NIKKI DENSO

Instruction Manual

AC Servo driver

VPH Series

HE Type

TDISC

Document No. TI-14870B

Ver.2.4

Preface

Thank you for adopting the AC servo driver <VPH HE Type>. Before use, please read this manual carefully to fully exploit the performance of this device.

Trademarks

ENSIS® is a registered trademark of Mitutoyo Corporation.
Linear Scale® is a registered trademark of Mitutoyo Corporation.
BiSS® is a registered trademark of iC-Haus GmbH.
EnDat® is a registered trademark of HEIDENHAIN CORPORATION.

Definition of terms

In this instruction manual, the terms listed below are used unless otherwise specified.

Term	Description
This manual	VPH Series HE Type τDISC Instruction Manual
Device, this device	AC servo driver (VPH HE Type)
Motor	τDISC motor (ND-s Series, HD-s Series, DD-s Series)
VPH DES	VPH Data Editing Software (editing software dedicated to VPH)
P***	Parameter number ("***" is a 3-digit number.)
Communication mode	MECHATROLINK-III
Maintenance mode	Mode in which this device operates alone

For details of the communication mode and the maintenance mode, refer to "1-3 Configuration of the run modes".

Precautions in safety

Before installation, wiring, operation, maintenance and inspection, and error diagnosis and countermeasures, carefully read this manual and all other related operating instruction manuals for proper usage.
Before use, be sure to fully acquaint with the equipment, safety information, and other related precautions.

The following labels are used to indicate safety precautions in this manual.
Cautions are ranked as "Danger" and "Caution".
And contents to follow are ranked as "Prohibition" and "Compulsion".

⚠Danger	If mishandling is made, dangerous situation as death or serious injury on a worker could occur.
⚠Caution	If mishandling is made, dangerous situation as medium or light injury could occur and damages on goods could be suspected. However, since ⚠Caution-marked item could also cause serious results depending on the actual conditions, please comply with the important instructions.
Prohibition	Prohibitions (actions not to be done) are indicated.
Compulsion	Compulsions (actions to be done) are indicated.

Precautions in handling

⚠Danger		
Prohibition	• Never touch inside of this device and terminal blocks. • Do not give damages, apply excessive force, and put any heavy articles on cables, and do not pinch any cable.	Electric shock may occur.
Prohibition	• Never touch rotating blocks of a running motor.	Injury may occur.
Compulsion	• Be sure to ground the earth terminal or earth cable of this device or the motor. • Use the earth cable specified in this manual or a thicker cable than that, for the class-D grounding or better. • Execute relocation, wiring, maintenance, and inspection a certain period of time (5 minutes for 3.3 kW or less and 10 minutes for 7 kW or more) after power-off. Start the job after the "CHARGE" LED is turned off. Never fail to shut off the control power, in addition to the main power.	Electric shock may occur.

⚠Caution		
Prohibition	• Never use this device in the atmosphere such as water splash, corrosive or flammable gas, nor place it close to combustible materials.	Fire or failure may occur.
Prohibition	• The motor, this device, and peripheral equipment become hot. Do not touch them. • When the power is supplied and for a while after the power is shut off, the radiator, motor, regenerative resistor, and other components of this device may be very hot. Do not touch them.	Burn may occur.
Compulsion	• Use the motor and this device in the specified combination.	Fire or failure may occur.
Compulsion	• Never conduct the voltage withstanding test or the Mega test on this device.	Failure may occur.

Storage

⚠Caution		
Prohibition	• Do not store this device in a place of raining, water dripping, and harmful gas and liquid.	Failure may occur.
Compulsion	• Store this device under controlled temperature and humidity within the range specified in this manual in a place avoiding direct sunlight. • Be sure to contact our sales representative when the storage period after purchase has passed more than three years.	Failure may occur.

Transportation

⚠Caution		
Prohibition	• Do not hold a shaft when handling the cable and motor in transportation.	Injury or failure may occur.
Compulsion	• Piling up or overloading the products can induce collapse of cargo; thus, follow instructions.	Injury or failure may occur.

Installation

⚠Danger		
Prohibition	• Do not climb or put any heavy thing on this device.	Injury or failure may occur.
Prohibition	• Do not apply heavy shock.	Equipment may be damaged.
Compulsion	• Never block air-intake/exhaust windows and do not allow foreign substance to go in. • Be sure to install this device to the specified directions. • Attach this device to a metal or non-flammable object.	Fire may occur.
Compulsion	• Distance of alignments between this device and the internal walls of control panel and other equipment should follow the measurements specified by this manual.	Fire or failure may occur.
Compulsion	• Conduct proper attachment suitable for the output or weight of this unit.	Equipment may be damaged.

Wiring

⚠Danger		
Compulsion	• To avoid electric shock and noise influence, be sure to make proper grounding (earth).	Motor runaway, electric shock, injury, or machine damage may occur.

⚠Caution		
Compulsion	• Be sure to conduct correct wiring.	Motor runaway or burnout, injury, or fire may occur.
Compulsion	• To avoid the impact of noise on this device, use cables with the length and treatment (shielding, twisting, etc.) specified in this manual. For the control input/output (I/O) signal line of this device, prepare another line system separate from other power lines and motor power lines.	Motor runaway, injury, or machine damage may occur.

Operation and run

⚠Caution		
Prohibition	• Since excessive adjustment can make the operation unstable, avoid this situation. • The brake of the brake-incorporated motor is for keeping the machine position. Do not use it for braking or to secure the safety of the machine.	Injury or machine damage may occur.
Prohibition	• Do not turn on the power in the condition where the motor shaft is in rotation or in vibration.	Motor runaway, injury, or machine damage may occur.
Prohibition	• While the main power supply is ON, make sure the control power supply to be ON as well, and avoid energizing the main power supply only.	Motor runaway, injury, or machine damage may occur. Failure may occur.
Compulsion	• Protect the motor by providing an emergency stop circuit having a built-in thermostat, for example. If the motor does not have a thermostat, add protective functions separately.	Injury or fire may occur.
Compulsion	• Check the power specifications are normal.	Injury, fire, or machine damage may occur.
Compulsion	• Install an emergency stop circuit externally, to stop operation instantly and shut off the power. • For trial run, fix the motor, check this device and motor only for operation, and then attach them to the machine. • When alarm happened, be sure to remove the cause after reset, and then restart.	Injury or machine damage may occur.
Compulsion	• After sudden blackout and restoration of power, keep away from the machine as it may restart suddenly. Design the machine to secure safeness of people even if it restarts.	Injury may occur.
Compulsion	• Avoid turning ON/OFF repeatedly. It may cause the deterioration of main circuit element.	Failure may occur.

Maintenance and inspection

⚠Caution		
Prohibition	• Overhaul/repair shall be conducted only by us or personnel designated by us.	Failure may occur.
Compulsion	• Be sure to use the device by strictly observing the permissible ambient temperature and humidity ranges.	Otherwise, errors and failures may occur.
Compulsion	• The device lifetime has a close relation with the temperature in use. Note that a use under the high temperature and high humidity environment may shorten the device lifetime. Generally, it is said that an increase of 10 ℃ in temperature can shorten the lifetime of equipment to half. • The capacitance of the main circuit electrolytic capacitor inside the device decreases due to deterioration. To prevent secondary accidents due to failures, it is recommended to replace it earlier than arranged. For information on the standard replacement period, refer to "Chapter 7 Maintenance". • The cooling effect of the built-in cooling fan motor of this device will decrease due to deterioration. To prevent secondary accidents due to failures, it is recommended to replace it earlier than arranged. For information on the standard replacement period, refer to "Chapter 7 Maintenance".	Failure may occur.

Precautions before installation (during transportation)

During transportation, please handle with care so as not to damage the device.
Do not pile up devices and do not put any item on the cover.

Cautions in storage

If the products are not used soon after delivery, store them under the following conditions in order to prevent the deterioration of insulation and rust formation. Unpack the packages soon after arrival and check for any damage and other non-conformances incurred during transportation.

Storage conditions of the device

Item		Description
Ambient condition	Temperature	-20 ℃ to +65 ℃
	Humidity	90% or less (non-condensing)
	Storage location	Store in a clean place free from dust and dirt. (Avoid a harmful atmosphere such as corrosive gas, grinding fluid, metal powder, and oil.)
Vibration		Store in a place free from vibration.
Other		If you store the product for a long period of time, conduct rust prevention treatments onto the screws at the terminal block and carry out periodic inspection.

Precautions in transportation

When it is necessary to transport the products after receive, satisfy following conditions.

Transporting conditions of the device

Item		Description
Ambient condition	Temperature	-20 ℃ to +65 ℃
	Humidity	90% or less (non-condensing)
	Storage location	Do not transport the products in a harmful atmosphere such as corrosive gas, grinding fluid, metal powder, oil, etc.
Vibration		Acceleration of 4.9 m/s^2 or less

⚠Caution
Humidity conditions remarkably affect the life of the device. Recommended storing or transporting condition is in humidity of 75% RH or less. If the humidity exceeds 75% RH, contact our sales representative.

About this manual

This manual explains the installation, wiring, and use of the device and the motor, as well as maintenance and inspection, error diagnosis, countermeasures, and other matters. In order to use this device correctly, deeply understand the contents of this manual. When performing the installation, wiring, operation, maintenance and inspection, and other work, observe the conditions and procedures contained in this manual.

When using a customized device, read this manual and the specification document for the customized device.
Here, the specification document prevails over this manual, if description and items are overlapped.

For details of the MECHATROLINK- III connection procedure and adjustment, refer to the separate instruction manuals.

[Related instruction manuals]

- TI-15080* "VPH Series Option"
  Instruction manual describing the optional items of this device
- TI-15170* "VPH Series Absolute Position Compensation"
  Instruction manual describing the absolute position compensation function
- TI-14701* "VPH Series Servo Adjustment Manual"
  Instruction manual describing the motor servo adjustment procedure
- TI-14970* "VPH Series STO Option"
  Instruction manual describing the STO optional function
- TJ-43200* "VPH Series HE Type Communications manual"
  Instruction manual describing the communication protocol of MECHATROLINK-III
- TJ-43450* "VPH Series HE Type KV-X Controller setting manual"
  Instruction manual describing the procedure for connecting to the KV-X controller
- TJ-43490* "VPH Series HE Type MP Controller setting manual"
  Instruction manual describing the procedure for connecting to the MP controller

Warranty period

Warranty period of our products is one year after shipment from our factory.
However, please note that any failure or error resulting from the following causes is not covered by the warranty.

a. Modification by parties other than us.
b. Nonstandard operation contradictory to the rules and regulations stipulated in this manual.
c. Natural and other disasters.
d. Connection with another maker's unit which is not approved by us.

The warranty is limited to the repair of this device. It does not cover any damage caused by a fault of the delivered device, any lost opportunities on the customer's side, lost profits, secondary damage, or accidents.
Regardless of the warranty period, please inform our sales person whenever you find any failure or error.

⚠Caution
• Our products have been designed and manufactured as general-purpose products in the general industry. They have not been designed or manufactured in any equipment or systems that may involve human lives. If, therefore, they are put to any other use, we shall not assume any responsibility whatsoever. (Examples: Uses that are expected to have a significant influence on human lives and property, such as uses in nuclear energy, aerospace, and medical equipment and systems and passenger cars) • When installing the product to the facility that may involve serious accidents and loss by excessive exterior noises or failure on the motor, install the back-up and fail-safe functions systematically. • If used under the conditions where sulfur or sulfide gas is produced, splitting due to corrosion on the tip resistors or poor connection on the contacts can occur.

Export control

If you have any concerns that the intended use and/or the end user of this product and/or the technology you are going to supply may be used for the development of weapons of mass destruction and/or conventional weapons, for example, you may be subject to the export control specified in the "Foreign Exchange and Foreign Trade Law". Before exporting it, perform adequate examination and the necessary export procedure.

Contents

Chapter 1 Features and configuration of the device

1-1 Features of the device

This device supports motor control, and it carries out MECHATROLINK-III-compliant controller command-based speed control, torque control, positioning control. The device has features such as those listed below, and the single device can support several types of motors and encoders with parameter settings.

Features of the VPH HE Type

a. In the MECHATROLINK-III communication mode, high-performance systems can be supported by using half-duplex 100Mbps high-speed communication.

b. Connections with simple Ethernet metal cables enable the wiring saving, downsizing, and easy expansion of systems.

c. For each operation, gain, filter, and acceleration/deceleration time settings can be made. It is possible to apply slow S-curve acceleration/deceleration in the jog mode and high-response acceleration/deceleration in the positioning mode without switching between them with an external signal or the like.

d. Torque waveforms are controlled with quadric curve under 2-stage S-curve acceleration/deceleration control.

e. The positioning drive time is within 1 ms.

f. Digital control through driftless, solution of adjustment mismatch, enhancement of man-machine interface, and other features pursue the reliability and user friendly operation.

g. Adoption of IPM (IGBT) to the power switching block realizes the improvement of servo performance and noise reduction.

h. With the full-scale software servo, control that fits the rigidity of the machine is possible, achieving linear/S-curve acceleration/deceleration, feed-forward, torque command filter, and at-stop and low-speed gain changeover.

i. It is possible to connect to VPH DES using USB communication to display servo waveforms on an oscilloscope, display frequency response characteristics, and edit parameters.

j. Using an absolute encoder eliminates the need for homing.The auto-tuning function makes servo adjustment easy.

1-2 System configuration

Figure 1-1 and Figure 1-2 show the peripheral system configuration of this device.

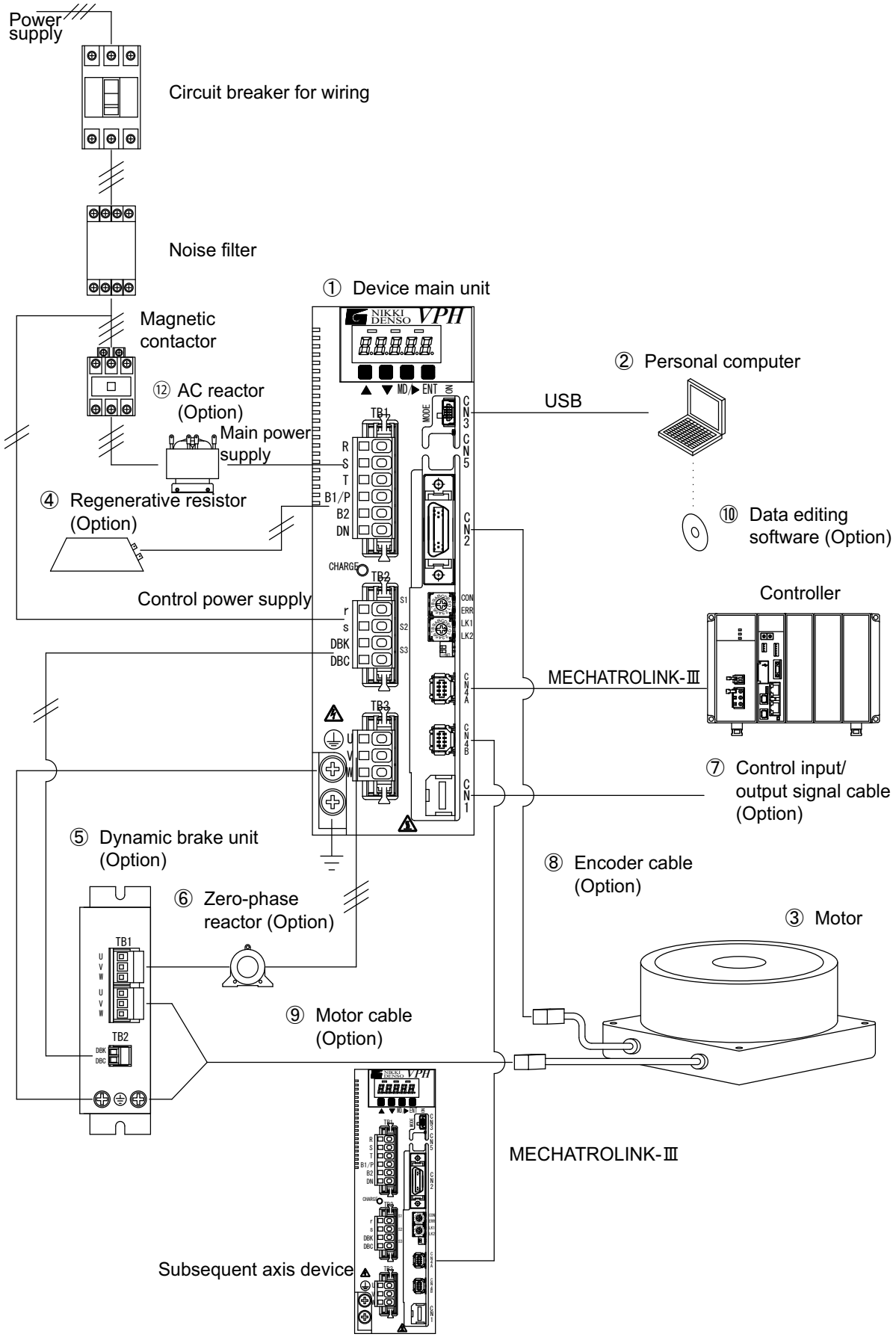


Figure 1-1 VPH HE Type system configuration for the 800 W class or less

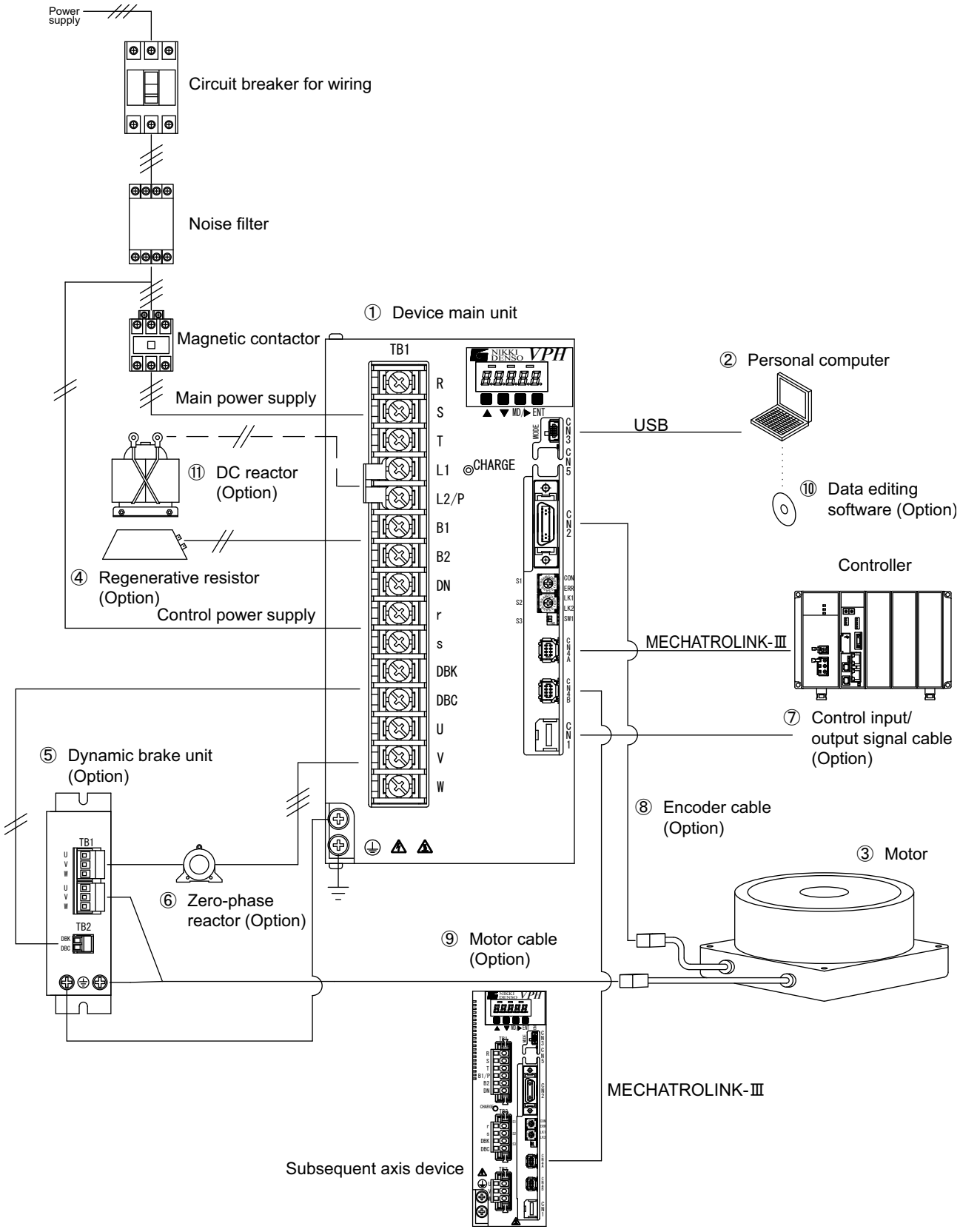


Figure 1-2 VPH HE Type system configuration for the 1.5 kW class or more

Names of parts

① Device main unit
This device controls the motor.
Using parameters, one device can cope with multiple kinds of motors and encoders.

② Personal computer
USB communication with editing software developed by us can perform below:
- Display of status data (such as operation speed and deviation).
- Control of the device control signal.
- Setting and backup of parameter and other settings.

Some machine models cannot be connected with a commercial PC; so, please consult us upon necessary.

③ Motor
As standard, our motor is connected.

④ Regenerative resistor (option)
The regenerative resistor is used to consume regenerative power generated by motor braking.

⑤ Dynamic brake unit (option)
The dynamic brake unit can brake the coasting motor.

⑥ Zero-phase reactor (option)
The zero-phase reactor is used to absorb noise produced by the main unit of the VPH Series and reduce the impact of noise on the device itself and peripheral equipment.

⑦ Control input/output signal cable (option)
The control input/output signal cable is connected to the control input/output connector (CN1) on the main unit of the VPH Series to input and output signals.

⑧ Encoder cable (option)
The encoder cable is used to connect the encoder feedback pulse input connector (CN2) on the main unit of the VPH Series to the encoder and the magnetic pole sensor.

⑨ Motor cable (option)
The motor cable is used to connect the motor power connector on the main unit of the VPH Series to the motor power cable.

⑩ Data editing software VPH DES (option)
Data editing software allows you to perform VPH Series operations including parameter editing, remote operation, checking of the operation status and signal status, and measurement of oscilloscope data from a PC.

⑪ DC reactor (The option is for 1.5 kW or more.)
The DC reactor is used to make the waveform of the input current into a waveform close to that of a sine wave to suppress harmonic waves. It can be used for the 1.5 kW class or more.

⑫ AC reactor (The option is for 800 W or less)
The AC reactor is used to make the waveform of the input current into a waveform close to that of a sine wave to suppress harmonic waves.
It can be used for the 800 kW class or less.

* Set parameters and other items through USB communication with VPH DES.

1-2-1 Setting a station address

Set the station address and the transmission bytes for a slave device of the MECHATROLINK-III network.

Make sure that the station address set on the device is the same as that set on the controller.

- By combining the station address setting switches (S1 and S2), set the station address (03H to EFH) of this device.
- With the transmission byte setting switch (S3), set the transmission bytes (32 bytes or 48 bytes) of this device.
- If different station addresses are set in a single communication system, the system does not operate normally.
- The state at power-on is set. Any changes made during device operation are invalid. If an attempt is made to make a change during operation, [FL.941: MECHATROLINK-III transmission byte setting SW change warning] or [FL942: MECHATROLINK-III station address setting SW change warning] is generated.

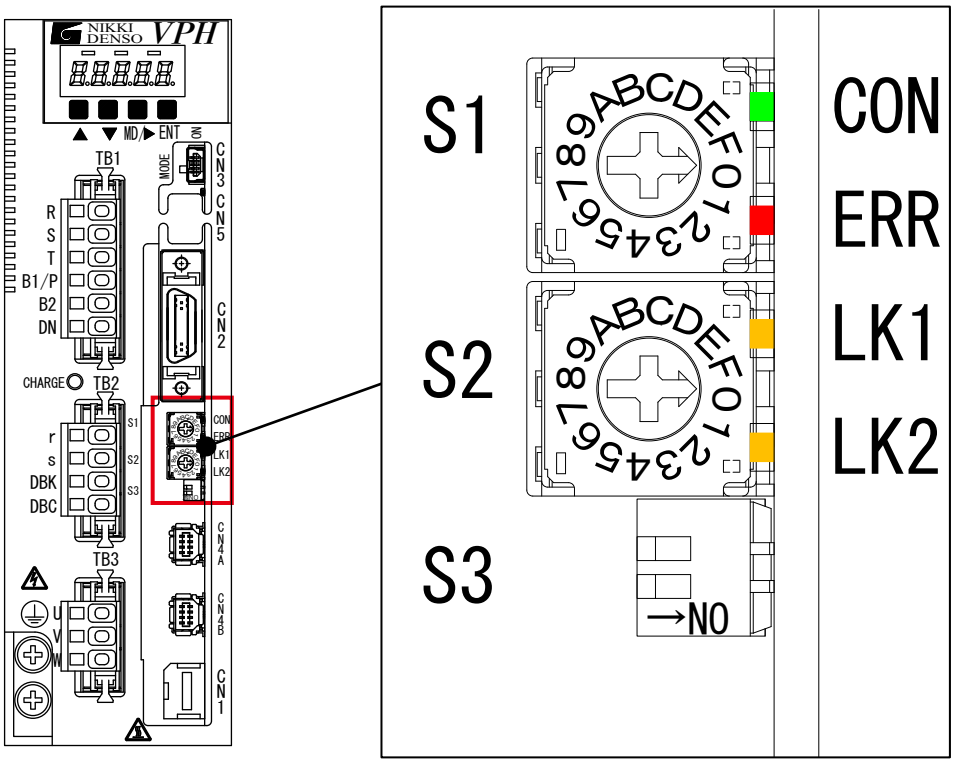


Figure 1-3 Setting a station address

Table 1-1 Station address correspondence table

S1	S2	Station address	
0	0 - 2	00h - 02h	Not for use
0	3	03h	Factory setting
0	4	04h	
▪	▪	▪	
▪	▪	▪	
E	F	EFh	
F	0 - F	F0h - FFh	Not for use

Table 1-2 Transmission bytes correspondence table

S3-1	S3-2	Transmission bytes
OFF	OFF	Not for use
ON	OFF	32 bytes
OFF	ON	48 bytes (factory setting)
ON	ON	Not for use

1-2-2 Communication status display LED panel

They display the communication status of the MECHATROLINK-III network.

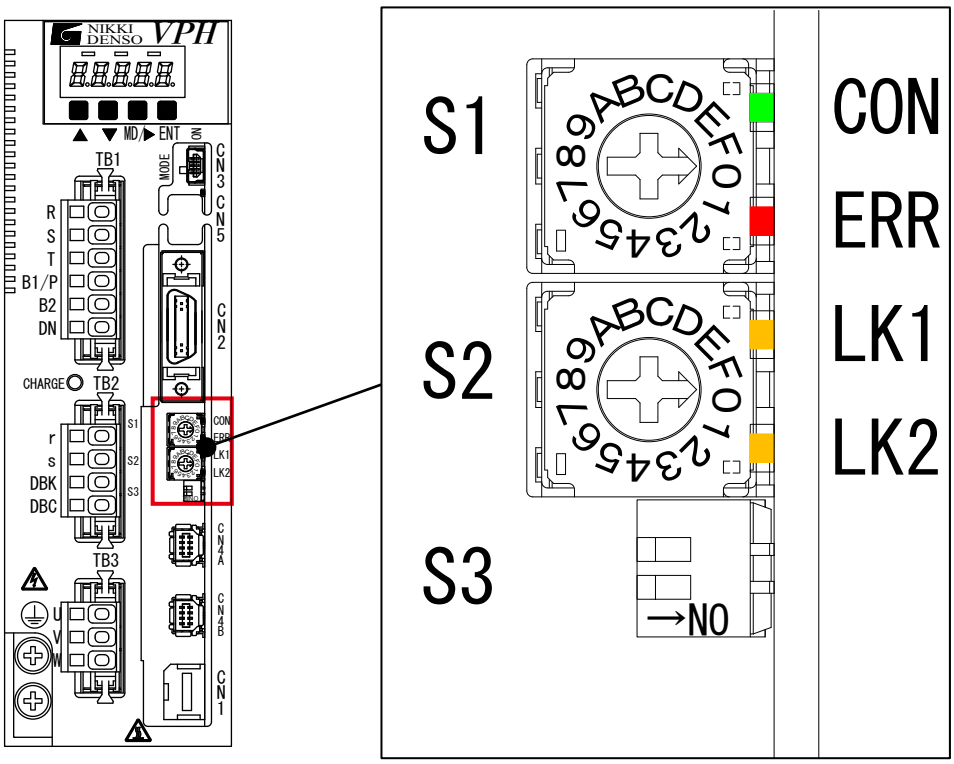


Figure 1-4 Appearance of the communication status display LED panel

Table 1-3 Communication status display LED correspondence table

Name	Color	Status	Description
CON	Green	On	MECHATROLINK-III communication between the controller and this device is established. (The "CONNECT" command is processed normally.) Motor operation with a command from the controller is possible.
		Off	MECHATROLINK-III communication between the controller and this device is not established. (The "CONNECT" command is not executed or terminates abnormally.)
ERR	Red	On	An error regarding MECHATROLINK-III communication occurred.
		Off	MECHATROLINK-III communication is normal.
LK1	Brown	On	To the communication cable connected to the "CN4A" connector, a hardware connection is established.
		Off	No communication cable is connected to the "CN4A" connector. Or, the power to the controller and this device is OFF.
LK2	Brown	On	To the communication cable connected to the "CN4B" connector, a hardware connection is established.
		Off	No communication cable is connected to the "CN4B" connector. Or, the power to the controller and this device is OFF.

