speed No. is determined by the DI logic.<br>The operating time of each speed is determined only by the interval time of speed switchover.<br>The speed reference direction can be switched through FunIN.5 (DIR-SEL). | <br>x, y: speed No. (The relationship between the speed No. and the DI logic is described below.)<br>$V_x$ , $V_y$: speed references for speeds x and y<br>The speed No. determined by DI does not change, which means the speed reference operates continuously regardless of the reference operating time. |

## H12.01 Number of speed references in multi-speed mode

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-02h | Effective Time: | Real time |
| Min.: | 1 | Unit: | - |
| Max.: | 16 | Data Type: | UInt16 |
| Default: | 16 | Change: | At stop |

**Value Range:**

1 to 16

**Description**

Defines the total number of speed references in the multi-speed mode. Different speed references, operating time, and acceleration/deceleration time (four groups optional) can be set for each speed.

H12.00 ≠ 2: Speeds are switched automatically in a sequence from 1, 2... H12.01.

H12.00 is 2: Assign four DIs (Hardware DI or VDI) with DI functions 6 to 9 (FunIN.6: CMD1 to FunIN.9: CMD4) and control the DI logic through the host controller to switch between different speeds. The displacement No. is a 4-bit binary value. Bit 0 to bit 3 correspond to CMD1 to CMD4.

| FunIN.9 | FunIN.8 | FunIN.7 | FunIN.6 | Segment No. |
|---|---|---|---|---|
| CMD4 | CMD3 | CMD2 | CMD1 | |
| 0 | 0 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 2 |
| ... | | | | |
| 1 | 1 | 1 | 1 | 16 |

The value of CMD(n) is 1 upon active DI logic and 0 upon inactive DI logic.

## H12.02 Operating time unit

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-03h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: sec

1: min

**Description**

Defines the time unit of multi-speed operation.

0: s

1: min

### H12.03 Acceleration time 1

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-04h | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 10 | Change: | Immediately |

**Value Range:**

0 ms to 65535 ms

**Description**

Four groups of acceleration/deceleration time can be set for each speed reference.

Acceleration time is the time for the motor to accelerate from 0 RPM to 1000 RPM at a constant speed.

### H12.04 Deceleration time 1

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-05h | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 10 | Change: | Immediately |

**Value Range:**

0 ms to 65535 ms

**Description**

Four groups of acceleration/deceleration time can be set for each speed reference.

Deceleration time is the time for the motor to decelerate from 1000 RPM to 0 RPM at a constant speed.

### H12.05 Acceleration time 2

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-06h | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 50 | Change: | Immediately |

**Value Range:**

0 ms to 65535 ms

**Description**

Four groups of acceleration/deceleration time can be set for each speed reference.

Acceleration time is the time for the motor to accelerate from 0 RPM to 1000 RPM at a constant speed.

**H12.06** **Deceleration time 2**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-07h | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 50 | Change: | Immediately |

**Value Range:**

0 ms to 65535 ms

**Description**

Four groups of acceleration/deceleration time can be set for each speed reference.

Deceleration time is the time for the motor to decelerate from 1000 RPM to 0 RPM at a constant speed.

**H12.07** **Acceleration time 3**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-08h | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 100 | Change: | Immediately |

**Value Range:**

0 ms to 65535 ms

**Description**

Four groups of acceleration/deceleration time can be set for each speed reference.

Acceleration time is the time for the motor to accelerate from 0 RPM to 1000 RPM at a constant speed.

**H12.08** **Deceleration time 3**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-09h | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 100 | Change: | Immediately |

**Value Range:**

0 ms to 65535 ms

**Description**

Four groups of acceleration/deceleration time can be set for each speed reference.

Deceleration time is the time for the motor to decelerate from 1000 RPM to 0 RPM at a constant speed.

**H12.09** **Acceleration time 4**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-0Ah | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 150 | Change: | Immediately |

**Value Range:**

0 ms to 65535 ms

**Description**

Four groups of acceleration/deceleration time can be set for each speed reference.

Acceleration time is the time for the motor to accelerate from 0 RPM to 1000 RPM at a constant speed.

**H12.10** **Deceleration time 4**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-0Bh | Effective Time: | Real time |
| Min.: | 0 | Unit: | ms |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 150 | Change: | Immediately |

**Value Range:**

0 ms to 65535 ms

**Description**

Four groups of acceleration/deceleration time can be set for each speed reference.

Deceleration time is the time for the motor to decelerate from 1000 RPM to 0 RPM at a constant speed.

**H12.20** **Speed reference 1**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-15h | Effective Time: | Real time |
| Min.: | -6000 | Unit: | rpm |
| Max.: | 6000 | Data Type: | Int16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

–6000 rpm to 6000 rpm

**Description**

-

**H12.21** **Operating time of speed 1**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-16h | Effective Time: | Real time |

| | | | |
|---|---|---|---|
| Min.: | 0.0 | Unit: | s (m) |
| Max.: | 6553.5 | Data Type: | UInt16 |
| Default: | 5.0 | Change: | Immediately |

**Value Range:**

0.0s(m) to 6553.5s(m)

**Description**

Defines the operating time of speed 1.

The operating time is the sum of the speed variation time from previous speed reference to present speed reference plus the average operating time of present speed reference.

If the operating time is set to 0, the drive skips this speed reference automatically.

As long as H12.00 (Multi-speed operation mode) is set to 2 (DI-based operation) and the speed No. determined by the external DI does not change, the drive continues operating at the speed defined by this speed reference, not affected by the reference operating time.

### H12.22 Acceleration/Deceleration time of speed 1

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-17h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 4 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0: Zero acceleration/deceleration time

1: Acceleration/Deceleration time 1

2: Acceleration/Deceleration time 2

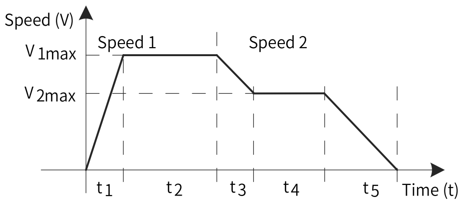
3: Acceleration/Deceleration time 3

4: Acceleration/Deceleration time 4

**Description**

Defines the acceleration/deceleration time of speed 1.

| Setpoint | Acceleration/ Deceleration time | Remarks |
|---|---|---|
| 0 | Zero acceleration/ deceleration time | Acceleration time: 0<br>Deceleration time: 0 |
| 1 | Acceleration/ Deceleration time 1 | Acceleration time: H12.03<br>Deceleration time: H12.04 |
| 2 | Acceleration/ Deceleration time 2 | Acceleration time: H12.05<br>Deceleration time: H12.06 |
| 3 | Acceleration/ Deceleration time 3 | Acceleration time: H12.07<br>Deceleration time: H12.08 |
| 4 | Acceleration/ Deceleration time 4 | Acceleration time: H12.09<br>Deceleration time: H12.10 |




- $V_{1max}$, $V_{2max}$: reference values of speed 1 and speed 2
- $t_1$: actual acceleration/deceleration time of speed 1
- $t_3$, $t_5$: acceleration/deceleration time of speed 2
- Operating time = Time taken in switching from the last speed to current speed + Duration of constant-speed operation at current speed (For example, the operating time of speed 1 is the sum of $t_1$ and $t_2$; the operating time of speed 2 is the sum of $t_3$ and $t_4$.)
- Do not set the operating time of a certain speed to 0. Otherwise, the drive skips this speed and switches to the next speed directly.

The actual acceleration time t1 is as follows.

$$t_1 = \frac{V_1}{1000} \times \text{Acc. time set for the speec}$$

The actual deceleration time $t_2$ is:

$$t_2 = \frac{V_1}{1000} \times \text{Dec. time set for the speed}$$

**H12.23** **Reference 2**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-18h | Effective Time: | Real time |
| Min.: | -6000 | Unit: | rpm |

| | | | |
|---|---|---|---|
| Max.: | 6000 | Data Type: | Int16 |
| Default: | 100 | Change: | Immediately |

**Value Range:**

–6000 rpm to 6000 rpm

**Description**

-

### H12.24 Operating time of speed 2

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-19h | Effective Time: | Real time |
| Min.: | 0.0 | Unit: | s (m) |
| Max.: | 6553.5 | Data Type: | UInt16 |
| Default: | 5.0 | Change: | Immediately |

**Value Range:**

0.0s(m) to 6553.5s(m)

**Description**

-

### H12.25 Acceleration/Deceleration time of speed 2

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-1Ah | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 4 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

See H12.22.

**Description**

-

### H12.26 Reference 3

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-1Bh | Effective Time: | Real time |
| Min.: | -6000 | Unit: | rpm |
| Max.: | 6000 | Data Type: | Int16 |
| Default: | 300 | Change: | Immediately |

**Value Range:**

–6000 rpm to 6000 rpm

**Description**

-

**H12.27** **Operating time of speed 3**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-1Ch | Effective Time: | Real time |
| Min.: | 0.0 | Unit: | s (m) |
| Max.: | 6553.5 | Data Type: | UInt16 |
| Default: | 5.0 | Change: | Immediately |

**Value Range:**

0.0s(m) to 6553.5s(m)

**Description**

-

**H12.28** **Acceleration/Deceleration time of speed 3**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-1Dh | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 4 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

See H12.22.

**Description**

-

**H12.29** **Reference 4**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-1Eh | Effective Time: | Real time |
| Min.: | -6000 | Unit: | rpm |
| Max.: | 6000 | Data Type: | Int16 |
| Default: | 500 | Change: | Immediately |

**Value Range:**

–6000 rpm to 6000 rpm

**Description**

-

**H12.30** **Operating time of speed 4**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-1Fh | Effective Time: | Real time |
| Min.: | 0.0 | Unit: | s (m) |
| Max.: | 6553.5 | Data Type: | UInt16 |
| Default: | 5.0 | Change: | Immediately |

**Value Range:**

0.0s(m) to 6553.5s(m)

**Description**

-

### H12.31 Acceleration/Deceleration time of speed 4

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-20h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 4 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

See H12.22.

**Description**

-

### H12.32 Reference 5

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-21h | Effective Time: | Real time |
| Min.: | -6000 | Unit: | rpm |
| Max.: | 6000 | Data Type: | Int16 |
| Default: | 700 | Change: | Immediately |

**Value Range:**

–6000 rpm to 6000 rpm

**Description**

-

### H12.33 Operating time of speed 5

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-22h | Effective Time: | Real time |
| Min.: | 0.0 | Unit: | s (m) |
| Max.: | 6553.5 | Data Type: | UInt16 |
| Default: | 5.0 | Change: | Immediately |

**Value Range:**

0.0s(m) to 6553.5s(m)

**Description**

-

### H12.34 Acceleration/Deceleration time of speed 5

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-23h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 4 | Data Type: | UInt16 |

| | | | |
|---|---|---|---|
| Default: | 0 | Change: | Immediately |

**Value Range:**

See H12.22.

**Description**

-

### H12.35 Reference 6

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-24h | Effective Time: | Real time |
| Min.: | -6000 | Unit: | rpm |
| Max.: | 6000 | Data Type: | Int16 |
| Default: | 900 | Change: | Immediately |

**Value Range:**

–6000 rpm to 6000 rpm

**Description**

-

### H12.36 Operating time of speed 6

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-25h | Effective Time: | Real time |
| Min.: | 0.0 | Unit: | s (m) |
| Max.: | 6553.5 | Data Type: | UInt16 |
| Default: | 5.0 | Change: | Immediately |

**Value Range:**

0.0s(m) to 6553.5s(m)

**Description**

-

### H12.37 Acc./dec. time of speed 6

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-26h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 4 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

See H12.22.

**Description**

-

### H12.38 Reference 7

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-27h | Effective Time: | Real time |

| | | | |
|---|---|---|---|
| Min.: | -6000 | Unit: | rpm |
| Max.: | 6000 | Data Type: | Int16 |
| Default: | 600 | Change: | Immediately |

**Value Range:**

–6000 rpm to 6000 rpm

**Description**

-

### H12.39 Operating time of speed 7

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-28h | Effective Time: | Real time |
| Min.: | 0.0 | Unit: | s (m) |
| Max.: | 6553.5 | Data Type: | UInt16 |
| Default: | 5.0 | Change: | Immediately |

**Value Range:**

0.0s(m) to 6553.5s(m)

**Description**

-

### H12.40 Acceleration/Deceleration time of speed 7

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-29h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 4 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

See H12.22.

**Description**

-

### H12.41 Reference 8

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-2Ah | Effective Time: | Real time |
| Min.: | -6000 | Unit: | rpm |
| Max.: | 6000 | Data Type: | Int16 |
| Default: | 300 | Change: | Immediately |

**Value Range:**

–6000 rpm to 6000 rpm

**Description**

-

### H12.42 Operating time of speed 8

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-2Bh | Effective Time: | Real time |
| Min.: | 0.0 | Unit: | s (m) |
| Max.: | 6553.5 | Data Type: | UInt16 |
| Default: | 5.0 | Change: | Immediately |

**Value Range:**

0.0s(m) to 6553.5s(m)

**Description**

-

### H12.43 Acceleration/Deceleration time of speed 8

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-2Ch | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 4 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

See H12.22.

**Description**

-

### H12.44 Reference 9

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-2Dh | Effective Time: | Real time |
| Min.: | -6000 | Unit: | rpm |
| Max.: | 6000 | Data Type: | Int16 |
| Default: | 100 | Change: | Immediately |

**Value Range:**

–6000 rpm to 6000 rpm

**Description**

-

### H12.45 Operating time of speed 9

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-2Eh | Effective Time: | Real time |
| Min.: | 0.0 | Unit: | s (m) |
| Max.: | 6553.5 | Data Type: | UInt16 |
| Default: | 5.0 | Change: | Immediately |

**Value Range:**

0.0s(m) to 6553.5s(m)

**Description**

-

### H12.46 Acceleration/Deceleration time of speed 9

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-2Fh | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 4 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

See H12.22.

**Description**

-

### H12.47 Reference 10

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-30h | Effective Time: | Real time |
| Min.: | -6000 | Unit: | rpm |
| Max.: | 6000 | Data Type: | Int16 |
| Default: | -100 | Change: | Immediately |

**Value Range:**

–6000 rpm to 6000 rpm

**Description**

-

### H12.48 Operating time of speed 10

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-31h | Effective Time: | Real time |
| Min.: | 0.0 | Unit: | s (m) |
| Max.: | 6553.5 | Data Type: | UInt16 |
| Default: | 5.0 | Change: | Immediately |

**Value Range:**

0.0s(m) to 6553.5s(m)

**Description**

-

### H12.49 Acceleration/Deceleration time of speed 10

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-32h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 4 | Data Type: | UInt16 |

| | | | |
|---|---|---|---|
| Default: | 0 | Change: | Immediately |

**Value Range:**

See H12.22.

**Description**

-

### H12.50 Reference 11

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-33h | Effective Time: | Real time |
| Min.: | -6000 | Unit: | rpm |
| Max.: | 6000 | Data Type: | Int16 |
| Default: | -300 | Change: | Immediately |

**Value Range:**

–6000 rpm to 6000 rpm

**Description**

-

### H12.51 Operating time of speed 11

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-34h | Effective Time: | Real time |
| Min.: | 0.0 | Unit: | s (m) |
| Max.: | 6553.5 | Data Type: | UInt16 |
| Default: | 5.0 | Change: | Immediately |

**Value Range:**

0.0s(m) to 6553.5s(m)

**Description**

-

### H12.52 Acceleration/Deceleration time of speed 11

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-35h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 4 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

See H12.22.

**Description**

-

### H12.53 Reference 12

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-36h | Effective Time: | Real time |

| | | | |
|---|---|---|---|
| Min.: | -6000 | Unit: | rpm |
| Max.: | 6000 | Data Type: | Int16 |
| Default: | -500 | Change: | Immediately |

**Value Range:**

–6000 rpm to 6000 rpm

**Description**

-

### H12.54 Operating time of speed 12

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-37h | Effective Time: | Real time |
| Min.: | 0.0 | Unit: | s (m) |
| Max.: | 6553.5 | Data Type: | UInt16 |
| Default: | 5.0 | Change: | Immediately |

**Value Range:**

0.0s(m) to 6553.5s(m)

**Description**

-

### H12.55 Acceleration/Deceleration time of speed 12

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-38h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 4 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

See H12.22.

**Description**

-

### H12.56 Reference 13

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-39h | Effective Time: | Real time |
| Min.: | -6000 | Unit: | rpm |
| Max.: | 6000 | Data Type: | Int16 |
| Default: | -700 | Change: | Immediately |

**Value Range:**

–6000 rpm to 6000 rpm

**Description**

-

## H12.57 Operating time of speed 13

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-3Ah | Effective Time: | Real time |
| Min.: | 0.0 | Unit: | s (m) |
| Max.: | 6553.5 | Data Type: | UInt16 |
| Default: | 5.0 | Change: | Immediately |

**Value Range:**

0.0s(m) to 6553.5s(m)

**Description**

-

## H12.58 Acceleration/Deceleration time of speed 13

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-3Bh | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 4 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

See H12.22.

**Description**

-

## H12.59 Reference 14

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-3Ch | Effective Time: | Real time |
| Min.: | -6000 | Unit: | rpm |
| Max.: | 6000 | Data Type: | Int16 |
| Default: | -900 | Change: | Immediately |

**Value Range:**

–6000 rpm to 6000 rpm

**Description**

-

## H12.60 Operating time of speed 14

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-3Dh | Effective Time: | Real time |
| Min.: | 0.0 | Unit: | s (m) |
| Max.: | 6553.5 | Data Type: | UInt16 |
| Default: | 5.0 | Change: | Immediately |

**Value Range:**

0.0s(m) to 6553.5s(m)

**Description**

-

### H12.61 Acceleration/Deceleration time of speed 14

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-3Eh | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 4 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

See H12.22.

**Description**

-

### H12.62 Reference 15

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-3Fh | Effective Time: | Real time |
| Min.: | -6000 | Unit: | rpm |
| Max.: | 6000 | Data Type: | Int16 |
| Default: | -600 | Change: | Immediately |

**Value Range:**

–6000 rpm to 6000 rpm

**Description**

-

### H12.63 Operating time of speed 15

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-40h | Effective Time: | Real time |
| Min.: | 0.0 | Unit: | s (m) |
| Max.: | 6553.5 | Data Type: | UInt16 |
| Default: | 5.0 | Change: | Immediately |

**Value Range:**

0.0s(m) to 6553.5s(m)

**Description**

-

### H12.64 Acceleration/Deceleration time of speed 15

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-41h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 4 | Data Type: | UInt16 |

| | | | |
|---|---|---|---|
| Default: | 0 | Change: | Immediately |

**Value Range:**

See H12.22.

**Description**

-

### H12.65 Reference 16

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-42h | Effective Time: | Real time |
| Min.: | -6000 | Unit: | rpm |
| Max.: | 6000 | Data Type: | Int16 |
| Default: | -300 | Change: | Immediately |

**Value Range:**

–6000 rpm to 6000 rpm

**Description**

-

### H12.66 Operating time of speed 16

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-43h | Effective Time: | Real time |
| Min.: | 0.0 | Unit: | s (m) |
| Max.: | 6553.5 | Data Type: | UInt16 |
| Default: | 5.0 | Change: | Immediately |

**Value Range:**

0.0s(m) to 6553.5s(m)

**Description**

-

### H12.67 Acc./dec. time of speed 16

| | | | |
|---|---|---|---|
| Hexadecimal: | 2012-44h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 4 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

See H12.22.

**Description**

-

## 3.17 H17 VDO/VDI settings

**H17.00** **VDI1 function selection**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-01h | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 41 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0: No assignment
1: S-ON
2: Warning reset signal
3: Gain switchover switch
4: Switchover between main and auxiliary commands
5: Multi-reference direction
6: Multi-reference switchover CMD1
7: Multi-reference switchover CMD2
8: Multi-reference switchover CMD3
9: Multi-reference switchover CMD4
10: Mode switchover M1-SEL
11: Mode switchover M2-SEL
12: Zero clamp enable signal
13: Position reference inhibited
14: Positive limit switch
15: Reverse limit switch
16: Positive external torque limit
17: Negative external torque limit
18: Forward jog
19: Reverse jog
20: Step enable
21: Hand wheel override signal 1
22: Hand wheel override signal 2
23: Hand wheel enable signal
24: Electronic gear ratio selection
25: Torque reference direction
26: Speed reference direction
27: Position reference direction
28: Multi-position reference enable
29: Interrupt positioning canceled
30: None

31: Home switch
32: Homing enable
33: Interrupt positioning inhibited
34: Emergency stop
35: Clear position deviation
36: Internal speed limit source
37: Pulse reference inhibited
38: Writing reference causes interrupt
39: Writing reference does not cause interrupt
40: Clear positioning and reference completed signals
41: Current position as home

**Description**

-

### H17.01 VDI1 logic selection

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-02h | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

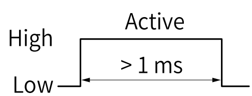
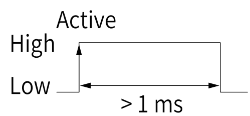
**Value Range:**

0: Active when the written value is 1

1: Active when the written value changes from 0 to 1

**Description**

It sets the input level logic of VDI1 for enabling the VDI1 function.

| Setpoint | VDI1 logic upon active DI function | Remarks |
|---|---|---|
| 0 | 0: Active when 1 is written |  |
| 1 | Active when written value changes from 0 to 1 |  |

### H17.02 VDI2 function selection

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-03h | Effective Time: | At stop |

| | | | |
|---|---|---|---|
| Min.: | 0 | Unit: | - |
| Max.: | 41 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

See H17.00.

**Description**

-

### H17.03 VDI2 logic selection

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-04h | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Active when the written value is 1

1: Active when the written value changes from 0 to 1

**Description**

-

### H17.04 VDI3 function selection

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-05h | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 41 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

See H17.00.

**Description**

-

### H17.05 VDI3 logic selection

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-06h | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Active when the written value is 1

1: Active when the written value changes from 0 to 1

**Description**

-

### H17.06 VDI4 function selection

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-07h | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 41 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

See H17.00.

**Description**

-

### H17.07 VDI4 logic selection

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-08h | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Active when the written value is 1

1: Active when the written value changes from 0 to 1

**Description**

-

### H17.08 VDI5 function selection

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-09h | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 41 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

See H17.00.

**Description**

-

### H17.09 VDI5 logic selection

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-0Ah | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Active when the written value is 1
1: Active when the written value changes from 0 to 1

**Description**

-

**H17.10** **VDI6 function selection**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-0Bh | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 41 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

See H17.00.

**Description**

-

**H17.11** **VDI6 logic selection**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-0Ch | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Active when the written value is 1
1: Active when the written value changes from 0 to 1

**Description**

-

**H17.12** **VDI7 function selection**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-0Dh | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 41 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

See H17.00.

**Description**

-

**H17.13** **VDI7 logic selection**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-0Eh | Effective Time: | At stop |

| | | | |
|---|---|---|---|
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Active when the written value is 1

1: Active when the written value changes from 0 to 1

**Description**

-

### H17.14 VDI8 function selection

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-0Fh | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 41 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

See H17.00.

**Description**

-

### H17.15 VDI8 logic selection

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-10h | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Active when the written value is 1

1: Active when the written value changes from 0 to 1

**Description**

-

### H17.16 VDI9 function selection

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-11h | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 41 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

See H17.00.

**Description**

-

**H17.17** **VDI9 logic selection**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-12h | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Active when the written value is 1

1: Active when the written value changes from 0 to 1

**Description**

-

**H17.18** **VDI10 function selection**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-13h | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 41 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

See H17.00.

**Description**

-

**H17.19** **VDI10 logic selection**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-14h | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Active when the written value is 1

1: Active when the written value changes from 0 to 1

**Description**

-

**H17.20** **VDI11 function selection**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-15h | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 41 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

See H17.00.

**Description**

-

**H17.21** **VDI11 logic selection**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-16h | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Active when the written value is 1

1: Active when the written value changes from 0 to 1

**Description**

-

**H17.22** **VDI12 function selection**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-17h | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 41 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

See H17.00.

**Description**

-

**H17.23** **VDI12 logic selection**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-18h | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Active when the written value is 1

1: Active when the written value changes from 0 to 1

**Description**

-

**H17.24** **VDI13 function selection**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-19h | Effective Time: | At stop |

| | | | |
|---|---|---|---|
| Min.: | 0 | Unit: | - |
| Max.: | 41 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

See H17.00.

**Description**

-

### H17.25 VDI13 logic selection

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-1Ah | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Active when the written value is 1

1: Active when the written value changes from 0 to 1

**Description**

-

### H17.26 VDI14 function selection

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-1Bh | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 41 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

See H17.00.