1-3 Configuration of the run modes

The following run modes are available by selecting each with the relevant external input signals.
Select the self-diagnosis mode using VPH DES.

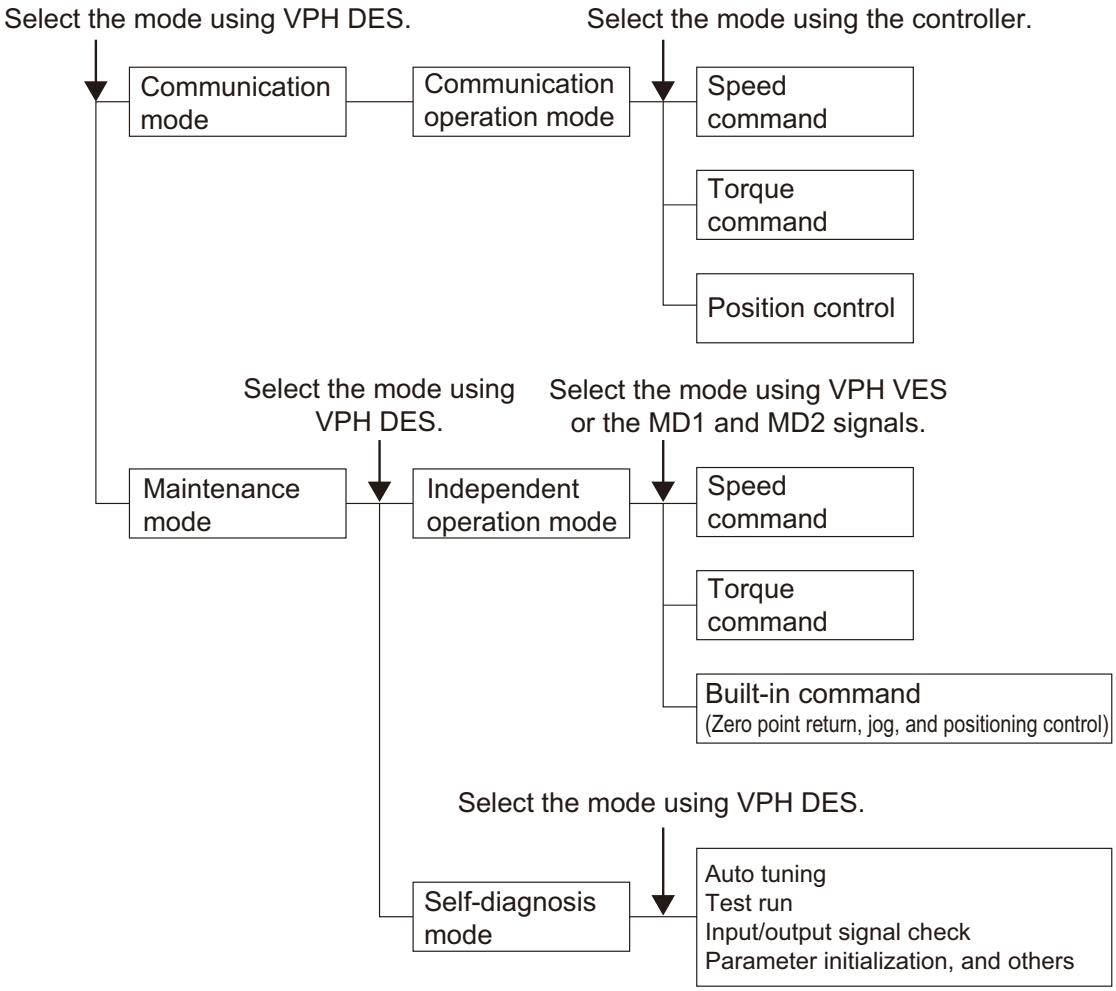


Figure 1-5 Mode configuration diagram

1-4 Mode switching

This device has the following modes.

Table 1-4 Description of modes

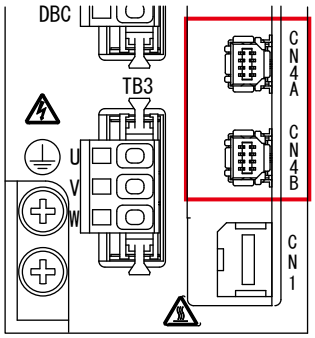
Mode	Description
Communication mode	Mode in which this device operates according to the commands issued from MECHATROLINK-III.
Maintenance mode	Mode in which this device operates alone. The motor can be operated according to the commands issued from internal speed control, torque control, built-in command control, and others.

When the power is turned on, this device is put in the communication mode.

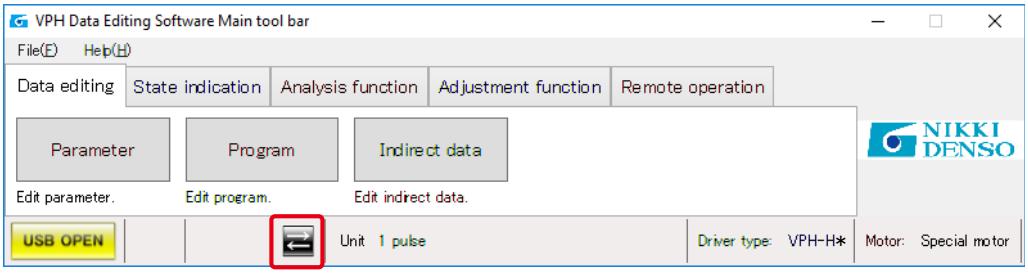
1-4-1 Mode switching procedure

To switch between the communication and maintenance modes, use VPH DES.
Switch between them with the following procedure.

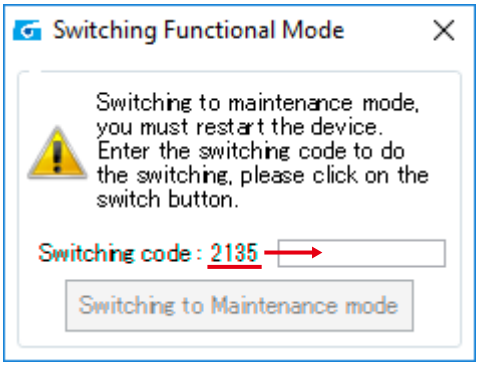
1. Disconnect the network.
- Disconnect the connector from CN4A or CN4B to disconnect the network.



2. Switch to the maintenance mode.
- Click the switching icon at the bottom of the <Main tool bar> window.

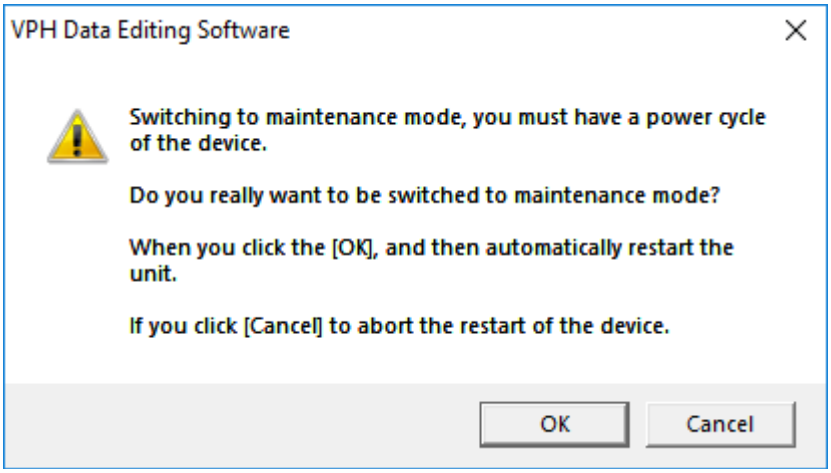


- The <Switching Functional Mode> window starts.
  Enter the number displayed for Switching code in the right input field and press the Enter key.
  Click "Switching to Maintenance mode".



3. Restart the device.

- A dialog appears, which prompts you to turn the power off, then on again. If you see no problem with automatically restarting the system, click "OK". The device will be automatically restarted.



- Confirm that the icon at the bottom of the <Main tool bar> window changes.

* To switch from the maintenance mode to the communication mode, perform either of the following:

- In the maintenance mode, perform steps 1 to 3 above.
- Turn off the power to the device, then on again.

1-4-2 Notes on mode switching

Mode switching is not possible in the cases below. Remove the cause, then retry.

Table 1-5 Conditions under which mode switching is impossible

Item	Description	Action
Network communication in progress	The CN4A, or CN4B cable is connected, and the device is in the communication status.	Remove the cable from CN4A, or CN4B, and retry in the status in which the device is disconnected from the network.
Occurrence of an alarm	One of the following communication-related alarms occurs • AL.005: CPU start error • AL.006: CPU error	Retry in the status in which the alarm is released. For details of the alarms, refer to "8-2 Error code specifications".

1-5 Restrictions

1-5-1 Restrictions on functions

In the MECHATROLINK- Ⅲ communication mode, the following functions are unavailable from VPH DES developed by us:

- Remote operation function
- Frequency response function
- Self-diagnosis function
- Positioning test run function
- Device reset, restart, and switching to the maintenance mode when parameters are written

1-5-2 Restrictions on parameter edit

To edit the parameters of this device, use VPH DES developed by us.

1-6 Startup procedure

To run this device, prepare according to the following procedure.

1. Product check at delivery
No damages during transportation? (Check packages for no breakages and product surface for no abnormalities)
- Correct products as you ordered?
  (Check the model, rated output, and so on, referring to "13-1-1 Model".)
- Accessories packaged? (Check the accessories, referring to "2-1 Incoming check".)

2. Installation
Correctly install the device, referring to "2-2 Installation environment" and "2-3 Installation method".

3. Wiring
- Wiring of the power supply block of the device main unit
  Connect the power supply of the device main unit, referring to "2-4 Power supply connection".
- Motor connection
  Connect the motor and the device main unit, referring to "2-5 Motor connection".
- Grounding
  Be sure to ground to prevent electric shock and take noise protection measures, referring to "2-6 Grounding".
- Connecting of the regenerative resistor
  When the regenerative resistor is supplied, refer to "2-7 Regenerative resistor connection".
- Control circuit wiring
  Connect the control circuit to connect with the device main unit. Refer to "2-8 Control circuit wiring".
- Noise protection
  To prevent troubles due to noise, be sure to take noise prevention measures and treatments, referring to "2-9 Noise protection".

When carrying out each wiring task, refer to "3-1 External wiring diagram".
As for electric wire to use in wiring, adopt the one described in "2-10 Applicable electric wires".
As for cables for the control circuit, use our optional cables.

4. Before-run inspection and start-up of the device
- Before-run inspection
  Be sure to carry out every item described in "4-1-2 Before-run inspection".
- Start-up of the device
  After completion of the inspection, carry out test run and adjustment, referring to "4-1 Run procedure".

5. Run start
Check that the above procedure is completed, and start operation.

Chapter 2 Installation and wiring

2-1 Incoming check

At the time of product delivery, check below points.

- Correct products as you ordered? (Model, rated output, etc.)
- No damages during transportation? (If no breakages in the package and no exterior abnormalities on products)
- Found all accessories?

If you find any shortages or damages, please contact our sales representative immediately.
An accessory of this device differs depending on the model, as listed below.

Table 2-1 100 V device accessory list

Device model	Accessory	
	Model	Quantity
NCR-HE1051*-A-*** Capacity: 50 W	Plug connector for main circuit block A [06JFAT-SBXGF-I]	1
	Plug connector for main circuit block B [03JFAT-SBYGF-I]	1
	Plug connector for the control block [04JFAT-SBXGF-I]	1
	Open tool [J-FAT-OT]	1
NCR-HE1101*-A-*** Capacity: 100 W	Plug connector for main circuit block A [06JFAT-SBXGF-I]	1
	Plug connector for main circuit block B [03JFAT-SBYGF-I]	1
	Plug connector for the control block [04JFAT-SBXGF-I]	1
	Open tool [J-FAT-OT]	1
NCR-HE1201*-A-*** Capacity: 200 W	Plug connector for main circuit block A [06JFAT-SBXGF-I]	1
	Plug connector for main circuit block B [03JFAT-SBYGF-I]	1
	Plug connector for the control block [04JFAT-SBXGF-I]	1
	Open tool [J-FAT-OT]	1

Table 2-2 200 V device accessory list

Device model	Accessory	
	Model	Quantity
NCR-HE2101*-A-*** Capacity: 100 W	Plug connector for main circuit block A [06JFAT-SBXGF-I] Plug connector for main circuit block B [03JFAT-SBYGF-I] Plug connector for the control block [04JFAT-SBXGF-I] Open tool [J-FAT-OT]	1 1 1 1
NCR-HE2201*-A-*** Capacity: 200 W	Plug connector for main circuit block A [06JFAT-SBXGF-I] Plug connector for main circuit block B [03JFAT-SBYGF-I] Plug connector for the control block [04JFAT-SBXGF-I] Open tool [J-FAT-OT]	1 1 1 1
NCR-HE2401*-A-*** Capacity: 400 W	Plug connector for main circuit block A [06JFAT-SBXGF-I] Plug connector for main circuit block B [03JFAT-SBYGF-I] Plug connector for the control block [04JFAT-SBXGF-I] Open tool [J-FAT-OT]	1 1 1 1
NCR-HE2801*-A-*** Capacity: 800 W	Plug connector for main circuit block A [06JFAT-SBXGF-I] Plug connector for main circuit block B [03JFAT-SBYGF-I] Plug connector for the control block [04JFAT-SBXGF-I] Open tool [J-FAT-OT]	1 1 1 1
NCR-HE2152*-A-*** Capacity: 1.5 kW	None	-
NCR-HE2222*-A-*** Capacity: 2.2 kW	None	-
NCR-HE2332*-A-*** Capacity: 3.3 kW	None	-
NCR-HE2702*-A-*** Capacity: 7 kW	Plug connector for the control block [FKC 2,5/ 4-STF-5,08]	1
NCR-HE2153*-A-*** Capacity: 15 kW	Plug connector for the control block [FKC 2,5/ 4-STF-5,08]	1

⚠Caution

If found damages on the package such as a cardboard box, please contact our sales representative without opening the package.

2-2 Installation environment

a. For information about the ambient conditions of the device, refer to "13-1-2 General specifications".

b. The device lifetime has a close relation with the temperature in use. A use under the high temperature and high humidity environment may shorten the device lifetime. Generally, it is said that an increase of 10 ℃ in temperature can shorten the lifetime of equipment to half.

c. For the temperature inside the storage control panel, consider the surrounding temperature and the temperature increase due to a loss in this device and in the equipment inside the panel. Be sure to keep the surrounding temperature of the device within the permissible range. In general, the calorific value of this device due to loss is about 5% + 50 W of the connected motor capacity.

d. As the device is equipped with a fan to cool the radiator, secure an opening not to block airflow. When storing plural devices, align them so that ventilation does not influence each other. (Refer to Figure 2-1.)

e. If there are nearby heating elements and vibrating sources, prepare an appropriate construction against the influence.

f. Do not install the product in a place of high temperature and high humidity or in places where excessive dust particles, metal powder, and cloud of steam exist, and in an environment where corrosive gas exists.

g. If there is a noise generation source, reinforce the grounding treatment to avoid mixture of induction noises. Depending on the use conditions, a noise filter may be required. Take noise protection measures, referring to "2-9 Noise protection".

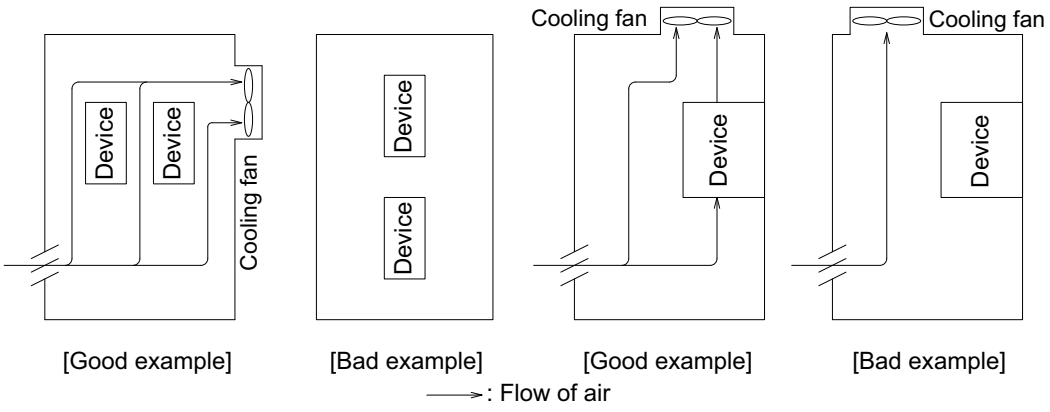


Figure 2-1 Alignment example for storing devices

⚠Caution
Be sure to use this device by strictly observing the permissible ambient temperature and humidity ranges. Using it outside the ranges may result in errors and failures.

2-3 Installation method

- Be sure to install the device in the vertical direction to secure normal heat radiation effect.
- Space around the device must be secured with the designated distance specified in Figure 2-2 (distance from other components or parts and a side wall of the control panel) in view of heat radiation efficiency and ease of maintenance.

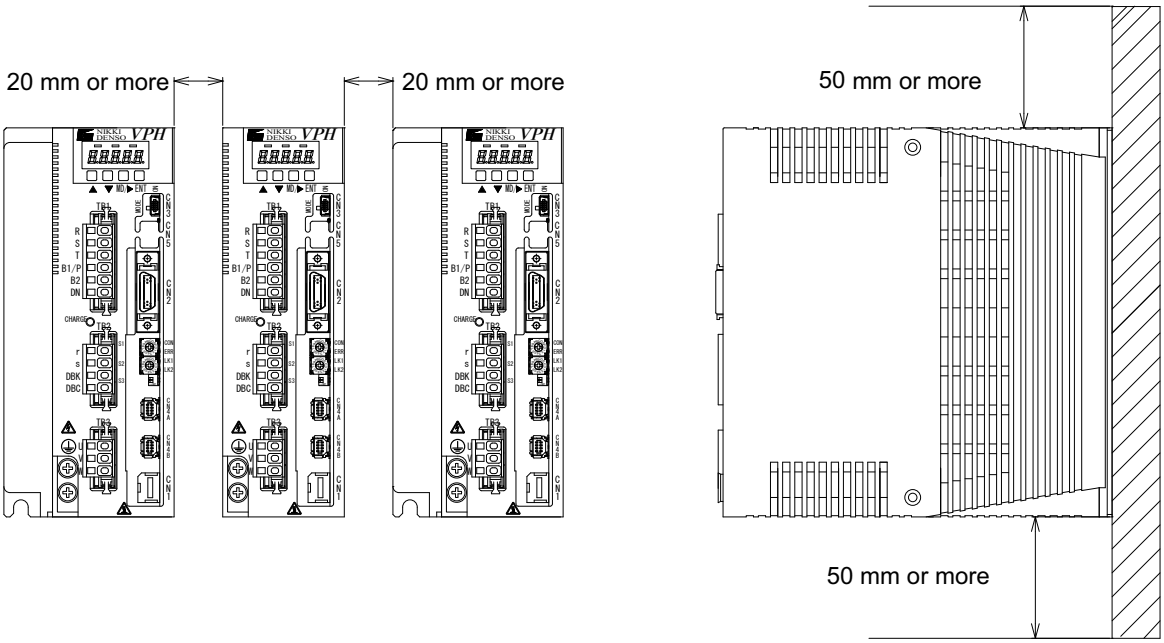


Figure 2-2 Installation and ventilation of the device

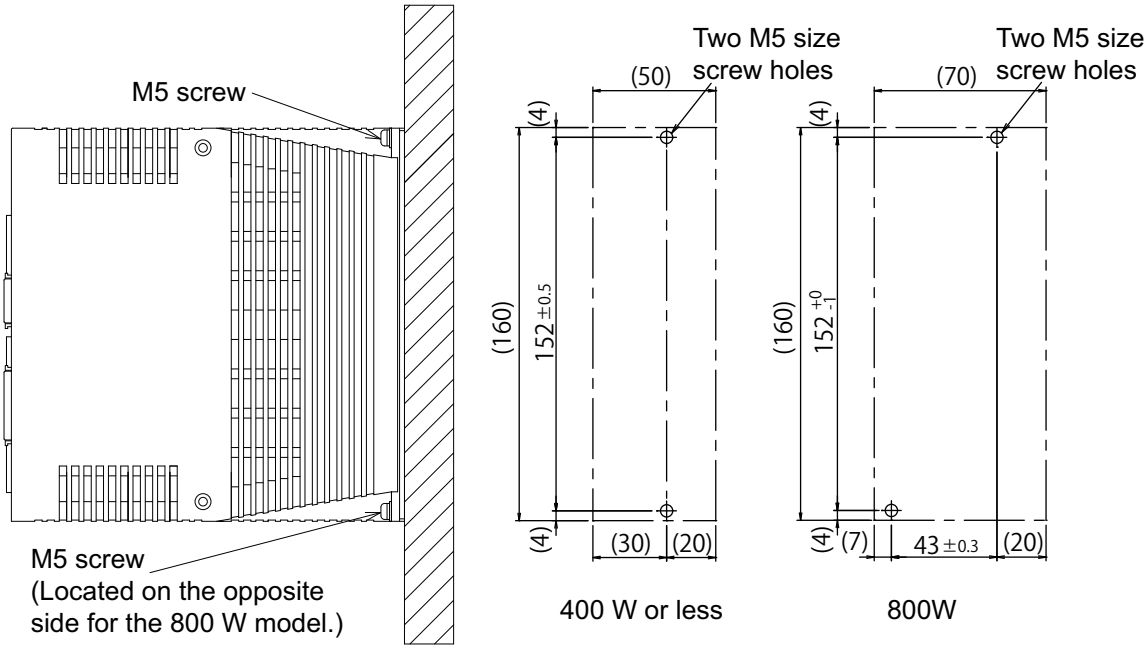


Figure 2-3 Device installation method (800 W or less)

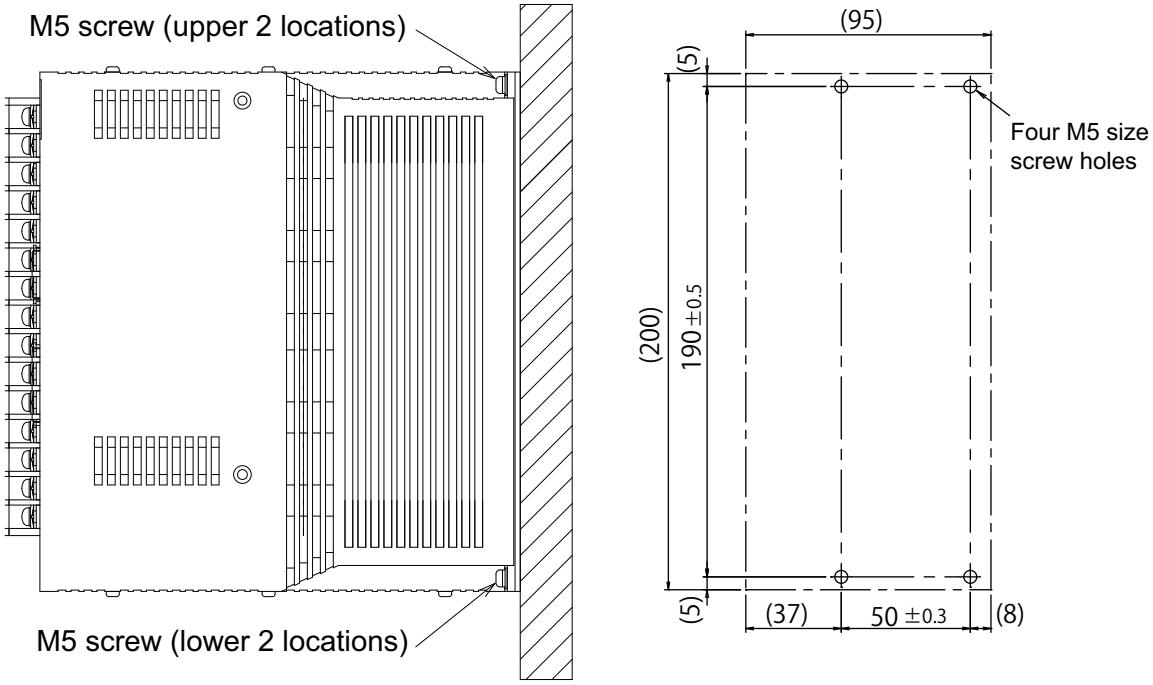


Figure 2-4 Device installation method (1.5 kW, 2.2 kW)

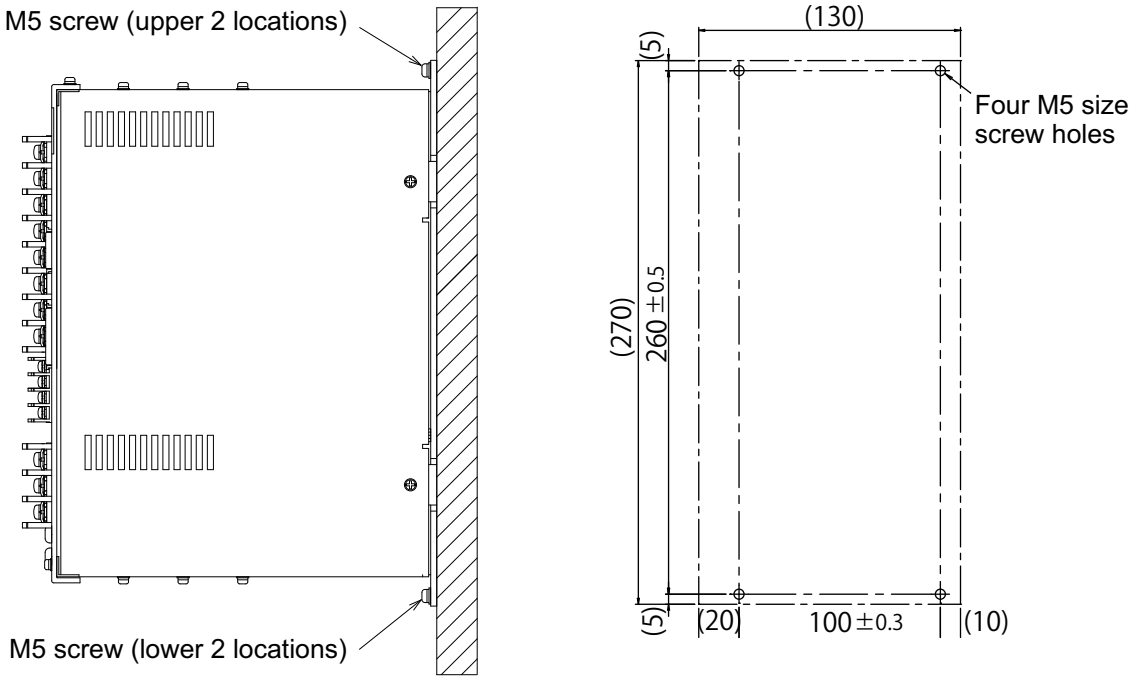


Figure 2-5 Device installation method (3.3 kW)

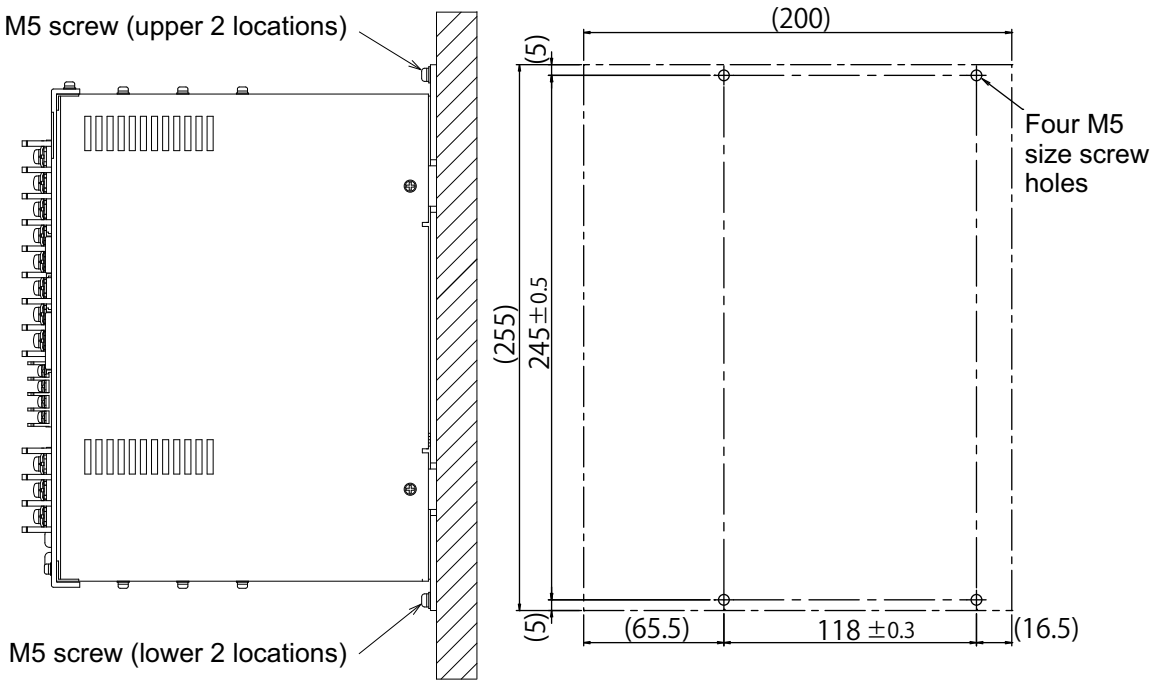


Figure 2-6 Device installation method (7 kW)

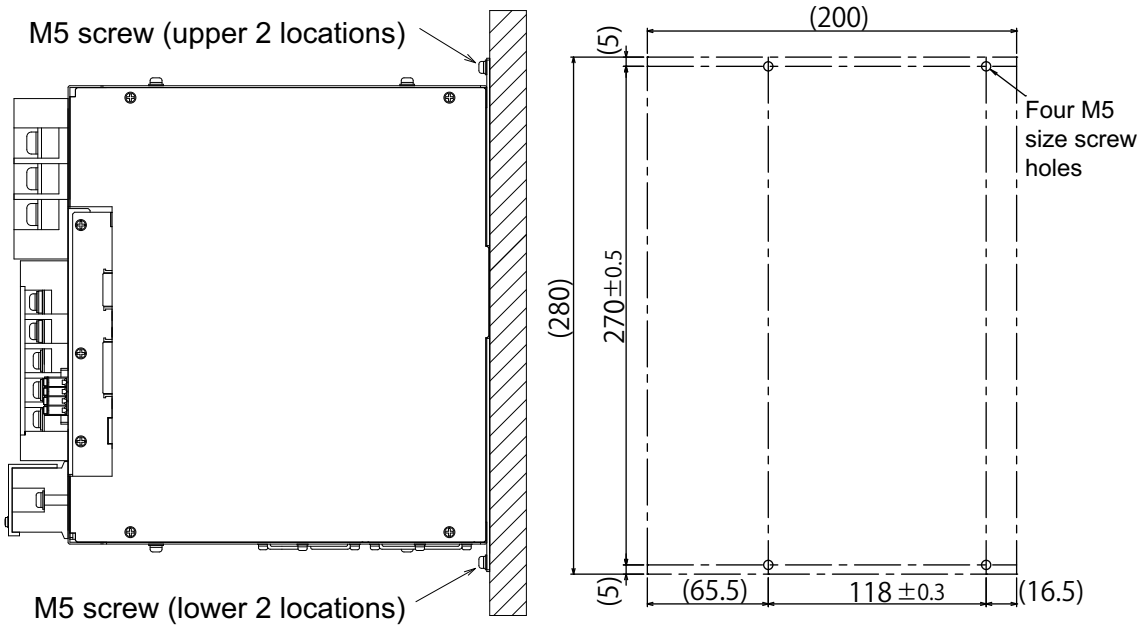


Figure 2-7 Device installation method (15 kW)

2-4 Power supply connection

2-4-1 Power supply wiring

The rated voltages of this device are as listed below.

NCR-HE1051*-A-*** to NCR-HE1201*-A-***
Main power supply: 100 to 120 VAC, 50/60 Hz, single-phase power supply
Control power supply: 100 to 120 VAC, 50/60 Hz, single-phase power supply
NCR-HE2101*-A-*** to NCR-HE2801*-A-***
Main power supply: 200 to 240 VAC, 50/60 Hz, single-/3-phase power supply
Control power supply: 200 to 240 VAC, 50/60 Hz, single-phase power supply
NCR-HE2152*-A-*** to NCR-HE2153*-A-***
Main power supply: 200 to 240 VAC, 50/60 Hz, 3-phase power supply
Control power supply: 200 to 240 VAC, 50/60 Hz, single-phase power supply

a. For accident and fire prevention, install a circuit breaker for wiring or fuse that is absolutely suitable for the line breaking capacity. When using an earth leakage circuit breaker, select a model that employs high-frequency measures for inverters.

b. Because the main circuit of this device is of the capacitor input type, large inrush current flows at the time of power-on. Therefore, a voltage drop can be induced depending on the power capacity and the power supply impedance. Allow enough spare or ample room when choosing the power capacity and the electric wire.

c. Be very careful not to connect the motor connecting terminal (U, V, W, E) of this device to the main power supply (R, S, T, E) erroneously.

d. When the power supply capacity exceeds 500 KVA, connect a reactor to coordinate power supply.
(For the reactor, contact our sales representative.)

⚠Caution
Be very careful not to connect the motor connecting terminal (U, V, W, E) of this device to the main power supply (R, S, T, E) erroneously. Otherwise, the device may be damaged.

2-4-2 Power supply circuit

Representative power supply circuits are shown in Figure 2-8 and Figure 2-9.

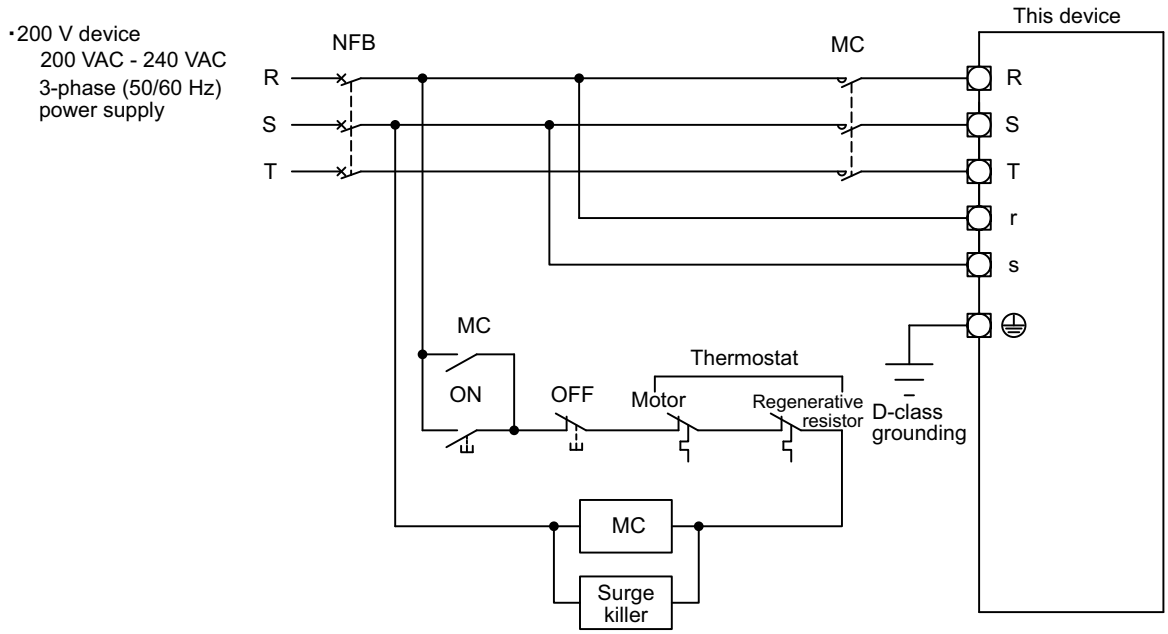


Figure 2-8 Typical power supply circuit for 3-phase power supply

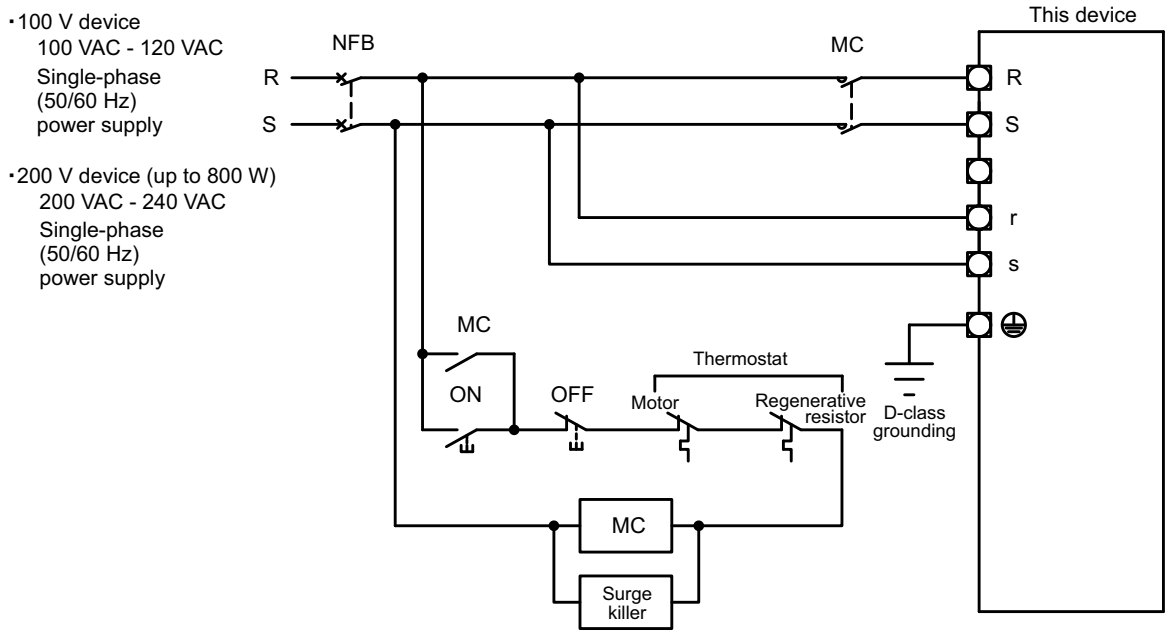


Figure 2-9 Typical power supply circuit for single-phase power supply

⚠Caution
• Never use by turning on the main power supply only. Device can be broken. • Be sure to strictly keep the range of specifications for the power supply. Device can be broken. • Install the circuit breaker for wiring, for power supply line protection and for fire and accident prevention. • For information about the breaker capacity, refer to "13-1-5 Device electrical specification". • When using the magnet contact, be sure to install the surge killer. • Prepare special power supply for the device apart from the power supply for other high-power equipment when possible.

2-4-3 Power-on sequence

a. Avoid turning power ON/OFF repeatedly since the main circuit of the device is condenser input type, and it may cause the deterioration of main circuit element.

b. Turn on the control power supply before turning on the main power supply or at the same timing, and turn off the control power supply after turning off the main power supply or at the same timing.

The figure below shows a timing chart. For information about brake output timing charts, refer to "Chapter 9 Parameters".

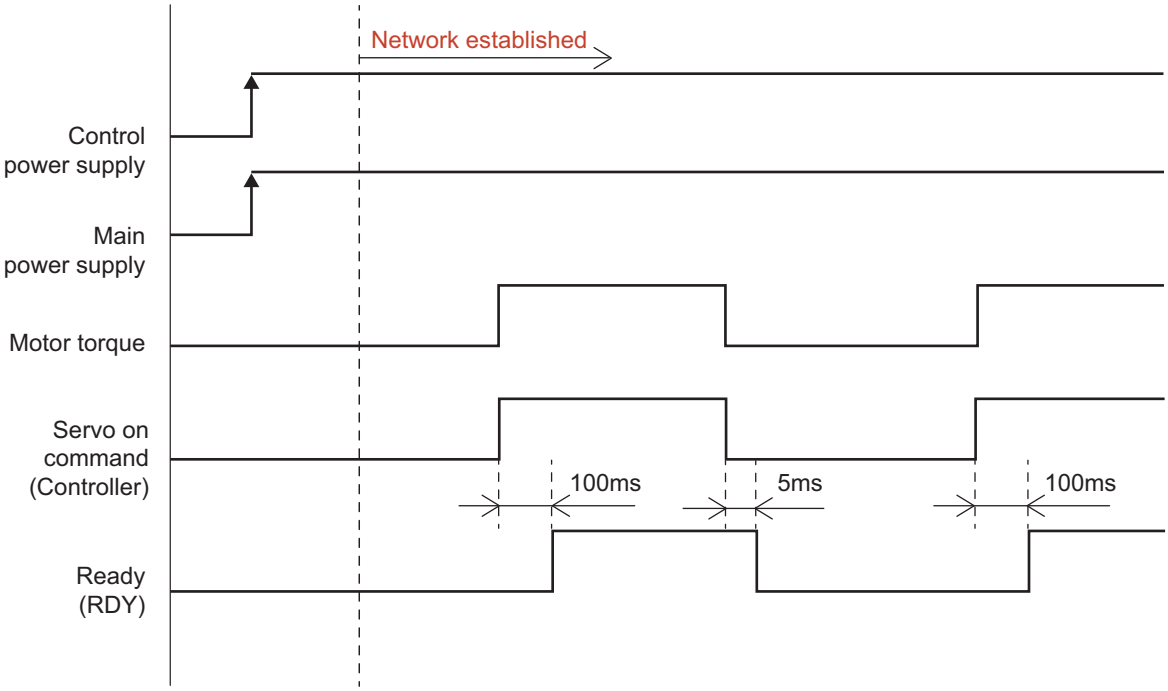


Figure 2-10 Timing chart

2-4-4 Selecting a circuit breaker for wiring and an earth leakage circuit breaker

a. For short circuit protection in the event of device failure, select an appropriate breaker that has the rated breaking capacity suitable for the power capacity. For information about the breaker capacity per device, refer to "13-1-5 Device electrical specification".

b. When using an earth leakage circuit breaker, because the inverter block of the device is PWM controlled, its output contains harmonic components. Due to the electrostatic capacitance against the ground in the electric line from the device to the motor and the floating capacitance between the winding wire and the iron core in the motor, leakage current is generated. Thus, an earth leakage circuit breaker of the inverter applicable type should be selected. A zero-phase reactor can be connected to the motor power supply line to suppress the leakage current.

⚠ Caution
• The device may not function properly when the power is turned on immediately after power-off. • If the over current or overload protection has been activated, remove the cause of error, leave it for about 30 minutes for cooling, then restart the device. Repeated reset operation in a short period of time increases the device temperature abnormally, which leads to the device breakages. • Make sure that the sequence control is such that it stops the command upon the alarm occurrence (output) due to the activation of the protective function. Make sure also that the sequence control is not such that when the power supply is restored after the occurrence of an electricity failure (or a sudden stop), commands (such as speed command voltage) are input so that the motor immediately runs.

2-5 Motor connection

2-5-1 Motor wiring

a. Connect correctly without fail in the phase sequence of the connecting terminal (U, V, W, and E) of the motor and connecting terminal (U, V, W, and E) of this device. (Connect U to U, V to V, and W to W respectively). Connection in the wrong phase sequence disables normal operation, the motor can vibrate, and the motor can also run regardless of the input command, which is very dangerous.

b. On the motor-device wiring, do not connect a magnet switch or a circuit breaker for wiring.

c. When using a motor with a brake, be sure to release the brake before operating the motor. If the motor is operated without releasing the brake, the motor may be burned out. Thus, pay attention to the timing, referring to "Figure 2-10　Timing chart".

d. Kits containing a motor power supply cable and connectors are available as our options. In addition, shielded cables and zero-phase reactors are also available as noise protection measures.

e. For devices with a rated output of 800 W or less, the supplied plug connector is used for wiring. For details of the wiring procedure, refer to "2-11-1 Wiring procedure".

2-6 Grounding

a. Be sure to ground for electric shock prevention and noise protection measures.

b. Use a wire for grounding which has a conductor cross-sectional area greater than or equal to that described in "2-10 Applicable electric wires".

c. Connect grounding wire to grounding terminal (E) of the device.

d. Use exclusive grounding. If common grounding is used, be sure to apply one-point grounding.

e. Be sure to connect the motor grounding wire to the grounding terminal (E) of the device.

⚠Caution
• To decrease common mode noise and to prevent erroneous run of the device, grounding should be the exclusive grounding and better than D-class grounding (grounding resistance 100 Ω or less). • If exclusive grounding is impossible, secure one-point common grounding to commonly ground with other equipment at the grounding spot. • Be sure to avoid common grounding with high-power equipment and grounding to steel frames. • Carefully wire not to loop the grounding wire. Failure in this can increase leakage current of the device and activate the earth leakage circuit breaker.

2-7 Regenerative resistor connection

a. Use the regenerative resistor supplied as an option, unless otherwise specified.

b. The regenerative resistor is used to consume excessive energy that the capacitor in the device cannot absorb, among regenerative energy generated by motor braking when load inertia (GD2) is large.

c. Since heat is generated by regenerative energy, locate the regenerative resistor not to influence other equipment.

d. The thermostat is supplied with a regenerative resistor. The contact of the thermostat operates (is opened) when the regenerative resistor gets overheated. Carry out wiring so that the main power supply is shut down when the contact operates. In the contact specifications of the thermostat, the contact current is 15 A at 100 VAC or 10 A at 200 VAC. When mounting the thermostat, refer to the figure below.

e. The cable length between the regenerative resistor and device shall be up to 3 m or as short as possible. As the cable is longer, surge voltage generated by power element switching becomes higher, and the device could be damaged.

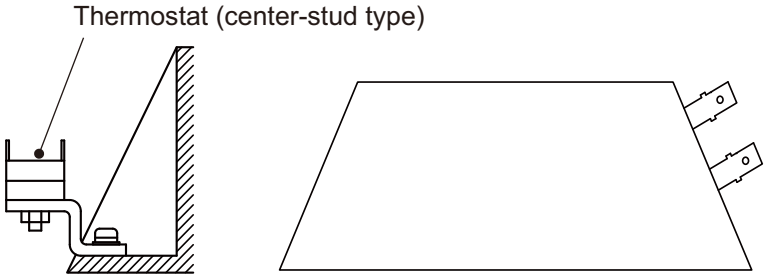


Figure 2-11 Mounting a thermostat on a cement resistor

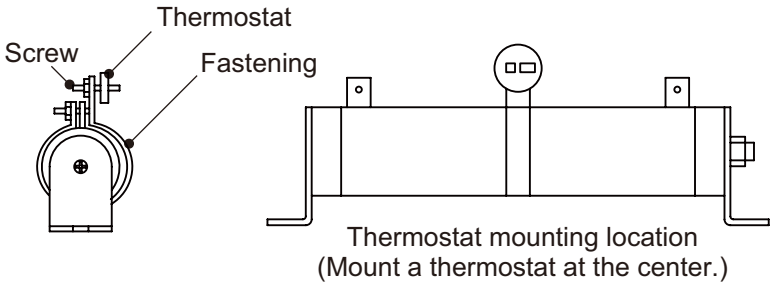


Figure 2-12 Mounting a thermostat on a vitreous enamel resistor

⚠Caution
If abnormally high current flows in a regenerative resistor, the resistor becomes hot in a short time and quite dangerous. Be sure to construct a circuit to shut down the main power supply using the contact of the thermostat.

2-8 Control circuit wiring

a. Encoder feedback pulse signal

- Using shielded twisted pair cable, be sure to connect the shield to the metal connector (FG) of connector CN2.
- For the purpose of movement of motor itself, keep the bending radius of motor as big as possible so as not to give stress.
- The maximum cable length differs depending on the combination of motor. Exclusive encoder cable sets are available as options. Contact our sales representative for details.

b. Control input and output signal

- When using relays and switches for control input/output signals, use an element for micro current.
- To prevent erroneous run due to noises, be sure to install surge killers and diode to relays, magnet switches, solenoid brakes, and solenoids, that are used around the device and suppress noise generation.
- Prepare the power supply +V (+12 V, 2.5 mA to +24 V, 5 mA/1 item) for control input signals by yourself.
- Keep the length of the cable within 3 m.

2-9 Noise protection

There are two intrusion routes for the incoming noise; one is "power supply line" and the other is "signal line". Incoming noise can cause erroneous run, which induces troubles. To prevent troubles by noises, it is important to suppress noise generation and not to lead generated noises.
Be sure to carry out the following countermeasures and preventive treatments.

a. Be sure to attach surge killers (for AC power supply) and diodes (for DC power supply) to the relay, magnet switch, solenoid brake, and solenoid that are used around the device, and suppress noise generation.

b. If a noise source such as electric welding machines and electric discharge machines exists close to the power supply line, and it makes the high noise environment, install noise filters or noise cut transformers on the main power supply and control power supply of the device to carry out noise protection measures on the power supply line.

c. When using noise filters, be sure to separate input wiring and output wiring of the filter and never bundle all wires together. Harness the grounding wire of filter separately from the filter output wire and be sure to carry out wiring (grounding) in the shortest distance.

d. This device switching controls the motor at the high speed. For this reason, generated switching noise can affect other equipment. In this case, install noise filters or common mode choke coils to the main power supply of the device to prevent round-about noises to the power supply. Furthermore, carry out countermeasures against radiation noises by housing power supply lines and motor lines into an iron-made pipe.

⚠Caution
• For control input/output signals wiring, use specified type of cable with the specified conductor cross-sectional area, and strictly follow precautions in wiring. No countermeasures may result in unexpected erroneous run due to noises and is very dangerous. • Separate wiring of control input/output signals from power line (power supply line, motor line, etc.), and never put them into the same duct and avoid all-in-one wire bundling.

2-10 Applicable electric wires

Use electric wires shown in Table 2-3 to Table 2-6.
As for cables for control circuit, use optional items.

Table 2-3 Applicable electric wires

Control circuit	Terminal	Conditions
Encoder pulse output	EA/EA*, EB/EB*, EM/EM*, GND	• Shielded twisted pair cable of AWG28 (0.08 mm^2) to AWG24 (0.2 mm^2) • Length: 3 m or less (for GND, AWG20 (0.5 mm^2))
Encoder feed Back pulse input	A/A*,B/B*, Z/Z* (EP5,GND)	90 deg phase contrast pulse encoder • Shielded twisted pair cable of AWG24 (0.2 mm^2) • For EP5 and GND, AWG20 (0.5 mm^2)*1 • Length: 30 m or less*2
	SD/SD* (EP5,GND)	Serial encoder • Shielded twisted pair cable of AWG24 (0.2 mm^2) • For EP5 and GND, AWG20 (0.5 mm^2)*1 • Length: 30 m or less
Magnetic pole sensor input	HA/HA*, HB/HB*, HC/HC*, (EP5,GND)	• Shielded twisted pair cable of AWG24 (0.2 mm^2) • For EP5 and GND, AWG20 (0.5 mm^2) or more*1 • Length: 30 m or less
Other control input/output		• Shielded cable of AWG28 (0.08 mm^2) to AWG24 (0.2 mm^2) • Length: 3 m or less

Electric wire diameter on Table 2-3 is decided based on PVC shielded twisted pair cable under the following conditions.

PVC shielded twisted pair cable: Rated 300 V, 80 ℃ , maximum ambient temperature: 40 ℃
Wiring conditions: air wiring, single string

*1 Wire diameter of EP5 and GND of the encoder feedback pulse input and the magnetic pole sensor differs depending on the encoder and the length of cable to combine. Thus, for details, contact our sales representative.

*2 If using a cable exceeding 20 m, contact our sales representative.

⚠Caution

- Wire type and wire diameter can differ depending on use conditions and environment. For details, contact our sales representative.
- If control signal wire is long, it becomes easy to receive the influence of noises. Thus, wire within the stipulated length.
- As for cable type, be sure to use the stipulated type.

Table 2-4 Applicable electric wire 100 VAC specification

Unit: AWG (mm^2)

Main circuit	Terminal	NCR-HE1051*-A-***	NCR-HE1101*-A-***	NCR-HE1201*-A-***		
Main power supply, grounding	R,S,E	14 (2)	14 (2)	14 (2)		
Control power supply	r,s	18 (0.75)	18 (0.75)	18 (0.75)		
Motor power supply	U,V,W	14 (2)	14 (2)	14 (2)		
Regenerative resistor	B1/P,B2	18 (0.75)	18 (0.75)	18 (0.75)		

Table 2-5 Applicable electric wire 200 VAC specification (800 W or less)

Unit: AWG (mm^2)

Main circuit	Terminal	NCR-HE2101*-A-***	NCR-HE2201*-A-***	NCR-HE2401*-A-***	NCR-HE2801*-A-***	
Main power supply, grounding	R,S,T,E	14 (2)	14 (2)	14 (2)	14 (2)	
Control power supply	r,s	18 (0.75)	18 (0.75)	18 (0.75)	18 (0.75)	
Motor power supply	U,V,W	14 (2)	14 (2)	14 (2)	14 (2)	
Regenerative resistor	B1/P,B2	18 (0.75)	18 (0.75)	18 (0.75)	18 (0.75)	

Table 2-6 Applicable electric wire 200 VAC specification (1.5 kW or more)

Unit: AWG (mm^2)

Main circuit	Terminal	NCR-HE2152*-A-***	NCR-HE2222*-A-***	NCR-HE2332*-A-***	NCR-HE2702*-A-***	NCR-HE2153*-A-***
Main power supply, grounding	R,S,T,E	14 (2)	12 (3.5)	10 (5.5)	6 (14)	6 (14)*
Control power supply	r,s	18 (0.75)	18 (0.75)	18 (0.75)	18 (0.75)	18 (0.75)
Motor power supply	U,V,W	14 (2)	12 (3.5)	10 (5.5)	6 (14)	6 (14)*
Regenerative resistor	B1,B2	18 (0.75)	18 (0.75)	18 (0.75)	10 (5.5)	8 (8)

* 4 (22) if UL-approved.

a. Electric wire diameter on Table 2-4 to Table 2-6 is decided based on vinyl insulation electric wire (KIV electric wire) for electric equipment under the following conditions.

- KIV electric wire: Rated 600 V, 60℃, operating temperature: 40℃, wiring condition: air, 3-string (interval s = d) wiring

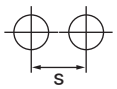
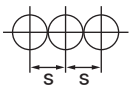
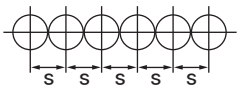
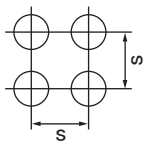
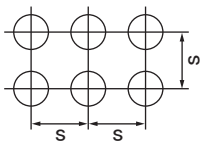
b. Permissible current of electric wire differs depending on use conditions (operating temperature, wiring conditions, etc.), trunking, insulation, and maker. Thus, choose appropriate electric wire diameter depending on use environment and conditions.

c. In the case of calculating the permissible current by changing operating temperature and wiring conditions to be used, the calculation should be performed by multiplying with the permissible current reduction coefficient and permissible current compensatory coefficient according to the objective temperature and conditions. Permissible current reduction coefficient (when cable permissible maximum temperature is 60 ℃) when operating temperature is higher than 30 ℃ .