**Description**

-

### H17.27 VDI14 logic selection

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-1Ch | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Active when the written value is 1

1: Active when the written value changes from 0 to 1

**Description**

-

**H17.28** **VDI15 function selection**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-1Dh | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 41 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

See H17.00.

**Description**

-

**H17.29** **VDI15 logic selection**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-1Eh | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Active when the written value is 1

1: Active when the written value changes from 0 to 1

**Description**

-

**H17.30** **VDI16 function selection**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-1Fh | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 41 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

See H17.00.

**Description**

-

**H17.31** **VDI16 logic selection**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-20h | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Active when the written value is 1

1: Active when the written value changes from 0 to 1

**Description**

-

**H17.32 VDO virtual level**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-21h | Effective Time: | - |
| Min.: | 0 | Unit: | - |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 0 | Change: | Unchangeable |

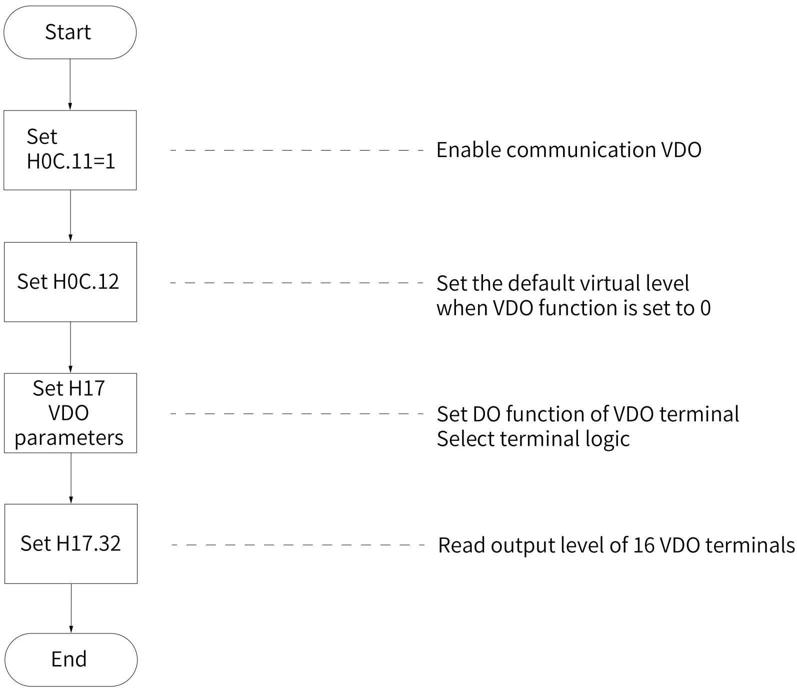
**Value Range:**

0–65535

**Description**

It sets the default virtual level of the VDO allocated with function 0 (disabled).

Use the VDO according to the following procedure:




**H17.33 VDO1 function selection**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-22h | Effective Time: | At stop |

| | | | |
|---|---|---|---|
| Min.: | 0 | Unit: | - |
| Max.: | 24 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: No assignment
1: Servo ready
2: Motor rotation
3: Zero speed
4: Speed matching
5: Positioning completed
6: Proximity
7: Torque limited
8: Speed limited
9: Brake
10: Warning
11: Fault
12: Output 3-bit warning code
13: Output 3-bit warning code
14: Output 3-bit warning code
15: Interrupt positioning completed
16: Homing completed
17: Electrical homing completed
18: Torque reach
19: Speed reach
22: Internal command completed
23: Writing next command allowed
24: Internal motion completed

**Description**

-

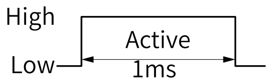
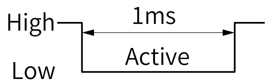
### H17.34 VDO1 logic level

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-23h | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Output 1 upon active logic
1: Output 0 upon active logic

**Description**

| Setpoint | VDO1 terminal logic | Remarks |
|---|---|---|
| 0 | Output 1 when function valid |  |
| 1 | Output 0 when function valid |  |

## H17.35 VDO2 function selection

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-24h | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 24 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

See H17.33.

**Description**

-

## H17.36 VDO2 logic level

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-25h | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Output 1 upon active logic

1: Output 0 upon active logic

**Description**

-

## H17.37 VDO3 function selection

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-26h | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 24 | Data Type: | UInt16 |

| | | | |
|---|---|---|---|
| Default: | 0 | Change: | At stop |

**Value Range:**

See H17.33.

**Description**

-

## H17.38 VDO3 logic level

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-27h | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Output 1 upon active logic

1: Output 0 upon active logic

**Description**

-

## H17.39 VDO4 function selection

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-28h | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 24 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

See H17.33.

**Description**

-

## H17.40 VDO4 logic level

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-29h | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Output 1 upon active logic

1: Output 0 upon active logic

**Description**

-

**H17.41** **VDO5 function selection**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-2Ah | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 24 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

See H17.33.

**Description**

-

**H17.42** **VDO5 logic level**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-2Bh | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Output 1 upon active logic

1: Output 0 upon active logic

**Description**

-

**H17.43** **VDO6 function selection**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-2Ch | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 24 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

See H17.33.

**Description**

-

**H17.44** **VDO6 logic level**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-2Dh | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Output 1 upon active logic
1: Output 0 upon active logic

**Description**

-

## H17.45 VDO7 function selection

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-2Eh | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 24 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

See H17.33.

**Description**

-

## H17.46 VDO7 logic level

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-2Fh | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Output 1 upon active logic
1: Output 0 upon active logic

**Description**

-

## H17.47 VDO8 function selection

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-30h | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 24 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

See H17.33.

**Description**

-

## H17.48 VDO8 logic level

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-31h | Effective Time: | At stop |

| | | | |
|---|---|---|---|
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Output 1 upon active logic

1: Output 0 upon active logic

**Description**

-

## H17.49 VDO9 function selection

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-32h | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 24 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

See H17.33.

**Description**

-

## H17.50 VDO9 logic level

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-33h | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Output 1 upon active logic

1: Output 0 upon active logic

**Description**

-

## H17.51 VDO10 function selection

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-34h | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 24 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

See H17.33.

**Description**

-

**H17.52** **VDO10 logic level**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-35h | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Output 1 upon active logic

1: Output 0 upon active logic

**Description**

-

**H17.53** **VDO11 function selection**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-36h | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 24 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

See H17.33.

**Description**

-

**H17.54** **VDO11 logic level**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-37h | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Output 1 upon active logic

1: Output 0 upon active logic

**Description**

-

**H17.55** **VDO12 function selection**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-38h | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 24 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

See H17.33.

**Description**

-

**H17.56 VDO12 logic level**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-39h | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Output 1 upon active logic

1: Output 0 upon active logic

**Description**

-

**H17.57 VDO13 function selection**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-3Ah | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 24 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

See H17.33.

**Description**

-

**H17.58 VDO13 logic level**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-3Bh | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Output 1 upon active logic

1: Output 0 upon active logic

**Description**

-

**H17.59 VDO14 function selection**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-3Ch | Effective Time: | At stop |

| | | | |
|---|---|---|---|
| Min.: | 0 | Unit: | - |
| Max.: | 24 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

See H17.33.

**Description**

-

### H17.60 VDO14 logic level

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-3Dh | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Output 1 upon active logic

1: Output 0 upon active logic

**Description**

-

### H17.61 VDO15 function selection

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-3Eh | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 24 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

See H17.33.

**Description**

-

### H17.62 VDO15 logic level

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-3Fh | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Output 1 upon active logic

1: Output 0 upon active logic

**Description**

-

**H17.63** **VDO16 function selection**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-40h | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 24 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

See H17.33.

**Description**

-

**H17.64** **VDO16 logic level**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2017-41h | Effective Time: | At stop |
| Min.: | 0 | Unit: | - |
| Max.: | 1 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0: Output 1 upon active logic

1: Output 0 upon active logic

**Description**

-

## 3.18 H1B Motor Storage Property

**H1B.14** **Bit01 of motor SN code**

| | | | |
|---|---|---|---|
| Hexadecimal: | 201B-0Fh | Effective Time: | - |
| Min.: | 0 | Unit: | - |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0 to 65535

**Description**

-

**H1B.15** **Bit23 of motor SN code**

| | | | |
|---|---|---|---|
| Hexadecimal: | 201B-10h | Effective Time: | - |
| Min.: | 0 | Unit: | - |
| Max.: | 65535 | Data Type: | UInt16 |

| | | | |
|---|---|---|---|
| Default: | 0 | Change: | At stop |

**Value Range:**

0 to 65535

**Description**

-

**H1B.16** **Bit45 of motor SN code**

| | | | |
|---|---|---|---|
| Hexadecimal: | 201B-11h | Effective Time: | - |
| Min.: | 0 | Unit: | - |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0 to 65535

**Description**

-

**H1B.17** **Bit67 of motor SN code**

| | | | |
|---|---|---|---|
| Hexadecimal: | 201B-12h | Effective Time: | - |
| Min.: | 0 | Unit: | - |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0 to 65535

**Description**

-

**H1B.18** **Bit89 of motor SN code**

| | | | |
|---|---|---|---|
| Hexadecimal: | 201B-13h | Effective Time: | - |
| Min.: | 0 | Unit: | - |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0 to 65535

**Description**

-

**H1B.19** **Bit11 of motor SN code**

| | | | |
|---|---|---|---|
| Hexadecimal: | 201B-14h | Effective Time: | - |

| | | | |
|---|---|---|---|
| Min.: | 0 | Unit: | - |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0 to 65535

**Description**

-

### H1B.20 Bit13 of motor SN code

| | | | |
|---|---|---|---|
| Hexadecimal: | 201B-15h | Effective Time: | - |
| Min.: | 0 | Unit: | - |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0 to 65535

**Description**

-

### H1B.21 Bit15 of motor SN code

| | | | |
|---|---|---|---|
| Hexadecimal: | 201B-16h | Effective Time: | - |
| Min.: | 0 | Unit: | - |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0 to 65535

**Description**

-

### H1B.47 Motor storage property shield word 1

| | | | |
|---|---|---|---|
| Hexadecimal: | 201B-30h | Effective Time: | Upon the next power-on |
| Min.: | 0 | Unit: | - |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0 to 65535

**Description**

-

### H1B.48 Motor storage property shield word 2

| | | | |
|---|---|---|---|
| Hexadecimal: | 201B-31h | Effective Time: | Upon the next power-on |
| Min.: | 0 | Unit: | - |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 0 | Change: | At stop |

**Value Range:**

0 to 65535

**Description**

-

## 3.19 H30 Servo status variables read through communication

### H30.00 Servo status read through communication

| | | | |
|---|---|---|---|
| Hexadecimal: | 2030-01h | Effective Time: | - |
| Min.: | 0 | Unit: | - |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

0 to 65535

**Description**

H30.00 value is hexadecimal, and is not displayed on the keypad. It is read as binary, and each bit of the binary is defined as follows:

| bit | Servo State | Remarks |
|---|---|---|
| 0 | Servo ready | It determines whether the servo main circuit DC bus voltage is ready and the servo drive is ready for running.<br>0: Servo drive not ready<br>1: Servo ready |
| 1–11 | Reserved | - |
| 12–13 | Servo running state | It determines the servo running state.<br>00: Servo drive not ready (main circuit DC bus voltage not set up correctly)<br>01: Servo drive ready (main circuit DC bus voltage set up correctly, servo drive is ready for running)<br>10: Servo drive running (S-ON active)<br>11: Servo drive fault (a level 1 or level 2 fault occurs) |
| 14–15 | Reserved | - |

**H30.01** **DO function state 1 read through communication**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2030-02h | Effective Time: | - |
| Min.: | 0 | Unit: | - |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

0 to 65535

**Description**

Used to read the state of DO functions 1 to 16 through communication. H30.01 is a hexadecimal which is not displayed on the keypad and must be converted to a binary equivalent when it is being read through communication.

| bit | DO Function | Remarks |
|---|---|---|
| 0 | DO function 1 (FunOUT.1: S-RDY, servo ready) | 0: Servo drive not ready<br>1: Servo ready |
| ... | | |
| 15 | DO function 16 (FunOUT.16: HomeAttain, homing output) | 0: Home not found<br>1: Home found |

## H30.02 DO function state 2 read through communication

| | | | |
|---|---|---|---|
| Hexadecimal: | 2030-03h | Effective Time: | - |
| Min.: | 0 | Unit: | - |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

0 to 65535

**Description**

Bit 0 corresponds to DO function 17.

Bit 1 corresponds to DO function 18.

Bit 2 corresponds to DO function 19.

…

By analogy

| bit | DO Function | Remarks |
|---|---|---|
| 0 | DO function 17 (FunOUT.17: S-ElecHomeAttain, electrical homing output) | 0: Electrical homing not completed<br>1: Electrical homing completed |
| ... | | |
| 4 to 15 | Reserved | - |

## H30.03 Input pulse reference sampling value read through communication

| | | | |
|---|---|---|---|
| Hexadecimal: | 2030-04h | Effective Time: | - |
| Min.: | 0 | Unit: | - |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

0 to 65535

**Description**

-

## H30.04 DI status read through communication

| | | | |
|---|---|---|---|
| Hexadecimal: | 2030-05h | Effective Time: | - |
| Min.: | 0 | Unit: | - |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 0 | Change: | Unchangeable |

**Value Range:**

0 to 65535

**Description**

-

## 3.20 H31 Related variables set through communication

### H31.00 VDI virtual level set through communication

| | | | |
|---|---|---|---|
| Hexadecimal: | 2031-01h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 65535 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

**Value Range:**

0–65535

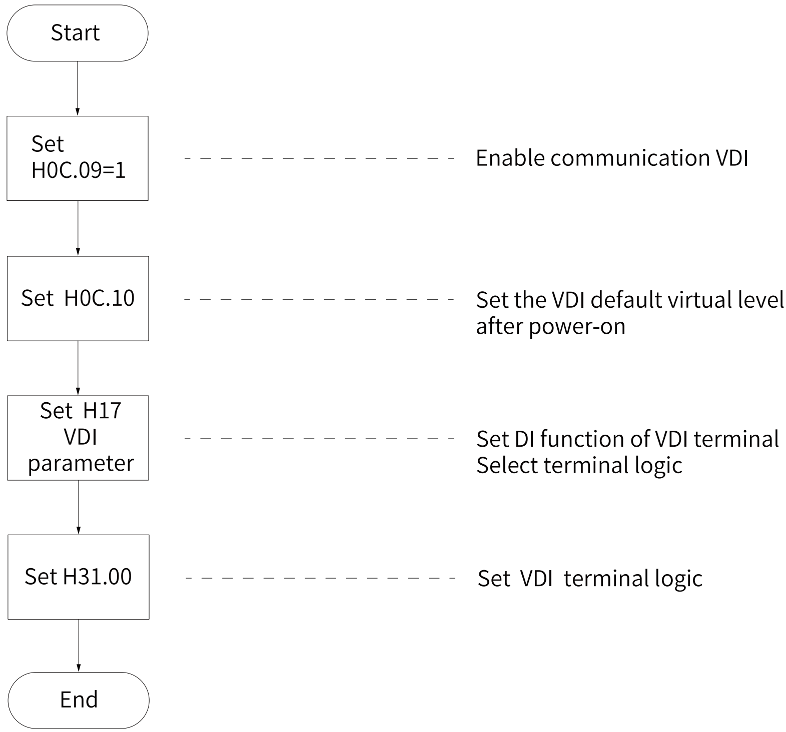
**Description**

When H0C.09 is set to 1, the VDI state is defined by H31.00.

The VDI logic is determined by H0C.10 (Default VDI virtual level value upon power-on) upon initial power-on. Then, H31.00 is determined by the VDI logic.

"bit(n) = 1" of H31.00 indicates the logic of VDI (n+1) is "1". "bit(n)=0" indicates the logic of VDI (n+1) is "0".

Use the VDI according to the following procedure:




**H31.04** **DO state set through communication**

| | | | |
|---|---|---|---|
| Hexadecimal: | 2031-05h | Effective Time: | Real time |
| Min.: | 0 | Unit: | - |
| Max.: | 31 | Data Type: | UInt16 |
| Default: | 0 | Change: | Immediately |

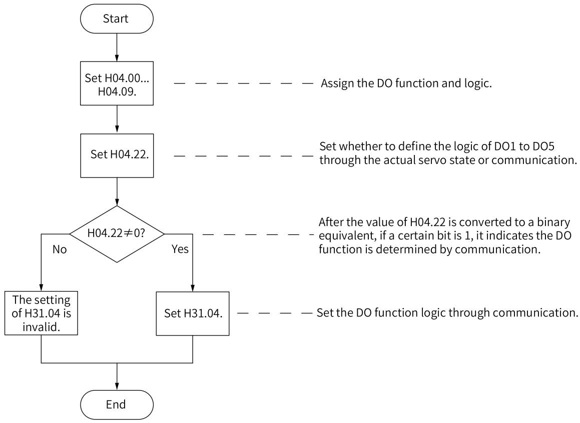
**Value Range:**

0 to 31

**Description**

Set H04.22 to define the DO state source by H31.04.

Use the DO according to the following procedure:




## H31.09 Speed reference set through communication

| | | | |
|---|---|---|---|
| Hexadecimal: | 2031-0Ah | Effective Time: | Real time |
| Min.: | -6000.000 | Unit: | rpm |
| Max.: | 6000.000 | Data Type: | Int32 |
| Default: | 0.000 | Change: | Immediately |

**Value Range:**

-6000.000rpm to 6000.000rpm

**Description**

Set H06.02 to 4 to define the speed reference in the speed control mode through H31.09 (unit: 0.001 rpm).

## H31.11 Torque reference set through communication

| | | | |
|---|---|---|---|
| Hexadecimal: | 2031-0Ch | Effective Time: | Real time |
| Min.: | -100.000 | Unit: | % |
| Max.: | 100.000 | Data Type: | Int32 |
| Default: | 0.000 | Change: | Immediately |

**Value Range:**

-100.000% to 100.000%

**Description**

Set H07.02 to 4 to define the torque reference in the torque control mode through H31.11 (unit: 0.001%). The setpoint 100.000% corresponds to the rated torque of the motor.

# 4 Parameter List

## 4.1 Parameter Group H00

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H00.00 | 2000-01h | Motor code | 0–65535 | 14101 | - | At stop | " H00_en.00" on page 136 |
| H00.02 | 2000-03h | Customized No. | 0.00–42949672.95 | 0.00 | - | Unchangeable | " H00_en.02" on page 136 |
| H00.04 | 2000-05h | Encoder version | 0.0–6553.5 | 0.0 | - | Unchangeable | " H00_en.04" on page 136 |
| H00.05 | 2000-06h | Serial-type motor code | 0–65535 | 0 | - | Unchangeable | " H00_en.05" on page 136 |
| H00.06 | 2000-07h | FPGA customized SN | 0.00–10485.75 | 0.00 | - | Unchangeable | " H00_en.06" on page 137 |
| H00.08 | 2000-09h | Serial encoder type | 0–65535 | 0 | - | Immediately | " H00_en.08" on page 137 |
| H00.09 | 2000-0Ah | Rated voltage | 0: 220 V<br>1: 380 V | 0 | V | At stop | " H00_en.09" on page 137 |
| H00.10 | 2000-0Bh | Rated power | 0.01 kW–655.35 kW | 0.01 | kW | At stop | " H00_en.10" on page 138 |
| H00.11 | 2000-0Ch | Rated current | 0.01 A to 655.35 A | 0.01 | A | At stop | " H00_en.11" on page 138 |
| H00.12 | 2000-0Dh | Rated torque | 0.10N·m–655.35N·m | 0.10 | N·m | At stop | " H00_en.12" on page 138 |
| H00.13 | 2000-0Eh | Max. torque | 0.10N·m–655.35N·m | 0.10 | N·m | At stop | " H00_en.13" on page 138 |
| H00.14 | 2000-0Fh | Rated speed | 100rpm–9000rpm | 100 | rpm | At stop | " H00_en.14" on page 139 |
| H00.15 | 2000-10h | Maximum speed | 100rpm–9000rpm | 100 | rpm | At stop | " H00_en.15" on page 139 |
| H00.16 | 2000-11h | Moment of inertia Jm | 0.01 $kgcm^2$–655.35 $kgcm^2$ | 0.01 | $kgcm^2$ | At stop | " H00_en.16" on page 139 |
| H00.17 | 2000-12h | Number of PMSM pole pairs | 2–360 | 2 | - | At stop | " H00_en.17" on page 140 |
| H00.18 | 2000-13h | Stator resistance | 0.001 Ω to 65.535 Ω | 0.001 | Ω | At stop | " H00_en.18" on page 140 |
| H00.19 | 2000-14h | Stator inductance Lq | 0.01 mH to 655.35 mH | 0.01 | mH | At stop | " H00_en.19" on page 140 |
| H00.20 | 2000-15h | Stator inductance Ld | 0.01 mH to 655.35 mH | 0.01 | mH | At stop | " H00_en.20" on page 140 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H00.21 | 2000-16h | Linear back EMF coefficient | 0.01 mV/rpm to 655.35 mV/rpm | 0.01 | mV/rpm | At stop | " H00_en.21" on page 141 |
| H00.22 | 2000-17h | Torque coefficient Kt | 0.01 N·m/Arms to 655.35 N·m/Arms | 0.01 | N·m/Arms | At stop | " H00_en.22" on page 141 |
| H00.23 | 2000-18h | Electrical constant Te | 0.01 ms to 655.35 ms | 0.01 | ms | At stop | " H00_en.23" on page 141 |
| H00.24 | 2000-19h | Mechanical constant Tm | 0.01 ms to 655.35 ms | 0.01 | ms | At stop | " H00_en.24" on page 141 |
| H00.27 | 2000-1Ch | Sine/Cosine number of serial encoder motor | 0–65535 | 1 | - | Immediately | " H00_en.27" on page 142 |
| H00.28 | 2000-1Dh | Absolute encoder position offset | 0P/Rev–1073741824P/Rev | 0 | PPR | At stop | " H00_en.28" on page 142 |
| H00.30 | 2000-1Fh | Encoder selection (Hex) | 0: Regular incremental encoder (UVW-ABZ)<br>1: Wire-saving encoder (ABZ[UVW])<br>2: Regular incremental encoder (ABZ, without UVW)<br>16: TAMAGAWA encoder<br>18: Nikon encoder<br>19: Inovance encoder<br>48: Optical scale | 19 | - | At stop | " H00_en.30" on page 142 |
| H00.31 | 2000-20h | Encoder PPR | 1P/Rev–1073741824P/Rev | 8388608 | PPR | At stop | " H00_en.31" on page 143 |
| H00.35 | 2000-24h | Motor code saved in the serial encoder | 0–65535 | 0 | - | At stop | " H00_en.35" on page 143 |
| H00.37 | 2000-26h | Encoder function setting bit | 0–255 | 0 | - | Unchangeable | " H00_en.37" on page 143 |
| H00.43 | 2000-2Ch | Maximum Current | 0.00 A to 655.35 A | 16.95 | A | At stop | " H00_en.43" on page 144 |