Permissible current reduction coefficient = $\sqrt{(60-\theta)/30}$

(θ = Operating temperature θ < 60)

Table 2-7 Permissible current compensatory coefficients when wiring plural cables in air

Number of strings		1	2	3	6	4	6
Alignment							
Central interval	s=d	1.00	0.85	0.80	0.70	0.70	0.60
	s=2d		0.95	0.95	0.90	0.90	0.90
	s=3d		1.00	1.00	0.95	0.95	0.95

2-11 Wiring to power supply block

For devices with a rated output of 800 W or less, the supplied plug connector is used for wiring to the main power supply block and the control power supply block.

2-11-1 Wiring procedure

1. Strip 9 to 10 mm of the coating of the application electric wire.
For details of the size of the application electric wire, refer to "2-10 Applicable electric wires".

2. Open the electric wire insertion block of the plug connector, using the supplied open tool.
For insertion, disconnect the plug connector from the device, then start work.

3. With the electric wire insertion block still open, insert the electric wire.
After insertion, remove the open tool to secure the electric wire.
(Be sure to check that the electric wire is connected tightly.)

4. Mount the plug connector to the device.
(Check that wiring is conducted according to the signals printed on the device.)

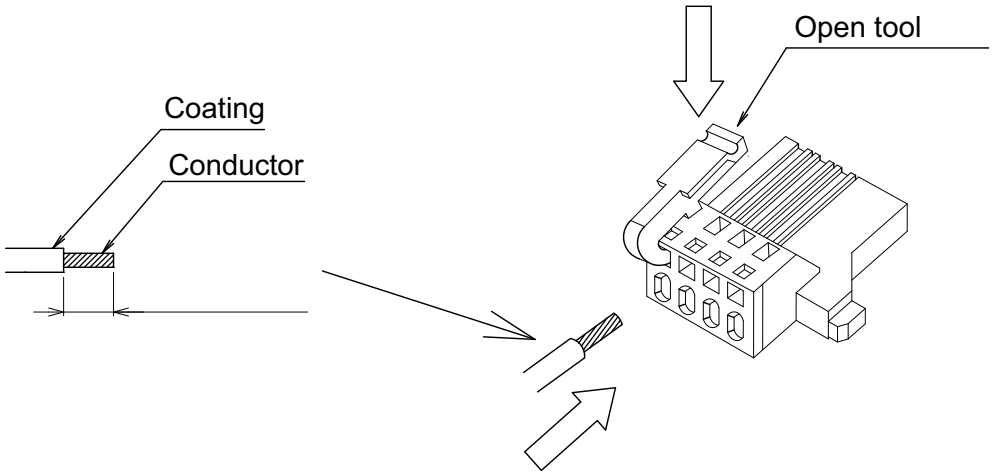


Figure 2-13 Plug connector wiring diagram

Chapter 3 Signal connection

3-1 External wiring diagram

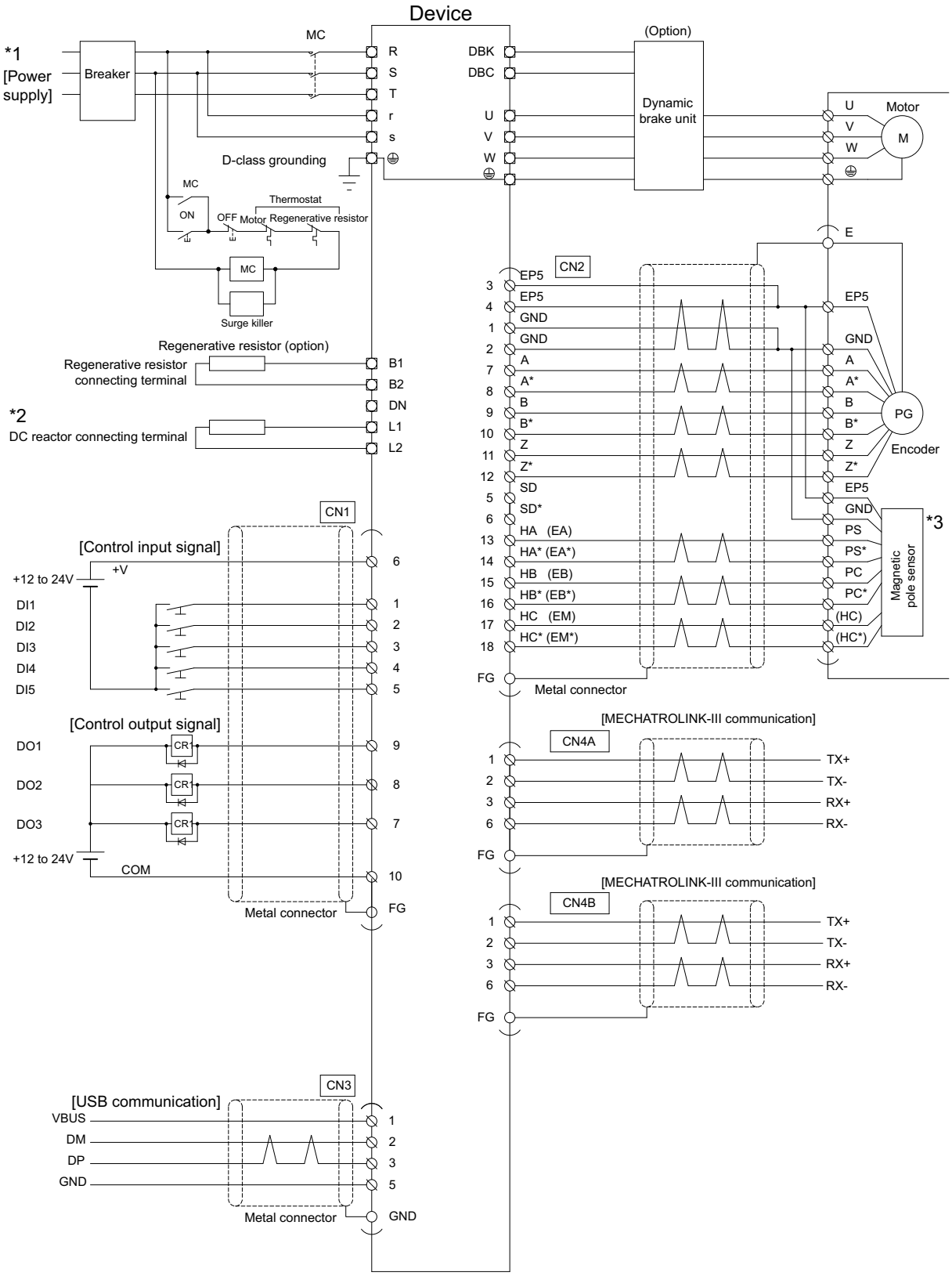


Figure 3-1 External wiring diagram

*1:For details of connecting the power supply, refer to "2-4-2 Power supply circuit".

*2:The DC reactor terminal is available to a model with an output capacity of at least 1.5 kW.

*3:Wiring is required when using the magnetic pole sensor.

According to the parameter setting, can be used as an encoder pulse output.

Note 1: The statuses of the switches connected to control input signals show the OFF statuses of the individual input signals.

Note 2: For information about the connection between motor and encoder, refer to the instruction manual of each motor.

Note 3: A pin not mentioned in this wiring diagram is NC.

Note 4: For a control input/output signal name, the value in parentheses is the initial value of the parameter.

Note 5: When wishing to use a DC reactor with a device capacity of 1.5 kW to 3.3 kW, prepare it by yourself. Options are available for a device capacity of 1.5 kW or more.
[Recommended specification (device capacity: 1.5 kW to 3.3 kW)]
Rated current: 18 A or more
Inductance: 3 mH or less
(For details, contact our sales representative.)

Note 6: When a serial encoder is used, make a connection, referring to "Figure 3-2 Serial encoder connecting diagram".

Note 7: In the maintenance mode, all control input signals can be allocated.

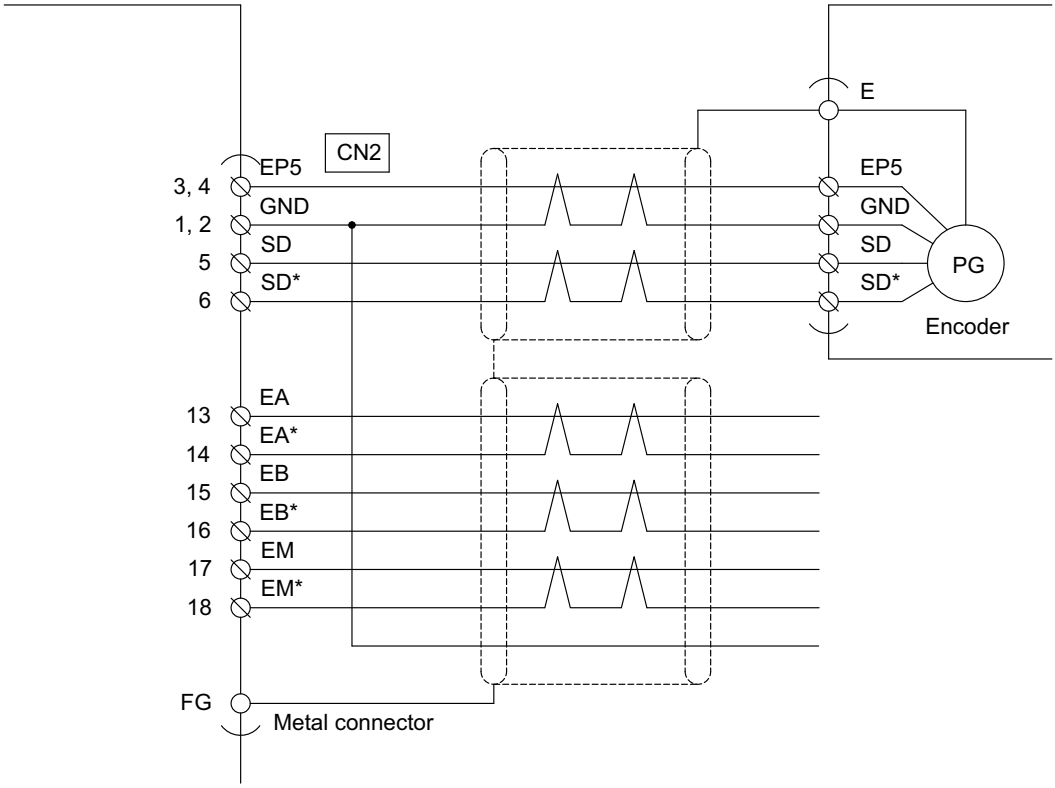


Figure 3-2 Serial encoder connecting diagram

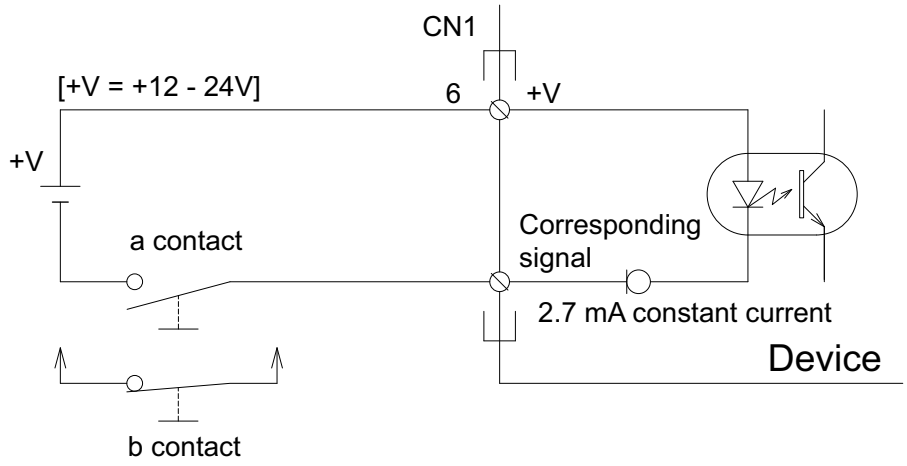
3-2 Input/output interface

The types and equivalent circuits of input/output signals are shown below.

Circuit No. I-1: DI1 to 5 control input signals

Connector No. CN1

a. Equivalent circuit



b. Electrical specifications

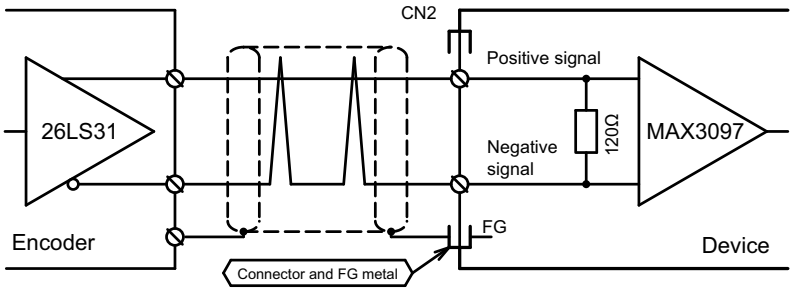
Item	Description
Insulation method	Photo coupler insulation
Operating voltage range	10.2 to 26.4 VDC
Ripple ratio	Within 5%
Rated input current	12 VDC: About 2.5 mA
	24 VDC: About 5.0 mA
Rated input current	2.7 mA
Input filter time constant	About 120 μs

- As a contact element, use micro current on/off relay or open collector output transistor.
- This signal becomes valid after input for at least 1 ms.
- The type of each input signal is shown in "3-4-3 Control input and output signal list".

Circuit No. I-2: A, A*, B, B*, Z, and Z* encoder feedback pulse inputs

Connector No. CN2

a. Equivalent circuit

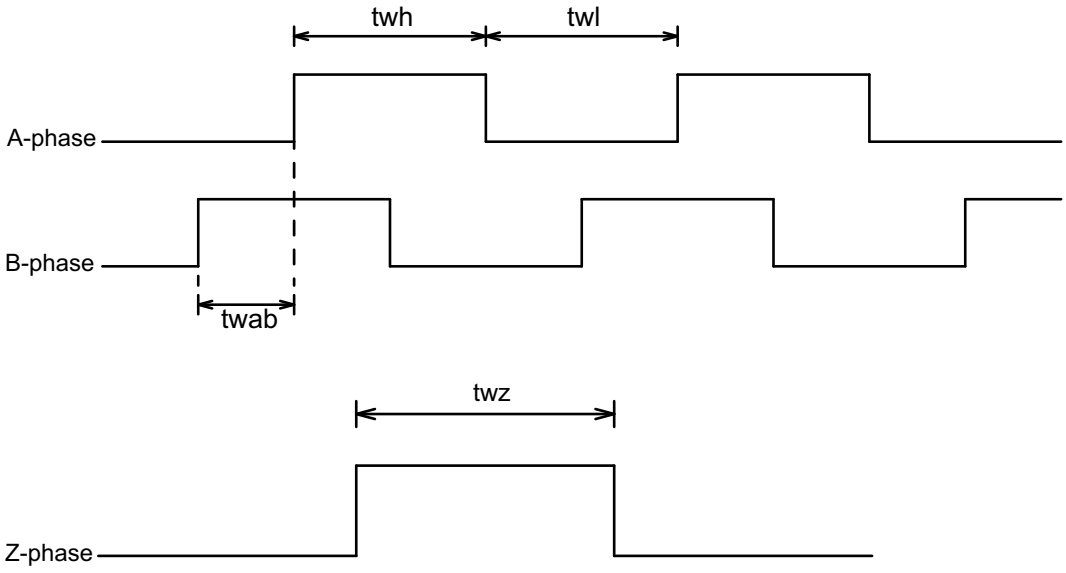


	Positive signal	Negative signal
A-phase	A	A*
B-phase	B	B*
Z-phase	Z	Z*

- Be sure that encoder feedback pulse is line driver (26LS31 equivalent) output.

b. Electrical specifications

- When attaching encoder in the forward direction, let B-phase go ahead of A-phase in motor forward direction operation.
- Minimum input pulse width [twh・twl] for A-phase and B-phase must be 80 ns or more.
- Minimum edge distance between A-phase and B-phase [twab] must be at least 40 ns.
- By changing [P066: Encoder input direction switching], the phase order can be switched.
- Minimum input pulse width [twz] of encoder marker signal (Z-phase) must be 500 ns or more.

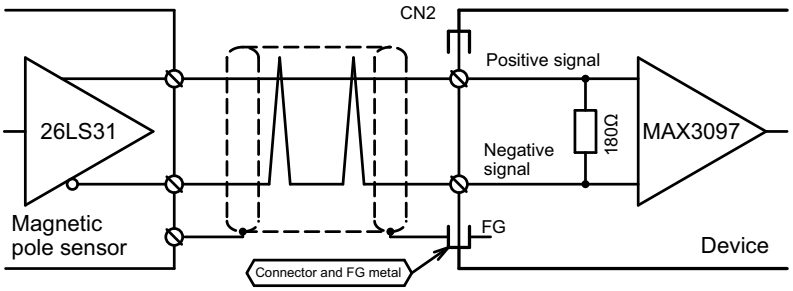


* In case of positive logic

Circuit No. I-3: HA, HA*, HB, and HB* magnetic pole sensors

Connector No. CN2

a. Equivalent circuit



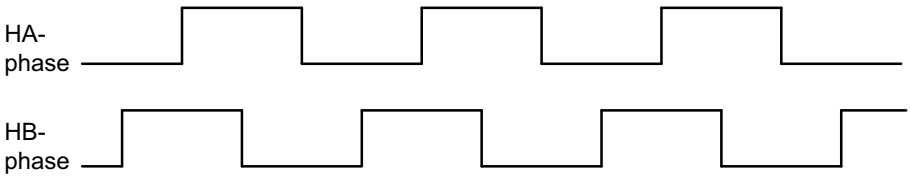
	Positive signal	Negative signal
HA-phase	HA	HA*
HB-phase	HB	HB*

b. Electrical specifications

Item	Description
Maximum input frequency	25 Mpps (4-multiplication)
Input method	Line receiver

- When attaching the magnetic pole sensor in the forward direction, let HB-phase go ahead of HA-phase in motor forward direction operation.

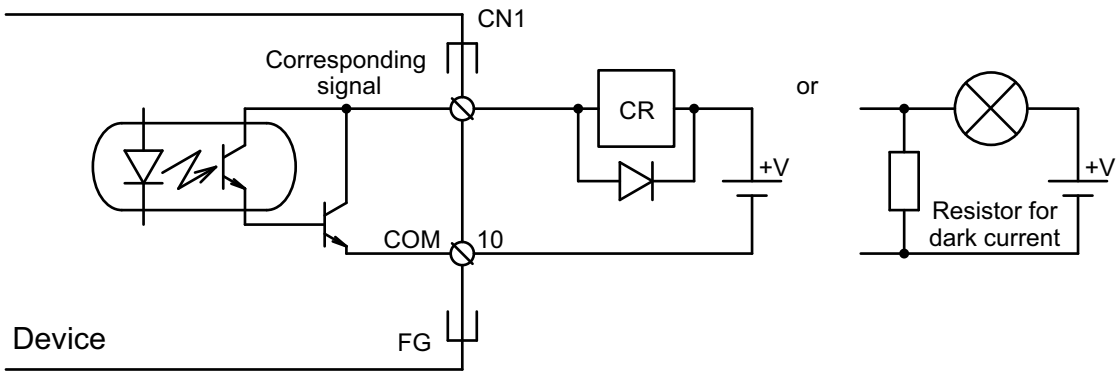
- 2-phase magnetic pole



Circuit No. O-1: DO1 to 3 control output signals

Connector No. CN1

a. Equivalent circuit



- When connecting inductive load such as relay, be sure to insert diode in parallel to the load.
- In the case of lamp load, insert resistor for dark current and use the circuit within the rated current including inrush current.
- Since photo coupler (PS2733 equivalent) is used in the output circuit, please consider the switching time by receipt circuit.

b. Electrical specifications

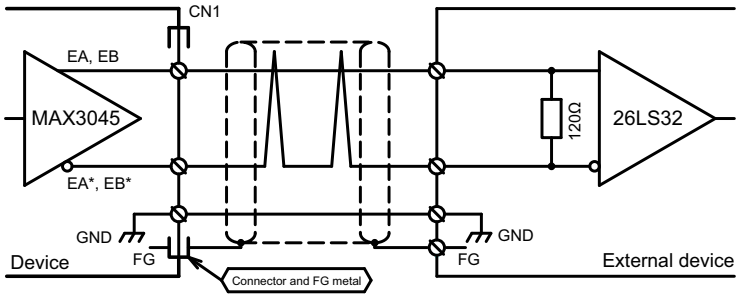
Item	Description
Insulation method	Photo coupler insulation
Maximum load voltage	30 VDC
Maximum load current	50 mA/1-point
Leak current	0.1 mA
Saturation voltage	1.0 V or less

- When conducted COM terminals, it becomes ON.
- When released COM terminals, it becomes OFF.
- The type of each output signal is shown in "3-4-3 Control input and output signal list".

Circuit No. O-2: EA, EA*, EB, and EB* encoder pulse outputs

Connector No. CN2

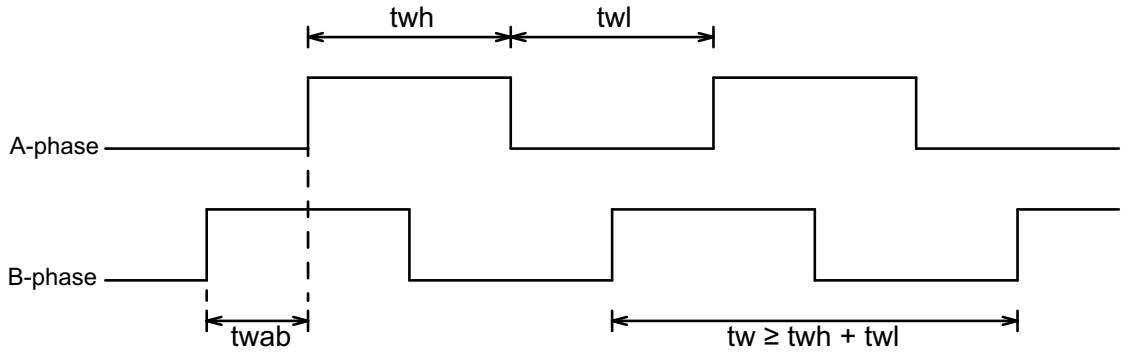
a. Equivalent circuit



- A line driver (equivalent to 26LS31) is used for output. Thus, provide an interface using a line receiver (equivalent to 26LS32).
- The terminating resistance on the receiving side must be 120 Ω (1/2 W or more).
- When the motor is operating in the forward direction, the B-phase is output before the A-phase. The phase relationship between A-phase and B-phase always match the operation direction of the motor, not influenced by the operating direction setting with the parameter.
- For up to two seconds after power ON, it is indefinite.

b. Electrical specifications

Output method	Hardware frequency dividing output, software control output	
Minimum output pulse width	$t_{wh,}$ t_{wl}	75 ns
Minimum edge distance	t_{wab}	37.5 ns



When [P140 (4th digit): Pulse output effective selection] is set to [1: Effective], these encoder pulse outputs function.
With a combination of [P060: Encoder type] and [P140: Pulse output selection], the frequency dividing output method is determined. For details of parameters, refer to the relevant parameter No. in "Chapter 9 Parameters".

1. Hardware fixed frequency dividing output
   With [P060], the "Frequency output by hardware" encoder is selected.
   With [P140], one of "0: 1/1 dividing output" to "5: 1/32 dividing output" is selected.

2. Software control output (fixed frequency division)
   With [P060], the "Frequency output by software" encoder is selected.
   With [P140], one of "0: 1/1 dividing output" to "5: 1/32 dividing output" is selected.
3. Software control output (free frequency division)
   With [P060], either "Frequency output by hardware" or "Frequency output by software" encoder is selected.
   With [P140], either "6: P141/P142 dividing output" or "7: P141/P142 dividing output After ABS pos comp. pulse output" is selected.

The specifications of the frequency dividing output method are listed below.

1. Hardware fixed frequency dividing output

Input/output frequency division ratio	1/1	1/2	1/4	1/8	1/16	1/32
Minimum edge distance [ns]	37.5	75	150	300	600	1200
Minimum sampling frequency [MHz]	26.67	13.34	6.67	3.34	1.67	0.84
Encoder pulse output maximum delay to encoder pulse input [ns]	190	215	240	265	290	315

2. Software control output (fixed frequency division)

Input/output frequency division ratio	1/1	1/2	1/4	1/8	1/16	1/32
Maximum number of output pulses (Multiplication by 4) [Mpps]	16.36	8.17	4.08	2.03	1.00	0.49
Minimum edge distance [ns]	50.0	112.5	225.0	462.5	937.5	1875
Minimum sampling frequency [MHz]	20.00	8.89	4.45	2.17	1.07	0.54
Encoder pulse output maximum delay to encoder feedback input signal [µs]	150					

* Software control fixed frequency dividing output is a function for outputting by setting the number of pulses with the fixed period in the device, and the output waveform is not necessarily that of a Duty 50% signal, and the edge distance is not constant. Thus, there occurs a difference between the maximum number of output pulses and the minimum sampling frequency.

* Select an optimum frequency division ratio under the following conditions.

- Maximum number of output pulses for actual use × Input/output frequency division ratio < Minimum sampling frequency < External device sampling frequency
- Maximum number of output pulses for actual use [pps] = Maximum speed for actual use [rps] × Resolution of encoder used [ppr]

[If maximum speed for actual use: 4.5 [rps], resolution of encoder used: 2,097,152 [ppr]]

Maximum number of output pulses for actual use = 4.5 × 2,097,152 ≒ 9.44 [Mpps]

If the output waveform is sampled with an external device with a sampling frequency of 4 [MHz], from the above conditions

Minimum sampling frequency < External device sampling frequency
2.58 [MHz] < 4 [MHz]

Thus, the frequency division ratio 1/8 with a minimum sampling frequency of 2.58 [MHz] is used.
9.44 [Mpps] / 8 ＝ 1.18 [Mpps] < 2.58 [MHz] < 4 [MHz]

Thus, the optimum frequency division ratio that meets the selection conditions is 1/8 frequency division.

3. Software control output (free frequency division)

Input/output frequency division ratio	1/1	1/2	1/4	1/8	1/16	1/32
Minimum sampling frequency rank [MHz]	20.00	8.89	4.45	2.17	1.07	0.54
Encoder pulse output maximum delay to encoder feedback input signal [μs]	With 100: [P060], the "Frequency output by hardware" encoder is selected. With 150: [P060], the "Frequency output by software" encoder is selected.					

* Free frequency dividing output is a function for outputting by setting the number of pulses with the fixed period in the device, and the signal waveform is not necessarily that of a Duty 50% signal, and the edge distance is not constant.
* Select an optimum parameter under the following conditions.

- Maximum number of output pulses for actual use × (P141: Pulse output selection dividing numerator/P142: Pulse output selection dividing denominator)
  < Minimum sampling frequency rank < External sampling frequency
- Maximum number of output pulses for actual use [pps] =
  Maximum speed for actual use [rps] × Resolution of encoder used [ppr]

[If maximum speed for actual use: 6 [rps], resolution of encoder used: 3,360,000 [ppr]]

Maximum number of output pulses for actual use = 6 × 3,360,000 = 20.16 [Mpps]

If the output waveform is sampled with an external device with a sampling frequency of 4 [MHz], from the above conditions

Minimum sampling frequency rank < External sampling frequency
2.58 [MHz] < 4 [MHz]

Thus,
20.16 [Mpps] × (P141/P142) < 2.58 [MHz] < 4 [MHz]

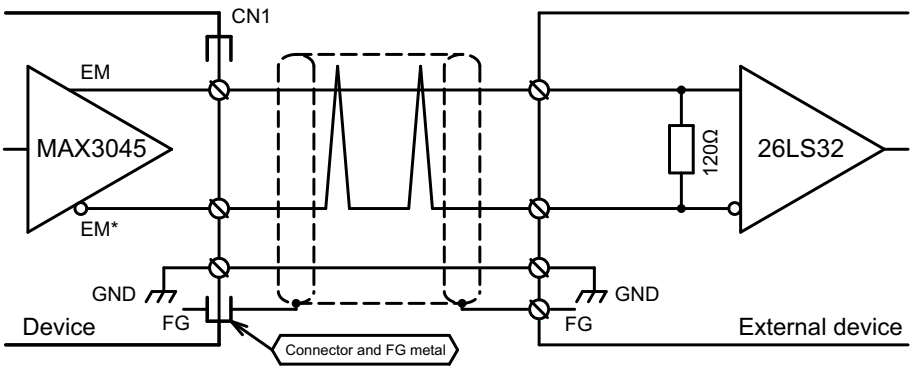
Parameters P141 and P142 that meet the above need to be selected.
([Examples] P141: 257 and P142: 2016)

- This results in a signal synchronized with the operating frequency inside the device.
- Depending on the length and the floating capacitance of the cable used, the output pulse width and the edge distance input to the external device may be shortened. Thus, perform a check before use.