## 4.2 Parameter Group H01

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H01.00 | 2001-01h | MCU software version | 0.0–6553.5 | 0.0 | - | Unchangeable | " H01_en.00" on page 144 |
| H01.01 | 2001-02h | FPGA software version | 0.0–6553.5 | 0.0 | - | Unchangeable | " H01_en.01" on page 144 |
| H01.02 | 2001-03h | Servo Drive Model | 0–65535 | 0 | - | At stop | " H01_en.02" on page 144 |
| H01.04 | 2001-05h | Voltage class | 0 V to 65535 V | 220 | V | Immediately | " H01_en.04" on page 145 |
| H01.05 | 2001-06h | Rated power | 0.01 kW–655.35 kW | 75.00 | kW | Immediately | " H01_en.05" on page 145 |
| H01.06 | 2001-07h | Max. output power | 0.01 kW–655.35 kW | 75.00 | kW | Immediately | " H01_en.06" on page 145 |
| H01.07 | 2001-08h | Rated output current | 0.01 A to 655.35 A | 5.50 | A | Immediately | " H01_en.07" on page 145 |
| H01.08 | 2001-09h | Max. output current | 0.01 A to 655.35 A | 16.90 | A | Immediately | " H01_en.08" on page 146 |
| H01.10 | 2001-0Bh | Carrier frequency | 4000–20000 | 8000 | - | Immediately | " H01_en.10" on page 146 |
| H01.11 | 2001-0Ch | Current loop modulation frequency | 0: Carrier frequency<br>1: 2 × carrier frequency | 1 | - | At stop | " H01_en.11" on page 146 |
| H01.12 | 2001-0Dh | Speed loop scheduling frequency-division coefficient | 1: Current loop modulation frequency/1<br>2: Current loop modulation frequency/2<br>4: Current loop modulation frequency/4<br>8: Current loop modulation frequency/8<br>16: Current loop modulation frequency/16<br>32: Current loop modulation frequency/32 | 1 | - | Immediately | " H01_en.12" on page 147 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H01.13 | 2001-0Eh | Position loop scheduling frequency-division coefficient | 2: Current loop modulation frequency/2<br>4: Current loop modulation frequency/4<br>8: Current loop modulation frequency/8<br>16: Current loop modulation frequency/16<br>32: Current loop modulation frequency/32<br>64: Current loop modulation frequency/64<br>128: Current loop modulation frequency/128 | 4 | - | Immediately | " H01_en.13" on page 147 |
| H01.14 | 2001-0Fh | Dead zone time | 0.01 us to 20.00 us | 2.00 | us | Immediately | " H01_en.14" on page 147 |
| H01.15 | 2001-10h | DC bus overvoltage protection threshold | 0 V to 2000 V | 420 | V | Immediately | " H01_en.15" on page 148 |
| H01.16 | 2001-11h | DC bus voltage discharge threshold | 0 V to 2000 V | 380 | V | Immediately | " H01_en.16" on page 148 |
| H01.17 | 2001-12h | DC bus undervoltage threshold | 0 V to 2000 V | 200 | V | Immediately | " H01_en.17" on page 148 |
| H01.18 | 2001-13h | Servo drive overcurrent protection threshold | 10%–100% | 100 | % | Immediately | " H01_en.18" on page 148 |
| H01.19 | 2001-14h | Sampling coefficient of 7860 | 1–65535 | 3200 | - | Immediately | " H01_en.19" on page 149 |
| H01.20 | 2001-15h | Dead zone compensation | 0.00us–20.00us | 2.00 | us | Immediately | " H01_en.20" on page 149 |
| H01.21 | 2001-16h | Minimum switch-on time of bootstrap circuit | 1.0us–20.0us | 4.0 | us | At stop | " H01_en.21" on page 149 |
| H01.22 | 2001-17h | D-axis back EMF constant | 0.0%–6553.5% | 60.0 | % | Immediately | " H01_en.22" on page 149 |
| H01.23 | 2001-18h | Q-axis back EMF constant | 0.0%–6553.5% | 100.0 | % | Immediately | " H01_en.23" on page 150 |
| H01.24 | 2001-19h | D-axis current loop gain | 1–65535 | 1000 | - | Immediately | " H01_en.24" on page 150 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H01.25 | 2001-1Ah | D-axis current loop integral compensation factor | 0–65535 | 200 | - | Immediately | " H01_en.25" on page 150 |
| H01.26 | 2001-1Bh | Sinc3 filter data extraction rate in current sampling | 0: Extraction rate 32<br>1: Extraction rate 64<br>2: Extraction rate 128<br>3: Extraction rate 256 | 0 | - | At stop | " H01_en.26" on page 151 |
| H01.27 | 2001-1Ch | Q-axis current loop gain | 1–65535 | 1000 | - | Immediately | " H01_en.27" on page 151 |
| H01.28 | 2001-1Dh | Q-axis current loop integral compensation factor | 0–65535 | 100 | - | Immediately | " H01_en.28" on page 151 |
| H01.29 | 2001-1Eh | Control power voltage sampling coefficient | 50.0–150.0 | 100.0 | - | At stop | " H01_en.29" on page 151 |
| H01.30 | 2001-1Fh | Bus voltage gain tuning | 50.0%–150.0% | 100.0 | % | Immediately | " H01_en.30" on page 152 |
| H01.31 | 2001-20h | FOC calculation time | 1.00us–100.00us | 2.60 | us | Immediately | " H01_en.31" on page 152 |
| H01.32 | 2001-21h | Relative gain of UV sampling | 0–65535 | 0 | - | Unchangeable | " H01_en.32" on page 152 |
| H01.37 | 2001-26h | Model identification version | 0–65535 | 0 | - | Immediately | " H01_en.37" on page 153 |
| H01.44 | 2001-2Dh | Sinc3 filter data extraction rate in 2nd group of current sampling | 0: Extraction rate 32<br>1: Extraction rate 64<br>2: Extraction rate 128<br>3: Extraction rate 256 | 2 | - | At stop | " H01_en.44" on page 153 |
| H01.45 | 2001-2Eh | Phase U duty cycle obtained upon voltage injection | 0–65535 | 0 | - | Immediately | " H01_en.45" on page 153 |
| H01.47 | 2001-30h | MCU current reference processing time | 0.00us–60.00us | 38.00 | us | Immediately | " H01_en.47" on page 153 |
| H01.48 | 2001-31h | AD sampling delay | 0.00us–20.00us | 1.00 | us | Immediately | " H01_en.48" on page 154 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H01.49 | 2001-32h | Serial encoder data dissemination delay | 0.00us–500.00us | 61.00 | us | Immediately | " H01_en.49" on page 154 |
| H01.50 | 2001-33h | Interval version of DSP software | 0.00–655.35 | 0.00 | - | Immediately | " H01_en.50" on page 154 |
| H01.52 | 2001-35h | D-axis proportional gain in performance priority mode | 0–65535 | 2000 | - | Immediately | " H01_en.52" on page 154 |
| H01.53 | 2001-36h | D-axis integral gain in performance priority mode | 0.00–655.35 | 2.00 | - | Immediately | " H01_en.53" on page 155 |
| H01.54 | 2001-37h | Q-axis proportional gain in performance priority mode | 0–65535 | 2000 | - | Immediately | " H01_en.54" on page 155 |
| H01.55 | 2001-38h | Q-axis integral gain in performance priority mode | 0.00–655.35 | 1.00 | - | Immediately | " H01_en.55" on page 155 |
| H01.56 | 2001-39h | 2nd group of proportional gain coefficient in performance priority mode | 0.0%–1000.0% | 100.0 | % | Immediately | " H01_en.56" on page 156 |
| H01.57 | 2001-3Ah | 3rd group of proportional gain coefficient in performance priority mode | 0.0%–1000.0% | 100.0 | % | Immediately | " H01_en.57" on page 156 |
| H01.58 | 2001-3Bh | 1st gain switchover threshold in performance priority mode | 0.0%–300.0% | 1.0 | % | Immediately | " H01_en.58" on page 156 |
| H01.59 | 2001-3Ch | 2nd gain switchover threshold in performance priority mode | 0.0%–300.0% | 2.0 | % | Immediately | " H01_en.59" on page 156 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H01.60 | 2001-3Dh | 3rd gain switchover threshold in performance priority mode | 0.0%–300.0% | 100.0 | % | Immediately | " H01_en.60" on page 157 |
| H01.61 | 2001-3Eh | 4th gain switchover threshold in performance priority mode | 0.0%–300.0% | 200.0 | % | Immediately | " H01_en.61" on page 157 |
| H01.62 | 2001-3Fh | Phase U/V 7860 detection protection threshold | 0–320 | 280 | - | Unchangeable | " H01_en.62" on page 157 |
| H01.63 | 2001-40h | Serial encoder data transmission compensation time | 0.00–10.00 | 0.00 | - | At stop | " H01_en.63" on page 158 |

## 4.3 Parameter Group H02

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H02.00 | 2002-01h | Control mode | 0: Speed control mode<br>1: Position control mode<br>2: Torque control mode<br>3: Torque<->Speed control mode<br>4: Speed<->Position control mode<br>5: Torque<->Position control mode<br>6: Torque<->Speed<->Position compound mode | 1 | - | At stop | " H02_en.00" on page 158 |
| H02.01 | 2002-02h | Absolute position detection system | 0: Incremental position mode<br>1: Absolute position linear mode<br>2: Absolute position rotation mode | 0 | - | At stop | " H02_en.01" on page 159 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H02.02 | 2002-03h | Forward direction | 0: Counterclockwise (CCW) as forward direction<br>1: Clockwise (CW) as forward direction | 0 | - | At stop | " H02_en.02" on page 160 |
| H02.03 | 2002-04h | Output pulse phase | 0: Phase A leads phase B<br>1: Phase A lags behind phase B | 0 | - | At stop | " H02_en.03" on page 160 |
| H02.05 | 2002-06h | Stop mode at S-OFF | 0: Coast to stop, keeping de-energized state<br>1: Stop at zero speed, keeping de-energized state<br>2: Stop at zero speed, keeping dynamic braking state<br>3: Dynamic braking stop, keeping dynamic braking state | 0 | - | At stop | " H02_en.05" on page 161 |
| H02.06 | 2002-07h | Stop mode at No.2 fault | 0: Coast to stop, keeping de-energized state<br>1: Stop at zero speed, keeping de-energized state<br>2: Stop at zero speed, keeping dynamic braking state<br>3: Dynamic braking stop, keeping DB state<br>4: DB stops, keeping operation state | 2 | - | At stop | " H02_en.06" on page 161 |
| H02.07 | 2002-08h | Stop mode at overtravel | 0: Coast to stop, keeping de-energized state<br>1: Stop at zero speed, keeping position lock state<br>2: Stop at zero speed, keeping de-energized state | 1 | - | At stop | " H02_en.07" on page 162 |
| H02.08 | 2002-09h | Stop mode at No.1 fault | 0: Coast to stop, keeping de-energized state<br>1: DB stop, keeping de-energized state<br>2: DB stop, keeping DB state | 2 | - | At stop | " H02_en.08" on page 162 |
| H02.09 | 2002-0Ah | Delay from brake output ON to command received | 0 ms to 500 ms | 250 | ms | Immediately | " H02_en.09" on page 163 |
| H02.10 | 2002-0Bh | Delay from brake output OFF to motor de-energized in the standstill state | 1 ms to 1000 ms | 150 | ms | Immediately | " H02_en.10" on page 163 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H02.11 | 2002-0Ch | Motor speed threshold at brake output OFF in rotation state | 0 rpm to 3000 rpm | 30 | rpm | Immediately | " H02_en.11" on page 163 |
| H02.12 | 2002-0Dh | Delay from S-ON OFF to brake output OFF in rotation state | 1 ms to 1000 ms | 500 | ms | Immediately | " H02_en.12" on page 164 |
| H02.14 | 2002-0Fh | Stop mode and state switching speed condition | 10rpm–100rpm | 10 | rpm | At stop | " H02_en.14" on page 164 |
| H02.15 | 2002-10h | Warning display on the keypad | 0: Output warning information immediately<br>1: Not output warning information | 0 | - | At stop | " H02_en.15" on page 164 |
| H02.17 | 2002-12h | Stop at zero speed upon main circuit power-off | 0: Disabled<br>1: Enabled | 1 | - | At stop | " H02_en.17" on page 165 |
| H02.18 | 2002-13h | S-ON filter time constant | 0 ms to 64 ms | 0 | ms | At stop | " H02_en.18" on page 165 |
| H02.19 | 2002-14h | S-ON brake open delay | 0 ms to 1000 ms | 0 | ms | At stop | " H02_en.19" on page 165 |
| H02.20 | 2002-15h | Dynamic brake relay coil ON delay | 10 ms to 30000 ms | 30 | ms | Immediately | " H02_en.20" on page 165 |
| H02.21 | 2002-16h | Min. permissible resistance of regenerative resistor | 0 Ω to 65535 Ω | 40 | Ω | Unchangeable | " H02_en.21" on page 166 |
| H02.22 | 2002-17h | Power of built-in regenerative resistor | 0 W to 65535 W | 40 | W | Unchangeable | " H02_en.22" on page 166 |
| H02.23 | 2002-18h | Resistance of built-in regenerative resistor | 0 Ω to 65535 Ω | 50 | Ω | Unchangeable | " H02_en.23" on page 166 |
| H02.24 | 2002-19h | Resistor heat dissipation coefficient | 10–100 | 30 | - | At stop | " H02_en.24" on page 167 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H02.25 | 2002-1Ah | Regenerative resistor type | 0: Built-in<br>1: External, natural ventilated<br>2: External, forced air cooling<br>3: Not needed | 0 | - | At stop | " H02_en.25" on page 168 |
| H02.26 | 2002-1Bh | Power capacity of external regenerative resistor | 1 W–65535 W | 40 | W | At stop | " H02_en.26" on page 168 |
| H02.27 | 2002-1Ch | Resistance of external regenerative resistor | 1 Ω to 1000 Ω | 50 | Ω | At stop | " H02_en.27" on page 169 |
| H02.28 | 2002-1Dh | 220 V min. bus voltage | 190 V to 260 V | 235 | V | At stop | " H02_en.28" on page 169 |
| H02.30 | 2002-1Fh | User password | 0–65535 | 0 | - | At stop | " H02_en.30" on page 169 |
| H02.31 | 2002-20h | System parameter initialization | 0: No operation<br>1: Restore default settings<br>2: Clear fault records | 0 | - | At stop | " H02_en.31" on page 170 |
| H02.32 | 2002-21h | Default keypad display | 0–99 | 50 | - | Immediately | " H02_en.32" on page 170 |
| H02.34 | 2002-23h | CAN software version | 0.00–655.35 | 0.00 | - | Unchangeable | " H02_en.34" on page 170 |
| H02.35 | 2002-24h | Keypad display refresh frequency | 0 Hz–29 Hz | 0 | Hz | Immediately | " H02_en.35" on page 171 |
| H02.41 | 2002-2Ah | Manufacturer password | 0–65535 | 0 | - | At stop | " H02_en.41" on page 171 |

# 4.4 Parameter Group H03

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H03.00 | 2003-01h | DI function allocation 1 (activated upon power-on) | 0: Corresponding to null<br>1: Corresponding to FunIN.1<br>2: Corresponding to FunIN.2<br>4: Corresponding to FunIN.3<br>8: Corresponding to FunIN.4<br>16: Corresponding to FunIN.5<br>32: Corresponding to FunIN.6<br>64: Corresponding to FunIN.7<br>128: Corresponding to FunIN.8<br>256: Corresponding to FunIN.9<br>512: Corresponding to FunIN.10<br>1024: Corresponding to FunIN.11<br>2048: Corresponding to FunIN.12<br>4096: Corresponding to FunIN.13<br>8192: Corresponding to FunIN.14<br>16384: Corresponding to FunIN.15 | 0 | - | Immediately | *" H03_en.00" on page 171* |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H03.01 | 2003-02h | DI function allocation 2 (activated upon power-on) | 0: Corresponding to null<br>1: Corresponding to FunIN.17<br>2: Corresponding to FunIN.18<br>4: Corresponding to FunIN.19<br>8: Corresponding to FunIN.20<br>16: Corresponding to FunIN.21<br>32: Corresponding to FunIN.22<br>64: Corresponding to FunIN.23<br>128: Corresponding to FunIN.24<br>256: Corresponding to FunIN.25<br>512: Corresponding to FunIN.26<br>1024: Corresponding to FunIN.27<br>2048: Corresponding to FunIN.28<br>4096: Corresponding to FunIN.29<br>8192: Corresponding to FunIN.30<br>16384: Corresponding to FunIN.31 | 0 | - | Immediately | " H03_en.01" on page 172 |
| H03.02 | 2003-03h | DI1 function selection | See " H03_en.02" on page 173 for details. | 14 | - | Immediately | " H03_en.02" on page 173 |
| H03.03 | 2003-04h | DI1 logic selection | 0: Active low<br>1: Active high | 0 | - | Immediately | " H03_en.03" on page 174 |
| H03.04 | 2003-05h | DI2 function | See H03.02. | 15 | - | Immediately | " H03_en.04" on page 175 |
| H03.05 | 2003-06h | DI2 logic selection | 0: Active low<br>1: Active high | 0 | - | Immediately | " H03_en.05" on page 175 |
| H03.06 | 2003-07h | DI3 function | See H03.02. | 13 | - | Immediately | " H03_en.06" on page 176 |
| H03.07 | 2003-08h | DI3 logic selection | 0: Active low<br>1: Active high | 0 | - | Immediately | " H03_en.07" on page 176 |
| H03.08 | 2003-09h | DI4 function selection | See H03.02. | 2 | - | Immediately | " H03_en.08" on page 176 |
| H03.09 | 2003-0Ah | DI4 logic selection | 0: Active low<br>1: Active high | 0 | - | Immediately | " H03_en.09" on page 176 |
| H03.10 | 2003-0Bh | DI5 function selection | See H03.02. | 1 | - | Immediately | " H03_en.10" on page 177 |
| H03.11 | 2003-0Ch | DI5 logic selection | 0: Active low<br>1: Active high | 0 | - | Immediately | " H03_en.11" on page 177 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H03.16 | 2003-11h | DI8 function selection | See H03.02. | 31 | - | Immediately | " H03_en.16" on page 177 |
| H03.17 | 2003-12h | DI8 logic selection | 0: Active low<br>1: Active high | 0 | - | Immediately | " H03_en.17" on page 178 |
| H03.18 | 2003-13h | DI9 function selection | See H03.02. | 0 | - | Immediately | " H03_en.18" on page 178 |
| H03.19 | 2003-14h | DI9 logic selection | 0: Active low<br>1: Active high | 0 | - | Immediately | " H03_en.19" on page 178 |
| H03.34 | 2003-23h | DI function allocation 3 (activated upon power-on) | 0: 0x0: Corresponding to null<br>1: 0x1: Corresponding to FunIN.33<br>2: 0x2: Corresponding to FunIN.34<br>4: 0x4: Corresponding to FunIN.35<br>8: 0x8: Corresponding to FunIN.36<br>16: 0x10: Corresponding to FunIN.37<br>32: 0x20: Corresponding to FunIN.38<br>64: 0x40: Corresponding to FunIN.39<br>128: 0x80: Corresponding to FunIN.40<br>256: 0x100: Corresponding to FunIN.41<br>512: 0x200: Corresponding to FunIN.42<br>1024: 0x400: Corresponding to FunIN.43<br>2048: 0x800: Corresponding to FunIN.44<br>4096: 0x1000: Corresponding to FunIN.45<br>8192: 0x2000: Corresponding to FunIN.46<br>16384: 0x4000: Corresponding to FunIN.47 | 0 | - | Immediately | " H03_en.34" on page 179 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H03.35 | 2003-24h | DI function allocation 4 (activated upon power-on) | 0: 0x0: Corresponding to null<br>1: 0x1: Corresponding to FunIN.49<br>2: 0x2: Corresponding to FunIN.50<br>4: 0x4: Corresponding to FunIN.51<br>8: 0x8: Corresponding to FunIN.52<br>16: 0x10: Corresponding to FunIN.53<br>32: 0x20: Corresponding to FunIN.54<br>64: 0x40: Corresponding to FunIN.55<br>128: 0x80: Corresponding to FunIN.56<br>256: 0x100: Corresponding to FunIN.57<br>512: 0x200: Corresponding to FunIN.58<br>1024: 0x400: Corresponding to FunIN.59<br>2048: 0x800: Corresponding to FunIN.60<br>4096: 0x1000: Corresponding to FunIN.61<br>8192: 0x2000: Corresponding to FunIN.62<br>16384: 0x4000: Corresponding to FunIN.63 | 0 | - | Immediately | " H03_en.35" on page 179 |
| H03.60 | 2003-3Dh | DI1 filter | 0.00 ms to 500.00 ms | 3.00 | ms | Immediately | " H03_en.60" on page 180 |
| H03.61 | 2003-3Eh | DI2 filter | 0.00 ms to 500.00 ms | 3.00 | ms | Immediately | " H03_en.61" on page 180 |
| H03.62 | 2003-3Fh | DI3 filter | 0.00 ms to 500.00 ms | 3.00 | ms | Immediately | " H03_en.62" on page 181 |
| H03.63 | 2003-40h | DI4 filter | 0.00 ms to 500.00 ms | 3.00 | ms | Immediately | " H03_en.63" on page 181 |
| H03.64 | 2003-41h | DI5 filter | 0.00 ms to 500.00 ms | 3.00 | ms | Immediately | " H03_en.64" on page 181 |
| H03.65 | 2003-42h | DI8 filter 1 | 0.00 ms to 500.00 ms | 0.00 | ms | Immediately | " H03_en.65" on page 182 |
| H03.66 | 2003-43h | DI9 filter 1 | 0.00 ms to 500.00 ms | 0.00 | ms | Immediately | " H03_en.66" on page 182 |

## 4.5 Parameter Group H04

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H04.00 | 2004-01h | DO1 function selection | See " H04_en.00" on page 182 for details. | 1 | - | Immediately | " H04_en.00" on page 182 |
| H04.01 | 2004-02h | DO1 logic level | 0: Output low (L) level when active (optocoupler ON)<br>1: Output high (H) level when active (optocoupler OFF) | 0 | - | Immediately | " H04_en.01" on page 183 |
| H04.02 | 2004-03h | DO2 function selection | See H04.00. | 5 | - | Immediately | " H04_en.02" on page 184 |
| H04.03 | 2004-04h | DO2 logic level | 0: Output low (L) level when active (optocoupler ON)<br>1: Output high (H) level when active (optocoupler OFF) | 0 | - | Immediately | " H04_en.03" on page 184 |
| H04.04 | 2004-05h | DO3 function | See H04.00. | 9 | - | Immediately | " H04_en.04" on page 185 |
| H04.05 | 2004-06h | DO3 logic level | 0: Output low (L) level when active (optocoupler ON)<br>1: Output high (H) level when active (optocoupler OFF) | 0 | - | Immediately | " H04_en.05" on page 185 |
| H04.06 | 2004-07h | DO4 function | See H04.00. | 11 | - | Immediately | " H04_en.06" on page 185 |
| H04.07 | 2004-08h | DO4 logic level | 0: Output low (L) level when active (optocoupler ON)<br>1: Output high (H) level when active (optocoupler OFF) | 0 | - | Immediately | " H04_en.07" on page 185 |
| H04.08 | 2004-09h | DO5 function selection | See H04.00. | 16 | - | Immediately | " H04_en.08" on page 186 |
| H04.09 | 2004-0Ah | DO5 logic level | 0: Output low (L) level when active (optocoupler ON)<br>1: Output high (H) level when active (optocoupler OFF) | 0 | - | Immediately | " H04_en.09" on page 186 |
| H04.22 | 2004-17h | DO source selection | 0–31 | 0 | - | At stop | " H04_en.22" on page 186 |