Circuit No. O-3: EM and EM* encoder marker outputs

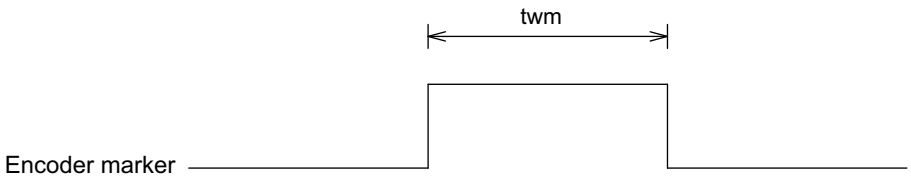
Connector No. CN1

a. Equivalent circuit



- A line driver (equivalent to 26LS31) is used for output. Thus, provide an interface using a line receiver (equivalent to 26LS32).
- The terminating resistance on the receiving side must be 120 Ω (1/2 W or more).
- For up to two seconds after power ON, it is indefinite.

b. Electrical specifications



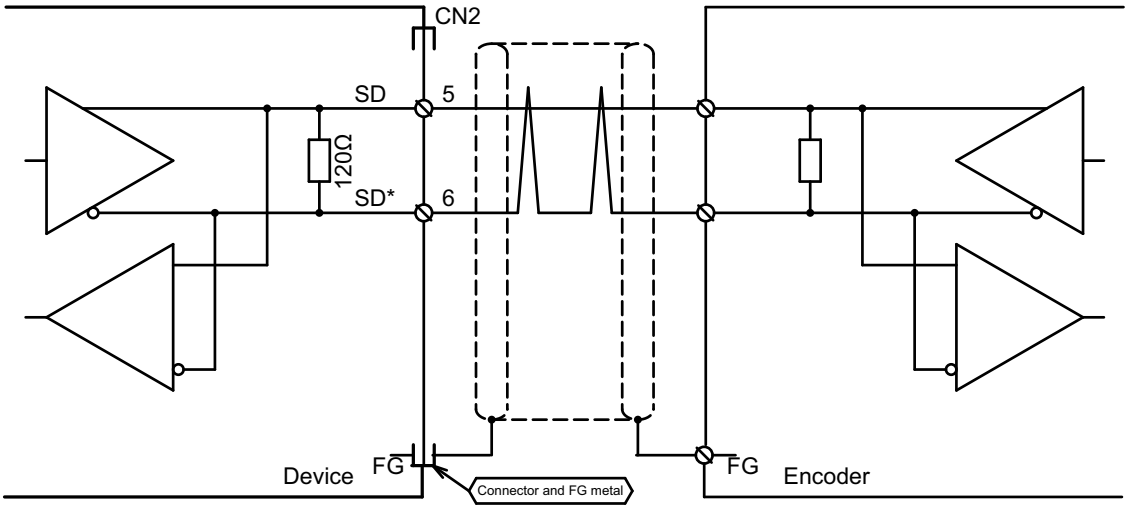
With a combination of [P060: Encoder type] and [P140: Marker output width], the marker output method and the output width twm are determined. With [P143: Marker output position], the marker output position is set. For details of parameters, refer to the relevant parameter No. in "Chapter 9 Parameters".

- This results in a signal synchronized with the operating frequency inside the device.
- Depending on the length and the floating capacitance of the cable used, the output pulse width and the edge distance input to the external device may be shortened. Thus, perform a check before use.

Circuit No. IO-1: SD and SD* serial encoder data inputs/outputs

Connector No. CN2

a. Equivalent circuit



b. Electrical specifications

- When a serial encoder is connected, serial data is processed in the half-duplex mode.
- By changing [P066: Encoder input direction switching], the phase order can be switched.

Circuit No. IO-2: USB communication

Connector No. CN3

a. Electrical specifications

- This circuit is provided for communication with a PC.
- Communication is possible based on USB2.0 (FULL SPEED).

3-3 Connector pin alignment

3-3-1 Control input/output connector CN1

a. Connector specification

Connector to be used (receptacle): MUF-RS10DK-GKXR (J.S.T. Mfg.) or equivalent

Applicable cable side connector (soldered plug): MUF-PK10K-X (J.S.T. Mfg.) or equivalent

b. Pin alignment

The figure below is the connector alignment of the main unit side viewed from the connecting block.

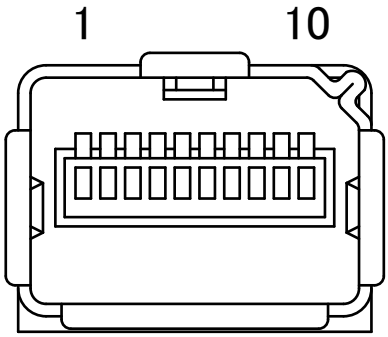


Table 3-1 Control input/output connector pin alignment

No.	Signal code	Signal name	No.	Signal code	Signal name
1	DI1	Control input signal 1 (ENG*)	6	+V	External power supply (+12 VDC to +24 VDC)
2	DI2	Control input signal 2 (FOT*)	7	DO3	Control output signal 3 (PN1)
3	DI3	Control input signal 3 (ROT*)	8	DO2	Control output signal 2 (ALM*)
4	DI4	Control input signal 4 (ZLS)	9	DO1	Control output signal 1 (BRK)
5	DI5	Control input signal 5 (EXT1)	10	COM	External power supply common

* For the control output signals DO1 to DO3 and the control input signals DI1 to DI5, the values in parentheses are initial setting values due to parameters.
An asterisk "*" indicates a negative logic signal.

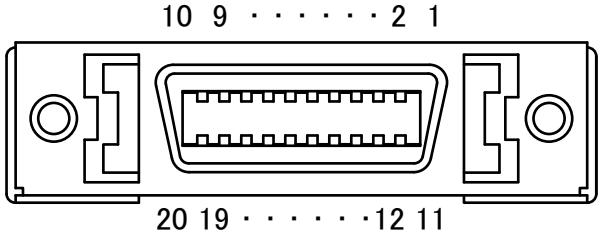
3-3-2 Encoder feedback pulse input connector CN2

a. Connector specification

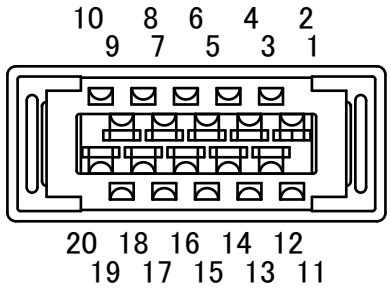
Connector to be used (receptacle): 10220-52A2PL (3M) or equivalent
Applicable cable side connector (soldered plug): 10120-3000PE (3M) or equivalent
Applicable cable side connector (shell): 10320-52A0-008 (3M) or equivalent

b. Pin alignment

The figure below is the connector alignment of the main unit side viewed from the connecting block.



The figure below is the connector alignment of the cable side viewed from the soldering terminal side.



For pins 13 to 18, one of the following specifications can be set with [P140(4th digit): Magnetic pole sensor signal pulse output selection].

- Magnetic pole sensor inputs (HA, HA*, HB, HB*, HC, and HC*)
- Encoder pulse outputs (EA, EA*, EB, and EB*) and marker outputs (EM and EM*)

Table 3-2 Encoder feedback pulse input

No.	Signal code	Signal name	No.	Signal code	Signal name
1	GND	Internal control power supply common	11	Z	Encoder marker signal input (positive pole)
2	GND	Internal control power supply common	12	Z*	Encoder marker signal input (negative pole)
3	EP5	Encoder power supply (+5 V)	13	HA/ EA	Magnetic pole sensor input/ Encoder pulse A-phase output (positive pole)
4	EP5	Encoder power supply (+5 V)	14	HA*/ EA*	Magnetic pole sensor input/ Encoder pulse A-phase output (negative pole)
5	SD	Communication data (positive pole)	15	HB/ EB	Magnetic pole sensor input/ Encoder pulse B-phase output (positive pole)

No.	Signal code	Signal name	No.	Signal code	Signal name
6	SD*	Communication data (negative pole)	16	HB*/ EB*	Magnetic pole sensor input/ Encoder pulse B-phase output (negative pole)
7	A	Encoder pulse A-phase input (positive pole)	17	HC/ EM	Magnetic pole sensor input/ Encoder marker output (positive pole)
8	A*	Encoder pulse A-phase input (negative pole)	18	HC*/ EM*	Magnetic pole sensor input/ Encoder marker output (negative pole)
9	B	Encoder pulse B-phase input (positive pole)	19	NC	Not connected (reserved)
10	B*	Encoder pulse B-phase input (negative pole)	20	NC	Not connected (reserved)

3-3-3 USB communication connector CN3

a. Connector specification

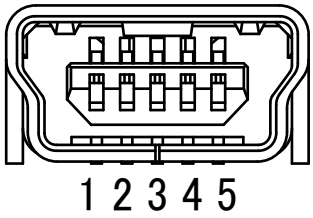
Connector to be used (receptacle):UB-M5BR-S14-4S (JST) or equivalent

Applicable cable: Commercially available USB cable

(host: A plug ⇔ device: Mini B plug)

b. Pin alignment

The figure below is the connector alignment of the main unit side viewed from the connecting block.



* We do not offer any USB cable as an option.

Table 3-3 USB communication

No.	Signal code	Signal name	No.	Signal code	Signal name
1	VBUS	USB power supply (+5 V)	4	NC	Not connected (reserved)
2	DM	Communication data (a pair with DP)	5	GND	Internal control power supply common
3	DP	Communication data (a pair with DM)			

3-3-4 MECHATROLINK-III communication connector CN4A, CN4B

a. Connector specification

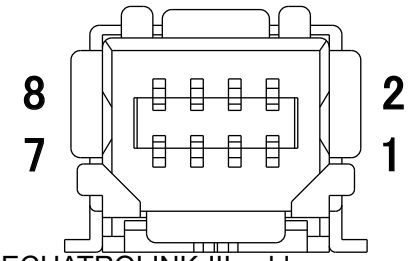
Connector to be used (receptacle):1981386-1 (Tyco Electronics) or equivalent

Applicable cable side connector (soldered plug):2040008-1 (Tyco Electronics) 2040008-1 or equivalent

Recommended cable:CAT5e or later

b. Pin alignment

Figure below is connector alignment of the main unit side observed from the connecting block.



* We do not prepare any MECHATROLINK-III cable as an option.
  Use a MECHATROLINK-III-compliant cable.

Table 3-4 MECHATROLINK-III communication

No.	Signal code	Signal name	No.	Signal code	Signal name
1	TX+	Transmitting data (a pair with TX-)	5	NC	Not connected (reserved)
2	TX-	Transmitting data (a pair with TX+)	6	RX-	Receiving data (a pair with RX+)
3	RX+	Receiving data (a pair with RX-)	7	NC	Not connected (reserved)
4	NC	Not connected (reserved)	8	NC	Not connected (reserved)

3-3-5 Power supply terminal TB1

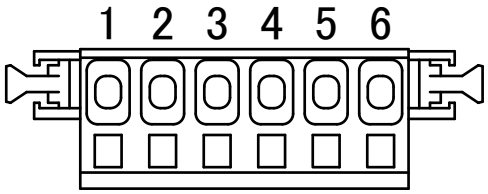
100 VAC specification: Use with 50 W, 100 W, and 200 W.
200 VAC specification: Use with 100 W, 200 W, 400 W, and 800 W.

a. Connector specification

Connector to be used (pin header): S06B-F32SK-GGXR (JST) or equivalent
Applicable cable side connector (plug): 06JFAT-SBXGF-I (JST) or equivalent (supplied with the device main unit)

b. Pin alignment

The figure below is the alignment when the plug is viewed from the cable insertion block.



Connect the grounding to the grounding terminal on the device cabinet.

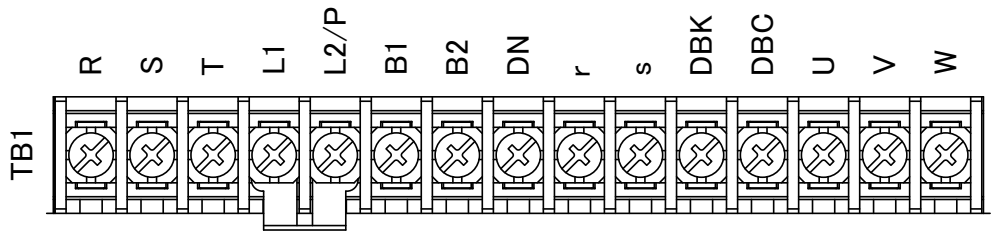
Table 3-5 Power supply terminal (TB1)

No.	Signal code	Signal name	No.	Signal code	Signal name
1	R	Main power supply R-phase (100 V/200 V)	4	B1/P	Regenerative resistor
2	S	Main power supply S-phase (100 V/200 V)	5	B2	Regenerative resistor
3	T	Main power supply T-phase (200 V)	6	DN	Not used

200 VAC specification: Use with 1.5 kW and 2.2 kW.

a. Pin alignment

Terminal block to be used: Number of terminals - 15, screw size - M4



Connect the grounding to the grounding terminal on the device cabinet.

When not using a DC reactor, do not remove the shorting bar between L1 and L2/P.

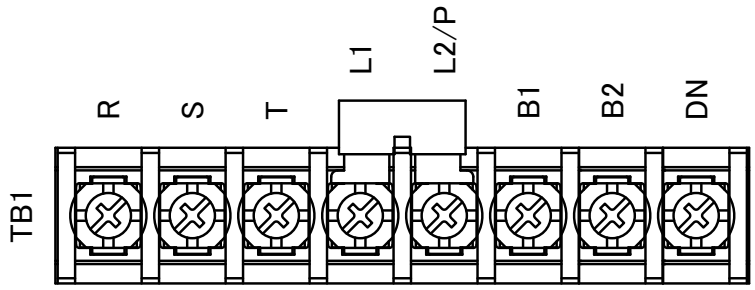
Table 3-6 Power supply terminal (TB1)

No.	Signal code	Signal name	No.	Signal code	Signal name
1	R	Main power supply R-phase	9	r	Control power supply R-phase
2	S	Main power supply S-phase	10	s	Control power supply S-phase
3	T	Main power supply T-phase	11	DBK	Dynamic brake signal
4	L1	DC reactor	12	DBC	Dynamic brake signal common
5	L2/P	DC reactor	13	U	Motor power U-phase
6	B1	Regenerative resistor	14	V	Motor power V-phase
7	B2	Regenerative resistor	15	W	Motor power W-phase
8	DN	Not used			

200 VAC specification: Use with 3.3 kW.

a. Pin alignment

Terminal block to be used: Number of terminals - 8, screw size - M4



Connect the grounding to the grounding terminal on the device cabinet.

When not using a DC reactor, do not remove the shorting bar between L1 and L2/P.

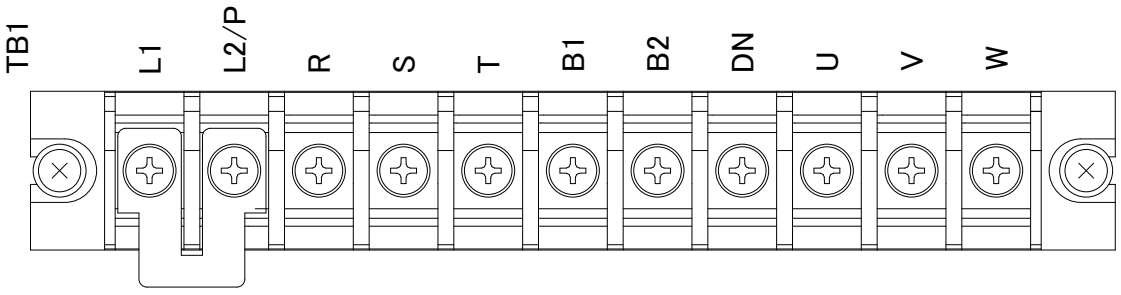
Table 3-7 Power supply terminal (TB1)

No.	Signal code	Signal name	No.	Signal code	Signal name
1	R	Main power supply R-phase	5	L2/P	DC reactor
2	S	Main power supply S-phase	6	B1	Regenerative resistor
3	T	Main power supply T-phase	7	B2	Regenerative resistor
4	L1	DC reactor	8	DN	Not used

200 VAC specification: Use with 7 kW.

a. Pin alignment

Terminal block to be used: Number of terminals - 11, screw size - M5



Connect the grounding to the grounding terminal on the device cabinet.

When not using a DC reactor, do not remove the shorting bar between L1 and L2/P.

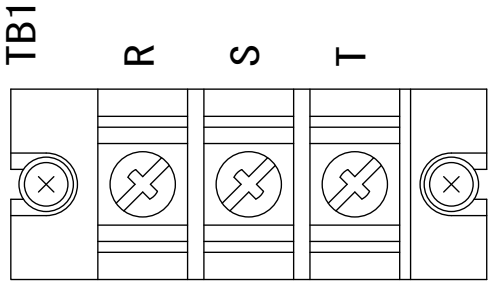
Table 3-8 Power supply terminal (TB1)

No.	Signal code	Signal name	No.	Signal code	Signal name
1	L1	DC reactor	7	B2	Regenerative resistor
2	L2/P	DC reactor	8	DN	Not used
3	R	Main power supply R-phase	9	U	Motor power U-phase
4	S	Main power supply S-phase	10	V	Motor power V-phase
5	T	Main power supply T-phase	11	W	Motor power W-phase
6	B1	Regenerative resistor			

200 VAC specification: Use with 15 kW.

a. Pin alignment

Terminal block to be used: Number of terminals - 3, screw size - M6



Connect the grounding to the grounding terminal on the device cabinet.

Table 3-9 Power supply terminal (TB1)

No.	Signal code	Signal name	No.	Signal code	Signal name
1	R	Main circuit input power supply R-phase (200 V)	3	T	Main circuit input power supply T-phase (200 V)
2	S	Main circuit input power supply S-phase (200 V)			

3-3-6 Power supply terminal TB2

100 VAC specification: Use with 50 W, 100 W, and 200 W.
200 VAC specification: Use with 100 W, 200 W, 400 W, and 800 W.

a. Connector specification

Connector to be used (pin header): S04B-F32SK-GGXR (JST) or equivalent
Applicable cable side connector (plug): 04JFAT-SBXGF-I (JST) or equivalent
(supplied with the device main unit)

b. Pin alignment

The figure below is the alignment when the plug is viewed from the cable insertion block.

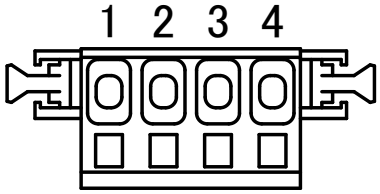


Table 3-10 Power supply terminal (TB2)

No.	Signal code	Signal name	No.	Signal code	Signal name
1	r	Control power supply R-phase (100 V/200 V)	3	DBK	Dynamic brake signal
2	s	Control power supply S-phase (100 V/200 V)	4	DBC	Dynamic brake signal common

200 VAC specification: Use with 3.3 kW.

a. Pin alignment

Terminal block to be used: Number of terminals - 4, screw size - M3

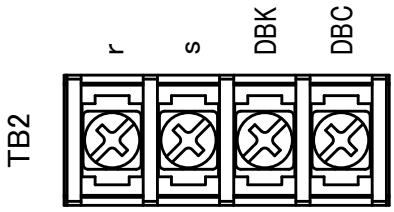


Table 3-11 Power supply terminal (TB2)

No.	Signal code	Signal name	No.	Signal code	Signal name
1	r	Control power supply R-phase (100 V/200 V)	3	DBK	Dynamic brake signal
2	s	Control power supply S-phase (100 V/200 V)	4	DBC	Dynamic brake signal common

200 VAC specification: Use with 7 kW and 15 kW.

a. Connector specification

Connector to be used (pin header): MSTB 2,5/4-GF-5,08 (PHOENIX CONTACT) or equivalent

Applicable cable side connector (plug): FKC 2,5/ 4-STF-5,08 (PHOENIX CONTACT) or equivalent
(supplied with the device main unit)

b. Pin alignment

The figure below is the alignment when the plug is viewed from the cable insertion block.

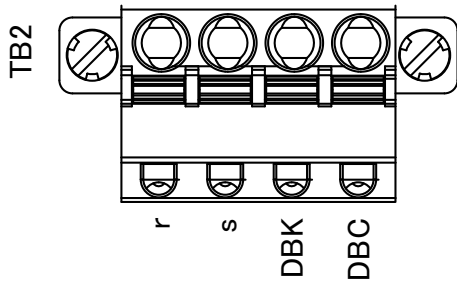


Table 3-12 Power supply terminal (TB2)

No.	Signal code	Signal name	No.	Signal code	Signal name
1	r	Control power supply R-phase (100 V/200 V)	3	DBK	Dynamic brake signal
2	s	Control power supply S-phase (100 V/200 V)	4	DBC	Dynamic brake signal common

3-3-7 Motor power supply terminal TB3

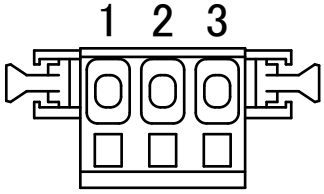
100 VAC specification: Use with 50 W, 100 W, and 200 W.
200 VAC specification: Use with 100 W, 200 W, 400 W, and 800 W.

a. Connector specification

Connector to be used (pin header): S03B-F32SK-GGYR (JST) or equivalent
Applicable cable side connector (plug): 03JFAT-SBYGF-I (JST) or equivalent (supplied with the device main unit)

b. Pin alignment

The figure below is the alignment when the plug is viewed from the cable insertion block.



Connect the grounding to the grounding terminal on the device cabinet.

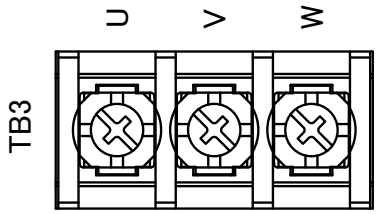
Table 3-13 Motor power supply terminal (TB3)

No.	Signal code	Signal name	No.	Signal code	Signal name
1	U	Motor power U-phase	3	W	Motor power W-phase
2	V	Motor power V-phase			

200 VAC specification: Use with 3.3 kW.

a. Pin alignment

Terminal block to be used: Number of terminals - 3, screw size - M4



Connect the grounding to the grounding terminal on the device cabinet.

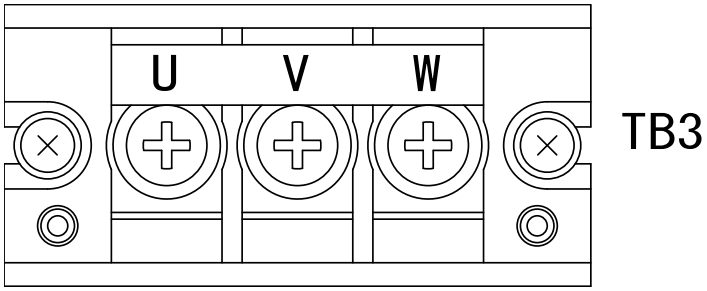
Table 3-14 Motor power supply terminal (TB3)

No.	Signal code	Signal name	No.	Signal code	Signal name
1	U	Motor power U-phase	3	W	Motor power W-phase
2	V	Motor power V-phase			

200 VAC specification: Use with 15 kW.

a. Pin alignment

Terminal block to be used: Number of terminals - 3, screw size - M6



Connect the grounding to the grounding terminal on the device cabinet.

Table 3-15 Motor power supply terminal (TB3)

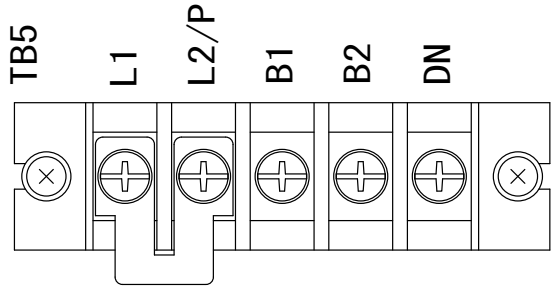
No.	Signal code	Signal name	No.	Signal code	Signal name
1	U	Motor power U-phase	3	W	Motor power W-phase
2	V	Motor power V-phase			

3-3-8 Power supply terminal TB5

200 VAC specification: Use with 15 kW.

a. Pin alignment

Terminal block to be used: Number of terminals - 5, screw size - M5



When not using a DC reactor, do not remove the shorting bar between L1 and L2/P.
Connect the grounding to the grounding terminal on the device cabinet.

Table 3-16 Motor power supply terminal (TB5)

No.	Signal code	Signal name	No.	Signal code	Signal name
1	L1	DC reactor	4	B2	Regenerative resistor
2	L2/P	DC reactor	5	DN	N.C
3	B1	Regenerative resistor			

3-4 Control input and output signals

For this device, any signals can be allocated to the control input signals (DI1 to DI5) and the control output signals (DO1 to DO3). Make the settings with parameters. By default, the following signals are allocated.
For this device, emergency stop (EMG*) and overtravel (FOT*, ROT*) are initialized. If you do not connect the control input signals, you cannot start operation unless you disable these signals with (P624, P623). If you disable the signals, pay sufficient attention to operation and make sure that you can stop operation safely in another way.
* The signal symbol "*" indicates a negative logic setting.

P620: Control input signal allocation 1

DI No.	Signal name	Signal code
DI1	Emergency stop	EMG*
DI2	Forward direction overtravel	FOT*
DI3	Reverse direction overtravel	ROT*
DI4	Zero point deceleration	ZLS

P621: Control input signal allocation 2

DI No.	Signal name	Signal code
DI5	1st external latch input	EXT1

P622: Control output signal allocation 1

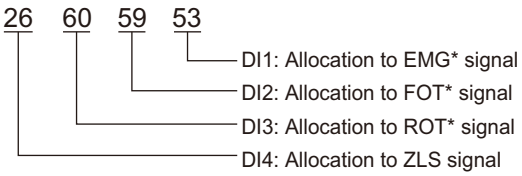
DO No.	Signal name	Signal code
DO1	Brake release	BRK
DO2	Alarm	ALM*
DO3	Positioning complete 1	PN1

3-4-1 Signal allocation settings with direct inputs

A parameter for setting signal allocation is divided into 2-digit items. For the digit corresponding to the DI No. and DO No. you want to set, set a signal allocation No. For information about allocation Nos., refer to "3-4-3 Control input and output signal list".
If "00" is set, the signal is ineffective.
To set negative logic, set an allocation No. in Control input and output signal allocation number table plus "50".

- P620: Control input signal allocation 1
  1st & 2nd digits: DI1 (CN1-1)
  3rd & 4th digits: DI2 (CN1-2)
  5th & 6th digits: DI3 (CN1-3)
  7th & 8th digits: DI4 (CN1-4)
- P621: Control input signal allocation 2
  1st & 2nd digits: DI5 (CN1-5)
- P622: Control output signal allocation 1
  1st & 2nd digits: DO1 (CN1-9)
  3rd & 4th digits: DO2 (CN1-8)
  5th & 6th digits: DO3 (CN1-7)

Example) If P620 = 26605953



3-4-2 Signal allocation settings with VPH DES

From VPH DES, the Parameter edit screen opens.
A parameter is divided into DI No. and DO No. items. In the relevant location, set a signal.

3-4-3 Control input and output signal list

The names of control input and output signals and the run modes in which the signals are effective are given in the following list.

a. Control input signal

The names of control input signals and the run modes in which the signals are effective are given in the following list.

* The speed command, torque command, and built-in command functions are available in the maintenance mode.