## 4.6 Parameter Group H05

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H05.00 | 2005-01h | Main position reference source | 0: Pulse reference<br>1: Step reference<br>2: Multi-position reference | 0 | - | At stop | " H05_en.00" on page 187 |
| H05.01 | 2005-02h | Position pulse reference input terminal | 0: Low speed<br>1: High speed | 0 | - | At stop | " H05_en.01" on page 188 |
| H05.02 | 2005-03h | Pulses per revolution | 0P/Rev–1048576P/Rev | 0 | PPR | At stop | " H05_en.02" on page 190 |
| H05.04 | 2005-05h | First-order low-pass filter time constant | 0.0 ms to 6553.5 ms | 0.0 | ms | At stop | " H05_en.04" on page 190 |
| H05.05 | 2005-06h | Step reference | -9999 to +9999 | 50 | Reference unit | At stop | " H05_en.05" on page 191 |
| H05.06 | 2005-07h | Moving average filtering time constant | 0.0 ms to 128.0 ms | 0.0 | ms | At stop | " H05_en.06" on page 192 |
| H05.07 | 2005-08h | Electronic gear ratio 1 (numerator) | 1–1073741824 | 8388608 | - | Immediately | " H05_en.07" on page 192 |
| H05.09 | 2005-0Ah | Electronic gear ratio 1 (denominator) | 1–1073741824 | 10000 | - | Immediately | " H05_en.09" on page 192 |
| H05.11 | 2005-0Ch | Electronic gear ratio 2 (numerator) | 1–1073741824 | 8388608 | - | Immediately | " H05_en.11" on page 193 |
| H05.13 | 2005-0Eh | Electronic gear ratio 2 (denominator) | 1–1073741824 | 10000 | - | Immediately | " H05_en.13" on page 193 |
| H05.15 | 2005-10h | Pulse reference form | 0: Direction + Pulse, positive logic<br>1: Direction + Pulse, negative logic<br>2: Phase A + phase B quadrature pulse, quadrupled frequency<br>3: CW + CCW | 0 | - | At stop | " H05_en.15" on page 193 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H05.16 | 2005-11h | Clear action | 0: Clear position deviation upon S-OFF and fault<br>1: Clear position deviation pulses upon S-OFF and fault<br>2: Clear position deviation by ClrPosErr signal input from DI | 0 | - | At stop | *" H05_en.16" on page 195* |
| H05.17 | 2005-12h | Number of encoder frequency-division pulses | 35P/Rev–32767P/Rev | 2500 | PPR | At stop | *" H05_en.17" on page 196* |
| H05.19 | 2005-14h | Speed feedforward control | 0: No speed feedforward<br>1: Internal speed feedforward | 1 | - | At stop | *" H05_en.19" on page 197* |
| H05.20 | 2005-15h | Condition for positioning completed signal output | 0: Absolute position deviation lower than the setpoint of H05.-21<br>1: Absolute position deviation lower than the setpoint of H05.-21 and the filtered position reference is 0<br>2: Absolute position deviation lower than the setpoint of H05.-21 and the unfiltered position reference is 0<br>3: Absolute position deviation kept lower than the setpoint of H05.-21 within the time defined by H05.-60 and the unfiltered position reference is 0 | 0 | - | Immediately | *" H05_en.20" on page 197* |
| H05.21 | 2005-16h | Threshold of positioning completed | 1 to 65535 | 5872 | Encoder unit | Immediately | *" H05_en.21" on page 198* |
| H05.22 | 2005-17h | Proximity threshold | 1 to 65535 | 65535 | Encoder unit | Immediately | *" H05_en.22" on page 199* |
| H05.23 | 2005-18h | Interrupt positioning selection | 0: Disable<br>1: Enabled | 0 | - | At stop | *" H05_en.23" on page 199* |
| H05.24 | 2005-19h | Displacement of interrupt positioning | 0 to 1073741824 | 10000 | Reference unit | Immediately | *" H05_en.24" on page 200* |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H05.26 | 2005-1Bh | Constant operating speed in interrupt positioning | 0 rpm to 6000 rpm | 200 | rpm | Immediately | " H05_en.26" on page 200 |
| H05.27 | 2005-1Ch | Acceleration/ Deceleration time of interrupt positioning | 0 ms to 1000 ms | 10 | ms | Immediately | " H05_en.27" on page 201 |
| H05.29 | 2005-1Eh | Interrupt positioning cancel signal | 0: Disabled<br>1: Enabled | 1 | - | Immediately | " H05_en.29" on page 201 |
| H05.30 | 2005-1Fh | Homing selection | 0: Disabled<br>1: Homing enabled through the HomingStart signal input from DI<br>2: Electrical homing enabled through the HomingStart signal input from DI<br>3: Homing started immediately upon power-on<br>4: Homing executed immediately<br>5: Electrical homing started<br>6: Current position as home<br>8: D-triggered position as home | 0 | - | Immediately | " H05_en.30" on page 202 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H05.31 | 2005-20h | Homing mode | 0: Forward, home switch as deceleration point and home<br>1: Reverse, home switch as deceleration point and home<br>2: Forward, Z signal as deceleration point and home<br>3: Reverse, motor Z signal as deceleration point and home<br>4: Forward, home switch as deceleration point and Z signal as home<br>5: Reverse, home switch as deceleration point and Z signal as home<br>6: Forward, positive limit switch as deceleration point and home<br>7: Reverse, negative limit switch as deceleration point and home<br>8: Forward, positive limit switch as deceleration point and Z signal as home<br>9: Reverse, negative limit switch as deceleration point and Z signal as home<br>10: Forward, mechanical limit position as deceleration point and home<br>11: Reverse, mechanical limit position as deceleration point and home<br>12: Forward, mechanical limit position as deceleration point and Z signal as home<br>13: Reverse, mechanical limit position as deceleration point and Z signal as home<br>14: Forward single-turn homing<br>15: Reverse single-turn homing<br>16: Nearby single-turn homing | 0 | - | Immediately | " H05_en.31" on page 203 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H05.32 | 2005-21h | Speed in high-speed searching for the home switch signal | 0 rpm to 3000 rpm | 100 | rpm | Immediately | " H05_en.32" on page 204 |
| H05.33 | 2005-22h | Speed in low-speed searching for the home switch signal | 0 rpm to 1000 rpm | 10 | rpm | Immediately | " H05_en.33" on page 204 |
| H05.34 | 2005-23h | Acceleration/ Deceleration time during homing | 0 ms to 1000 ms | 1000 | ms | Immediately | " H05_en.34" on page 205 |
| H05.35 | 2005-24h | Home search time limit | 0 ms to 65535 ms | 10000 | ms | Immediately | " H05_en.35" on page 205 |
| H05.36 | 2005-25h | Mechanical home offset | -1073741824 to 1073741824 | 0 | Reference unit | Immediately | " H05_en.36" on page 205 |
| H05.38 | 2005-27h | Servo pulse output source | 0: Encoder frequency division output<br>1: Pulse reference synchronous output<br>2: Frequency division or synchronous output inhibited | 0 | - | At stop | " H05_en.38" on page 206 |
| H05.39 | 2005-28h | Electronic gear ratio switchover condition | 0: Switchover after position reference is kept 0 for 2.5 ms<br>1: Switched in real time | 0 | - | At stop | " H05_en.39" on page 207 |
| H05.40 | 2005-29h | Mechanical home offset and action upon overtravel | 0: H05.36 as the coordinate after homing, reverse homing applied after homing triggered again upon overtravel<br>1: H05.36 as the relative offset after homing, reverse homing applied after homing triggered again upon overtravel<br>2: H05.36 as the coordinate after homing, reverse homing applied automatically upon overtravel<br>3: H05.36 as the relative offset after homing, reverse homing applied automatically upon overtravel | 0 | - | At stop | " H05_en.40" on page 207 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H05.41 | 2005-2Ah | Z pulse output polarity | 0: Negative (Z pulse active low)<br>1: Positive (Z pulse active high) | 1 | - | At stop | " H05_en.41" on page 208 |
| H05.43 | 2005-2Ch | Position pulse edge | 0: Falling edge-triggered<br>1: Rising edge-triggered | 1 | - | Immediately | " H05_en.43" on page 210 |
| H05.44 | 2005-2Dh | Encoder multi-turn data offset | 0–65535 | 0 | - | Immediately | " H05_en.44" on page 210 |
| H05.46 | 2005-2Fh | Position offset in absolute position linear mode (low 32 bits) | -2147483648 to 2147483647 | 0 | Encoder unit | At stop | " H05_en.46" on page 210 |
| H05.48 | 2005-31h | Position offset in absolute position linear mode (high 32 bits) | -2147483648 to 2147483647 | 0 | Encoder unit | At stop | " H05_en.48" on page 211 |
| H05.50 | 2005-33h | Mechanical gear ratio in absolute position rotation mode (numerator) | 1–65535 | 1 | - | At stop | " H05_en.50" on page 211 |
| H05.51 | 2005-34h | Mechanical gear ratio in absolute position rotation mode (denominator) | 1–65535 | 1 | - | At stop | " H05_en.51" on page 211 |
| H05.52 | 2005-35h | Pulses per revolution of the load in absolute position rotation mode (low 32 bits) | 0 to 2147483647 | 0 | Encoder unit | At stop | " H05_en.52" on page 211 |
| H05.54 | 2005-37h | Pulses per revolution of the load in absolute position rotation mode (high 32 bits) | 0 to 127 | 0 | Encoder unit | At stop | " H05_en.54" on page 212 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H05.56 | 2005-39h | Speed threshold in homing upon hit-and-stop | 0 rpm to 1000 rpm | 2 | rpm | Immediately | *" H05_en.56" on page 212* |
| H05.57 | 2005-3Ah | Mechanical limit times threshold | 0–65535 | 20 | - | Immediately | *" H05_en.57" on page 212* |
| H05.58 | 2005-3Bh | Torque threshold in homing upon hit-and-stop | 0.0%–300.0% | 100.0 | % | Immediately | *" H05_en.58" on page 213* |
| H05.59 | 2005-3Ch | Positioning window time | 0 ms to 30000 ms | 0 | ms | Immediately | *" H05_en.59" on page 213* |
| H05.60 | 2005-3Dh | Hold time of positioning completed | 0 ms to 30000 ms | 0 | ms | Immediately | *" H05_en.60" on page 213* |
| H05.61 | 2005-3Eh | Encoder frequency-division pulse output (32-bit) | 0P/Rev–262143P/Rev | 0 | PPR | At stop | *" H05_en.61" on page 213* |
| H05.63 | 2005-40h | Real time update of position reference source | 0–1 | 0 | - | At stop | *" H05_en.63" on page 214* |
| H05.66 | 2005-43h | Homing time unit | 0: 1 ms<br>1: 10 ms<br>2: 100 ms | 0 | - | At stop | *" H05_en.66" on page 214* |
| H05.67 | 2005-44h | Offset between zero point and single-turn absolute position | 0–2147483648 | 0 | - | At stop | *" H05_en.67" on page 214* |
| H05.69 | 2005-46h | Auxiliary homing function | 0: Disabled<br>1: Enable single-turn homing<br>2: Record deviation position<br>3: Start a new search for the Z signal (homing)<br>4: Clear the position deviation | 0 | - | At stop | *" H05_en.69" on page 215* |

## 4.7 Parameter Group H06

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H06.00 | 2006-01h | Source of main speed reference A | 0: Digital setting (H06.03) | 0 | - | At stop | " H06_en.00" on page 215 |
| H06.01 | 2006-02h | Source of auxiliary speed reference B | 0: Digital setting (H06.03)<br>5: Multi-speed reference | 5 | - | At stop | " H06_en.01" on page 216 |
| H06.02 | 2006-03h | Speed reference source | 0: Source of main speed reference A<br>1: Source of auxiliary speed reference B<br>2: A+B<br>3: Switched between A and B<br>4: Communication | 0 | - | At stop | " H06_en.02" on page 216 |
| H06.03 | 2006-04h | Speed reference set through keypad | –6000 rpm to 6000 rpm | 200 | rpm | Immediately | " H06_en.03" on page 217 |
| H06.04 | 2006-05h | Jog speed setpoint | 0 rpm to 6000 rpm | 100 | rpm | Immediately | " H06_en.04" on page 217 |
| H06.05 | 2006-06h | Acceleration ramp time constant of speed reference | 0 ms to 65535 ms | 0 | ms | Immediately | " H06_en.05" on page 218 |
| H06.06 | 2006-07h | Deceleration ramp time constant of speed reference | 0 ms to 65535 ms | 0 | ms | Immediately | " H06_en.06" on page 218 |
| H06.07 | 2006-08h | Maximum speed limit | 0 rpm to 6000 rpm | 6000 | rpm | Immediately | " H06_en.07" on page 219 |
| H06.08 | 2006-09h | Forward speed limit | 0 rpm to 6000 rpm | 6000 | rpm | Immediately | " H06_en.08" on page 219 |
| H06.09 | 2006-0Ah | Reverse speed limit | 0 rpm to 6000 rpm | 6000 | rpm | Immediately | " H06_en.09" on page 220 |
| H06.11 | 2006-0Ch | Torque feedforward control | 0: No torque feedforward<br>1: Internal torque feedforward | 1 | - | Immediately | " H06_en.11" on page 221 |
| H06.13 | 2006-0Eh | Speed smoothing time | 0us–20000us | 0 | us | At stop | " H06_en.13" on page 222 |
| H06.15 | 2006-10h | Zero clamp speed threshold | 0 rpm to 6000 rpm | 10 | rpm | Immediately | " H06_en.15" on page 223 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H06.16 | 2006-11h | Threshold of TGON (motor rotation) signal | 0 rpm to 1000 rpm | 20 | rpm | Immediately | " H06_en.16" on page 223 |
| H06.17 | 2006-12h | Threshold of V-Cmp (speed matching) signal | 0 rpm to 100 rpm | 10 | rpm | Immediately | " H06_en.17" on page 224 |
| H06.18 | 2006-13h | Threshold of speed reach signal | 10rpm–6000rpm | 1000 | rpm | Immediately | " H06_en.18" on page 225 |
| H06.19 | 2006-14h | Threshold of zero speed output signal | 1 rpm to 6000 rpm | 10 | rpm | Immediately | " H06_en.19" on page 226 |
| H06.28 | 2006-1Dh | Cogging torque ripple compensation | 0 to 1 | 1 | - | Immediately | " H06_en.28" on page 227 |
| H06.31 | 2006-20h | Sine frequency | 0 to 16000 | 50 | - | Immediately | " H06_en.31" on page 227 |
| H06.32 | 2006-21h | Sine amplitude | 0 to 30000 | 30 | - | Immediately | " H06_en.32" on page 228 |
| H06.33 | 2006-22h | Sine amplitude | 0: Disabled<br>1: Position reference sine<br>2: Speed reference sine<br>3: Torque reference sine | 30 | - | Immediately | " H06_en.33" on page 228 |
| H06.35 | 2006-24h | Sine offset | -9900 to 9900 | 0 | - | Immediately | " H06_en.35" on page 228 |

## 4.8 Parameter Group H07

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H07.00 | 2007-01h | Source of main torque reference A | 0: Keypad (H07.03) | 0 | - | At stop | " H07_en.00" on page 229 |
| H07.01 | 2007-02h | Source of auxiliary torque reference B | 0: Keypad (H07.03) | 0 | - | At stop | " H07_en.01" on page 229 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H07.02 | 2007-03h | Torque reference source | 0: Source of main torque reference A<br>1: Source of auxiliary torque reference B<br>2: Source of A+B<br>3: Switched between A and B<br>4: Communication | 0 | - | At stop | " H07_en.02" on page 229 |
| H07.03 | 2007-04h | Torque reference set through keypad | -400.0%–400.0% | 0.0 | % | Immediately | " H07_en.03" on page 230 |
| H07.05 | 2007-06h | Torque reference filter time constant | 0.00 ms to 30.00 ms | 0.50 | ms | Immediately | " H07_en.05" on page 230 |
| H07.06 | 2007-07h | 2nd torque reference filter time constant | 0.00 ms to 30.00 ms | 0.27 | ms | Immediately | " H07_en.06" on page 231 |
| H07.07 | 2007-08h | Torque limit source | 0: Forward/Reverse internal torque limit (default)<br>1: Forward/Reverse external torque limit (selected through P-CL and N-CL) | 0 | - | At stop | " H07_en.07" on page 232 |
| H07.09 | 2007-0Ah | Positive internal torque limit | 0.0%–400.0% | 350.0 | % | Immediately | " H07_en.09" on page 233 |
| H07.10 | 2007-0Bh | Negative internal torque limit | 0.0%–400.0% | 350.0 | % | Immediately | " H07_en.10" on page 233 |
| H07.11 | 2007-0Ch | Positive external torque limit | 0.0%–400.0% | 350.0 | % | Immediately | " H07_en.11" on page 233 |
| H07.12 | 2007-0Dh | Negative external torque limit | 0.0%–400.0% | 350.0 | % | Immediately | " H07_en.12" on page 234 |
| H07.15 | 2007-10h | Emergency-stop torque | 0.0%–300.0% | 100.0 | % | At stop | " H07_en.15" on page 234 |
| H07.17 | 2007-12h | Speed limit source | 0: Internal speed limit (in torque control)<br>1: 0 (no action)<br>2: 1st or 2nd speed limit input selected by FunIN.36 | 0 | - | Immediately | " H07_en.17" on page 234 |
| H07.19 | 2007-14h | Forward speed limit/1st speed limit in torque control | 0 rpm to 6000 rpm | 3000 | rpm | Immediately | " H07_en.19" on page 235 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H07.20 | 2007-15h | Reverse speed limit/2nd speed limit in torque control | 0 rpm to 6000 rpm | 3000 | rpm | Immediately | " H07_en.20" on page 235 |
| H07.21 | 2007-16h | Base value for torque reach | 0.0%–300.0% | 0.0 | % | Immediately | " H07_en.21" on page 235 |
| H07.22 | 2007-17h | Torque reach valid value | 0.0%–300.0% | 20.0 | % | Immediately | " H07_en.22" on page 235 |
| H07.23 | 2007-18h | Torque reach invalid value | 0.0%–300.0% | 10.0 | % | Immediately | " H07_en.23" on page 236 |
| H07.24 | 2007-19h | Field weakening depth | 60%–120% | 115 | % | Immediately | " H07_en.24" on page 237 |
| H07.25 | 2007-1Ah | Max. permissible demagnetizing current | 0%–200% | 100 | % | Immediately | " H07_en.25" on page 237 |
| H07.26 | 2007-1Bh | Field weakening selection | 0–1 | 1 | - | Immediately | " H07_en.26" on page 237 |
| H07.27 | 2007-1Ch | Flux weakening gain | 1 Hz–1000 Hz | 30 | Hz | Immediately | " H07_en.27" on page 237 |
| H07.40 | 2007-29h | Speed limit window in the torque control mode | 0.5 ms to 30.0 ms | 1.0 | ms | Immediately | " H07_en.40" on page 238 |

## 4.9 Parameter Group H08

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H08.00 | 2008-01h | Speed loop gain | 0.1 Hz–2000.0 Hz | 40.0 | Hz | Immediately | " H08_en.00" on page 239 |
| H08.01 | 2008-02h | Speed loop integral time constant | 0.15 ms to 512.00 ms | 19.89 | ms | Immediately | " H08_en.01" on page 239 |
| H08.02 | 2008-03h | Position loop gain | 0.0 Hz–2000.0 Hz | 64.0 | Hz | Immediately | " H08_en.02" on page 239 |
| H08.03 | 2008-04h | 2nd speed loop gain | 0.1 Hz–2000.0 Hz | 75.0 | Hz | Immediately | " H08_en.03" on page 240 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H08.04 | 2008-05h | 2nd speed loop integral time constant | 0.15 ms to 512.00 ms | 10.61 | ms | Immediately | " H08_en.04" on page 240 |
| H08.05 | 2008-06h | 2nd position loop gain | 0.0 Hz–2000.0 Hz | 120.0 | Hz | Immediately | " H08_en.05" on page 240 |
| H08.08 | 2008-09h | 2nd gain mode setting | 0: Fixed to the 1st group of gains, P/PI switched through external<br>DI1:Switched between the 1st and 2nd group of gains as defined by H08.09 | 1 | - | Immediately | " H08_en.08" on page 241 |
| H08.09 | 2008-0Ah | Gain switchover condition | 0: Fixed to the 1st gain set (PS)<br>1: Switch with external DI (PS)<br>2: Torque reference too large (PS)<br>3: Speed reference too large (PS)<br>4: Speed reference change rate too large (PS)<br>5: Speed reference low/high speed threshold (PS)<br>6: Position deviation too large (P)<br>7: Position reference available (P)<br>8: Positioning unfinished (P)<br>9: Actual speed (P)<br>10: Position reference + Actual speed (P) | 0 | - | Immediately | " H08_en.09" on page 241 |
| H08.10 | 2008-0Bh | Gain switchover delay | 0.0 ms to 1000.0 ms | 5.0 | ms | At stop | " H08_en.10" on page 243 |
| H08.11 | 2008-0Ch | Gain switchover level | 0–20000 | 50 | - | Immediately | " H08_en.11" on page 243 |
| H08.12 | 2008-0Dh | Gain switchover dead time | 0–20000 | 30 | - | At stop | " H08_en.12" on page 244 |
| H08.13 | 2008-0Eh | Position gain switchover time | 0.0 ms to 1000.0 ms | 3.0 | ms | At stop | " H08_en.13" on page 244 |
| H08.14 | 2008-0Fh | Auto-tuned inertia value | 0.00–200.00 | 0.00 | - | Unchangeable | " H08_en.14" on page 245 |
| H08.15 | 2008-10h | Load moment of inertia ratio | 0.00–120.00 | 2.00 | - | Immediately | " H08_en.15" on page 245 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H08.18 | 2008-13h | Speed feedforward filter time constant | 0.00 ms to 64.00 ms | 0.50 | ms | Immediately | " H08_en.18" on page 246 |
| H08.19 | 2008-14h | Speed feedforward gain | 0.0%–100.0% | 0.0 | % | Immediately | " H08_en.19" on page 246 |
| H08.20 | 2008-15h | Torque feedforward filter time constant | 0.00 ms to 64.00 ms | 0.50 | ms | Immediately | " H08_en.20" on page 247 |
| H08.21 | 2008-16h | Torque feedforward gain | 0.0%–200.0% | 0.0 | % | Immediately | " H08_en.21" on page 247 |
| H08.22 | 2008-17h | Speed feedback filtering option | 0: Inhibited<br>1: 2 times<br>2: 4 times<br>3: 8 times<br>4: 16 times | 0 | - | At stop | " H08_en.22" on page 247 |
| H08.23 | 2008-18h | Cutoff frequency of speed feedback low-pass filter | 100 Hz–4000 Hz | 4000 | Hz | Immediately | " H08_en.23" on page 248 |
| H08.24 | 2008-19h | PDFF control coefficient | 0.0%–1000.0% | 100.0 | % | Immediately | " H08_en.24" on page 248 |
| H08.27 | 2008-1Ch | Cutoff frequency of speed observer | 10 Hz–2000 Hz | 170 | Hz | Immediately | " H08_en.27" on page 249 |
| H08.28 | 2008-1Dh | Speed inertia correction coefficient | 10%–10000% | 100 | % | Immediately | " H08_en.28" on page 249 |
| H08.29 | 2008-1Eh | Speed observer filter time | 0.02 ms to 20.00 ms | 0.80 | ms | Immediately | " H08_en.29" on page 249 |
| H08.31 | 2008-20h | Disturbance observer cutoff frequency | 1 Hz–1700 Hz | 600 | Hz | Immediately | " H08_en.31" on page 250 |
| H08.32 | 2008-21h | Disturbance observer compensation coefficient | 0%–100% | 0 | % | Immediately | " H08_en.32" on page 250 |
| H08.33 | 2008-22h | Disturbance inertia correction coefficient | 1%–10000% | 100 | % | Immediately | " H08_en.33" on page 250 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H08.34 | 2008-23h | Medium- and high-frequency jitter suppression phase modulation 1 | 0%–1600% | 0 | % | Immediately | " H08_en.34" on page 251 |
| H08.35 | 2008-24h | Medium- and high-frequency jitter suppression frequency 1 | 0 Hz–1000 Hz | 0 | Hz | Immediately | " H08_en.35" on page 251 |
| H08.36 | 2008-25h | Medium- and high-frequency jitter suppression compensation 1 | 0%–200% | 0 | % | Immediately | " H08_en.36" on page 251 |
| H08.37 | 2008-26h | Phase modulation for medium-frequency jitter suppression 2 | -90–90 | 0 | - | Immediately | " H08_en.37" on page 251 |
| H08.38 | 2008-27h | Frequency of medium-frequency jitter suppression 2 | 0 Hz–1000 Hz | 0 | Hz | Immediately | " H08_en.38" on page 252 |
| H08.39 | 2008-28h | Compensation gain of medium-frequency jitter suppression 2 | 0%–300% | 0 | % | Immediately | " H08_en.39" on page 252 |
| H08.40 | 2008-29h | Speed observer selection | 0–1 | 0 | - | At stop | " H08_en.40" on page 252 |
| H08.42 | 2008-2Bh | Model control selection | 0–1 | 0 | - | At stop | " H08_en.42" on page 252 |
| H08.43 | 2008-2Ch | Model gain | 0.0–2000.0 | 40.0 | - | Immediately | " H08_en.43" on page 253 |
| H08.45 | 2008-2Eh | Feedforward position | 0–1 | 0 | - | Immediately | " H08_en.45" on page 253 |
| H08.46 | 2008-2Fh | Model feedforward | 0.0–102.4 | 95.0 | - | Immediately | " H08_en.46" on page 253 |
| H08.51 | 2008-34h | Model filtering time 2 | 0.00 ms to 20.00 ms | 0.00 | ms | Immediately | " H08_en.51" on page 254 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H08.53 | 2008-36h | Medium- and low-frequency jitter suppression frequency 3 | 0.0 Hz–600.0 Hz | 0.0 | Hz | Immediately | " H08_en.53" on page 254 |
| H08.54 | 2008-37h | Medium- and low-frequency jitter suppression compensation 3 | 0%–200% | 0 | % | Immediately | " H08_en.54" on page 254 |
| H08.56 | 2008-39h | Medium- and low-frequency jitter suppression phase modulation 3 | 0–1600 | 100 | - | Immediately | " H08_en.56" on page 254 |
| H08.58 | 2008-3Bh | Er.660 (Vibration too strong) switch | 0–2 | 0 | - | Immediately | " H08_en.58" on page 255 |
| H08.59 | 2008-3Ch | Medium- and low-frequency jitter suppression frequency 4 | 0.0 Hz–600.0 Hz | 0.0 | Hz | Immediately | " H08_en.59" on page 255 |
| H08.60 | 2008-3Dh | Medium- and low-frequency jitter suppression compensation 4 | 0%–200% | 0 | % | Immediately | " H08_en.60" on page 255 |
| H08.61 | 2008-3Eh | Medium- and low-frequency jitter suppression phase modulation 4 | 0–1600 | 100 | - | Immediately | " H08_en.61" on page 255 |
| H08.62 | 2008-3Fh | Position loop integral time constant | 0.15 ms to 512.00 ms | 512.00 | ms | Immediately | " H08_en.62" on page 256 |
| H08.63 | 2008-40h | 2nd position loop integral time constant | 0.15 ms to 512.00 ms | 512.00 | ms | Immediately | " H08_en.63" on page 256 |
| H08.64 | 2008-41h | Speed observer feedback selection | 0–1 | 0 | - | Immediately | " H08_en.64" on page 256 |

## 4.10 Parameter Group H09

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H09.00 | 2009-01h | Gain auto-tuning mode | 0: Disabled, manual gain tuning required<br>1: Enabled, gain parameters generated automatically based on the stiffness level<br>2: Positioning mode, gain parameters generated automatically based on the stiffness level<br>3: Interpolation mode+Inertia auto-tuning<br>4: Standard mode+Inertia auto-tuning<br>6: Quick positioning mode+Inertia auto-tuning | 0 | - | Immediately | " H09_en.00" on page 257 |
| H09.01 | 2009-02h | Stiffness level | 0–41 | 15 | - | Immediately | " H09_en.01" on page 258 |
| H09.02 | 2009-03h | Adaptive notch mode | 0: Adaptive notch no longer updated;<br>1: One adaptive notch activated (3rd notch)<br>2: Two adaptive notches activated (3rd and 4th notches)<br>3: Resonance point tested only (displayed in H09.24)<br>4: Adaptive notch cleared, values of 3rd and 4th notches restored to default | 0 | - | Immediately | " H09_en.02" on page 259 |
| H09.03 | 2009-04h | Online inertia auto-tuning mode | 0: Disabled<br>1: Enabled, changing slowly<br>2: Enabled, changing normally<br>3: Enabled, changing quickly | 0 | - | Immediately | " H09_en.03" on page 259 |
| H09.04 | 2009-05h | Low-frequency resonance suppression mode | 0: Set vibration frequency manually<br>1: Identify vibration frequency | 0 | - | Immediately | " H09_en.04" on page 260 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H09.05 | 2009-06h | Offline inertia auto-tuning mode | 0: Positive/Negative triangular wave mode<br>1: JOG mode<br>2: Bidirectional auto-tuning mode<br>3: Unidirectional auto-tuning mode | 0 | - | At stop | " H09_en.05" on page 260 |
| H09.06 | 2009-07h | Max. speed of inertia auto-tuning | 100 rpm to 1000 rpm | 500 | rpm | At stop | " H09_en.06" on page 261 |
| H09.07 | 2009-08h | Time constant for accelerating to max. speed during inertia auto-tuning | 20 ms to 800 ms | 125 | ms | At stop | " H09_en.07" on page 261 |
| H09.08 | 2009-09h | Interval time after an individual inertia auto-tuning | 50 ms to 10000 ms | 800 | ms | At stop | " H09_en.08" on page 262 |
| H09.09 | 2009-0Ah | Motor revolutions per inertia auto-tuning | 0.00–100.00 | 1.00 | - | Immediately | " H09_en.09" on page 262 |
| H09.11 | 2009-0Ch | Vibration threshold | 0.0%–100.0% | 5.0 | % | Immediately | " H09_en.11" on page 262 |
| H09.12 | 2009-0Dh | Frequency of the 1st notch | 50 Hz–4000 Hz | 4000 | Hz | Immediately | " H09_en.12" on page 263 |
| H09.13 | 2009-0Eh | Width level of the 1st notch | 0–40 | 2 | - | Immediately | " H09_en.13" on page 263 |
| H09.14 | 2009-0Fh | Depth level of the 1st notch | 0–99 | 0 | - | Immediately | " H09_en.14" on page 263 |
| H09.15 | 2009-10h | Frequency of the 2nd notch | 50 Hz–4000 Hz | 4000 | Hz | Immediately | " H09_en.15" on page 264 |
| H09.16 | 2009-11h | Width level of the 2nd notch | 0–20 | 2 | - | Immediately | " H09_en.16" on page 264 |
| H09.17 | 2009-12h | Depth level of the 2nd notch | 0–99 | 0 | - | Immediately | " H09_en.17" on page 264 |
| H09.18 | 2009-13h | Frequency of the 3rd notch | 50 Hz–4000 Hz | 4000 | Hz | Immediately | " H09_en.18" on page 264 |
| H09.19 | 2009-14h | Width level of the 3rd notch | 0–20 | 2 | - | Immediately | " H09_en.19" on page 265 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H09.20 | 2009-15h | Depth level of the 3rd notch | 0–99 | 0 | - | Immediately | " H09_en.20" on page 265 |
| H09.21 | 2009-16h | Frequency of the 4th notch | 50 Hz–4000 Hz | 4000 | Hz | Immediately | " H09_en.21" on page 265 |
| H09.22 | 2009-17h | Width level of the 4th notch | 0–20 | 2 | - | Immediately | " H09_en.22" on page 266 |
| H09.23 | 2009-18h | Depth level of the 4th notch | 0–99 | 0 | - | Immediately | " H09_en.23" on page 266 |
| H09.24 | 2009-19h | Auto-tuned resonance frequency | 0–2000 | 0 | - | Unchangeable | " H09_en.24" on page 266 |
| H09.30 | 2009-1Fh | Torque disturbance compensation gain | -100.0%–100.0% | 0.0 | % | Immediately | " H09_en.30" on page 266 |
| H09.31 | 2009-20h | Filter time constant of torque disturbance observer | 0.00 ms to 25.00 ms | 0.50 | ms | Immediately | " H09_en.31" on page 267 |
| H09.32 | 2009-21h | Gravity compensation value | -100.0–100.0 | 0.0 | - | Immediately | " H09_en.32" on page 267 |
| H09.33 | 2009-22h | Positive friction compensation | -100.0%–100.0% | 0.0 | % | Immediately | " H09_en.33" on page 267 |
| H09.34 | 2009-23h | Negative friction compensation | -100.0%–100.0% | 0.0 | % | Immediately | " H09_en.34" on page 267 |
| H09.35 | 2009-24h | Friction compensation speed threshold | 0.1rpm–30.0rpm | 2.0 | rpm | Immediately | " H09_en.35" on page 268 |
| H09.36 | 2009-25h | Friction compensation speed | 0: Speed reference<br>1: Model tracking speed<br>2: Speed feedback | 0 | - | Immediately | " H09_en.36" on page 268 |
| H09.38 | 2009-27h | Low-frequency resonance suppression frequency at the mechanical end | 1.0 Hz–100.0 Hz | 100.0 | Hz | At stop | " H09_en.38" on page 268 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H09.39 | 2009-28h | Low-frequency resonance suppression at the mechanical end | 0–3 | 2 | - | At stop | " H09_en.39" on page 269 |
| H09.41 | 2009-2Ah | Frequency of the 5th notch | 50 Hz–8000 Hz | 4000 | Hz | At stop | " H09_en.41" on page 269 |
| H09.42 | 2009-2Bh | Width level of the 5th notch | 0–20 | 2 | - | Immediately | " H09_en.42" on page 269 |
| H09.43 | 2009-2Ch | Depth level of the 5th notch | 0–99 | 0 | - | Immediately | " H09_en.43" on page 269 |
| H09.44 | 2009-2Dh | Frequency of low-frequency resonance suppression 1 at mechanical load end | 0.0 Hz–200.0 Hz | 0.0 | Hz | Immediately | " H09_en.44" on page 270 |
| H09.45 | 2009-2Eh | Responsiveness of low-frequency resonance suppression 1 at mechanical load end | 0.01–10.00 | 1.00 | - | Immediately | " H09_en.45" on page 270 |
| H09.47 | 2009-30h | Width of low-frequency resonance suppression 1 at mechanical load end | 0.00–2.00 | 1.00 | - | Immediately | " H09_en.47" on page 270 |
| H09.49 | 2009-32h | Frequency of low-frequency resonance suppression 2 at mechanical load end | 0.0 Hz–200.0 Hz | 0.0 | Hz | Immediately | " H09_en.49" on page 270 |
| H09.50 | 2009-33h | Responsiveness of low-frequency resonance suppression 2 at mechanical load end | 0.01–10.00 | 1.00 | - | Immediately | " H09_en.50" on page 271 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H09.52 | 2009-35h | Width of low-frequency resonance suppression 2 at mechanical load end | 0.00–2.00 | 1.00 | - | Immediately | " H09_en.52" on page 271 |
| H09.57 | 2009-3Ah | STune resonance suppression switchover frequency | 0 Hz–4000 Hz | 850 | Hz | Immediately | " H09_en.57" on page 271 |
| H09.58 | 2009-3Bh | STune resonance suppression reset selection | 0: Disable<br>1: Enable | 0 | - | Immediately | " H09_en.58" on page 272 |

## 4.11 Parameter Group H0A

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H0A.00 | 200A-01h | Power input phase loss protection | 0: Enable phase loss fault and inhibit phase loss warning<br>1: Enable phase loss fault and warning<br>2: Disable phase loss fault and warning | 0 | - | Immediately | " H0A_en.00" on page 272 |
| H0A.02 | 200A-03h | Vibration alarm switch | 0: On<br>1: Off | 0 | - | Immediately | " H0A_en.02" on page 273 |
| H0A.03 | 200A-04h | Power-off memory | 0: Disabled<br>1: Enabled | 0 | - | Immediately | " H0A_en.03" on page 273 |
| H0A.04 | 200A-05h | Motor overload protection gain | 50%–300% | 100 | % | At stop | " H0A_en.04" on page 274 |
| H0A.08 | 200A-09h | Overspeed threshold | 0 rpm to 10000 rpm | 0 | rpm | Immediately | " H0A_en.08" on page 274 |
| H0A.09 | 200A-0Ah | Maximum position pulse frequency | 100 kHz–4000 kHz | 4000 | kHz | At stop | " H0A_en.09" on page 275 |
| H0A.10 | 200A-0Bh | Threshold of excessive position deviation | 1 to 1073741824 | 27486951 | Encoder unit | Immediately | " H0A_en.10" on page 275 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H0A.12 | 200A-0Dh | Runaway protection | 0: Disabled<br>1: Enabled | 1 | - | Immediately | " H0A_en.12" on page 276 |
| H0A.16 | 200A-11h | Threshold of low-frequency resonance position deviation | 1–1000 | 5 | - | Immediately | " H0A_en.16" on page 276 |
| H0A.17 | 200A-12h | Reference/ Pulse selection | 0: Pulse unit<br>1: Reference unit | 0 | - | At stop | " H0A_en.17" on page 276 |
| H0A.19 | 200A-14h | DI8 filter time constant | 0–255 | 80 | - | At stop | " H0A_en.19" on page 277 |
| H0A.20 | 200A-15h | DI9 filter time constant | 0–255 | 80 | - | At stop | " H0A_en.20" on page 277 |
| H0A.22 | 200A-17h | Sigma_Delta filter time | 0–3 | 0 | - | At stop | " H0A_en.22" on page 277 |
| H0A.23 | 200A-18h | Tz signal filter time | 0–31 | 15 | - | At stop | " H0A_en.23" on page 277 |
| H0A.24 | 200A-19h | Filter time constant of low-speed pulse input pin | 0–255 | 30 | - | At stop | " H0A_en.24" on page 278 |
| H0A.25 | 200A-1Ah | Filter time constant of speed feedback display value | 0 ms to 5000 ms | 200 | ms | At stop | " H0A_en.25" on page 278 |
| H0A.26 | 200A-1Bh | Motor overload detection | 0: Show motor overload warning (E909.0) and fault (E620.0)<br>1: Hide motor overload warning (E909.0) and fault (E620.0)<br>2: No meaning<br>3: Enabled for new motors | 3 | - | At stop | " H0A_en.26" on page 278 |
| H0A.27 | 200A-1Ch | Speed DO filter time constant | 0 ms to 5000 ms | 10 | ms | At stop | " H0A_en.27" on page 279 |
| H0A.28 | 200A-1Dh | Quadrature encoder filter time constant | 0 ns to 255 ns | 30 | ns | At stop | " H0A_en.28" on page 279 |
| H0A.30 | 200A-1Fh | Filter time constant of high-speed pulse input pin | 0 ns to 255 ns | 2 | ns | At stop | " H0A_en.30" on page 280 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H0A.32 | 200A-21h | Motor stall over-temperature protection time window | 10 ms to 65535 ms | 200 | ms | Immediately | " H0A_en.32" on page 280 |
| H0A.33 | 200A-22h | Motor stall over-temperature detection | 0: Disabled<br>1: Enable<br>2: Enabled for new over-temperature | 1 | - | Immediately | " H0A_en.33" on page 280 |
| H0A.35 | 200A-24h | Inhibit reading encoder EEPRROM on power-on (for third-party encoders) | 0: Allow<br>1: Inhibit | 0 | - | Immediately | " H0A_en.35" on page 281 |
| H0A.36 | 200A-25h | Encoder multi-turn overflow fault | 0: Not hide<br>1: Hide | 0 | - | At stop | " H0A_en.36" on page 281 |
| H0A.38 | 200A-27h | IGBT over-temperature threshold | 0°C to 175°C | 135 | °C | At stop | " H0A_en.38" on page 282 |
| H0A.39 | 200A-28h | IGBT over-temperature protection switch | 0: Disabled<br>1: Enabled | 0 | - | At stop | " H0A_en.39" on page 282 |
| H0A.40 | 200A-29h | Software limit selection | 0: No operation<br>1: Activated immediately<br>2: Activated after homing is done | 0 | - | At stop | " H0A_en.40" on page 282 |
| H0A.41 | 200A-2Ah | Forward position of software limit | -2147483648–2147483647 | 2147483647 | - | At stop | " H0A_en.41" on page 283 |
| H0A.43 | 200A-2Ch | Reverse position of software limit | -2147483648–2147483647 | -2147483648 | - | At stop | " H0A_en.43" on page 283 |
| H0A.47 | 200A-30h | Brake protection | 0–1 | 0 | - | Immediately | " H0A_en.47" on page 283 |
| H0A.48 | 200A-31h | Gravity load | 0–3000 | 300 | - | Immediately | " H0A_en.48" on page 283 |
| H0A.49 | 200A-32h | Regenerative wafer over-temperature threshold | 0°C to 175°C | 115 | °C | At stop | " H0A_en.49" on page 284 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H0A.50 | 200A-33h | Torque reference display filter time | 0 ms to 5000 ms | 200 | ms | At stop | " H0A_en.50" on page 284 |
| H0A.51 | 200A-34h | Encoder fault tolerance count | 0–31 | 31 | - | Immediately | " H0A_en.51" on page 284 |
| H0A.52 | 200A-35h | Defines the temperature threshold for encoder overtemperature protection. | 0° to 175° | 105 | ° | Immediately | " H0A_en.52" on page 285 |
| H0A.55 | 200A-38h | Runaway current threshold | 100.0%–400.0% | 200.0 | % | Immediately | " H0A_en.55" on page 285 |
| H0A.57 | 200A-3Ah | Runaway speed threshold | 1 rpm to 1000 rpm | 10 | rpm | Immediately | " H0A_en.57" on page 285 |
| H0A.58 | 200A-3Bh | Speed feedback filtering time | 0.1 ms to 100.0 ms | 2.0 | ms | Immediately | " H0A_en.58" on page 285 |
| H0A.59 | 200A-3Ch | Runaway protection detection time | 10 ms to 1000 ms | 30 | ms | Immediately | " H0A_en.59" on page 286 |
| H0A.61 | 200A-3Eh | Phase loss detection time threshold | 30 ms to 65535 ms | 50 | ms | Immediately | " H0A_en.61" on page 286 |
| H0A.85 | 200A-56h | Wire breakage detection torque threshold | 4.0%–400.0% | 5.0 | % | At stop | " H0A_en.85" on page 286 |
| H0A.86 | 200A-57h | Wire breakage detection filter time | 5 ms to 1000 ms | 30 | ms | At stop | " H0A_en.86" on page 287 |

## 4.12 Parameter Group H0b

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H0b.00 | 200b-01h | Motor speed actual value | -9999rpm to 9999rpm | 0 | rpm | Unchangeable | " H0b_en.00" on page 287 |
| H0b.01 | 200b-02h | Speed reference | -9999rpm to 9999rpm | 0 | rpm | Unchangeable | " H0b_en.01" on page 287 |
| H0b.02 | 200b-03h | Internal torque reference | -300.0%–300.0% | 0.0 | % | Unchangeable | " H0b_en.02" on page 287 |
| H0b.03 | 200b-04h | Monitored DI status | 0–65535 | 0 | - | Unchangeable | " H0b_en.03" on page 288 |
| H0b.05 | 200b-06h | Monitored DO status | 0–65535 | 0 | - | Unchangeable | " H0b_en.05" on page 288 |
| H0b.07 | 200b-08h | Absolute position counter | -2147483648 to 2147483647 | 0 | Reference unit | Unchangeable | " H0b_en.07" on page 289 |
| H0b.09 | 200b-0Ah | Mechanical angle | 0–65535 | 0 | - | Unchangeable | " H0b_en.09" on page 289 |
| H0b.10 | 200b-0Bh | Electrical angle | 0.0° to 360.0° | 0.0 | ° | Unchangeable | " H0b_en.10" on page 290 |
| H0b.11 | 200b-0Ch | Speed corresponding to the input position reference | -9999rpm to 9999rpm | 0 | rpm | Unchangeable | " H0b_en.11" on page 290 |
| H0b.12 | 200b-0Dh | Average load rate | 0.0%–6553.5% | 0.0 | % | Unchangeable | " H0b_en.12" on page 290 |
| H0b.13 | 200b-0Eh | Input position reference counter | -2147483648 to 2147483647 | 0 | Reference unit | Unchangeable | " H0b_en.13" on page 291 |
| H0b.15 | 200b-10h | Encoder position deviation counter | -2147483648 to 2147483647 | 0 | Encoder unit | Unchangeable | " H0b_en.15" on page 291 |
| H0b.17 | 200b-12h | Feedback pulse counter | -2147483648 to 2147483647 | 0 | Encoder unit | Unchangeable | " H0b_en.17" on page 291 |
| H0b.19 | 200b-14h | Total power-on time | 0.0s–214748364.7s | 0.0 | s | Unchangeable | " H0b_en.19" on page 292 |
| H0b.24 | 200b-19h | RMS value of phase current | 0.00 A to 655.35 A | 0.00 | A | Unchangeable | " H0b_en.24" on page 292 |
| H0b.26 | 200b-1Bh | Bus voltage | 0.0 V to 6553.5 V | 0.0 | V | Unchangeable | " H0b_en.26" on page 292 |
| H0b.27 | 200b-1Ch | Module temperature | 0°C to 65535°C | 0 | °C | Unchangeable | " H0b_en.27" on page 292 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H0b.28 | 200b-1Dh | Absolute encoder fault information given by FPGA | 0–65535 | 0 | - | Unchangeable | " H0b_en.28" on page 293 |
| H0b.29 | 200b-1Eh | System status information given by FPGA | 0–65535 | 0 | - | Unchangeable | " H0b_en.29" on page 293 |
| H0b.30 | 200b-1Fh | System fault information given by FPGA | 0–65535 | 0 | - | Unchangeable | " H0b_en.30" on page 293 |
| H0b.33 | 200b-22h | Fault log | 0: Present fault<br>1: Last fault<br>2: 2nd to last fault<br>3: 3rd to last fault<br>4: 4th to last fault<br>5: 5th to last fault 6: 6th to last fault<br>7: 7th to last fault<br>8: 8th to last fault<br>9: 9th to last fault<br>10: 10th to last fault<br>11: 11th to last fault<br>12: 12th to last fault<br>13: 13th to last fault<br>14: 14th to last fault<br>15: 15th to last fault<br>16: 16th to last fault<br>17: 17th to last fault<br>18: 18th to last fault<br>19: 19th to last fault | 0 | - | Immediately | " H0b_en.33" on page 294 |
| H0b.34 | 200b-23h | Fault code of the selected fault | 0–65535 | 0 | - | Unchangeable | " H0b_en.34" on page 294 |
| H0b.35 | 200b-24h | Time stamp upon occurrence of the selected fault | 0.0s–214748364.7s | 0.0 | s | Unchangeable | " H0b_en.35" on page 294 |
| H0b.37 | 200b-26h | Motor speed upon occurrence of the selected fault | -32767 rpm to +32767 rpm | 0 | rpm | Unchangeable | " H0b_en.37" on page 294 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H0b.38 | 200b-27h | Motor phase U current upon occurrence of the selected fault | -327.67 A to 327.67 A | 0.00 | A | Unchangeable | *" H0b_en.38" on page 295* |
| H0b.39 | 200b-28h | Motor phase V current upon occurrence of the selected fault | -327.67 A to 327.67 A | 0.00 | A | Unchangeable | *" H0b_en.39" on page 295* |
| H0b.40 | 200b-29h | Bus voltage upon occurrence of the selected fault | 0.0 V to 6553.5 V | 0.0 | V | Unchangeable | *" H0b_en.40" on page 295* |
| H0b.41 | 200b-2Ah | DI status upon occurrence of the selected fault | 0–65535 | 0 | - | Unchangeable | *" H0b_en.41" on page 296* |
| H0b.42 | 200b-2Bh | DO status upon occurrence of the selected fault | 0–65535 | 0 | - | Unchangeable | *" H0b_en.42" on page 296* |
| H0b.43 | 200b-2Ch | Group No. of the abnormal parameter | 0–65535 | 0 | - | Unchangeable | *" H0b_en.43" on page 296* |
| H0b.44 | 200b-2Dh | Offset of the abnormal parameter within the parameter group | 0–65535 | 0 | - | Unchangeable | *" H0b_en.44" on page 296* |
| H0b.45 | 200b-2Eh | Internal fault code | 0–65535 | 0 | - | Unchangeable | *" H0b_en.45" on page 297* |
| H0b.46 | 200b-2Fh | Absolute encoder fault information given by FPGA upon occurrence of the selected fault | 0–65535 | 0 | - | Unchangeable | *" H0b_en.46" on page 297* |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H0b.47 | 200b-30h | System status information given by FPGA upon occurrence of the selected fault | 0–65535 | 0 | - | Unchangeable | " H0b_en.47" on page 297 |
| H0b.48 | 200b-31h | System fault information given by FPGA upon occurrence of the selected fault | 0–65535 | 0 | - | Unchangeable | " H0b_en.48" on page 297 |
| H0b.51 | 200b-34h | Internal fault code upon occurrence of the selected fault | 0–65535 | 0 | - | Unchangeable | " H0b_en.51" on page 298 |
| H0b.52 | 200b-35h | Timeout fault flat bit given by FPGA upon occurrence of the selected fault | 0–65535 | 0 | - | Unchangeable | " H0b_en.52" on page 298 |
| H0b.53 | 200b-36h | Position deviation counter | -2147483648 to 2147483647 | 0 | Reference unit | Unchangeable | " H0b_en.53" on page 298 |
| H0b.55 | 200b-38h | Motor speed actual value | -6000.0rpm to 6000.0rpm | 0.0 | rpm | Unchangeable | " H0b_en.55" on page 299 |
| H0b.57 | 200b-3Ah | Bus voltage of the control circuit | 0.0 V to 65535.0 V | 0.0 | V | Unchangeable | " H0b_en.57" on page 299 |
| H0b.58 | 200b-3Bh | Mechanical absolute position (low 32 bits) | -2147483647 to 2147483647 | 0 | Encoder unit | Unchangeable | " H0b_en.58" on page 299 |
| H0b.60 | 200b-3Dh | Mechanical absolute position (high 32 bits) | -2147483647 to 2147483647 | 0 | Encoder unit | Unchangeable | " H0b_en.60" on page 299 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H0b.63 | 200b-40h | NotRdy state | 1: Control circuit error<br>2: Main circuit power input error<br>3: Bus undervoltage<br>4: Soft start failed<br>5: Encoder initialization undone<br>6: Short circuit to ground failed<br>7: Others | 0 | - | Unchangeable | " H0b_en.63" on page 300 |
| H0b.64 | 200b-41h | Real-time input position reference counter | -2147483648 to 2147483647 | 0 | Reference unit | Unchangeable | " H0b_en.64" on page 300 |
| H0b.66 | 200b-43h | Encoder temperature | -32768°C to 32767°C | 0 | °C | Unchangeable | " H0b_en.66" on page 300 |
| H0b.70 | 200b-47h | Number of revolutions recorded in the absolute encoder | 0 Rev to 65535 Rev | 0 | Rev | Unchangeable | " H0b_en.70" on page 301 |
| 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 301 |
| H0b.73 | 200b-4Ah | Single-turn offset position of absolute encoder | 0 to 2147483647 | 0 | Encoder unit | Unchangeable | " H0b_en.73" on page 301 |
| H0b.75 | 200b-4Ch | Load inertia ratio in online inertia auto-tuning | 0.00–655.35 | 0.00 | - | Unchangeable | " H0b_en.75" on page 301 |
| H0b.76 | 200b-4Dh | External load in online inertia auto-tuning | 0.0–6553.5 | 0.0 | - | Unchangeable | " H0b_en.76" on page 302 |
| H0b.77 | 200b-4Eh | Absolute position fed back by the absolute encoder (low 32 bits) | -2147483647 to 2147483647 | 0 | Encoder unit | Unchangeable | " H0b_en.77" on page 302 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H0b.79 | 200b-50h | Absolute position fed back by the absolute encoder (high 32 bits) | -2147483647 to 2147483647 | 0 | Encoder unit | Unchangeable | " H0b_en.79" on page 302 |
| H0b.81 | 200b-52h | Load position within one turn in absolute position rotation mode (low 32 bits) | -2147483647 to 2147483647 | 0 | Encoder unit | Unchangeable | " H0b_en.81" on page 303 |
| H0b.83 | 200b-54h | Load position within one turn in absolute position rotation mode (high 32 bits) | -2147483647 to 2147483647 | 0 | Encoder unit | Unchangeable | " H0b_en.83" on page 303 |
| H0b.85 | 200b-56h | Load position within one turn in absolute position rotation mode | -2147483647 to 2147483647 | 0 | Reference unit | Unchangeable | " H0b_en.85" on page 303 |