Table 3-17 Control input signal list

○ : Effective, -: Ineffective

Control input signal			Communication mode	Maintenance mode				
Allocation No.	Signal code	Signal name		Speed	Torque	Built-in command		
						Jog	POS	HOME
1	RST	Reset	—	○	○	○	○	○
2	ARST	Alarm reset	○	○	○	○	○	○
3	EMG	Emergency stop	○	○	○	○	○	○
4	SON	Servo on	—	○	○	○	○	○
5	DR	Drive	—	○	○	○	○	○
6	CLR	Deviation clear	—	—	—	○	○	○
8	TL	Torque limit	○	○	○	○	○	○
9	FOT	Forward direction overtravel	○	—	—	○	○	○
10	ROT	Reverse direction overtravel	○	—	—	○	○	○
11	MD1	Mode select 1	—	○	○	○	○	○
12	MD2	Mode select 2	—	○	○	○	○	○
13	GSL1	Gain select 1	○	○	○	○	○	○
14	GSL2	Gain select 2	○	○	○	○	○	○
16	RVS	Command direction inversion	—	○	—	—	—	—
17	SS1	Command selection 1	—	○	○	○	○	○
18	SS2	Command selection 2	—	○	○	○	○	○
19	SS3	Command selection 3	—	○	○	○	○	○
20	SS4	Command selection 4	—	—	—	—	○	○
21	SS5	Command selection 5	—	—	—	—	○	○
22	SS6	Command selection 6	—	—	—	—	○	○
23	SS7	Command selection 7	—	—	—	—	○	○
24	SS8	Command selection 8	—	—	—	—	○	○
25	ZST	Positioning drive	—	—	—	—	○	○
26	ZLS	Zero point deceleration	○	—	—	—	—	○
27	ZMK	External zero point marker	○	—	—	—	—	○
28	TRG	External trigger	—	—	—	—	○	—

Control input signal			Communication mode	Maintenance mode				
Allocation No.	Signal code	Signal name		Speed	Torque	Built-in command		
						Jog	POS	HOME
29	CMDZ	Command zero	—	○	○	○	○	○
30	ZCAN	Positioning cancel	—	—	—	—	○	○
31	FJOG	Forward direction jog	—	—	—	○	—	—
32	RJOG	Reverse direction jog	—	—	—	○	—	—
37	MTOH	Motor overheat	○	○	○	○	○	○
41	EXT1	1st external latch input	○	—	—	—	—	—
42	EXT2	2nd external latch input	○	—	—	—	—	—
43	EXT3	3rd external latch input	○	—	—	—	—	—

b. Control output signal

The names of control output signals and the operation mode in which the signals are effective are given in the following list.

* The speed command, torque command, and built-in command functions are available in the maintenance mode.

Table 3-18 Control output signal list

○ : Effective, -: Ineffective

Control output signal			Communication mode	Maintenance mode				
Allocation No.	Signal code	Signal name		Speed	Torque	Built-in command		
						Jog	POS	HOME
1	ALM	Alarm	○	○	○	○	○	○
2	WNG	Warning	○	○	○	○	○	○
3	RDY	Servo ready	○	○	○	○	○	○
4	SZ	Speed Zero	○	○	○	○	○	○
5	PE1	Position deviation range 1	○	—	○	○	○	○
6	PE2	Position deviation range 2	○	—	○	○	○	○
7	PN1	Positioning complete 1	○	—	○	○	○	○
8	PN2	Positioning complete 2	○	—	○	○	○	○
9	PZ1	Positioning complete response 1	—	—	—	—	○	○
10	PZ2	Positioning complete response 2	—	—	—	—	○	○
11	ZN	Command complete	—	—	—	—	○	○
12	ZZ	Command complete response	○	—	—	—	○	○
13	ZRDY	Command drive ready	○	—	—	—	○	○
14	PRF	Rough match	○	—	—	○	○	○
15	VCP	Speed attainment	○	○	—	○	○	○
17	BRK	Brake release	○	○	○	○	○	○
18	LIM	Limit in-Process	○	○	○	○	○	○
19	EMGO	Emergency stop	○	○	○	○	○	○
20	HCP	Zero point return complete	○	○	○	○	○	○
21	HLDZ	Command zero in-process	—	○	○	○	○	○
22	OTO	Overtravel in-process	○	○	○	○	○	○
23	MTON	Motor electrification in-process	○	○	○	○	○	○
25	SMOD	Speed command mode in-process	—	○	—	—	—	—
26	TMOD	Torque command mode in-process	—	—	○	—	—	—
27	PMOD	Position control mode in-process	○	—	—	—	—	—
28	NMOD	Built-in command mode in-process	○	—	○	○	○	○

Control output signal			Communication mode	Maintenance mode				
Allocation No.	Signal code	Signal name		Speed	Torque	Built-in command		
						Jog	POS	HOME
33	OUT1	Common output 1	—	—	—	—	○	○
34	OUT2	Common output 2	—	—	—	—	○	○
35	OUT3	Common output 3	—	—	—	—	○	○
36	OUT4	Common output 4	—	—	—	—	○	○
37	OUT5	Common output 5	—	—	—	—	○	○
38	OUT6	Common output 6	—	—	—	—	○	○
39	OUT7	Common output 7	—	—	—	—	○	○
40	OUT8	Common output 8	—	—	—	—	○	○
49	OCEM	Marker output	○	○	○	○	○	○

3-4-4 Control input signals

Reset [RST]

a. Function

- When this signal is switched ON, any detected alarm is reset and the alarm signal (ALM) is switched OFF.
- While this signal is ON, the motor is in the power-off state and the brake release signal (BRK) and the servo ready signal (RDY) are not output. When this signal is switched OFF again, the device returns to the normal operating status.
- When this signal is switched ON, the emergency stop signal (EMGO) is released.

⚠Caution

Be sure to remove the cause of an alarm before resetting the alarm.

b. Related signals

- [ALM: Alarm]
- [RDY: Servo ready]
- [BRK: Brake release]
- [EMGO: Emergency stop]

Alarm reset [ARST]

a. Function

- When this signal is switched ON, any detected alarm is reset and the alarm signal (ALM) is switched OFF.
- When no alarm is detected and this signal is switched ON, no operation is performed.

⚠Caution

Be sure to remove the cause of an alarm before resetting the alarm.

b. Related signal

- [ALM: Alarm]

Emergency stop [EMG] (initial allocation: DI1)

a. Function

For details of this signal, refer to the explanation of P633 in "Chapter 9 Parameters".

- When this signal is switched ON, the emergency stop signal (EMGO) is switched ON and the motor stops according to the stop mode and deceleration time specified in [P633]. At this time, the servo ready signal (RDY) is switched OFF.
- For a torque command, the torque command becomes zero without braking stoppage.
- After the motor stops, when the time specified in [P633: Servo OFF delay time after EMG braking stoppage] has elapsed, the motor enters the power-off state.

b. Related signals

- [RDY: Servo ready]
- [EMGO: Emergency stop]

c. Related parameters

- [P623: Control input signal condition setting 1(EMG)]
- [P633: Stopping selection when EMG signal is ON, Deceleration time after EMG signal braking stoppage, Servo OFF delay time after EMG braking stoppage]

Servo on [SON]

a. Function

- When this signal is switched ON, the motor enters the power-on state.
- When this signal is switched OFF, the motor enters the power-off state.
- When this signal is OFF, the brake release signal (BRK) and the servo ready signal (RDY) are not output.

b. Related signals

- [RDY: Servo ready]
- [BRK: Brake release]
- [MTON: Motor electrification in-process]

Drive [DR]

a. Function

- When this signal is switched ON, the command in each mode can be accepted.
- When this signal is switched OFF during motor operation, each command becomes invalid and the motor stops in the relevant mode listed below.

Run mode	Stop mode
Speed command	Deceleration with the setting value of P405P409
Torque command	Torque drop with the setting of P439
Position control	Quick stop
Built-in command	Quick stop

b. Related parameters

- [P405: Speed command deceleration standard time]
- [P409: Internal speed command deceleration standard time]
- [P439: Internal torque command Increase/Decrease change time]

Deviation clear [CLR]

a. Function

- When this signal is switched ON, position deviation is cleared and the motor stops in the status in which the speed command is "0".
- When this signal is switched ON during motor operation, the motor stops quickly. The commands remaining when this signal is switched ON are discarded.

Torque limit [TL]

a. Function
- When this signal is switched ON, the torque limit values specified in [P636: TL signal torque limit value +] and [P637: TL signal torque limit value -] become valid.
- The lowest torque limit value specified in the following related parameters is used.
- Torque limit is effective even to a sudden motor stop and a deceleration stop in the event of an alarm/warning.

b. Related signal
- [LIM: Limit in-Process]

c. Related parameters
- [P080: Max torque limit value +]
- [P081: Max torque limit value -]
- [P415 - : Torque limit value]
- [P523 - : SEL Torque limit value]
- [P636: TL signal torque limit value +]
- [P637: TL signal torque limit value -]

Forward direction overtravel [FOT] (initial allocation: DI2)

a. Function
- This signal indicates the travel limit (stroke end) in the forward direction.
- When this signal is switched ON, the motor recognizes that the travel limit point is reached and stops after the deceleration time set in [P634].
- For a torque command, the torque becomes zero without braking stoppage.
- When this signal is ON, operation can be performed only in the reverse direction.
- When this signal is OFF, the device recognizes that the current position is within the normal operation range and can perform normal operation.
- During a reverse direction command, this signal is invalid.

b. Related parameter
- [P634: Deceleration time after OT signal braking stoppage]

Reverse direction overtravel [ROT] (initial allocation: DI3)

a. Function
- This signal indicates the travel limit (stroke end) in the reverse direction.
- For a torque command, the torque becomes zero without braking stoppage.
- When this signal is ON, operation can be performed only in the forward direction.
- When this signal is OFF, the device recognizes that the current position is within the normal operation range and can perform normal operation.
- During a forward direction command, this signal is invalid.

b. Related parameter
- [P634: Deceleration time after OT signal braking stoppage]

Mode select 1, 2 [MD1, MD2]

a. Function

- When this signal is switched ON, the run mode is selected according to the combination of MD1 and MD2 as listed in the table below.

MD2	MD1	Run mode
OFF	OFF	Speed command
OFF	ON	Torque command
ON	OFF	Speed command
ON	ON	Built-in command

b. Related parameter

- [P638: MD signal delay time]

Gain select 1, 2 [GSL1, GSL2]

a. Function

- When this signal is switched ON, a gain number is selected in the combination of GSL1 and GSL2 as shown in the table below.

GSL2	GSL1	Valid gain number
OFF	OFF	Gain number selected with SEL
OFF	ON	Gain No. 1
ON	OFF	Gain No. 2
ON	ON	Gain No. 3

Command direction inversion [RVS]

a. Function

- When this signal is switched ON, the command direction is inversed against the internal speed command.

Command selection 1 - 8 [SS1 to SS8]

a. Function

- These signals, SS1 to SS8, select a command in combination of them.
- SS4 to SS8 are valid only for built-in commands. When SS4 to SS8 are specified for other than a built-in command, they are ignored.

b. Related parameter

- [P638: SS signal delay time]
- The signals SS4 to SS8 are invalid for speed commands, torque commands, and built-in command (jog).

● : ON Blank: OFF

SS3 - 1			Speed command	Torque command	Built-in command (jog)
3	2	1			
			Speed command 0 (P410 - P412)	Torque command 0 (P441 - P443)	Jog speed 0 (P573)
		●	Speed command 1 (P413 - P415)	Torque command 1 (P444 - P446)	Jog speed 1 (P574)
	●		Speed command 2 (P416 - P418)	Torque command 2 (P447 - P449)	Jog speed 2 (P575)
	●	●	Speed command 3 (P419 - P421)	Torque command 4 (P450 - P452)	Jog speed 3 (P576)
●			Speed command 4 (P422 - P424)	Torque command 4 (P453 - P455)	Jog speed 4 (P577)
●		●	Speed command 5 (P425 - P427)	Torque command 5 (P456 - P458)	Jog speed 5 (P578)
●	●		Speed command 6 (P428 - P430)	Torque command 6 (P459 - P461)	Jog speed 6 (P579)
●	●	●	Speed command 7 (P431 - P433)	Torque command 7 (P462 - P464)	Jog speed 7 (P580)

SS8 - 1								Built-in command (command)
8	7	6	5	4	3	2	1	
								Address 0
							●	Address 1
						●		Address 2
						●	●	Address 3
					●			Address 4
					●		●	Address 5
					●	●		Address 6
					●	●	●	Address 7
●	●	●	●	●	●		●	Address 253
●	●	●	●	●	●	●		Address 254
●	●	●	●	●	●	●	●	Address 255

Positioning drive (ZST)

a. Function
- When this signal is switched ON, the command selected with command selection 1 to 8 (SS1 to SS8) is executed.
- When this signal is ON, the positioning complete signals (PN1 and PN2) are OFF.

b. Related signal
- [SS1 to SS8: Command selection 1 - 8]

c. Related parameter
- [P638: ZST signal delay time]

Zero point deceleration [ZLS] (initial allocation: DI4)

a. Function
- When this signal is switched ON during zero point return operation, zero point deceleration starts.
- When this signal is ON and zero point return operation starts, the device moves the motor in the direction opposite to the zero point return direction once, checks that this signal is OFF, and executes zero point return operation.
- For details, refer to "Chapter 4 Run".

b. Related parameter
- [P582: Zero point return creep speed]

External zero point marker [ZMK]

a. Function
- This signal is used as the external marker input during zero point return.

b. Related parameter
- [P581: Zero point marker selection for homing]

External trigger [TRG]

a. Function
- When operation for which built-in command external trigger positioning is valid is executed, switching TRG ON starts external trigger positioning operation.
- This signal can be input as a pulse signal for at least 200 μsec.

Command zero [CMDZ]

a. Function
- When this signal is switched ON, the command listed below becomes zero.

Run mode	Corresponding command
Speed command	Speed command
Torque command	Torque command
Built-in command	Speed command

- When this signal is switched ON during motor operation, the execution of the command is stopped and the motor performs deceleration stop. The deceleration time follows the parameter setting of each command. When this signal is switched OFF, motor operation restarts from the point in the command at which operation was stopped.

Positioning cancel [ZCAN]

a. Function

- When this signal is switched ON during motor operation, the motor performs deceleration stop according to the specified deceleration time.
- When this signal is switched ON during the execution of a command, the run is canceled and the operation is interrupted.
- The device is in the start waiting state with address assignment when the motor is being stopped and after it is stopped.

Forward direction jog [FJOG]

a. Function

- When this signal is ON for at least the time listed in the table below, jog operation is performed in the forward direction. When this signal is switched OFF, the execution of the command is stopped.
- When this signal is ON, switching the reverse direction jog signal (RJOG) ON stops the execution of the forward direction jog command.

ON state time	Jog operation
• Minimum signal acceptance time Minimum ON state time required for recognizing the signal. For details of the time, refer to "Circuit No. I-1: DI1 to 5 control input signals" of the explanation of "3-2 Input/output interface".	• One-shot jog Travel in the distance of the minimum setting unit
100 [ms] or more	Forward direction jog

b. Related signal

- [RJOG: Reverse direction jog]

c. Related parameters

- [P573 - P580: Jog speed 0 - 7]

Reverse direction jog [RJOG]

a. Function

- When this signal is ON for at least the time listed in the table below, jog operation is performed in the reverse direction. When this signal is switched OFF, the execution of the command is stopped.
- When this signal is ON, switching the forward direction jog signal (FJOG) ON stops the execution of the reverse direction jog command.

ON state time	Jog operation
• Minimum signal acceptance time Minimum ON state time required for recognizing the signal. For details of the time, refer to "Circuit No. I-1: DI1 to 5 control input signals" of the explanation of "3-2 Input/output interface".	• One-shot jog Travel in the distance of the minimum setting unit
100 [ms] or more	Reverse direction jog

b. Related signal

- [FJOG: Forward direction jog]

c. Related parameters

- [P573 - P580: Jog speed 0 - 7]

Motor overheat [MTOH]

a. Function

- When this signal is switched ON, a motor overheat error occurs.
- When this signal is switched OFF, the motor overheat error is released.
- When this signal is ON, the motor overheat error is not released.
- For details of this signal, refer to "6-5 Motor overheat detection function".

b. Related signal

- [ALM: Alarm]

1st external latch input [EXT1] (initial allocation: DI5)

a. Function

- If a connection is made to a Keyence Corporation KV-X controller, used as a "zero point sensor" during zero point return operation.
- If a connection is made to a controller other than the above, used as the first external latch signal.

2nd external latch input [EXT2]

a. Function

- If a connection is made to a Keyence Corporation KV-X controller, used as a "stop sensor" during zero point positioning control operation.
- If a connection is made to a controller other than the above, used as the 2nd external latch signal.

3rd external latch input [EXT3]

a. Function

- If a connection is made to a Keyence Corporation KV-X controller, used as a "latch control input" during zero point synchronization control.
- If a connection is made to a controller other than the above, used as the 3rd external latch signal.

3-4-5 Control output signals

Alarm [ALM] (initial allocation: DO2)

a. Function
- When an alarm occurs, this signal is switched ON, and at the same time, the servo ready signal (RDY) is switched OFF. When the motor enters the power-off state, the brake release signal (BRK) is switched OFF.
- If an alarm occurs, the motor executes brake stop or enters the power-off state.
- When this signal is ON, the relevant alarm number is displayed on the data display LED panel.
- For how to release the alarm, refer to "Chapter 8 Protective function".

b. Switched OFF when
- The power is turned off, then on again.
- The reset signal (RST) is switched ON.
- The alarm reset signal (ARST) is switched ON.

c. Related signals
- [RST: Reset]
- [ARST: Alarm reset]

Warning [WNG]

a. Function
- If continuing operation in the current status may cause the device to detect an error and stop, this signal is switched ON as warning.
- When this signal is ON, run operation does not stop.
- When there is no possibility that an error occurs, this signal is switched OFF.
- When this signal is ON, the relevant warning number is displayed on the data display LED panel.
- For how to release the warning, refer to "Chapter 8 Protective function".

Servo ready [RDY]

a. Function
- When motor control is ready to operate, this signal is switched ON.
- When an alarm occurs, this signal is switched OFF, and is switched ON again when the alarm is reset.

b. Switched OFF when
- An alarm occurs.
- The reset signal (RST) is switched ON.
- The servo on signal (SON) is switched OFF.
- The motor enters the power-off state.

Speed Zero [SZ]

a. Function
- This signal is ON when the motor speed is within the speed range specified in [P651: SZ signal speed range] and is OFF when the speed is not within the range.

b. Related parameter
- [P651: SZ signal speed range]

Position deviation range 1, 2 [PE1, PE2]

a. Function
- This signal is ON when position deviation is within the range specified in [P653: PE1 signal deviation range] ([P655]).
- If [P654: PE1 signal delay time] ([P656]) is set, this signal is ON after the elapse of the delay time from the time the deviation enters the deviation range.

b. Switched OFF when
- An alarm occurs.
- The reset signal (RST) is switched ON.
- The emergency stop signal (EMG) is switched ON.
- The servo on signal (SON) is switched OFF.
- The drive signal (DR) is OFF.
- The deviation clear signal (CLR) is switched ON.
- The run mode is other than the built-in command run mode.
- The position deviation falls out of the range specified in [P653] ([P655]).
- Before the elapse of the delay time of [P654] ([P656]) from the time the position deviation falls within the [P653]([P655]) setting range

c. Related parameters
- [P653: PE1 signal deviation range]
- [P654: PE1 signal delay time]
- [P655: PE2 signal deviation range]
- [P656: PE2 signal delay time]

Positioning complete 1, 2 [PN1, PN2] (initial allocation: PN1:DO3)

a. Function

- After the execution of a command is completed, this signal is switched ON when position deviation falls within the range specified in [P653: PE1 signal deviation range] ([P655]).
- If [P654: PE1 signal delay time] ([P656]) is set, this signal is ON after the elapse of the delay time from the time the deviation enters the deviation range.

b. Switched OFF when

- An alarm occurs.
- The run mode is changed.
- The reset signal (RST) is switched ON.
- The emergency stop signal (EMG) is switched ON.
- The servo on signal (SON) is switched OFF.
- The drive signal (DR) is switched OFF.
- The deviation clear signal (CLR) is switched ON.
- The positioning cancel signal (ZCAN) is switched ON.
- A program is started.
- The run mode is other than the built-in command run mode.
- The position deviation falls out of the range specified in [P653] ([P655]).
- Before the elapse of the [P654] ([P656]) delay time from the time the position deviation falls within the [P653]([P655]) setting range

c. Related parameters

- [P179: S-curve time 2]
- [P522: SEL S-curve time 1]
- [P653: PE1 signal deviation range]
- [P654: PE1 signal delay time]
- [P655: PE2 signal deviation range]
- [P656: PE2 signal delay time]
- [P823: S-curve time 1]

Positioning complete response 1, 2 [PZ1, PZ2]

a. Function

- This signal is used as a handshake to check that the device recognizes the positioning drive signal (ZST).
- This signal is switched ON when positioning is completed.

b. Switched OFF when

- Operation is performed not in the built-in command run mode.
- The positioning drive signal (ZST) is switched ON.

Command complete [ZN]

a. Function
- This signal is switched ON when the execution of any of the POS/HOME/INDX commands is completed.

b. Switched OFF when
- An alarm occurs.
- The run mode is changed.
- The command is issued.
- The reset signal (RST) is switched ON.
- The emergency stop signal (EMG) is switched ON.
- The servo on signal (SON) is switched OFF.
- The deviation clear signal (CLR) is switched ON.
- The positioning cancel signal (ZCAN) is switched ON.

Command complete response [ZZ]

a. Function
- This signal is used as a handshake to check that the device recognizes the positioning drive signal (ZST).
- This signal is switched ON when the execution of the relevant command is completed.

b. Switched OFF when
- Operation is performed not in the built-in command run mode.
- The positioning drive signal (ZST) is switched ON.

Command drive ready [ZRDY]

a. Function
- This signal is switched ON when command operation becomes ready.
- After an alarm occurs and this signal is switched OFF, this signal is recovered when the alarm is reset.

b. Switched OFF when
- An alarm occurs.
- The reset signal (RST) is switched ON.
- The emergency stop signal (EMG) is switched ON.
- The servo on signal (SON) is switched OFF.
- The drive signal (DR) is switched OFF.
- The deviation clear signal (CLR) is switched ON.
- The positioning cancel signal (ZCAN) is switched ON.
- The motor enters the power-off state.
- Operation is performed not in the built-in command run mode.

Rough match [PRF]

a. Function
- For a built-in command, after positioning operation starts, this signal is switched ON when the difference between the current position and target position falls within the range specified in [P657: PRF signal distance] or when positioning complete 1 signal (PN1) is switched ON.
- If zero point return (HOME command) is executed with a built-in command, this signal is switched ON under the same conditions as those of the zero point return complete signal (HCP).

b. Switched OFF when
- An alarm occurs.
- Operation starts.
- The run mode is changed.
- The reset signal (RST) is switched ON.
- The emergency stop signal (EMG) is switched ON.
- The servo on signal (SON) is switched OFF.
- The deviation clear signal (CLR) is switched ON.
- The positioning cancel signal (ZCAN) is switched ON (built-in command mode).

c. Related signals
- [HCP: Zero point return complete]
- [PN1: Positioning complete 1]

d. Related parameter
- [P657: PRF signal distance]

Speed attainment [VCP]

a. Function
- This signal is switched ON when the difference between the specified speed and motor speed falls within the range specified in [P652: VCP signal speed deviation range].

b. Related parameter
- [P652: VCP signal speed deviation range]

Brake release [BRK] (initial allocation: DO1)

a. Function
- This signal is ON when the brake is released.
- For details of this signal, refer to "6-9 Brake function".

b. Switched OFF when
- An alarm occurs.
- The motor is not electrified.
- The emergency stop signal (EMG) is switched ON.

c. Related parameters
- [P658: Brake release delay time, Brake activation delay time]
- [P659: Brake activation effective low speed range]
- [P660: Brake enforced activation delay time]

Limit in-process [LIM]

a. Function
- This signal is switched ON when the motor enters the torque limit area and OFF when the motor leaves the torque limit area.
- For a torque command, this signal is valid in the speed limit value. This signal is switched ON when the motor enters the speed limit area.

b. Related parameters
- [P080: Max torque limit value +]
- [P081: Max torque limit value -]
- [P123 (9th - 7th digits): Main power supply drop torque limit value]
- [P415 - : Torque limit value]
- [P440: Speed limit value at torque command mode]
- [P443 - : TRQSEL Speed limit value]
- [P523 - : SEL Torque limit value]
- [P636: TL signal torque limit value +]
- [P637: TL signal torque limit value -]

Emergency stop in-process [EMGO]

a. Function
- This signal is switched ON when the emergency stop signal (EMG) is switched ON.
- When the emergency stop signal (EMG) is OFF, this signal is switched OFF by switching the reset signal (RST) ON, then OFF again.

b. Related signals
- [RST: Reset]
- [EMG: Emergency stop]

Zero point return complete [HCP]

a. Function
- This signal is switched ON when the device can recognize the absolute position.
  When an absolute encoder is used and the value indicating Reflected is specified in [P170], this signal is switched ON at power-on.
  When other than an absolute encoder is used, this signal is switched ON once zero point return is completed after power-on.

b. Switched OFF when
- Power ON
- Zero point return is started.
- An encoder alarm occurs.
- One of [P161], [P162], [P163], and [P164] settings is changed and reflected.

c. Related parameters
- [P060: Encoder type]
- [P161 (1st digit): Moving direction selection]
- [P162: Electronic gear numerator ratio]
- [P163: Electronic gear denominator ratio]
- [P164: Mechanical movement]
- [P170: Present position reflection selection after main power of ABS is ON]

Command zero in-process [HLDZ]

a. Function
- This signal is switched ON when the command zero signal (CMDZ) is ON and the motor stops.

b. Switched OFF when
- The motor runs.
- The command zero signal (CMDZ) is switched OFF.

c. Related signal
- [CMDZ: Command zero]

Overtravel in-process [OTO]

a. Function
- This signal is switched ON when an overtravel state occurs.
- This signal is switched OFF when the overtravel state is canceled.
- This signal is invalid in the communication mode.

b. Related signals
- [FOT: Forward direction overtravel]
- [ROT: Reverse direction overtravel]

Motor electrification in-process [MTON]

a. Function
- This signal is switched ON when the servo on signal (SON) is switched ON and the motor enters the power-on state.
- When the reset signal (RST) is switched ON in the motor power-on state, the motor is in the power-off state while the reset signal (RST) is ON. The motor enters the power-on state again when the reset signal (RST) is switched OFF.

b. Switched OFF when
- The reset signal (RST) is switched ON.
- The servo on signal (SON) is switched OFF.

c. Related parameters
- [P633: Servo OFF delay time after EMG braking stoppage]
- [P658: Brake activation delay time]

Speed command mode in-process [SMOD]

a. Function
- This signal is ON in the speed command run mode.

b. Related signal
- [MD1,2: Mode select 1, 2]

Torque command mode in-process [TMOD]

a. Function
- This signal is ON in the torque command run mode.

b. Related signal
- [MD1,2: Mode select 1, 2]

Position control mode in-process [PMOD]

a. Function
- This signal is ON in the position control run mode.

b. Related signal
- [MD1,2: Mode select 1, 2]

Built-in command mode in-process [NMOD]

a. Function
- This signal is ON in the built-in command run mode.

b. Related signal
- [MD1,2: Mode select 1, 2]

Common output 1 - 8 [OUT1 to OUT8]

a. Function
- This signal is switched ON when a command for which common output data is valid is executed in the command run mode.
- This signal is kept ON after the execution of the command is completed.
- OUT8 to OUT1 are treated as binary data (8 bits) and correspond to bit 7 to 0, respectively.
  - Corresponding bit = 0: This signal is OFF.
  - Corresponding bit = 1: This signal is ON.

b. Switched OFF when
- An alarm occurs.
- The run mode is changed.
- Command at the start
- The reset signal (RST) is switched ON.
- The emergency stop signal (EMG) is switched ON.
- The servo on signal (SON) is switched OFF.
- The deviation clear signal (CLR) is switched ON.

Marker output [OCEM]

a. Function
- This signal outputs the marker pulse corresponding to the motor encoder marker signal.
- The output conditions are the same as those for the encoder pulse outputs (EM, EM*), but the output method differs. For details, refer to control output signals (DO1 to DO3) in "3-2 Input/output interface".

b. Switched OFF when
- No marker signal is output.

c. Related parameters
- [P060: Encoder type]
- [P140 (3rd digit): Marker output width]
- [P143: Marker output position]

Chapter 4 Run

4-1 Run procedure

Operate this device in accordance with following procedure.

1. Be sure to conduct trial run.

2. When conducting trial run, be very careful not to cause accident. To avoid problems, first run this device in the no-load status. After confirming no fault, connect the device to the machine.