## 4.13 Parameter Group H0C

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H0C.00 | 200C-01h | Drive axis address | 0–247 | 1 | - | Immediately | " H0C_en.00" on page 303 |
| H0C.02 | 200C-03h | Serial baud rate | 0: 2400bps<br>1: 4800bps<br>2: 9600bps<br>3: 19200bps<br>4: 38400bps<br>5: 57600bps<br>6: 115200bps | 5 | - | Immediately | " H0C_en.02" on page 304 |
| H0C.03 | 200C-04h | Modbus data format | 0: No parity, 2 stop bits<br>1: Even parity, 1 stop bit<br>2: Odd parity, 1 stop bit<br>3: No parity, 1 stop bit | 0 | - | Immediately | " H0C_en.03" on page 304 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H0C.08 | 200C-09h | CAN communication rate | 0: 20K<br>1: 50K<br>2: 100K<br>3: 125K<br>4: 250K<br>5: 500K<br>6: 1M<br>7: 1M | 5 | - | Immediately | *" H0C_en.08" on page 305* |
| H0C.09 | 200C-0Ah | Communication VDI | 0: Disabled<br>1: Enabled | 0 | - | At stop | *" H0C_en.09" on page 306* |
| H0C.10 | 200C-0Bh | VDI default value upon power-on | 0–65535 | 0 | - | Immediately | *" H0C_en.10" on page 306* |
| H0C.11 | 200C-0Ch | Communication VDO | 0: Disabled<br>1: Enabled | 0 | - | At stop | *" H0C_en.11" on page 307* |
| H0C.12 | 200C-0Dh | Default level of the VDO allocated with function 0 | 0–65535 | 0 | - | At stop | *" H0C_en.12" on page 308* |
| H0C.13 | 200C-0Eh | Update parameter values written through communication to EEPROM | 0: Not update EEPROM<br>1: Update EEPROM | 1 | - | Immediately | *" H0C_en.13" on page 309* |
| H0C.14 | 200C-0Fh | Modbus error code | 0: N/A<br>1: Illegal parameter (command code)<br>2: Command code data address<br>3: Illegal data<br>4: Slave device fault | 2 | - | Unchangeable | *" H0C_en.14" on page 309* |
| H0C.16 | 200C-11h | Update parameter values written through CAN communication to EEPROM | 0: Not update EEPROM<br>1: Update EEPROM | 0 | - | Immediately | *" H0C_en.16" on page 310* |
| H0C.25 | 200C-1Ah | Modbus command response delay | 0 ms to 20 ms | 0 | ms | Immediately | *" H0C_en.25" on page 310* |
| H0C.26 | 200C-1Bh | Modbus communication data sequence | 0: High 16 bits before low 16 bits<br>1: Low 16 bits before high 16 bits | 1 | - | Immediately | *" H0C_en.26" on page 310* |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H0C.30 | 200C-1Fh | Modbus error frame format | 0: Old protocol<br>1: New protocol (standard) | 1 | - | Immediately | " H0C_en.30" on page 311 |
| H0C.31 | 200C-20h | Modbus receiving selection | 0: Receiving interrupt enabled<br>1: Current loop interrupt inquiry | 0 | - | Immediately | " H0C_en.31" on page 311 |

# 4.14 Parameter Group H0d

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H0d.00 | 200d-01h | Software Reset | 0: No operation<br>1: Enable | 0 | - | At stop | " H0d_en.00" on page 311 |
| H0d.01 | 200d-02h | Fault Reset | 0: No operation<br>1: Enable | 0 | - | At stop | " H0d_en.01" on page 312 |
| H0d.02 | 200d-03h | Inertia auto-tuning selection | 0–65 | 0 | - | At stop | " H0d_en.02" on page 312 |
| H0d.03 | 200d-04h | Initial angle auto-tuning | 0: No operation<br>1: Enabled | 0 | - | At stop | " H0d_en.03" on page 313 |
| H0d.04 | 200d-05h | Read/write in encoder ROM | 0: No operation<br>1: Write ROM<br>2: Read ROM | 0 | - | At stop | " H0d_en.04" on page 313 |
| H0d.05 | 200d-06h | Emergency stop | 0: No operation<br>1: Emergency stop | 0 | - | Immediately | " H0d_en.05" on page 313 |
| H0d.06 | 200d-07h | Current loop parameter auto-tuning | 0: No operation<br>1: Save parameters<br>2: Do not save parameters | 0 | - | At stop | " H0d_en.06" on page 314 |
| H0d.12 | 200d-0Dh | Phase U/V current balance correction | 0–1 | 0 | - | Unchangeable | " H0d_en.12" on page 314 |
| H0d.17 | 200d-12h | Forced DI/DO selection | 0: No operation<br>1: Forced DI enabled, forced DO disabled<br>2: Forced DO enabled, forced DI disabled<br>3: Forced DI and DO enabled | 0 | - | Immediately | " H0d_en.17" on page 314 |
| H0d.18 | 200d-13h | Forced DI setting | 0–511 | 511 | - | Immediately | " H0d_en.18" on page 314 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H0d.19 | 200d-14h | Forced DO setting | 0–31 | 0 | - | Immediately | " H0d_en.19" on page 315 |
| H0d.20 | 200d-15h | Multi-turn absolute encoder reset | 0: No operation<br>1 Reset<br>2: Reset the fault and multi-turn data | 0 | - | At stop | " H0d_en.20" on page 316 |

## 4.15 Parameter Group H11

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H11.00 | 2011-01h | Multi-position operation mode | 0: Single run (number of displacements selected in H11.01)<br>1: Cyclic operation (number of displacement selected in H11.01)<br>2: DI-based operation (selected by DI)<br>3: Sequential operation<br>5: Axis-controlled continuous operation | 1 | - | At stop | " H11_en.00" on page 317 |
| H11.01 | 2011-02h | Number of displacement references in multi-position mode | 1–16 | 1 | - | At stop | " H11_en.01" on page 320 |
| H11.02 | 2011-03h | Starting displacement No. after pause | 0: Continue to execute the unexecuted displacements<br>1: Start from displacement 1 | 0 | - | At stop | " H11_en.02" on page 320 |
| H11.03 | 2011-04h | Interval time unit | 0: ms<br>1: s | 0 | - | At stop | " H11_en.03" on page 321 |
| H11.04 | 2011-05h | Displacement reference type | 0: Relative displacement reference<br>1: Absolute displacement reference | 0 | - | Immediately | " H11_en.04" on page 322 |
| H11.05 | 2011-06h | Starting displacement No. in sequential operation | 0–16 | 0 | - | At stop | " H11_en.05" on page 323 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H11.09 | 2011-0Ah | Deceleration upon axis control OFF | 0 ms to 65535 ms | 65535 | ms | Immediately | "H11_en.09" on page 324 |
| H11.10 | 2011-0Bh | Start speed of the 1st displacement | 0 rpm to 6000 rpm | 0 | rpm | Immediately | "H11_en.10" on page 324 |
| H11.11 | 2011-0Ch | Stop speed of the 1st displacement | 0 rpm to 6000 rpm | 0 | rpm | Immediately | "H11_en.11" on page 325 |
| H11.12 | 2011-0Dh | Displacement 1 | -1073741824 to 1073741824 | 10000 | Reference unit | Immediately | "H11_en.12" on page 325 |
| H11.14 | 2011-0Fh | Max. speed of displacement 1 | 1 rpm to 6000 rpm | 200 | rpm | Immediately | "H11_en.14" on page 325 |
| H11.15 | 2011-10h | Acc/Dec time of displacement 1 | 0 ms to 65535 ms | 10 | ms | Immediately | "H11_en.15" on page 325 |
| H11.16 | 2011-11h | Interval time after displacement 1 | 0 ms (s)–10000 ms (s) | 10 | ms (s) | Immediately | "H11_en.16" on page 326 |
| H11.17 | 2011-12h | Displacement 2 | -1073741824 to 1073741824 | 10000 | Reference unit | Immediately | "H11_en.17" on page 326 |
| H11.19 | 2011-14h | Max. speed of displacement 2 | 1 rpm to 6000 rpm | 200 | rpm | Immediately | "H11_en.19" on page 327 |
| H11.20 | 2011-15h | Acc/Dec time of displacement 2 | 0 ms to 65535 ms | 10 | ms | Immediately | "H11_en.20" on page 327 |
| H11.21 | 2011-16h | Interval time after displacement 2 | 0 ms (s)–10000 ms (s) | 10 | ms (s) | Immediately | "H11_en.21" on page 327 |
| H11.22 | 2011-17h | Displacement 3 | -1073741824 to 1073741824 | 10000 | Reference unit | Immediately | "H11_en.22" on page 327 |
| H11.24 | 2011-19h | Max. speed of displacement 3 | 1 rpm to 6000 rpm | 200 | rpm | Immediately | "H11_en.24" on page 328 |
| H11.25 | 2011-1Ah | Acc/Dec time of displacement 3 | 0 ms to 65535 ms | 10 | ms | Immediately | "H11_en.25" on page 328 |
| H11.26 | 2011-1Bh | Interval time after displacement 3 | 0 ms (s)–10000 ms (s) | 10 | ms (s) | Immediately | "H11_en.26" on page 328 |
| H11.27 | 2011-1Ch | Displacement 4 | -1073741824 to 1073741824 | 10000 | Reference unit | Immediately | "H11_en.27" on page 329 |
| H11.29 | 2011-1Eh | Max. speed of displacement 4 | 1 rpm to 6000 rpm | 200 | rpm | Immediately | "H11_en.29" on page 329 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H11.30 | 2011-1Fh | Acc/Dec time of displacement 4 | 0 ms to 65535 ms | 10 | ms | Immediately | " H11_en.30" on page 329 |
| H11.31 | 2011-20h | Interval time after displacement 4 | 0 ms (s)–10000 ms (s) | 10 | ms (s) | Immediately | " H11_en.31" on page 329 |
| H11.32 | 2011-21h | Displacement 5 | -1073741824 to 1073741824 | 10000 | Reference unit | Immediately | " H11_en.32" on page 330 |
| H11.34 | 2011-23h | Max. speed of displacement 5 | 1 rpm to 6000 rpm | 200 | rpm | Immediately | " H11_en.34" on page 330 |
| H11.35 | 2011-24h | Acc/Dec time of displacement 5 | 0 ms to 65535 ms | 10 | ms | Immediately | " H11_en.35" on page 330 |
| H11.36 | 2011-25h | Interval time after displacement 5 | 0 ms (s)–10000 ms (s) | 10 | ms (s) | Immediately | " H11_en.36" on page 330 |
| H11.37 | 2011-26h | Displacement 6 | -1073741824 to 1073741824 | 10000 | Reference unit | Immediately | " H11_en.37" on page 331 |
| H11.39 | 2011-28h | Max. speed of displacement 6 | 1 rpm to 6000 rpm | 200 | rpm | Immediately | " H11_en.39" on page 331 |
| H11.40 | 2011-29h | Acc/Dec time of displacement 6 | 0 ms to 65535 ms | 10 | ms | Immediately | " H11_en.40" on page 331 |
| H11.41 | 2011-2Ah | Interval time after displacement 6 | 0 ms (s)–10000 ms (s) | 10 | ms (s) | Immediately | " H11_en.41" on page 331 |
| H11.42 | 2011-2Bh | Displacement 7 | -1073741824 to 1073741824 | 10000 | Reference unit | Immediately | " H11_en.42" on page 332 |
| H11.44 | 2011-2Dh | Max. speed of displacement 7 | 1 rpm to 6000 rpm | 200 | rpm | Immediately | " H11_en.44" on page 332 |
| H11.45 | 2011-2Eh | Acc/Dec time of displacement 7 | 0 ms to 65535 ms | 10 | ms | Immediately | " H11_en.45" on page 332 |
| H11.46 | 2011-2Fh | Interval time after displacement 7 | 0 ms (s)–10000 ms (s) | 10 | ms (s) | Immediately | " H11_en.46" on page 333 |
| H11.47 | 2011-30h | Displacement 8 | -1073741824 to 1073741824 | 10000 | Reference unit | Immediately | " H11_en.47" on page 333 |
| H11.49 | 2011-32h | Max. speed of displacement 8 | 1 rpm to 6000 rpm | 200 | rpm | Immediately | " H11_en.49" on page 333 |
| H11.50 | 2011-33h | Acc/Dec time of displacement 8 | 0 ms to 65535 ms | 10 | ms | Immediately | " H11_en.50" on page 333 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H11.51 | 2011-34h | Interval time after displacement 8 | 0 ms (s)–10000 ms (s) | 10 | ms (s) | Immediately | " H11_en.51" on page 334 |
| H11.52 | 2011-35h | Displacement 9 | -1073741824 to 1073741824 | 10000 | Reference unit | Immediately | " H11_en.52" on page 334 |
| H11.54 | 2011-37h | Max. speed of displacement 9 | 1 rpm to 6000 rpm | 200 | rpm | Immediately | " H11_en.54" on page 334 |
| H11.55 | 2011-38h | Acc/Dec time of displacement 9 | 0 ms to 65535 ms | 10 | ms | Immediately | " H11_en.55" on page 334 |
| H11.56 | 2011-39h | Interval time after displacement 9 | 0 ms (s)–10000 ms (s) | 10 | ms (s) | Immediately | " H11_en.56" on page 335 |
| H11.57 | 2011-3Ah | Displacement 10 | -1073741824 to 1073741824 | 10000 | Reference unit | Immediately | " H11_en.57" on page 335 |
| H11.59 | 2011-3Ch | Max. speed of displacement 10 | 1 rpm to 6000 rpm | 200 | rpm | Immediately | " H11_en.59" on page 335 |
| H11.60 | 2011-3Dh | Acc/Dec time of displacement 10 | 0 ms to 65535 ms | 10 | ms | Immediately | " H11_en.60" on page 336 |
| H11.61 | 2011-3Eh | Interval time after displacement 10 | 0 ms (s)–10000 ms (s) | 10 | ms (s) | Immediately | " H11_en.61" on page 336 |
| H11.62 | 2011-3Fh | Displacement 11 | -1073741824 to 1073741824 | 10000 | Reference unit | Immediately | " H11_en.62" on page 336 |
| H11.64 | 2011-41h | Max. speed of displacement 11 | 1 rpm to 6000 rpm | 200 | rpm | Immediately | " H11_en.64" on page 336 |
| H11.65 | 2011-42h | Acc/Dec time of displacement 11 | 0 ms to 65535 ms | 10 | ms | Immediately | " H11_en.65" on page 337 |
| H11.66 | 2011-43h | Interval time after displacement 11 | 0 ms (s)–10000 ms (s) | 10 | ms (s) | Immediately | " H11_en.66" on page 337 |
| H11.67 | 2011-44h | Displacement 12 | -1073741824 to 1073741824 | 10000 | Reference unit | Immediately | " H11_en.67" on page 337 |
| H11.69 | 2011-46h | Max. speed of displacement 12 | 1 rpm to 6000 rpm | 200 | rpm | Immediately | " H11_en.69" on page 337 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H11.70 | 2011-47h | Acc/Dec time of displacement 12 | 0 ms to 65535 ms | 10 | ms | Immediately | " H11_en.70" on page 338 |
| H11.71 | 2011-48h | Interval time after displacement 12 | 0 ms (s)–10000 ms (s) | 10 | ms (s) | Immediately | " H11_en.71" on page 338 |
| H11.72 | 2011-49h | Displacement 13 | -1073741824 to 1073741824 | 10000 | Reference unit | Immediately | " H11_en.72" on page 338 |
| H11.74 | 2011-4Bh | Max. speed of displacement 13 | 1 rpm to 6000 rpm | 200 | rpm | Immediately | " H11_en.74" on page 339 |
| H11.75 | 2011-4Ch | Acc/Dec time of displacement 13 | 0 ms to 65535 ms | 10 | ms | Immediately | " H11_en.75" on page 339 |
| H11.76 | 2011-4Dh | Interval time after displacement 13 | 0 ms (s)–10000 ms (s) | 10 | ms (s) | Immediately | " H11_en.76" on page 339 |
| H11.77 | 2011-4Eh | Displacement 14 | -1073741824 to 1073741824 | 10000 | Reference unit | Immediately | " H11_en.77" on page 339 |
| H11.79 | 2011-50h | Max. speed of displacement 14 | 1 rpm to 6000 rpm | 200 | rpm | Immediately | " H11_en.79" on page 340 |
| H11.80 | 2011-51h | Acc/Dec time of displacement 14 | 0 ms to 65535 ms | 10 | ms | Immediately | " H11_en.80" on page 340 |
| H11.81 | 2011-52h | Interval time after displacement 14 | 0 ms (s)–10000 ms (s) | 10 | ms (s) | Immediately | " H11_en.81" on page 340 |
| H11.82 | 2011-53h | Displacement 15 | -1073741824 to 1073741824 | 10000 | Reference unit | Immediately | " H11_en.82" on page 340 |
| H11.84 | 2011-55h | Max. speed of displacement 15 | 1 rpm to 6000 rpm | 200 | rpm | Immediately | " H11_en.84" on page 341 |
| H11.85 | 2011-56h | Acc/Dec time of displacement 15 | 0 ms to 65535 ms | 10 | ms | Immediately | " H11_en.85" on page 341 |
| H11.86 | 2011-57h | Interval time after displacement 15 | 0 ms (s)–10000 ms (s) | 10 | ms (s) | Immediately | " H11_en.86" on page 341 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H11.87 | 2011-58h | Displacement 16 | -1073741824 to 1073741824 | 10000 | Reference unit | Immediately | " H11_en.87" on page 342 |
| H11.89 | 2011-5Ah | Max. speed of displacement 16 | 1 rpm to 6000 rpm | 200 | rpm | Immediately | " H11_en.89" on page 342 |
| H11.90 | 2011-5Bh | Acc/Dec time of displacement 16 | 0 ms to 65535 ms | 10 | ms | Immediately | " H11_en.90" on page 342 |
| H11.91 | 2011-5Ch | Interval time after displacement 16 | 0 ms (s)–10000 ms (s) | 10 | ms (s) | Immediately | " H11_en.91" on page 342 |