3. If [P068: Magnetic pole sensor type] is "Auto magnetic pole sensing", at the power-on or after recovery from encoder errors, "auto magnetic pole detection operation" is executed at the first Servo On. Carefully perform this operation because the motor performs swing motion during the operation. The swing and motion in this operation depend on values in parameter [P380] to [P387] (magnetic pole detection operation related parameters). When this operation cannot be terminated normally, the motor stops due to error detection. The servo ready signal (RDY) is not output during this operation. The signal is output after normal termination.

⚠Caution		
⃠Prohibition	• Do not touch terminal block of the device carelessly. • Do not use the device leaving the cover of terminal block removed. • Voltage also remains after the power is turned off. Confirm that the "CHARGE" LED on the device front panel goes off, then start work.	Electric shock may occur.
⃠Prohibition	• After duly confirming safety, switch ON/OFF the power supply. • Note that motor performs swing motion in the auto magnetic pole detection operation. • In the case of machine that cannot carry out auto magnetic pole detection operation at the power-on with the motor (due to interference on works, etc.) use the "magnetic pole sensor".	Injury or failure may occur.

4-1-1 Power supply voltage check

Confirm that the power supply voltage for the device satisfies required specification.
For information about the specification of the power supply voltage, refer to "13-1-5 Device electrical specification".

4-1-2 Before-run inspection

After completing installation and wiring, carry out following before-run inspection.

a. Isn't there any miswiring? Specially, is the power not connected to motor connection terminal U, V, W?

b. Isn't there any place in short-circuit status by cable chips, etc.?

c. Isn't there any place where excessive stress is on wires?

d. Isn't there any loose fit screw or terminal? Are connectors inserted tightly?

e. Is power supply voltage correct?

f. Isn't there any short-circuit or line-to-ground fault in external sequence circuit?

g. Is grounding method correct? Is the grounding grade D-class or better?

⚠Caution		
⃠Prohibition	Never apply insulation test such as withstand voltage test and mega test, and noise test using noise simulators, to the device.	Those tests may damage the device.

Before starting this device, confirm following setting.

- Set motor data using VPH DES.
- Check the positive/negative logic setting for input signals (when used).
- Set the parameter corresponding to the positive/negative logic operation of the servo on signal (SON).

4-1-3 Setting the motor run direction

In this manual, the motor run directions are defined as follows: Forward direction as CCW and reverse direction as CW. They indicate the rotation directions of the rotation axis as observed from the top of the motor.

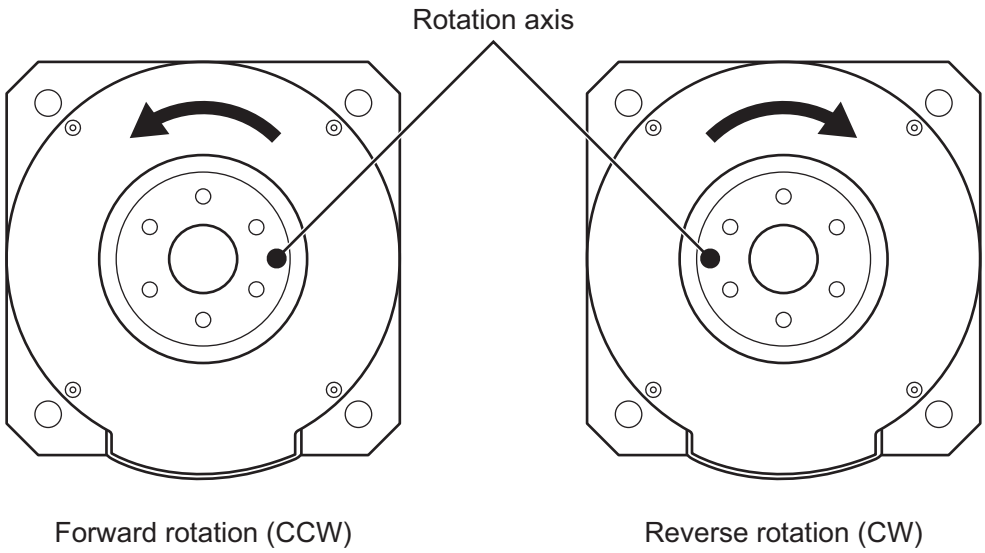


Figure 4-1 Run direction of the τDISC motor

Table 4-1 Each command input and motor rotation direction (with the τDISC motor)

Command input mode	Polarity	Motor rotation direction	
Speed command	Forward direction	The rotation axis rotates counterclockwise when viewed from the front.	: Forward rotation (CCW)
	Reverse direction	The rotation axis rotates clockwise when viewed from the front.	: Reverse rotation (CW)
Torque command	Forward direction	The rotation axis rotates counterclockwise when viewed from the front.	: Forward rotation (CCW)
	Reverse direction	The rotation axis rotates clockwise when viewed from the front.	: Reverse rotation (CW)
Positioning operation command	Forward direction	The rotation axis rotates counterclockwise when viewed from the front.	: Forward rotation (CCW)
	Reverse direction	The rotation axis rotates clockwise when viewed from the front.	: Reverse rotation (CW)

Hereinafter in this document, "motor forward direction" means the motor move direction when the forward direction is specified in the input command, and "motor reverse direction" means the motor move direction when the reverse direction is specified in the input command.

To run the motor in the reverse direction with a positive voltage command or forward direction command, set parameter [P161: Moving direction selection] to "Reverse direction operation" in the standard connection state.

4-1-4 Adjustment

To adjust the device, use VPH DES.
For details of the adjustment method, refer to the separate instruction manual "VPH Series Servo Adjustment Manual".

4-1-5 Adjustment at shipment

- For information about standard factory settings (initial values), refer to "9-2 Parameter list".
- This device is preset standard (initial value) at the factory before shipment; however, when linked with machine systems, readjustment can be required depending on load status and method to be used.

4-2 Run modes

This device supports the following run modes.
A run mode is selected with the mode select 1 (MD1) signal and the mode select 2 (MD2) signal.
By combining signal ON/OFF states, the device is switched between run modes.

Table 4-2 Mode select table

○ : Signal ON, -: Signal OFF

Run mode	Mode select signal 1 (MD1)	Mode select signal 2 (MD2)
Speed command	—	—
Torque command	○	—
Speed command	—	○
Built-in command	○	○

4-2-1 SEL setting

For each run mode, there are eight command numbers.

Table 4-3 Selecting a run mode

Run mode	SEL name	SEL number
Speed command mode	SPD SEL	0 - 7
Torque command mode	TRQ SEL	0 - 7
Built-in command mode	SEL	0 - 7

A SEL number is selected with the command selection 1 (SS1) signal, command selection 2 (SS2) signal, and command selection 3 (SS3) signal. By combining signal ON/OFF states, the device is switched between SEL numbers.

Table 4-4 Selecting a SEL number

SS3	SS2	SS1	SEL number
OFF	OFF	OFF	SEL number 0
OFF	OFF	ON	SEL number 1
OFF	ON	OFF	SEL number 2
OFF	ON	ON	SEL number 3
ON	OFF	OFF	SEL number 4
ON	OFF	ON	SEL number 5
ON	ON	OFF	SEL number 6
ON	ON	ON	SEL number 7

Chapter 5 Maintenance mode

5-1 Speed command mode

At speed command mode, speed control run is executed according to the the internal speed command value that is set in a parameter. Eight speed command values, SPD SEL 0 to SPD SEL 7, can be set. Select a speed command specification with the "Speed command value spec selection" of each SEL number.

Table 5-1 Speed command spec-related parameters

No.	Name	Input range
P410 [1st digit]	SPD SEL 0 Speed command value spec selection	0: Speed command/command number 0 setting value 1: Analog speed command 2: Speed command/indirect data assignment
P413 [1st digit]	SPD SEL 1 Speed command value spec selection	0: Speed command/command number 0 setting value 1: Analog speed command 2: Speed command/indirect data assignment
P416 [1st digit]	SPD SEL 2 Speed command value spec selection	0: Speed command/command number 0 setting value 1: Analog speed command 2: Speed command/indirect data assignment
P419 [1st digit]	SPD SEL 3 Speed command value spec selection	0: Speed command/command number 0 setting value 1: Analog speed command 2: Speed command/indirect data assignment
P422 [1st digit]	SPD SEL 4 Speed command value spec selection	0: Speed command/command number 0 setting value 1: Analog speed command 2: Speed command/indirect data assignment
P425 [1st digit]	SPD SEL 5 Speed command value spec selection	0: Speed command/command number 0 setting value 1: Analog speed command 2: Speed command/indirect data assignment
P428 [1st digit]	SPD SEL 6 Speed command value spec selection	0: Speed command/command number 0 setting value 1: Analog speed command 2: Speed command/indirect data assignment
P431 [1st digit]	SPD SEL 7 Speed command value spec selection	0: Speed command/command number 0 setting value 1: Analog speed command 2: Speed command/indirect data assignment

- If [Speed command value spec selection] is "Speed command value/command number setting value" or "Speed command vale/indirect data assignment", refer to "5-1-1 Internal speed command".

5-1-1 Internal speed command

Run is executed by controlling the speed according to the internal command value that is set in a parameter. The command can be executed by selecting "Speed command value/ command number setting value" or "Speed command vale/indirect data assignment" in the [Speed command value spec selection] of each SEL number.

a. Internal speed command function

- Set the motor operation speed to the speed command value parameter.
- With a positive value, the motor performs forward direction operation.
- The speed command values are SPD SEL 0 to SPD SEL 7. For the SEL number to use, set a command value.
- If "Reverse direction operation" is selected for [P161: Moving direction selection], the motor performs reverse direction operation with the positive value command.
- Indirect data assignment is possible by setting [Speed command value spec selection] to "Speed command vale/indirect data assignment" and setting a minus value (-99 to -1).

b. Internal speed command-related parameters

Table 5-2 Internal speed command-related parameters

No.	Name	Input range
P411	SPD SEL 0 Speed command value	-300000000 to 300000000 [P161 unit/s]
P414	SPD SEL 1 Speed command value	-300000000 to 300000000 [P161 unit/s]
P417	SPD SEL 2 Speed command value	-300000000 to 300000000 [P161 unit/s]
P420	SPD SEL 3 Speed command value	-300000000 to 300000000 [P161 unit/s]
P423	SPD SEL 4 Speed command value	-300000000 to 300000000 [P161 unit/s]
P426	SPD SEL 5 Speed command value	-300000000 to 300000000 [P161 unit/s]
P429	SPD SEL 6 Speed command value	-300000000 to 300000000 [P161 unit/s]
P432	SPD SEL 7 Speed command value	-300000000 to 300000000 [P161 unit/s]

c. Internal speed command-related time chart

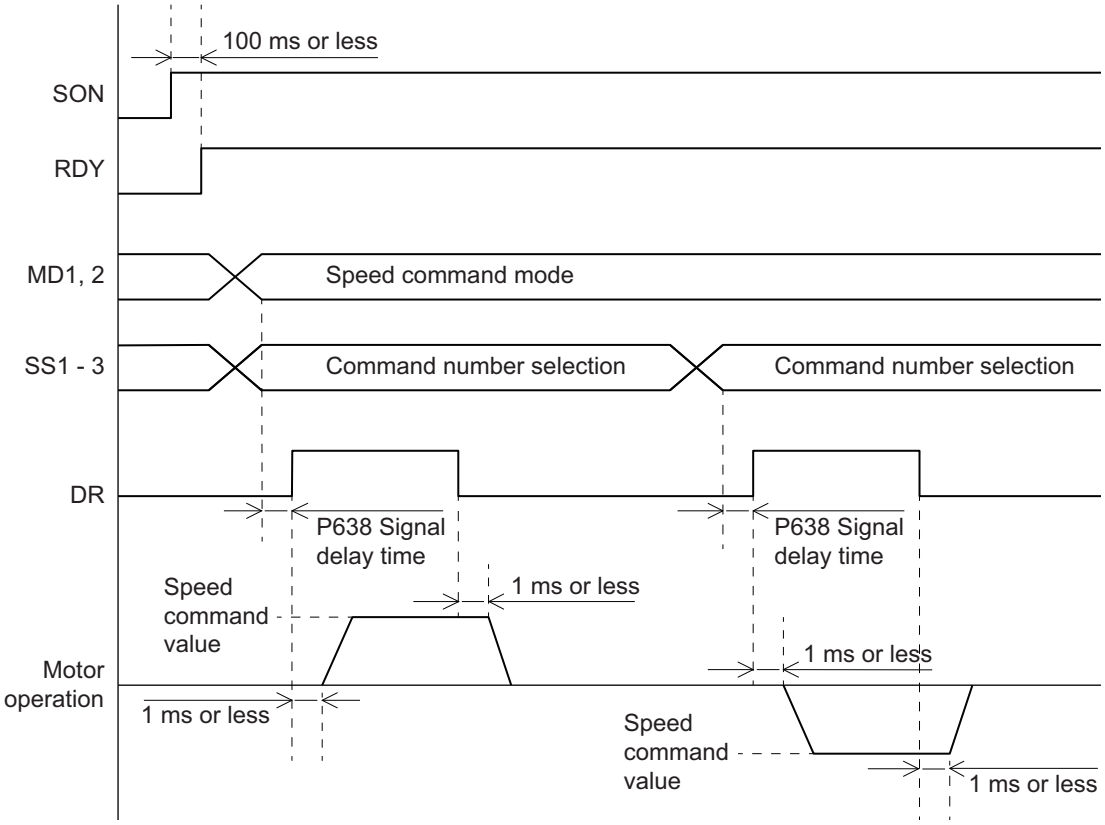


Figure 5-1 Internal speed command time chart

5-1-2 Acceleration/deceleration at speed command mode

Acceleration/deceleration is controlled according to the value that is set in a parameter. Acceleration/deceleration is decided by combining the standard speed and the time required to reach the standard speed.

a. Acceleration/deceleration function at speed command mode

- Set an acceleration value to the acceleration standard speed and the acceleration time and a deceleration value to the deceleration standard speed and the deceleration time.
- For acceleration, if the time required to reach the acceleration standard speed from the motor stop status is set to the acceleration time, acceleration is performed proportionally.
- For deceleration, if the time required to reach the motor stop status from the deceleration standard speed is set to the deceleration time, deceleration is performed proportionally.
- If the acceleration standard speed and the deceleration standard speed is set to "0", the maximum speed of the motor is assumed to be the standard speed.

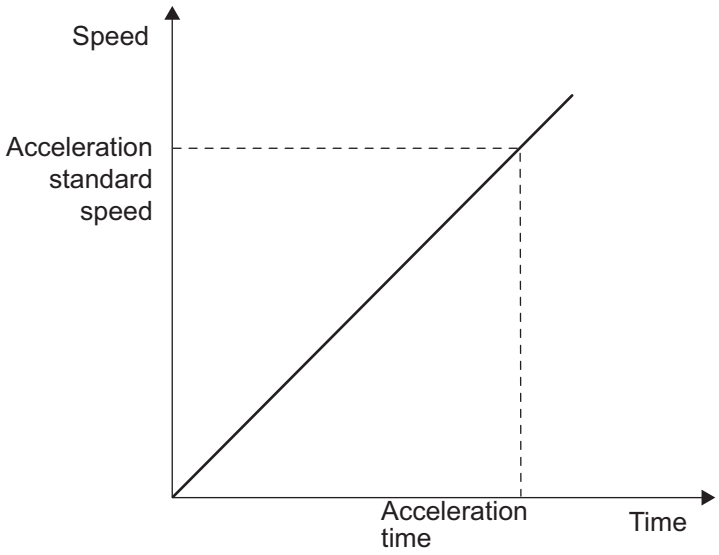


Figure 5-2 Acceleration standard speed in relation to acceleration time at speed command mode

b. Acceleration/deceleration setting-related parameters

Table 5-3 Acceleration/deceleration setting-related parameters

No.	Name	Input range
P404	Speed command acceleration standard time	0 to 300000000 [P161 unit/s]
P405	Speed command deceleration standard time	0 to 300000000 [P161 unit/s]
P408	Internal speed command acceleration standard time	0.0 to 99999.9 [ms]
P409	Internal speed command deceleration standard time	0.0 to 99999.9 [ms]

5-1-3 Torque limit at speed command mode

The torque limit value at speed command mode follows the internal command that is set in a parameter.

a. Torque limit with the internal command

- The torque limit values are SPD SEL 0 to SPD SEL 7. The torque limit value of the SEL number used during operation is effective.
- The torque limit value is a setting value common to the forward direction and the reverse direction.
- Indirect data assignment is possible by setting a minus value (-9.9 to -0.1).

b. Torque limit-related parameters

Table 5-4 Internal torque limit-related parameters

No.	Name	Input range
P412	SPD SEL 0 Torque limit value	-9.9 to 799.9 [%]
P415	SPD SEL 1 Torque limit value	-9.9 to 799.9 [%]
P418	SPD SEL 2 Torque limit value	-9.9 to 799.9 [%]
P421	SPD SEL 3 Torque limit value	-9.9 to 799.9 [%]
P424	SPD SEL 4 Torque limit value	-9.9 to 799.9 [%]
P427	SPD SEL 5 Torque limit value	-9.9 to 799.9 [%]
P430	SPD SEL 6 Torque limit value	-9.9 to 799.9 [%]
P433	SPD SEL 7 Torque limit value	-9.9 to 799.9 [%]

5-2 Torque command mode

At torque command mode, torque control run is executed according to the internal torque command value that is set in a parameter. Up to eight torque command values, TRQ SEL 0 to TRQ SEL 7, can be set. Select a speed command specification with the "Torque command value spec selection" of each SEL number.

Table 5-5 Torque command-related parameters

No.	Name	Input range
P441 [1st digit]	TRQ SEL 0 Torque command value spec selection	0: Torque command/command number 0 setting value 1: Analog torque command 2: Torque command/indirect data assignment
P444 [1st digit]	TRQ SEL 1 Torque command value spec selection	0: Torque command/command number 0 setting value 1: Analog torque command 2: Torque command/indirect data assignment
P447 [1st digit]	TRQ SEL 2 Torque command value spec selection	0: Torque command/command number 0 setting value 1: Analog torque command 2: Torque command/indirect data assignment
P450 [1st digit]	TRQ SEL 3 Torque command value spec selection	0: Torque command/command number 0 setting value 1: Analog torque command 2: Torque command/indirect data assignment
P453 [1st digit]	TRQ SEL 4 Torque command value spec selection	0: Torque command/command number 0 setting value 1: Analog torque command 2: Torque command/indirect data assignment
P456 [1st digit]	TRQ SEL 5 Torque command value spec selection	0: Torque command/command number 0 setting value 1: Analog torque command 2: Torque command/indirect data assignment
P459 [1st digit]	TRQ SEL 6 Torque command value spec selection	0: Torque command/command number 0 setting value 1: Analog torque command 2: Torque command/indirect data assignment
P462 [1st digit]	TRQ SEL 7 Torque command value spec selection	0: Torque command/command number 0 setting value 1: Analog torque command 2: Torque command/indirect data assignment

- If [Torque command value spec selection] is "Torque command value/command number setting value" or "Torque command value/indirect data assignment", refer to "5-2-1 Internal torque command".

5-2-1 Internal torque command

Run is executed by controlling the torque according to the command value that is set in a parameter. The command can be executed by selecting "Torque command value/command number setting value" or "Torque command value/indirect data assignment" in the [Torque command value spec selection] of each SEL number.

a. Internal torque command function

- Set the torque value of the motor to the torque command value parameter.
- With a positive value, the motor performs forward direction operation.
- The torque command values are TRQ SEL 0 to TRQ SEL 7. For the SEL number to use, set a command value.
- If "Reverse direction operation" is selected for [P161: Moving direction selection], the motor performs reverse direction operation with the positive value command.
- Indirect data assignment is possible by setting [Torque command value spec selection] to "Torque command vale/indirect data assignment" and setting a minus value (-99 to -1).

b. Internal torque command-related parameters

Table 5-6 Internal torque command-related parameters

No.	Name	Input range
P442	TRQ SEL 0 Torque command value	-799.9 to 799.9 [%]
P445	TRQ SEL 1 Torque command value	-799.9 to 799.9 [%]
P448	TRQ SEL 2 Torque command value	-799.9 to 799.9 [%]
P451	TRQ SEL 3 Torque command value	-799.9 to 799.9 [%]
P454	TRQ SEL 4 Torque command value	-799.9 to 799.9 [%]
P457	TRQ SEL 5 Torque command value	-799.9 to 799.9 [%]
P460	TRQ SEL 6 Torque command value	-799.9 to 799.9 [%]
P463	TRQ SEL 7 Torque command value	-799.9 to 799.9 [%]

c. Internal torque command time chart

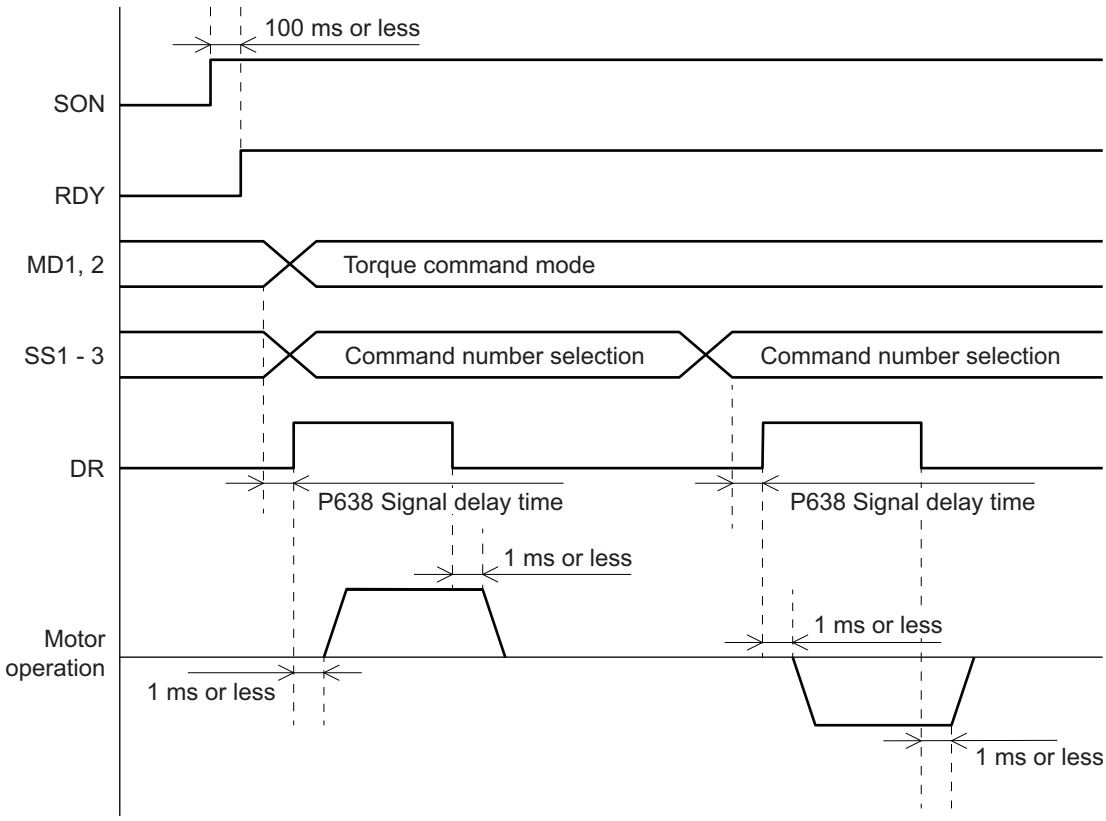


Figure 5-3 Internal torque command time chart

5-2-2 Torque command Increase/Decrease change time

The torque increase/decrease time is controlled according to the values that are set in parameters.

a. Torque command increase/decrease time function at torque command mode

- For torque increase, if the time required to reach the rated torque from the torque zero state is set, the torque increases proportionally.

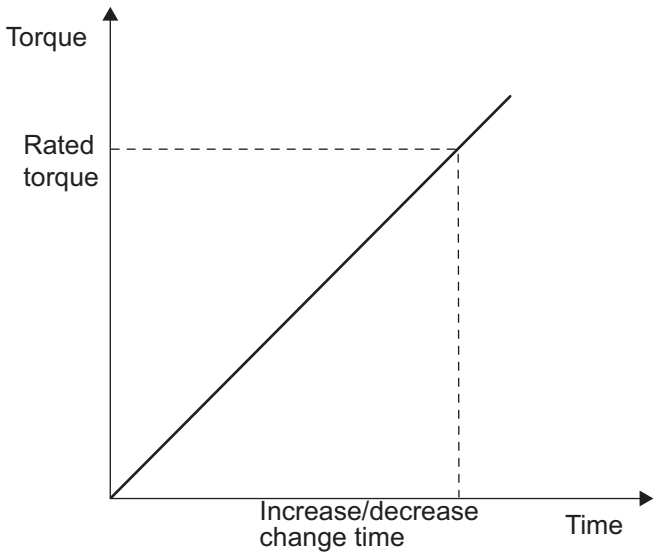


Figure 5-4 Torque command increase/decrease change in relation to rated torque

b. Torque command increase/decrease change time-related parameters

Table 5-7 Torque increase/decrease change time-related parameters

No.	Name	Input range
P439	Internal torque command Increase/Decrease change time	0.0 to 9999.9 [ms]

5-2-3 Speed limit at torque command mode

The speed limit at torque command mode follows the internal command that is set in a parameter.

a. Speed limit with the internal command

- The speed limit values are TRQ SEL 0 to TRQ SEL 7. The speed limit value of the SEL number used during operation is effective.
- It is a setting value common to the forward direction and the reverse direction.
- Indirect data assignment is possible by setting a minus value (-99 to -1).

b. Speed limit-related parameters

Table 5-8 Speed limit-related parameters

No.	Name	Input range
P440	Speed limit value at torque command mode	0 to 300000000 [P161 unit/s]
P443	TRQ SEL 0 Speed limit value	-990000000 to 300000000 [P161 unit/s]
P446	TRQ SEL 1 Speed limit value	-990000000 to 300000000 [P161 unit/s]
P449	TRQ SEL 2 Speed limit value	-990000000 to 300000000 [P161 unit/s]
P452	TRQ SEL 3 Speed limit value	-990000000 to 300000000 [P161 unit/s]
P455	TRQ SEL 4 Speed limit value	-990000000 to 300000000 [P161 unit/s]
P458	TRQ SEL 5 Speed limit value	-990000000 to 300000000 [P161 unit/s]
P461	TRQ SEL 6 Speed limit value	-990000000 to 300000000 [P161 unit/s]
P464	TRQ SEL 7 Speed limit value	-990000000 to 300000000 [P161 unit/s]

5-3 Built-in command

At built-inr command mode, program operation is executed with jog operation or commands. As per the built-in command specifications, up to eight SELs, SEL0 to SEL7, can be set.

5-3-1 Program operation

Run is executed according to the commands that are set in a program. There are command addresses 0 to 255, and up to 256 addresses can be set. For details of programs, refer to "5-4 Program".