## 4.16 Parameter Group H12

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H12.00 | 2012-01h | Multi-speed operation mode | 0: Individual operation (number of speeds selected in H12.01)<br>1: Cyclic operation (number of speeds selected in H12.01)<br>2: DI-based operation | 1 | - | At stop | " H12_en.00" on page 343 |
| H12.01 | 2012-02h | Number of speed references in multi-speed mode | 1–16 | 16 | - | At stop | " H12_en.01" on page 345 |
| H12.02 | 2012-03h | Operating time unit | 0: sec<br>1: min | 0 | - | At stop | " H12_en.02" on page 345 |
| H12.03 | 2012-04h | Acceleration time 1 | 0 ms to 65535 ms | 10 | ms | Immediately | " H12_en.03" on page 346 |
| H12.04 | 2012-05h | Deceleration time 1 | 0 ms to 65535 ms | 10 | ms | Immediately | " H12_en.04" on page 346 |
| H12.05 | 2012-06h | Acceleration time 2 | 0 ms to 65535 ms | 50 | ms | Immediately | " H12_en.05" on page 346 |
| H12.06 | 2012-07h | Deceleration time 2 | 0 ms to 65535 ms | 50 | ms | Immediately | " H12_en.06" on page 347 |
| H12.07 | 2012-08h | Acceleration time 3 | 0 ms to 65535 ms | 100 | ms | Immediately | " H12_en.07" on page 347 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H12.08 | 2012-09h | Deceleration time 3 | 0 ms to 65535 ms | 100 | ms | Immediately | " H12_en.08" on page 347 |
| H12.09 | 2012-0Ah | Acceleration time 4 | 0 ms to 65535 ms | 150 | ms | Immediately | " H12_en.09" on page 348 |
| H12.10 | 2012-0Bh | Deceleration time 4 | 0 ms to 65535 ms | 150 | ms | Immediately | " H12_en.10" on page 348 |
| H12.20 | 2012-15h | Speed reference 1 | –6000 rpm to 6000 rpm | 0 | rpm | Immediately | " H12_en.20" on page 348 |
| H12.21 | 2012-16h | Operating time of speed 1 | 0.0s(m) to 6553.5s(m) | 5.0 | s (m) | Immediately | " H12_en.21" on page 348 |
| H12.22 | 2012-17h | Acceleration/ Deceleration time of speed 1 | 0: Zero acceleration/ deceleration time<br>1: Acceleration/Deceleration time 1<br>2: Acceleration/Deceleration time 2<br>3: Acceleration/Deceleration time 3<br>4: Acceleration/Deceleration time 4 | 0 | - | Immediately | " H12_en.22" on page 349 |
| H12.23 | 2012-18h | Reference 2 | –6000 rpm to 6000 rpm | 100 | rpm | Immediately | " H12_en.23" on page 350 |
| H12.24 | 2012-19h | Operating time of speed 2 | 0.0s(m) to 6553.5s(m) | 5.0 | s (m) | Immediately | " H12_en.24" on page 351 |
| H12.25 | 2012-1Ah | Acceleration/ Deceleration time of speed 2 | See H12.22. | 0 | - | Immediately | " H12_en.25" on page 351 |
| H12.26 | 2012-1Bh | Reference 3 | –6000 rpm to 6000 rpm | 300 | rpm | Immediately | " H12_en.26" on page 351 |
| H12.27 | 2012-1Ch | Operating time of speed 3 | 0.0s(m) to 6553.5s(m) | 5.0 | s (m) | Immediately | " H12_en.27" on page 352 |
| H12.28 | 2012-1Dh | Acceleration/ Deceleration time of speed 3 | See H12.22. | 0 | - | Immediately | " H12_en.28" on page 352 |
| H12.29 | 2012-1Eh | Reference 4 | –6000 rpm to 6000 rpm | 500 | rpm | Immediately | " H12_en.29" on page 352 |
| H12.30 | 2012-1Fh | Operating time of speed 4 | 0.0s(m) to 6553.5s(m) | 5.0 | s (m) | Immediately | " H12_en.30" on page 352 |
| H12.31 | 2012-20h | Acceleration/ Deceleration time of speed 4 | See H12.22. | 0 | - | Immediately | " H12_en.31" on page 353 |
| H12.32 | 2012-21h | Reference 5 | –6000 rpm to 6000 rpm | 700 | rpm | Immediately | " H12_en.32" on page 353 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H12.33 | 2012-22h | Operating time of speed 5 | 0.0s(m) to 6553.5s(m) | 5.0 | s (m) | Immediately | " H12_en.33" on page 353 |
| H12.34 | 2012-23h | Acceleration/ Deceleration time of speed 5 | See H12.22. | 0 | - | Immediately | " H12_en.34" on page 353 |
| H12.35 | 2012-24h | Reference 6 | –6000 rpm to 6000 rpm | 900 | rpm | Immediately | " H12_en.35" on page 354 |
| H12.36 | 2012-25h | Operating time of speed 6 | 0.0s(m) to 6553.5s(m) | 5.0 | s (m) | Immediately | " H12_en.36" on page 354 |
| H12.37 | 2012-26h | Acc./dec. time of speed 6 | See H12.22. | 0 | - | Immediately | " H12_en.37" on page 354 |
| H12.38 | 2012-27h | Reference 7 | –6000 rpm to 6000 rpm | 600 | rpm | Immediately | " H12_en.38" on page 354 |
| H12.39 | 2012-28h | Operating time of speed 7 | 0.0s(m) to 6553.5s(m) | 5.0 | s (m) | Immediately | " H12_en.39" on page 355 |
| H12.40 | 2012-29h | Acc./dec. time of speed 7 | See H12.22. | 0 | - | Immediately | " H12_en.40" on page 355 |
| H12.41 | 2012-2Ah | Reference 8 | –6000 rpm to 6000 rpm | 300 | rpm | Immediately | " H12_en.41" on page 355 |
| H12.42 | 2012-2Bh | Operating time of speed 8 | 0.0s(m) to 6553.5s(m) | 5.0 | s (m) | Immediately | " H12_en.42" on page 356 |
| H12.43 | 2012-2Ch | Acc./dec. time of speed 8 | See H12.22. | 0 | - | Immediately | " H12_en.43" on page 356 |
| H12.44 | 2012-2Dh | Reference 9 | –6000 rpm to 6000 rpm | 100 | rpm | Immediately | " H12_en.44" on page 356 |
| H12.45 | 2012-2Eh | Operating time of speed 9 | 0.0s(m) to 6553.5s(m) | 5.0 | s (m) | Immediately | " H12_en.45" on page 356 |
| H12.46 | 2012-2Fh | Acc./dec. time of speed 9 | See H12.22. | 0 | - | Immediately | " H12_en.46" on page 357 |
| H12.47 | 2012-30h | Reference 10 | –6000 rpm to 6000 rpm | -100 | rpm | Immediately | " H12_en.47" on page 357 |
| H12.48 | 2012-31h | Operating time of speed 10 | 0.0s(m) to 6553.5s(m) | 5.0 | s (m) | Immediately | " H12_en.48" on page 357 |
| H12.49 | 2012-32h | Acc./dec. time of speed 10 | See H12.22. | 0 | - | Immediately | " H12_en.49" on page 357 |
| H12.50 | 2012-33h | Reference 11 | –6000 rpm to 6000 rpm | -300 | rpm | Immediately | " H12_en.50" on page 358 |
| H12.51 | 2012-34h | Operating time of speed 11 | 0.0s(m) to 6553.5s(m) | 5.0 | s (m) | Immediately | " H12_en.51" on page 358 |
| H12.52 | 2012-35h | Acc./dec. time of speed 11 | See H12.22. | 0 | - | Immediately | " H12_en.52" on page 358 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H12.53 | 2012-36h | Reference 12 | –6000 rpm to 6000 rpm | -500 | rpm | Immediately | " H12_en.53" on page 358 |
| H12.54 | 2012-37h | Operating time of speed 12 | 0.0s(m) to 6553.5s(m) | 5.0 | s (m) | Immediately | " H12_en.54" on page 359 |
| H12.55 | 2012-38h | Acc./dec. time of speed 12 | See H12.22. | 0 | - | Immediately | " H12_en.55" on page 359 |
| H12.56 | 2012-39h | Reference 13 | –6000 rpm to 6000 rpm | -700 | rpm | Immediately | " H12_en.56" on page 359 |
| H12.57 | 2012-3Ah | Operating time of speed 13 | 0.0s(m) to 6553.5s(m) | 5.0 | s (m) | Immediately | " H12_en.57" on page 360 |
| H12.58 | 2012-3Bh | Acc./dec. time of speed 13 | See H12.22. | 0 | - | Immediately | " H12_en.58" on page 360 |
| H12.59 | 2012-3Ch | Reference 14 | –6000 rpm to 6000 rpm | -900 | rpm | Immediately | " H12_en.59" on page 360 |
| H12.60 | 2012-3Dh | Operating time of speed 14 | 0.0s(m) to 6553.5s(m) | 5.0 | s (m) | Immediately | " H12_en.60" on page 360 |
| H12.61 | 2012-3Eh | Acc./dec. time of speed 14 | See H12.22. | 0 | - | Immediately | " H12_en.61" on page 361 |
| H12.62 | 2012-3Fh | Reference 15 | –6000 rpm to 6000 rpm | -600 | rpm | Immediately | " H12_en.62" on page 361 |
| H12.63 | 2012-40h | Operating time of speed 15 | 0.0s(m) to 6553.5s(m) | 5.0 | s (m) | Immediately | " H12_en.63" on page 361 |
| H12.64 | 2012-41h | Acc./dec. time of speed 15 | See H12.22. | 0 | - | Immediately | " H12_en.64" on page 361 |
| H12.65 | 2012-42h | Reference 16 | –6000 rpm to 6000 rpm | -300 | rpm | Immediately | " H12_en.65" on page 362 |
| H12.66 | 2012-43h | Operating time of speed 16 | 0.0s(m) to 6553.5s(m) | 5.0 | s (m) | Immediately | " H12_en.66" on page 362 |
| H12.67 | 2012-44h | Acc./dec. time of speed 16 | See H12.22. | 0 | - | Immediately | " H12_en.67" on page 362 |

## 4.17 Parameter Group H17

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H17.00 | 2017-01h | VDI1 function selection | See " H17_en.00" on page 363 for details. | 0 | - | Immediately | " H17_en.00" on page 363 |
| H17.01 | 2017-02h | VDI1 logic selection | 0: Active when the written value is 1<br>1: Active when the written value changes from 0 to 1 | 0 | - | At stop | " H17_en.01" on page 364 |
| H17.02 | 2017-03h | VDI2 function selection | See H17.00. | 0 | - | Immediately | " H17_en.02" on page 364 |
| H17.03 | 2017-04h | VDI2 logic selection | 0: Active when the written value is 1<br>1: Active when the written value changes from 0 to 1 | 0 | - | At stop | " H17_en.03" on page 365 |
| H17.04 | 2017-05h | VDI3 function | See H17.00. | 0 | - | Immediately | " H17_en.04" on page 365 |
| H17.05 | 2017-06h | VDI3 logic selection | 0: Active when the written value is 1<br>1: Active when the written value changes from 0 to 1 | 0 | - | At stop | " H17_en.05" on page 365 |
| H17.06 | 2017-07h | VDI4 function | See H17.00. | 0 | - | Immediately | " H17_en.06" on page 366 |
| H17.07 | 2017-08h | VDI4 logic selection | 0: Active when the written value is 1<br>1: Active when the written value changes from 0 to 1 | 0 | - | At stop | " H17_en.07" on page 366 |
| H17.08 | 2017-09h | VDI5 function selection | See H17.00. | 0 | - | Immediately | " H17_en.08" on page 366 |
| H17.09 | 2017-0Ah | VDI5 logic selection | 0: Active when the written value is 1<br>1: Active when the written value changes from 0 to 1 | 0 | - | At stop | " H17_en.09" on page 366 |
| H17.10 | 2017-0Bh | VDI6 function selection | See H17.00. | 0 | - | Immediately | " H17_en.10" on page 367 |
| H17.11 | 2017-0Ch | VDI6 logic selection | 0: Active when the written value is 1<br>1: Active when the written value changes from 0 to 1 | 0 | - | At stop | " H17_en.11" on page 367 |
| H17.12 | 2017-0Dh | VDI7 function selection | See H17.00. | 0 | - | Immediately | " H17_en.12" on page 367 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H17.13 | 2017-0Eh | VDI7 logic | 0: Active when the written value is 1<br>1: Active when the written value changes from 0 to 1 | 0 | - | At stop | " H17_en.13" on page 367 |
| H17.14 | 2017-0Fh | VDI8 function | See H17.00. | 0 | - | Immediately | " H17_en.14" on page 368 |
| H17.15 | 2017-10h | VDI8 logic selection | 0: Active when the written value is 1<br>1: Active when the written value changes from 0 to 1 | 0 | - | At stop | " H17_en.15" on page 368 |
| H17.16 | 2017-11h | VDI9 function | See H17.00. | 0 | - | Immediately | " H17_en.16" on page 368 |
| H17.17 | 2017-12h | VDI9 logic | 0: Active when the written value is 1<br>1: Active when the written value changes from 0 to 1 | 0 | - | At stop | " H17_en.17" on page 369 |
| H17.18 | 2017-13h | VDI10 function | See H17.00. | 0 | - | Immediately | " H17_en.18" on page 369 |
| H17.19 | 2017-14h | VDI10 logic selection | 0: Active when the written value is 1<br>1: Active when the written value changes from 0 to 1 | 0 | - | At stop | " H17_en.19" on page 369 |
| H17.20 | 2017-15h | VDI11 function selection | See H17.00. | 0 | - | Immediately | " H17_en.20" on page 369 |
| H17.21 | 2017-16h | VDI11 logic selection | 0: Active when the written value is 1<br>1: Active when the written value changes from 0 to 1 | 0 | - | At stop | " H17_en.21" on page 370 |
| H17.22 | 2017-17h | VDI12 function | See H17.00. | 0 | - | Immediately | " H17_en.22" on page 370 |
| H17.23 | 2017-18h | VDI12 logic selection | 0: Active when the written value is 1<br>1: Active when the written value changes from 0 to 1 | 0 | - | At stop | " H17_en.23" on page 370 |
| H17.24 | 2017-19h | VDI13 function | See H17.00. | 0 | - | Immediately | " H17_en.24" on page 370 |
| H17.25 | 2017-1Ah | VDI13 logic selection | 0: Active when the written value is 1<br>1: Active when the written value changes from 0 to 1 | 0 | - | At stop | " H17_en.25" on page 371 |
| H17.26 | 2017-1Bh | VDI14 function | See H17.00. | 0 | - | Immediately | " H17_en.26" on page 371 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H17.27 | 2017-1Ch | VDI14 logic selection | 0: Active when the written value is 1<br>1: Active when the written value changes from 0 to 1 | 0 | - | At stop | " H17_en.27" on page 371 |
| H17.28 | 2017-1Dh | VDI15 function | See H17.00. | 0 | - | Immediately | " H17_en.28" on page 372 |
| H17.29 | 2017-1Eh | VDI15 logic selection | 0: Active when the written value is 1<br>1: Active when the written value changes from 0 to 1 | 0 | - | At stop | " H17_en.29" on page 372 |
| H17.30 | 2017-1Fh | VDI16 function | See H17.00. | 0 | - | Immediately | " H17_en.30" on page 372 |
| H17.31 | 2017-20h | VDI16 logic selection | 0: Active when the written value is 1<br>1: Active when the written value changes from 0 to 1 | 0 | - | At stop | " H17_en.31" on page 372 |
| H17.32 | 2017-21h | VDO virtual level | 0–65535 | 0 | - | Unchangeable | " H17_en.32" on page 373 |
| H17.33 | 2017-22h | VDO1 function | 0: No assignment<br>1: Servo ready<br>2: Motor rotation<br>3: Zero speed<br>4: Speed matching<br>5: Positioning completed<br>6: Proximity<br>7: Torque limited<br>8: Speed limited<br>9: Brake<br>10: Warning<br>11: Fault<br>12: Output 3-bit warning code<br>13: Output 3-bit warning code<br>14: Output 3-bit warning code<br>15: Interrupt positioning completed<br>16: Homing completed<br>17: Electrical homing completed<br>18: Torque reach<br>19: Speed reach<br>22: Internal command completed<br>23: Writing next command allowed<br>24: Internal motion completed | 0 | - | At stop | " H17_en.33" on page 373 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H17.34 | 2017-23h | VDO1 logic level | 0: Output 1 upon active logic<br>1: Output 0 upon active logic | 0 | - | At stop | " H17_en.34" on page 374 |
| H17.35 | 2017-24h | VDO2 function selection | See H17.33. | 0 | - | At stop | " H17_en.35" on page 375 |
| H17.36 | 2017-25h | VDO2 logic level | 0: Output 1 upon active logic<br>1: Output 0 upon active logic | 0 | - | At stop | " H17_en.36" on page 375 |
| H17.37 | 2017-26h | VDO3 function | See H17.33. | 0 | - | At stop | " H17_en.37" on page 375 |
| H17.38 | 2017-27h | VDO3 logic level | 0: Output 1 upon active logic<br>1: Output 0 upon active logic | 0 | - | At stop | " H17_en.38" on page 376 |
| H17.39 | 2017-28h | VDO4 function | See H17.33. | 0 | - | At stop | " H17_en.39" on page 376 |
| H17.40 | 2017-29h | VDO4 logic level | 0: Output 1 upon active logic<br>1: Output 0 upon active logic | 0 | - | At stop | " H17_en.40" on page 376 |
| H17.41 | 2017-2Ah | VDO5 function | See H17.33. | 0 | - | At stop | " H17_en.41" on page 377 |
| H17.42 | 2017-2Bh | VDO5 logic level | 0: Output 1 upon active logic<br>1: Output 0 upon active logic | 0 | - | At stop | " H17_en.42" on page 377 |
| H17.43 | 2017-2Ch | VDO6 function | See H17.33. | 0 | - | At stop | " H17_en.43" on page 377 |
| H17.44 | 2017-2Dh | VDO6 logic level | 0: Output 1 upon active logic<br>1: Output 0 upon active logic | 0 | - | At stop | " H17_en.44" on page 377 |
| H17.45 | 2017-2Eh | VDO7 function | See H17.33. | 0 | - | At stop | " H17_en.45" on page 378 |
| H17.46 | 2017-2Fh | VDO7 logic level | 0: Output 1 upon active logic<br>1: Output 0 upon active logic | 0 | - | At stop | " H17_en.46" on page 378 |
| H17.47 | 2017-30h | VDO8 function | See H17.33. | 0 | - | At stop | " H17_en.47" on page 378 |
| H17.48 | 2017-31h | VDO8 logic level | 0: Output 1 upon active logic<br>1: Output 0 upon active logic | 0 | - | At stop | " H17_en.48" on page 378 |
| H17.49 | 2017-32h | VDO9 function | See H17.33. | 0 | - | At stop | " H17_en.49" on page 379 |
| H17.50 | 2017-33h | VDO9 logic level | 0: Output 1 upon active logic<br>1: Output 0 upon active logic | 0 | - | At stop | " H17_en.50" on page 379 |
| H17.51 | 2017-34h | VDO10 function selection | See H17.33. | 0 | - | At stop | " H17_en.51" on page 379 |
| H17.52 | 2017-35h | VDO10 logic level | 0: Output 1 upon active logic<br>1: Output 0 upon active logic | 0 | - | At stop | " H17_en.52" on page 380 |
| H17.53 | 2017-36h | VDO11 function | See H17.33. | 0 | - | At stop | " H17_en.53" on page 380 |
| H17.54 | 2017-37h | VDO11 logic level | 0: Output 1 upon active logic<br>1: Output 0 upon active logic | 0 | - | At stop | " H17_en.54" on page 380 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H17.55 | 2017-38h | VDO12 function | See H17.33. | 0 | - | At stop | " H17_en.55" on page 380 |
| H17.56 | 2017-39h | VDO12 logic level | 0: Output 1 upon active logic<br>1: Output 0 upon active logic | 0 | - | At stop | " H17_en.56" on page 381 |
| H17.57 | 2017-3Ah | VDO13 function | See H17.33. | 0 | - | At stop | " H17_en.57" on page 381 |
| H17.58 | 2017-3Bh | VDO13 logic level | 0: Output 1 upon active logic<br>1: Output 0 upon active logic | 0 | - | At stop | " H17_en.58" on page 381 |
| H17.59 | 2017-3Ch | VDO14 function | See H17.33. | 0 | - | At stop | " H17_en.59" on page 381 |
| H17.60 | 2017-3Dh | VDO14 logic level | 0: Output 1 upon active logic<br>1: Output 0 upon active logic | 0 | - | At stop | " H17_en.60" on page 382 |
| H17.61 | 2017-3Eh | VDO15 function | See H17.33. | 0 | - | At stop | " H17_en.61" on page 382 |
| H17.62 | 2017-3Fh | VDO15 logic level | 0: Output 1 upon active logic<br>1: Output 0 upon active logic | 0 | - | At stop | " H17_en.62" on page 382 |
| H17.63 | 2017-40h | VDO16 function | See H17.33. | 0 | - | At stop | " H17_en.63" on page 383 |
| H17.64 | 2017-41h | VDO16 logic level | 0: Output 1 upon active logic<br>1: Output 0 upon active logic | 0 | - | At stop | " H17_en.64" on page 383 |

## 4.18 Parameter Group H1B

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H1B.14 | 201B-0Fh | Bit01 of motor SN code | 0–65535 | 0 | - | At stop | " H1B_en.14" on page 383 |
| H1B.15 | 201B-10h | Bit23 of motor SN code | 0–65535 | 0 | - | At stop | " H1B_en.15" on page 383 |
| H1B.16 | 201B-11h | Bit45 of motor SN code | 0–65535 | 0 | - | At stop | " H1B_en.16" on page 384 |
| H1B.17 | 201B-12h | Bit67 of motor SN code | 0–65535 | 0 | - | At stop | " H1B_en.17" on page 384 |
| H1B.18 | 201B-13h | Bit89 of motor SN code | 0–65535 | 0 | - | At stop | " H1B_en.18" on page 384 |
| H1B.19 | 201B-14h | Bit11 of motor SN code | 0–65535 | 0 | - | At stop | " H1B_en.19" on page 384 |
| H1B.20 | 201B-15h | Bit13 of motor SN code | 0–65535 | 0 | - | At stop | " H1B_en.20" on page 385 |

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H1B.21 | 201B-16h | Bit15 of motor SN code | 0–65535 | 0 | - | At stop | " H1B_en.21" on page 385 |
| H1B.47 | 201B-30h | Motor storage property shield word 1 | 0–65535 | 0 | - | At stop | " H1B_en.47" on page 385 |
| H1B.48 | 201B-31h | Motor storage property shield word 2 | 0–65535 | 0 | - | At stop | " H1B_en.48" on page 386 |

## 4.19 Parameter Group H30

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H30.00 | 2030-01h | Servo status read through communication | 0–65535 | 0 | - | Unchangeable | " H30_en.00" on page 386 |
| H30.01 | 2030-02h | DO function state 1 read through communication | 0–65535 | 0 | - | Unchangeable | " H30_en.01" on page 387 |
| H30.02 | 2030-03h | DO function state 2 read through communication | 0–65535 | 0 | - | Unchangeable | " H30_en.02" on page 388 |
| H30.03 | 2030-04h | Input pulse reference sampling value read through communication | 0–65535 | 0 | - | Unchangeable | " H30_en.03" on page 388 |
| H30.04 | 2030-05h | DI status read through communication | 0–65535 | 0 | - | Unchangeable | " H30_en.04" on page 388 |

# 4.20 Parameter Group H31

| Parameter | Hexadecimal Parameters | Name | Setpoint | Default | Unit | Change Method | Page |
|---|---|---|---|---|---|---|---|
| H31.00 | 2031-01h | VDI virtual level set through communication | 0–65535 | 0 | - | Immediately | " H31_en.00" on page 389 |
| H31.04 | 2031-05h | DO state set through communication | 0–31 | 0 | - | Immediately | " H31_en.04" on page 390 |
| H31.09 | 2031-0Ah | Speed reference set through communication | -6000.000rpm to 6000.000rpm | 0.000 | rpm | Immediately | " H31_en.09" on page 391 |
| H31.11 | 2031-0Ch | Torque reference set through communication | -100.000%–100.000% | 0.000 | % | Immediately | " H31_en.11" on page 391 |

# 5 Appendix

## 5.1 CANlink Enhanced Axis Control Parameters

Table 5–1 List of default parameters for enhanced axis control

| Parameter | Description | Default |
|---|---|---|
| H11.00 | Multi-position operation mode | 5: Axis-controlled continuous operation |
| H11.04 | Displacement reference type | 1: Absolute displacement reference |
| H11.05 | Starting displacement No. in sequential operation | 1 |
| H11.16 | Interval time after displacement 1 | 0 |
| H05.00 | Main position reference source | 2: Multi-position reference |
| H05.02 | Pulses per revolution | 10000 |
| H05.30 | Homing selection | 1: Homing enabled by signal input from DI |
| H05.31 | Homing mode | 1: Reverse homing, home switch as the deceleration point and the home |
| H05.32 | Speed in high-speed searching for the home switch signal | 200 RPM |
| H05.33 | Speed in low-speed searching for the home switch signal | 20 RPM |
| H05.35 | Home search time limit | 30000 ms |
| H05.40 | Mechanical home offset and action upon overtravel | 3: H05.36 (Mechanical home offset) used as the relative offset after homing, reverse homing applied automatically upon overtravel |
| H09.00 | Gain auto-tuning mode | 1: Standard stiffness level mode |
| H09.02 | Adaptive notch mode | 1: Only one adaptive notch (3rd notch) activated |
| H0C.09 | Communication VDI | 1: Enable |
| H0C.11 | Communication VDO | 1: Enable |
| H04.00 | DO1 function selection | 0-No assignment |
| H04.02 | DO2 function selection | 0-No assignment |
| H04.04 | DO3 function selection | 9: Brake |
| H04.06 | DO4 function selection | 0-No assignment |
| H04.08 | DO5 function selection | 0-No assignment |
| H03.06 | DI3 function selection | 0-No assignment |
| H03.08 | DI4 function selection | 0-No assignment |

| Parameter | Description | Default |
|---|---|---|
| H03.10 | DI5 function selection | 0-No assignment |
| H17.00 | VDI1 function selection | 1: Servo ON |
| H17.02 | VDI2 function selection | 18: Forward jog |
| H17.04 | VDI3 function selection | 19: Reverse jog |
| H17.06 | VDI4 function selection | 28: Multi-position reference selection |
| H17.08 | VDI5 function selection | 32: Homing enable |
| H17.10 | VDI6 function selection | 34: Emergency stop |
| H17.12 | VDI7 function selection | 2: Fault and warning reset signal |
| H17.14 | VDI8 function selection | 38: Command-write interrupted |
| H17.15 | VDI8 logic selection | 1: Active when the written value changes from 0 to 1 |
| H17.16 | VDI9 function selection | Active: Command-write not interrupted |
| H17.17 | VDI9 logic selection | 1: Active when the written value changes from 0 to 1 |
| H17.18 | VDI10 function selection | 40: Positioning and reference completed signal cleared |

## *Note*

See the following for how to use CANlink enhanced axis control function:

1. Set H02.31 to 1 to restore parameters to default values.
2. Set H11.00 to 5. If the previous value of H11-00 is not 5, setting it to 5 enables enhanced axis control function. Parameter involved will be correlated automatically. See the detailed setpoints in the preceding table.
3. If the previous value of H11.00 is 5, setting it to a value other than 5 restores all the parameters listed in the preceding table to default values.

## 5.2 DI/DO Function Definitions

| No. | Name | Function Name | Description | Remarks |
|---|---|---|---|---|
| Description of DI Signals | | | | |
| FunIN.1 | S-ON | Servo ON | Disabled: Servo motor disabled<br>Enabled: Servo motor enabled | The corresponding terminal logic must be level-triggered.<br>The change of the corresponding DI/VDI or terminal logic is activated at next power-on. |

| No. | Name | Function Name | Description | Remarks |
|---|---|---|---|---|
| FunIN.2 | ALM-RST | Fault and warning reset | Inactive: Disabled<br>Active: Enabled | Edge-triggered will be applied even if level-triggered is selected.<br>To reset No. 1 and NO.2 resettable faults, switch off the S-ON signal first.<br>The servo drive may, depending on the alarm type, continue running after reset. |
| FunIN.3 | GAIN-SEL | Gain Switchover | • H08.09 = 1:<br>• Inactive: Speed control loop being PI control<br>• Active: Speed control loop being P control<br>• H08.09 = 2:<br>• Inactive: Fixed to the 1st group of gains<br>• Active: Fixed to the 2nd group of gains | The corresponding terminal logic is recommended to be level-triggered. |
| FunIN.4 | CMD-SEL | Main/Auxiliary reference switchover | Inactive: Current reference being A<br>Active: Current reference being B | The corresponding terminal logic is recommended to be level-triggered. |
| FunIN.5 | DIR-SEL | Direction switchover through DI in multi-speed mode | Inactive: Reference direction by default<br>Active: Reverse to reference direction. | The corresponding terminal logic is recommended to be level-triggered. |
| FunIN.6 | CMD1 | Multi-reference switchover 1 | Used to select a reference from 16 references. | The corresponding terminal logic is recommended to be level-triggered. |
| FunIN.7 | CMD2 | Multi-reference switchover 2 | Used to select a reference from 16 references. | The corresponding terminal logic is recommended to be level-triggered. |
| FunIN.8 | CMD3 | Multi-reference switchover 3 | Used to select a reference from 16 references. | The corresponding terminal logic is recommended to be level-triggered. |
| FunIN.9 | CMD4 | Multi-reference switchover 4 | Used to select a reference from 16 references. | The corresponding terminal logic is recommended to be level-triggered. |
| FunIN.10 | M1-SEL | Mode switchover 1 | Used to switch among speed control, position control, and torque control based on the selected control mode (H02-00 = 3/4/5). | The corresponding terminal logic is recommended to be level-triggered. |
| FunIN.11 | M2-SEL | Mode switchover 2 | Used to switch among speed control, position control, and torque control based on the selected control mode (H02-00 = 6). | The corresponding terminal logic is recommended to be level-triggered. |

| No. | Name | Function Name | Description | Remarks |
|---|---|---|---|---|
| FunIN.12 | ZCLAMP | Zero clamp | Active: Zero clamp enabled<br>Inactive: Zero clamp disabled | The corresponding terminal logic is recommended to be level-triggered. |
| FunIN.13 | INHIBIT | Position reference inhibited | Active: Pulse reference input inhibited<br>Inactive: Pulse reference input allowed | It is originally pulse inhibit. The position references include internal and external position references.<br>The corresponding terminal logic must be level-triggered. |
| FunIN.14 | P-OT | Positive limit switch | Enabled: Forward drive inhibited<br>Disabled: Forward drive permitted | Overtravel prevention applies when the machine moves beyond the limit. It is recommended that the corresponding terminal logic is level-triggered. |
| FunIN.15 | N-OT | Negative limit switch | Overtravel prevention applies when the load moves beyond the limit.<br>Active: Reverse drive inhibited<br>Inactive: Reverse drive allowed | The corresponding terminal logic is recommended to be level-triggered. |
| FunIN.16 | P-CL | Positive external torque limit | The torque limit source is switched based on H07.07 (Torque limit source).<br>H07.07 = 1:<br>Active: Positive external torque limit activated<br>Inactive: Positive internal torque limit activated | The corresponding terminal logic is recommended to be level-triggered. |
| FunIN.17 | N-CL | Negative external torque limit | The torque limit source is switched based on H07.07 (Torque limit source).<br>H07.07 = 1:<br>Active: Negative external torque limit activated<br>Inactive: Negative internal torque limit activated | The corresponding terminal logic is recommended to be level-triggered. |
| FunIN.18 | JOGCMD+ | Forward jog | Active: Input based on command<br>Inactive: Command input stopped | The corresponding terminal logic is recommended to be level-triggered. |
| FunIN.19 | JOGCMD– | Reverse jog | Active: Input in reverse to the command<br>Inactive: Command input stopped | The corresponding terminal logic is recommended to be level-triggered. |
| FunIN.20 | POSSTEP | Step selection | Active: Execute step reference set in H05-05, servo motor running<br>Inactive: Servo motor in locked state | The corresponding terminal logic is recommended to be level-triggered. |

| No. | Name | Function Name | Description | Remarks |
|---|---|---|---|---|
| FunIN.21 | HX1 | Hand wheel override signal 1 | HX1 active, HX2 inactive: X10.<br>HX1 inactive, HX2 active: x 100.<br>Other: X1. | The corresponding terminal logic is recommended to be level-triggered. |
| FunIN.22 | HX2 | Hand wheel override signal 2 | | |
| FunIN.23 | HX_EN | Hand wheel enable signal | Inactive: Execute position control as defined by H05-00.<br>Active: Execute position control based on handwheel signal in position mode | The corresponding terminal logic is recommended to be level-triggered. |
| FunIN.24 | GEAR_SEL | Electronic gear ratio switchover | Inactive: Electronic gear ratio 1<br>Active: Electronic gear ratio 2 | The corresponding terminal logic is recommended to be level-triggered. |
| FunIN.25 | TOQDirSel | Torque reference direction | Inactive: Forward.<br>Active: Reverse | The corresponding terminal logic is recommended to be level-triggered. |
| FunIN.26 | SPDDirSel | Speed reference direction | Inactive: Forward.<br>Active: Reverse. | The corresponding terminal logic is recommended to be level-triggered. |
| FunIN.27 | POSDirSel | Position reference direction | Inactive: Actual position reference direction same as the set direction<br>Active: Actual position reference direction opposite to the set direction | The corresponding terminal logic is recommended to be level-triggered. |
| FunIN.28 | PosInSen | Multi-position reference enable | Disabled: The reference is ineffective.<br>Enabled: The reference is enabled. | The corresponding terminal logic is recommended to be level-triggered. |
| FunIN.29 | XintFree | Interrupt positioning clear | Inactive: Disabled<br>Active: Enabled | - |
| FunIN.31 | HomeSwitch | Home switch | Disabled: The switch is not triggered.<br>Enabled: The switch is triggered. | The corresponding terminal logic must be level-triggered.<br>It is recommended to assign this function to a high-speed DI terminal.<br>If the logic is set to 2 (rising edge active), the servo drive forcibly changes it to 1 (active high). If the logic is set to 3 (falling edge active), the servo drive forcibly changes it to 0 (active low). If the logic is set to 4 (both rising edge and falling edge active), the servo drive forcibly changes it to 0 (low level active). |
| FunIN.32 | HomingStart | Homing enable | Inactive: Disabled<br>Active: Enabled | - |

| No. | Name | Function Name | Description | Remarks |
|---|---|---|---|---|
| FunIN.33 | XintInhibit | Interrupt positioning inhibited | Active: Interrupt positioning inhibited.<br>Inactive: Interrupt positioning allowed. | The corresponding terminal logic must be level-triggered.<br>• If the logic is set to 2 (rising edge active), the servo drive forcibly changes it to 1 (active high).<br>• If the logic is set to 3 (falling edge active), the servo drive forcibly changes it to 0 (active low).<br>• If the logic is set to 4 (both rising edge and falling edge active), the servo drive forcibly changes it to 0 (low level active). |
| FunIN.34 | Emergence Stop | Emergency stop | Enabled: Position lock is applied after stop at zero speed.<br>Disabled: Current operating state is unaffected. | The corresponding terminal logic is recommended to be level-triggered. |
| FunIN.35 | ClrPosErr | Position deviation clear | Active: Clear the position deviation<br>Inactive: Do not clear the position deviation | It is recommended to assign this function to DI8 or DI9. |
| FunIN.36 | V_LmtSel | Internal speed limit source | Inactive: H07.19 used as positive/negative internal speed limit<br>Active: H07.20 used as positive/negative internal speed limit | The corresponding terminal logic is recommended to be level-triggered. |
| FunIN.37 | PulseInhibit | Pulse reference inhibited | When the position reference source is pulse reference (H05.00 = 0) in the position control mode:<br>Inactive: Respond to pulse references<br>Active: Not respond to pulse references | The corresponding terminal logic is recommended to be level-triggered. |
| FunIN.38 | MultiBlockTrig | Axis control command write interrupted | When the position reference source is multi-position reference (H05.00 = 2) in the position control mode:<br>Inactive: Not write commands<br>Active: Write command and generate interrupt | The corresponding terminal logic is recommended to be level-triggered. |

| No. | Name | Function Name | Description | Remarks |
|---|---|---|---|---|
| FunIN.39 | MultiBlockWr | Axis control command written uninterrupted | When the position reference source is multi-position reference (H05.00 = 2) in the position control mode:<br>Inactive: Not write commands<br>Active: Command written and interrupt not generated | The corresponding terminal logic is recommended to be level-triggered |
| FunIN.40 | ClrCmdOkAndArrOk | Command cleared and positioning completed | Inactive: Command not cleared and positioning completed<br>Active: Command cleared and positioning completed | The corresponding terminal logic is recommended to be level-triggered |
| FunIN.41 | HomeRecord | Present position as the home | Inactive: The switch is not triggered<br>Active: Triggered | The corresponding terminal logic is recommended to be level-triggered |
| Description of DO Signals | | | | |
| FunOUT.1 | S-RDY | Servo ready | The servo drive is ready to receive the S-ON signal. Enabled: The servo drive is ready.<br>Disabled: The servo drive not ready. | - |
| FunOUT.2 | TGON | Motor rotation output | Inactive: Absolute value of filtered motor speed lower than H06.16 (Threshold of TGON signal)<br>Active: Absolute value of filtered motor speed reaching H06.16 (Threshold of TGON signal) | - |
| FunOUT.3 | ZERO | Zero speed | Inactive: Difference between motor speed feedback and reference value larger than H06.19 (Threshold of zero speed output signal)<br>Active: Difference between motor speed feedback and reference value less than or equal to H06.19 (Threshold of zero speed output signal) | - |
| FunOUT.4 | V-CMP | Speed matching | Active when the absolute value of the difference between the motor speed and the speed reference lower than H06.17 (Threshold of V-Cmp signal) in the speed control mode | - |
| FunOUT.5 | COIN | Positioning completed | Active when position deviation pulses reaching H05.21 (Threshold of positioning completion) in the position control mode | - |

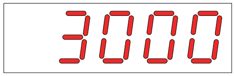
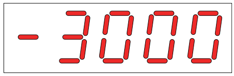
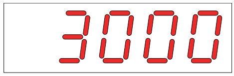
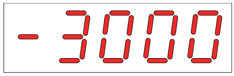
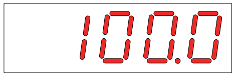
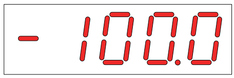
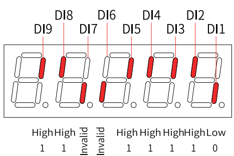
| No. | Name | Function Name | Description | Remarks |
|---|---|---|---|---|
| FunOUT.6 | NEAR | Proximity | Active when position deviation pulses reaching H05.22 (Threshold of proximity) in the position control mode | - |
| FunOUT.7 | C-LT | Torque limit | Torque limit acknowledge signal:<br>Active: Servo drive torque reference reaching the torque limit value and restricted to this value<br>Inactive: Servo drive torque reference not reaching the torque limit value | - |
| FunOUT.8 | V-LT | Speed limit | Speed limit acknowledge signal in the torque control mode:<br>Active: Motor speed limited<br>Inactive: Motor speed unlimited | - |
| FunOUT.9 | BK | Brake output | Brake signal output:<br>Active: Brake released<br>Active: The power is off, the brake is released, and the motor can rotate. | - |
| FunOUT.10 | WARN | Warning output | The warning output is active (conducted). (ON) | - |
| FunOUT.11 | ALM | Fault output | Active upon fault event | - |
| FunOUT.12 | ALMO1 | Output 3-digit warning code | Output 3-digit warning code | - |
| FunOUT.13 | ALMO2 | Output 3-digit warning code | Output 3-digit warning code | - |
| FunOUT.14 | ALMO3 | Output 3-digit warning code | Output 3-digit warning code | - |
| FunOUT.15 | Xintcoin | Interrupt positioning completed | Active: Interrupt positioning completed<br>Inactive: Interrupt positioning not completed | - |
| FunOUT.16 | HomeAttain | Homing completed | Homing state:<br>Active: Homing completed in the position control mode<br>Inactive: Homing not completed | - |
| FunOUT.17 | ElecHome Attain | Electrical homing output | Electrical homing state:<br>Active: Electrical homing completed<br>Inactive: Electrical homing not completed | - |

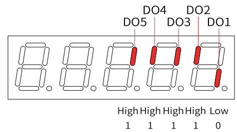
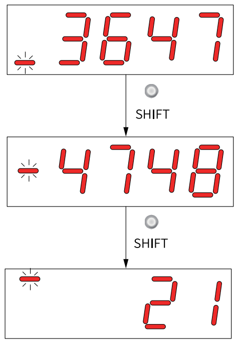
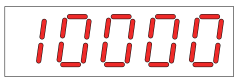
| No. | Name | Function Name | Description | Remarks |
|---|---|---|---|---|
| FunOUT.18 | ToqReach | Torque Reach Output | Active: Absolute value of torque reference reached setting value<br>Inactive: Absolute value of torque reference smaller than setting value | - |
| FunOUT.19 | V-Arr | Speed reaches output | Active: Speed feedback reaches setting value<br>Inactive: Speed feedback smaller than setting value | - |
| FunOUT.20 | AngIntRdy | Angle auto-tuning output | Active: Angle auto-tuning completed<br>Inactive: Angle auto-tuning not completed | - |
| FunOUT.21 | DB | Dynamic braking output | Active: Dynamic brake relay opened<br>Inactive: Dynamic braking relay closed | - |
| FunOUT.22 | CmdOk | Internal reference output | Active: Internal reference completed<br>Inactive: Internal reference not completed | - |
| FunOUT.23 | WrNextBlockEn | Write next block enabled | Active: Writing the next segment allowed.<br>Inactive: Writing the next segment inhibited. | - |
| FunOUT.24 | McOk | Motion control output | Active: Motion control done<br>Inactive: Motion control not done | - |

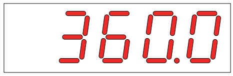
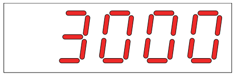
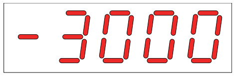
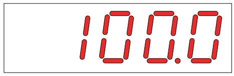
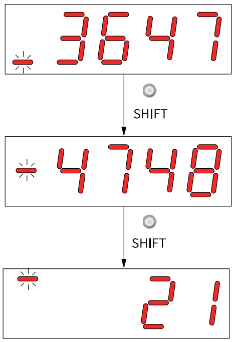
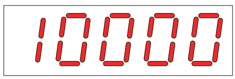
## 5.3 Display of Monitoring Parameters

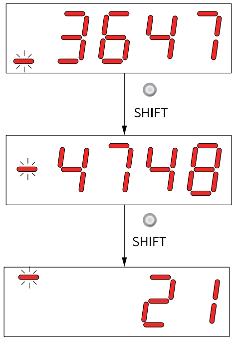
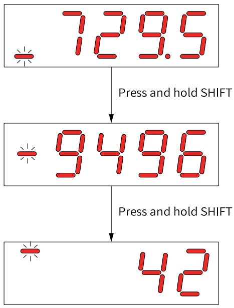
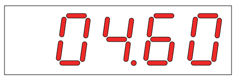
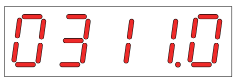
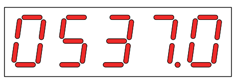
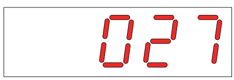
- Group H0b: Displays parameters used to monitor the operating state of the servo drive.
- Set H02.32 (Default keypad display) properly. After the motor operates normally, the keypad switches from status display to parameter display. The parameter group number is H0b and the offset within the group is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

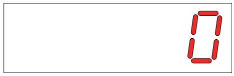
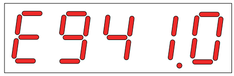
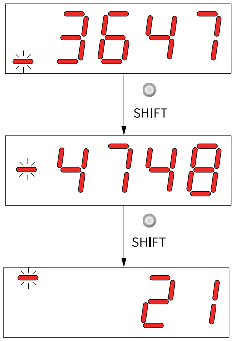
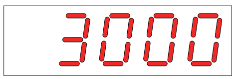
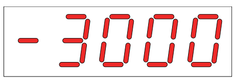
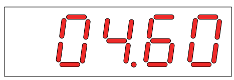
The following table describes the monitoring parameters in group H0b.

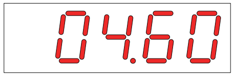
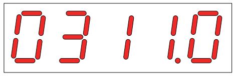
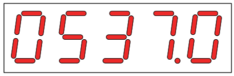
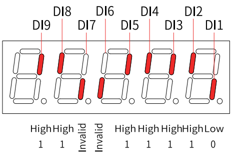
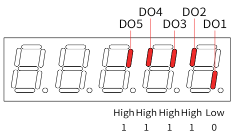
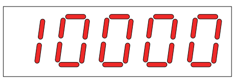
| Parameter | Name | Unit | Meaning | Example of Display |
|---|---|---|---|---|
| H0b.00 | Motor speed actual value | rpm | Displays the actual value of the motor speed after round-off, which can be accurate to 1 rpm. | Display of 3000 rpm:<br><br>-3000 rpm:<br> |
| H0b.01 | Speed reference | rpm | Displays the present speed reference of the servo drive. | Display of 3000 rpm:<br><br>-3000 rpm:<br> |
| H0b.02 | Internal torque reference | 0.10% | Displays the ratio of actual torque output of the motor to the rated torque of the motor. | Display of 100.0%:<br><br>Display of -100.0%:<br> |
| H0b.03 | Monitored DI status | - | Displays the optocoupler status of DI1 to DI9:<br>Upper LED segments turned on: The optocoupler is switched off (indicated by "1").<br>Lower LED segments turned on: The optocoupler is switched on (indicated by "0").<br>The value of H0b.03 read in the software tool is a decimal. | For example, if DI1 is low level and DI2 to DI9 are high level, The corresponding binary value is "110011110", and the value of H0b.03 read in the software tool is 414.<br>The keypad displays as follows:<br> |

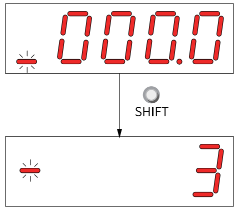
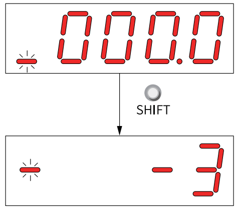
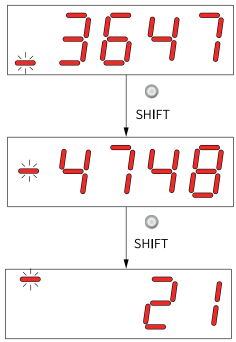
| Parameter | Name | Unit | Meaning | Example of Display |
|---|---|---|---|---|
| H0b.05 | Monitored DO status | - | Displays the optocoupler status of DO1 to DO5:<br>Upper LED segments turned on: The optocoupler is switched off (indicated by "1").<br>Lower LED segments turned on: The optocoupler is switched on (indicated by "0").<br>The value of H0b.05 read in the software tool is a decimal. | For example, if DO1 is low level and DO2 to DO5 are high level:<br>then, the binary value is "11110".<br>and the value of H0b.05 read in the software tool is 30.<br>The keypad displays as follows:<br><br> |
| 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:<br><br> |
| H0b.09 | Mechanical angle (pulses starting from the home) | p | Indicates the current mechanical angle (p) of the motor. The value 0 indicates that the mechanical angle is 0°.<br>Maximum value of H0b.09 for an incremental encoder: Number of encoder pulses per revolution x 4 - 1. For example, the maximum value of H0b.09 for a 2500-PPR incremental encoder is 9999.<br>Maximum value of H0b.09 for an absolute encoder is 65535.<br>The actual mechanical angle is calculated using the following formula:<br>$\text{Actual mechanical angle} = \frac{\text{H0B-09}}{\text{Max. H0B-09+1}} \times 360.0°$ | Display of 10000 p:<br><br> |

| Parameter | Name | Unit | Meaning | Example of Display |
|---|---|---|---|---|
| H0b.10 | Rotation angle (electrical angle) | 0.1° | Displays current electrical angle of the motor. | Display of 360.0°:   |
| H0b.11 | Speed corresponding to the input position reference | rpm | Displays the speed corresponding to the position reference per control cycle of the servo drive. | Display of 3000 rpm:   -3000 rpm:   |
| H0b.12 | Average load rate | 0.10% | Displays the ratio of the average load torque to the rated torque of the motor. | Display of 100.0%:   |
| H0b.13 | Input position reference counter (32-bit decimal) | Reference unit | Counts and displays the number of input position references. | Display of 1073741824 in reference unit:   |
| H0b.15 | Encoder position deviation counter (32-bit decimal) | Encoder unit | Encoder position deviation = Sum of input position references (encoder unit) – Sum of pulses fed back by the encoder (encoder unit) | Display of 10000 in encoder unit:   |

| Parameter | Name | Unit | Meaning | Example of Display |
|---|---|---|---|---|
| H0b.17 | Feedback pulse counter (32-bit decimal) | Encoder unit | Counts and displays the number of pulses fed back by the encoder (encoder unit). | Display of 1073741824 in encoder unit:<br> |
| H0b.19 | Total power-on time (32-bit decimal) | 0.1s | Counts and displays the total power-on time of the servo drive. | Display of 429496729.5s:<br> |
| H0b.24 | RMS value of phase current | 0.01 A | Displays the RMS value of the phase current of the servo motor. | Display of 4.60 A:<br> |
| H0b.26 | Bus voltage | 0.1 V | Displays the DC bus voltage of the main circuit. | Display of 311.0 V rectified from 220 VAC:<br><br>Display of 537.0 V rectified from 380 VAC:<br> |
| H0b.27 | Module temperature | °C | Displays the temperature of the power module inside the servo drive. | Display of 27°C:<br> |

| Parameter | Name | Unit | Meaning | Example of Display |
|---|---|---|---|---|
| H0b.33 | Fault log | - | Used to select the previous fault to be viewed.<br>0: Present fault<br>1: Last fault<br>2: 2nd to last fault<br>...<br>9: 9th to last fault | 0: Display of present fault:<br> |
| H0b.34 | Fault code of the selected fault | - | Displays the code of the fault selected in H0b.33.<br>When no fault occurs, the displayed value of H0b.34 is E000.0. | If H0b.33 is 0, and H0b.34 is E941.0, the current fault code is 941. Corresponding display:<br> |
| 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.<br>When no fault occurs, the value of H0b.35 is 0. | If H0b.34 is E941.0 and H0b.35 is 107374182.4, the current fault code is 941 and the total operating time of the servo drive is 107374182.4s when the fault occurs.<br> |
| H0b.37 | Motor speed upon occurrence of the selected fault | rpm | Displays the servo motor speed when the fault displayed in H0b.34 occurred.<br>When no fault occurs, the value of H0b.37 is 0. | Display of 3000 rpm:<br><br>-3000 rpm:<br> |
| H0b.38 | Motor phase U current upon occurrence of the selected fault | 0.01 A | Displays the RMS value of motor phase U winding current when the fault displayed in H0b.34 occurred.<br>When no fault occurs, the value of H0b.38 is 0. | Display of 4.60 A:<br> |

| Parameter | Name | Unit | Meaning | Example of Display |
|---|---|---|---|---|
| H0b.39 | Motor phase V current upon occurrence of the selected fault | 0.01 A | Displays the RMS value of motor phase V winding current when the fault displayed in H0b.34 occurred. When no fault occurs, the value of H0b.39 is 0. | Display of 4.60 A:  |
| H0b.40 | Bus voltage upon occurrence of the selected fault | V | Displays the DC bus voltage of the main circuit when the fault displayed in H0b.34 occurred. When no fault occurs, the value of H0b.40 is 0. | Display of 311.0 V rectified from 220 VAC:  Display of 537.0 V rectified from 380 VAC:  |
| H0b.41 | DI status upon occurrence of the selected fault | - | Displays the high/low level status of DI1 to DI9 when the fault displayed in H0b.34 occurs. The method for determining the DI level status is the same as that of H0b.03. When no fault occurs, all DIs are displayed as low level in H0b.41 (indicated by the decimal value 0). | Display of H0b.41 = 414:  |
| H0b.42 | DO status upon occurrence of the selected fault | - | Displays the high/low level status of DO1 to DO5 when the fault displayed in H0b.34 occurred. The method for determining the DO level status is the same as that of H0b.05. When no fault occurs, all DOs are displayed as low level in H0b.42 (indicated by the decimal value 0). | Display of H0b.42 = 15:  |
| H0b.53 | Position deviation counter (32-bit decimal) | Reference unit | Position deviation = Sum of input position references (reference unit) - Sum of pulses fed back by the encoder (reference unit) | Display of 10000 in reference unit:  |

| Parameter | Name | Unit | Meaning | Example of Display |
|---|---|---|---|---|
| H0b.55 | Motor speed actual value | 0.1 rpm | Displays the actual value of the motor speed, which can be accurate to 0.1 RPM. | Display of 3000.0rpm:<br><br><br>Display of –3000.0 RPM:<br><br> |
| H0b.64 | Real-time input position reference counter | Reference unit | Displays the value of the position reference counter before being divided or multiplied by the electronic gear ratio. This value is independent of the servo drive status and the control mode. | Display of 1073741824 in reference unit:<br><br> |

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