5-3-2 Jog operation

Run is executed by controlling the speed according to the command value that is set in a parameter.

a. Jog operation function

- Set the motor operation speed to the jog speed parameter.
- There are jog speeds from 0 to 7. For the number to use, set a command value.
- With a positive value, the motor performs forward direction operation.
- If "Reverse direction operation" is selected for [P161: Moving direction selection], it is possible to cause the motor to perform reverse direction operation with a positive value command.
- The acceleration/deceleration and other specs follow the setting of SEL0.

b. Jog operation-related parameters

Table 5-9 Jog operation-related parameters

No.	Name	Input range
P573	Jog speed 0	-990000000 to 300000000 [P161 unit/s]
P574	Jog speed 1	-990000000 to 300000000 [P161 unit/s]
P575	Jog speed 2	-990000000 to 300000000 [P161 unit/s]
P576	Jog speed 3	-990000000 to 300000000 [P161 unit/s]
P577	Jog speed 4	-990000000 to 300000000 [P161 unit/s]
P578	Jog speed 5	-990000000 to 300000000 [P161 unit/s]
P579	Jog speed 6	-990000000 to 300000000 [P161 unit/s]
P580	Jog speed 7	-990000000 to 300000000 [P161 unit/s]

c. Jog operation time chart

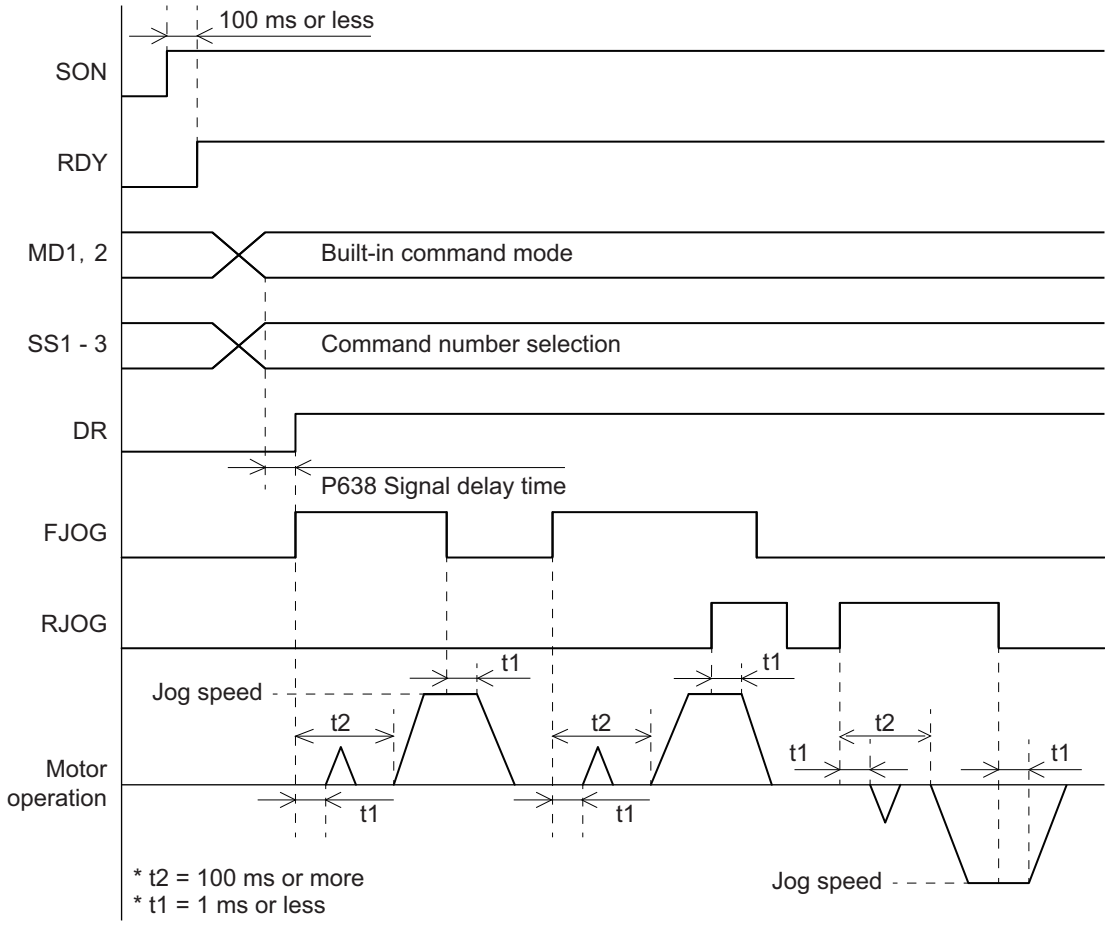


Figure 5-5 Jog operation time chart

5-3-3 Acceleration/deceleration at built-in command mode

Acceleration/deceleration is controlled according to the value that is set in a parameter. Acceleration/deceleration is decided by combining the standard speed and the time required to reach the standard speed.

a. Acceleration/deceleration function at built-in command mode

- Set an acceleration value to the acceleration standard speed and the acceleration time and a deceleration value to the deceleration standard speed and the deceleration time.
- For acceleration, if the time required to reach the acceleration standard speed from the motor stop status is set to the acceleration time, acceleration is performed proportionally.
- For deceleration, if the time required to reach the motor stop status from the deceleration standard speed is set to the deceleration time, deceleration is performed proportionally.
- If the acceleration standard speed and the deceleration standard speed is set to "0", the maximum speed of the motor is assumed to be the standard speed.

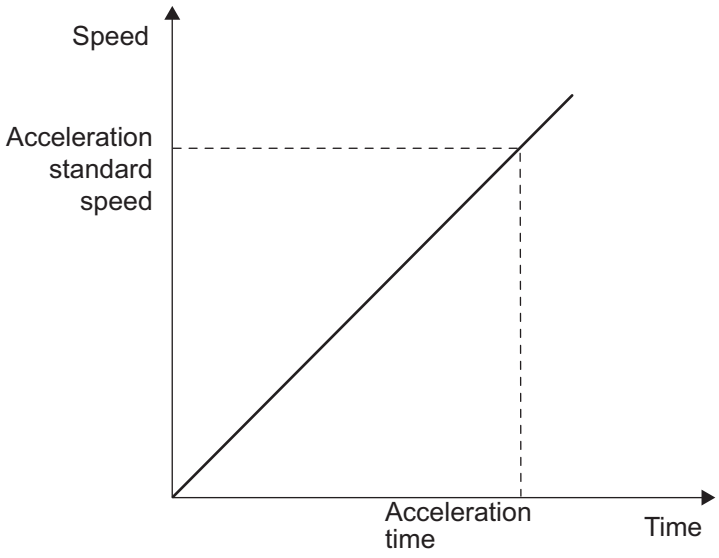


Figure 5-6 Acceleration standard speed in relation to acceleration time at built-in command mode

b. Acceleration/deceleration setting-related parameters

Table 5-10 Acceleration/deceleration setting-related parameters

No.	Name	Input range
P518	SEL0 Acceleration standard speed	-990000000 to 300000000 [P161 unit/s]
P519	SEL0 Deceleration standard speed	-990000000 to 300000000 [P161 unit/s]
P520	SEL0 Acceleration time	-9.9 to 99999.9 [ms]
P521	SEL0 Deceleration time	-9.9 to 99999.9 [ms]
P525	SEL1 Acceleration standard speed	-990000000 to 300000000 [P161 unit/s]
P526	SEL1 Deceleration standard speed	-990000000 to 300000000 [P161 unit/s]
P527	SEL1 Acceleration time	-9.9 to 99999.9 [ms]
P528	SEL1 Deceleration time	-9.9 to 99999.9 [ms]

No.	Name	Input range
P532	SEL2 Acceleration standard speed	-990000000 to 300000000 [P161 unit/s]
P533	SEL2 Deceleration standard speed	-990000000 to 300000000 [P161 unit/s]
P534	SEL2 Acceleration time	-9.9 to 99999.9 [ms]
P535	SEL2 Deceleration time	-9.9 to 99999.9 [ms]
P539	SEL3 Acceleration standard speed	-990000000 to 300000000 [P161 unit/s]
P540	SEL3 Deceleration standard speed	-990000000 to 300000000 [P161 unit/s]
P541	SEL3 Acceleration time	-9.9 to 99999.9 [ms]
P542	SEL3 Deceleration time	-9.9 to 99999.9 [ms]
P546	SEL4 Acceleration standard speed	-990000000 to 300000000 [P161 unit/s]
P547	SEL4 Deceleration standard speed	-990000000 to 300000000 [P161 unit/s]
P548	SEL4 Acceleration time	-9.9 to 99999.9 [ms]
P549	SEL4 Deceleration time	-9.9 to 99999.9 [ms]
P553	SEL5 Acceleration standard speed	-990000000 to 300000000 [P161 unit/s]
P554	SEL5 Deceleration standard speed	-990000000 to 300000000 [P161 unit/s]
P555	SEL5 Acceleration time	-9.9 to 99999.9 [ms]
P556	SEL5 Deceleration time	-9.9 to 99999.9 [ms]
P560	SEL6 Acceleration standard speed	-990000000 to 300000000 [P161 unit/s]
P561	SEL6 Deceleration standard speed	-990000000 to 300000000 [P161 unit/s]
P562	SEL6 Acceleration time	-9.9 to 99999.9 [ms]
P563	SEL6 Deceleration time	-9.9 to 99999.9 [ms]
P567	SEL7 Acceleration standard speed	-990000000 to 300000000 [P161 unit/s]
P568	SEL7 Deceleration standard speed	-990000000 to 300000000 [P161 unit/s]
P569	SEL7 Acceleration time	-9.9 to 99999.9 [ms]
P570	SEL7 Deceleration time	-9.9 to 99999.9 [ms]

5-3-4 S-curve acceleration/deceleration at built-in command mode

By setting S-curve acceleration/deceleration, you can reduce the impact at the start and end of acceleration/deceleration. There are two S-curve acceleration/deceleration settings. The value resulting from synthesizing the first and second settings is the S-curve acceleration/deceleration.

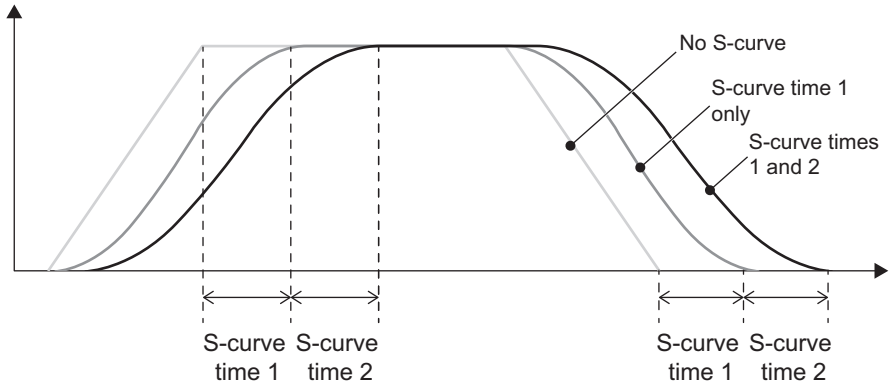


Figure 5-7 S-curve acceleration/deceleration operation example

a. S-curve acceleration/deceleration-related parameters

They are parameters for setting S-curve acceleration/deceleration time. Set the first ones for the individual SELs individually. The second ones are common settings.

Table 5-11 S-curve acceleration/deceleration-related parameters

No.	Name	Input range
P179	S-curve time 2	0.0 to 1000.0 [ms]
P522	SEL 0 S-curve time 1	0.0 to 1000.0 [ms]
P529	SEL 1 S-curve time 1	0.0 to 1000.0 [ms]
P536	SEL 2 S-curve time 1	0.0 to 1000.0 [ms]
P543	SEL 3 S-curve time 1	0.0 to 1000.0 [ms]
P550	SEL 4 S-curve time 1	0.0 to 1000.0 [ms]
P557	SEL 5 S-curve time 1	0.0 to 1000.0 [ms]
P564	SEL 6 S-curve time 1	0.0 to 1000.0 [ms]
P571	SEL 7 S-curve time 1	0.0 to 1000.0 [ms]

5-3-5 Torque limit at built-in command mode

The torque limit value at built-in command mode follows the internal command that is set in a parameter.

a. Torque limit with the internal command

- The torque limit values at built-in command mode are SEL 0 to SEL 7. The torque limit value of the SEL number used during operation is effective.
- It is a setting value common to the forward direction and the reverse direction.
- Indirect data assignment is possible by setting a negative value (-9.9 to -0.1).

Table 5-12 Internal torque limit-related parameters

No.	Name	Input range
P523	SEL 0 Torque limit value	-9.9 to 799.9 [%]
P530	SEL 1 Torque limit value	-9.9 to 799.9 [%]
P537	SEL 2 Torque limit value	-9.9 to 799.9 [%]
P544	SEL 3 Torque limit value	-9.9 to 799.9 [%]
P551	SEL 4 Torque limit value	-9.9 to 799.9 [%]
P558	SEL 5 Torque limit value	-9.9 to 799.9 [%]
P565	SEL 6 Torque limit value	-9.9 to 799.9 [%]
P572	SEL 7 Torque limit value	-9.9 to 799.9 [%]

5-4 Program

Positioning operation and zero point return are executed with a program.

5-4-1 Command list

This section outlines the commands supported by this device.

Table 5-13 Command list

Title	Command name	Function
NOP	No operation command [No OPeration]	Performs no operation.
POS	Positioning [POSitioning]	Performs positioning operation.
HOME	Zero point return [HOME positioning]	Performs zero point return operation.
INDX	Index positioning [INDeX positioning]	Performs rotator positioning operation.

5-4-2 Positioning

If the POS command is executed in program run, positioning operation is started.
Positioning operation is executed by specifying an address where the POS command is set and switching the positioning start signal (ZST) ON. Upon the completion of the operation, the command complete signal (ZN) is switched ON.
Even in the overtravel state, operation can be performed in the release direction.
By setting [P516: Positioning approval selection when homing is not completed], it is possible to disable the execution of positioning operation before the completion of zero point return.

a. Positioning operation input data

Data name	Data function	Input range	Unit
POS	Positioning position and direction	-2147483648 to 2147483647 IX00 to IX99	P161 unit

Set a positioning amount. If a value outside the range is set, [AL432: Positioning command incorrect] occurs.

Data name	Data function	Input range	Unit
F	Positioning speed	0 to 300000000 IX00 to IX99	P161 unit/s

Set a positioning speed. If "0" is set, the motor does not operate with the command being under execution. To disable the command, switch the positioning cancel signal (ZCAN) ON.
For indirect data assignment, if a value outside the range is set in indirect data, the positioning speed is set to "0".

Data name	Data function	Input range	Unit
TRG	External trigger position	0 to 2147483647 IX00 to IX99	P161 unit

Set the moving amount from the time the external trigger signal (TRG) is switched ON. The positioning direction follows the positioning position and direction (POS). If "0" is set, external trigger positioning is ineffective.

Data name	Data function	Input range	Unit
OUT	Common output	00000000 to 11111111 IX00 to IX99	Binary

Set a common output. A common output is possible at the start of operation.

Data name	Data function	Input range	Unit
A/I	Absolute position/relative position	ABSOLUTE/INCREMENT	None

Select a positioning amount type.
- ABSOLUTE
  Set the target position and direction in reference to position data. (Absolute position)

- INCREMENT
  Set the moving amount and direction from the current position of the motor. (Relative position)
  When the maximum value is set for the positioning position, infinite length feed is performed.

Data name	Data function	Input range	Unit
UPDN	SEL selection	SEL 0 to 7	None

Select the SEL number used for positioning operation.
The following setting values follow the selected SEL number.
Acceleration/deceleration time, S-curve acceleration/deceleration time, torque limit value, Gain No., and PN signal selection

b. Positioning operation time chart

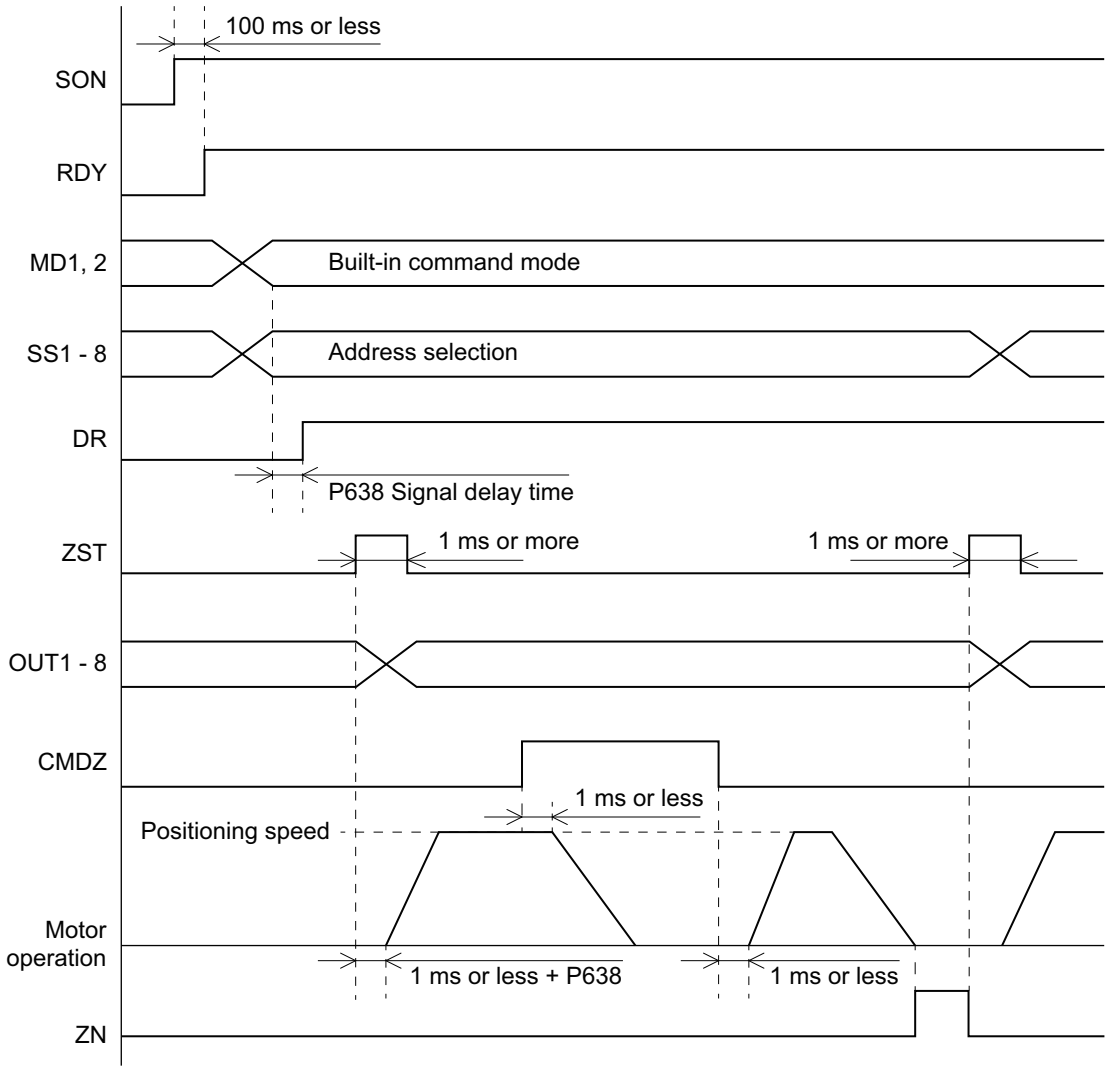


Figure 5-8 POS command time chart

5-4-3 Zero point return

When the HOME command in program run is executed, zero point return operation is started. By specifying an address in which the HOME command is set and switching the positioning start signal (ZST) ON, zero point return operation is executed. Upon completion of operation, the command complete signal (ZN) is switched ON.
Even in the overtravel state, operation can be performed in the release direction.
For an ABS encoder, the zero point marker position is [P143: Marker output position].

The following methods of zero point return are available.

TYPE	Zero point return method	Description
STD.HOME	Standard zero point return	Detects the marker after zero point deceleration, and sets the zero point.
LS LESS	LS less zero point return	Detects the marker without using zero point deceleration, and sets the zero point.
STOP HOME	On-the-spot zero point return	Sets the current position of the motor as the zero point without operation.
OT HOME	OT return zero point return	Detects the marker after zero point deceleration, and sets the zero point. The direction is reversed when OT is detected before zero point deceleration.
OT LSLESS	OT return LS less Zero point return	Detects the marker without using zero point deceleration, and sets the zero point. The direction is reversed when OT is detected.
SET ABS	ABS encoder Current position auto setting	Sets the relationship between the encoder position and mechanical position when an absolute encoder is connected. SET ABS can be executed even in the servo off status.

a. Zero point return operation input data

Data name	Data function	Input range	Unit
DIR	Zero point return direction	FORWARD/REVERSE	None

Select a zero point return direction.
- FORWARD : Operation is performed in the forward direction.
- REVERSE : Operation is performed in the reverse direction.

* For STOP HOME and SET ABS, zero point return direction is not used.

Data name	Data function	Input range	Unit
F	Zero point return speed	0 to 300000000	P161 unit/s

Set a positioning speed. If "0" is set, the motor does not operate with the command being under execution. To disable the command, switch the positioning cancel signal (ZCAN) ON.

* For STOP HOME and SET ABS, the zero point return speed is not used.

Data name	Data function	Input range	Unit
OUT	Common output	00000000 to 11111111 IX00 to IX99	Binary

Set a common output. A common output is possible at the start of operation.

Data name	Data function	Input range	Unit
TYPE	Zero point return method	STD HOME/LS LESS/ STOP HOME/OT HOME/ SET ABS/OUT POS/ OT LS LESS	None

Select a zero point return method.

Data name	Data function	Input range	Unit
UPDN	SEL selection	SEL 0 to 7	None

Select the SEL number used for positioning operation.

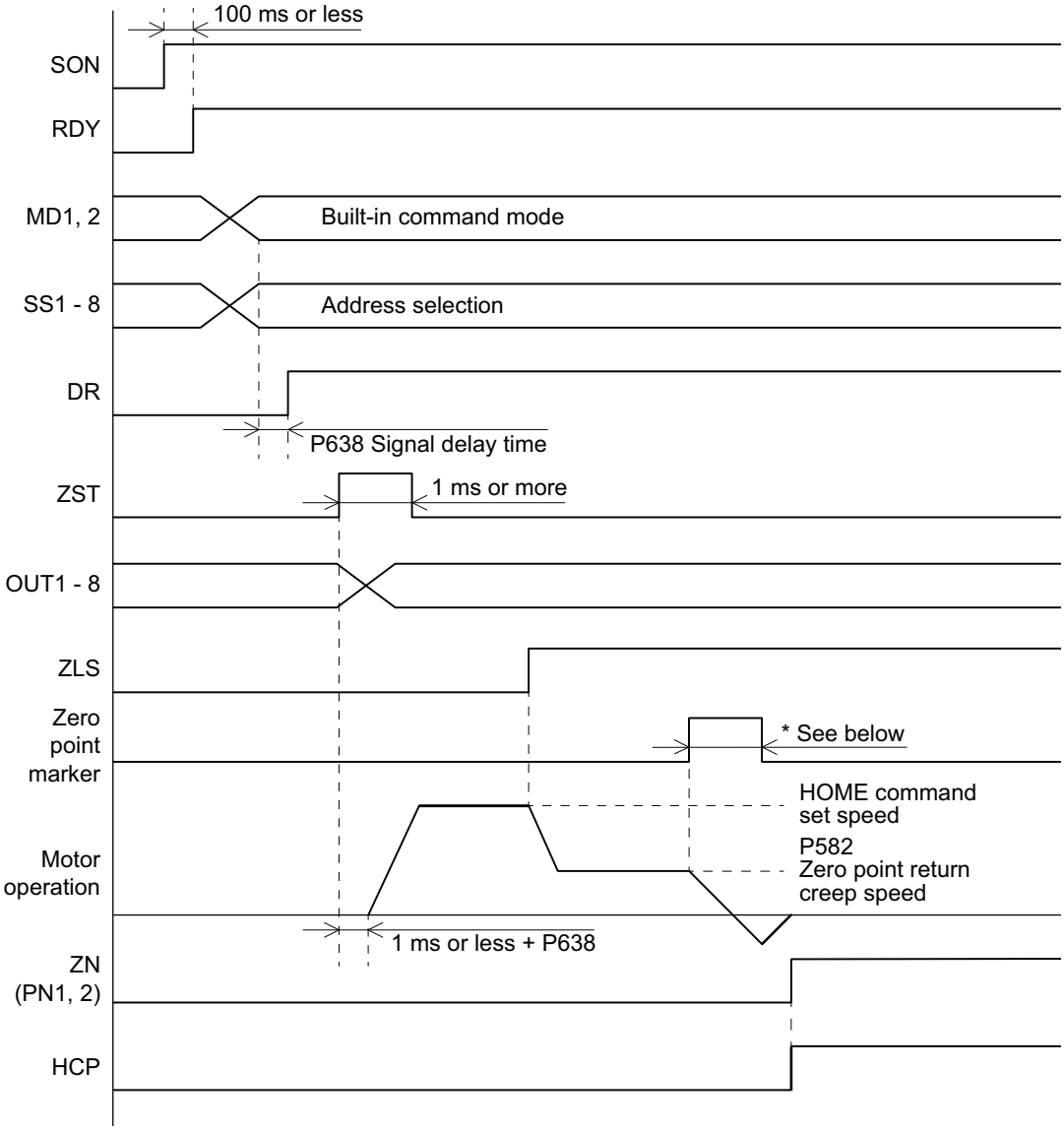
The following setting values follow the selected SEL number.

Acceleration/deceleration time, S-curve acceleration/deceleration time, torque limit value, Gain No., and PN signal selection

b. Zero point return operation time chart

- STD HOME

  Detects the marker after zero point deceleration, and sets the zero point.

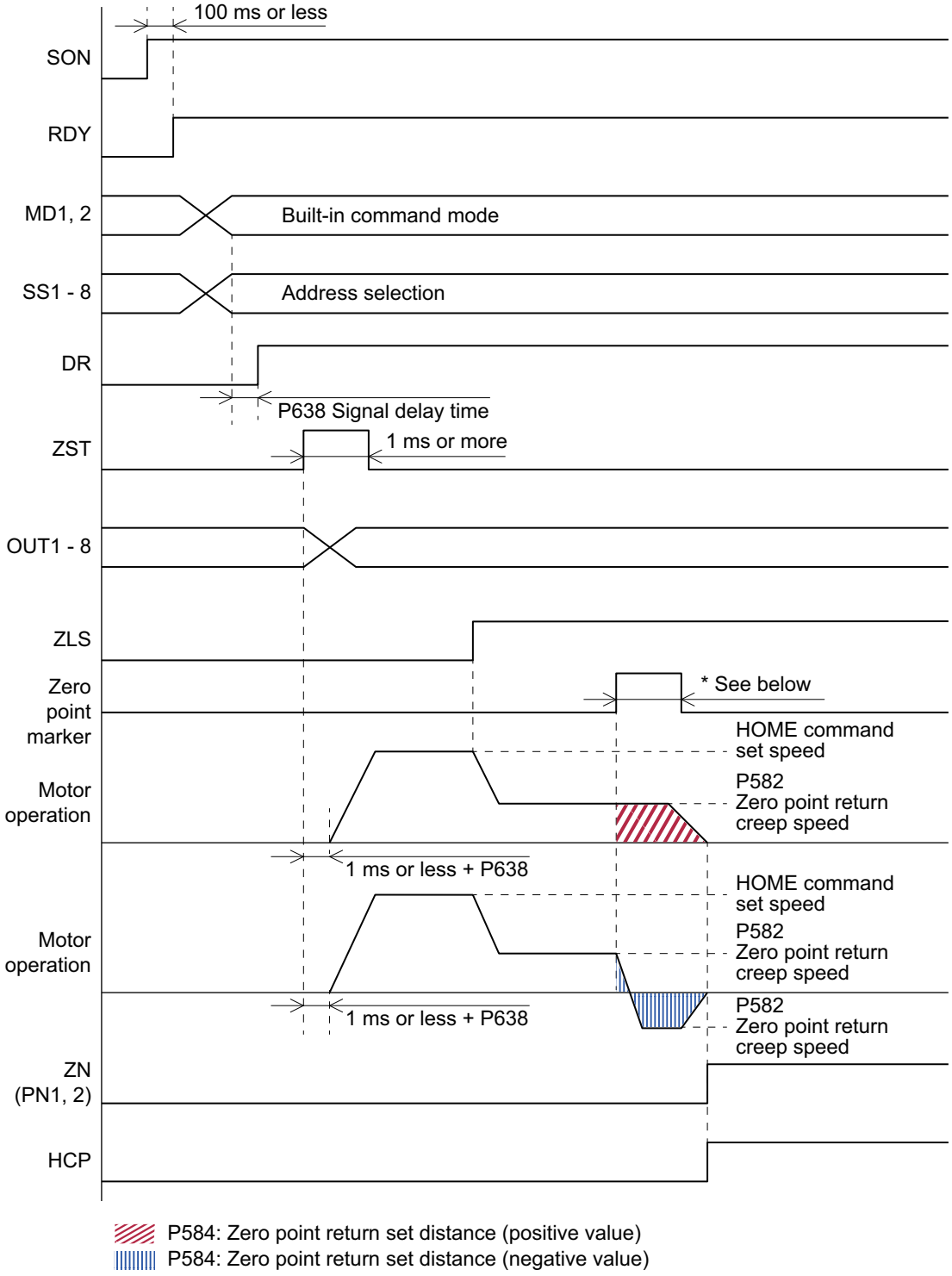


* Select the zero point marker to use from [P581 (1st digit): Zero point marker selection for homing].

Feedback marker: 0.5 µs or more, external marker: 1 ms or more

Figure 5-9 STD HOME time chart ①

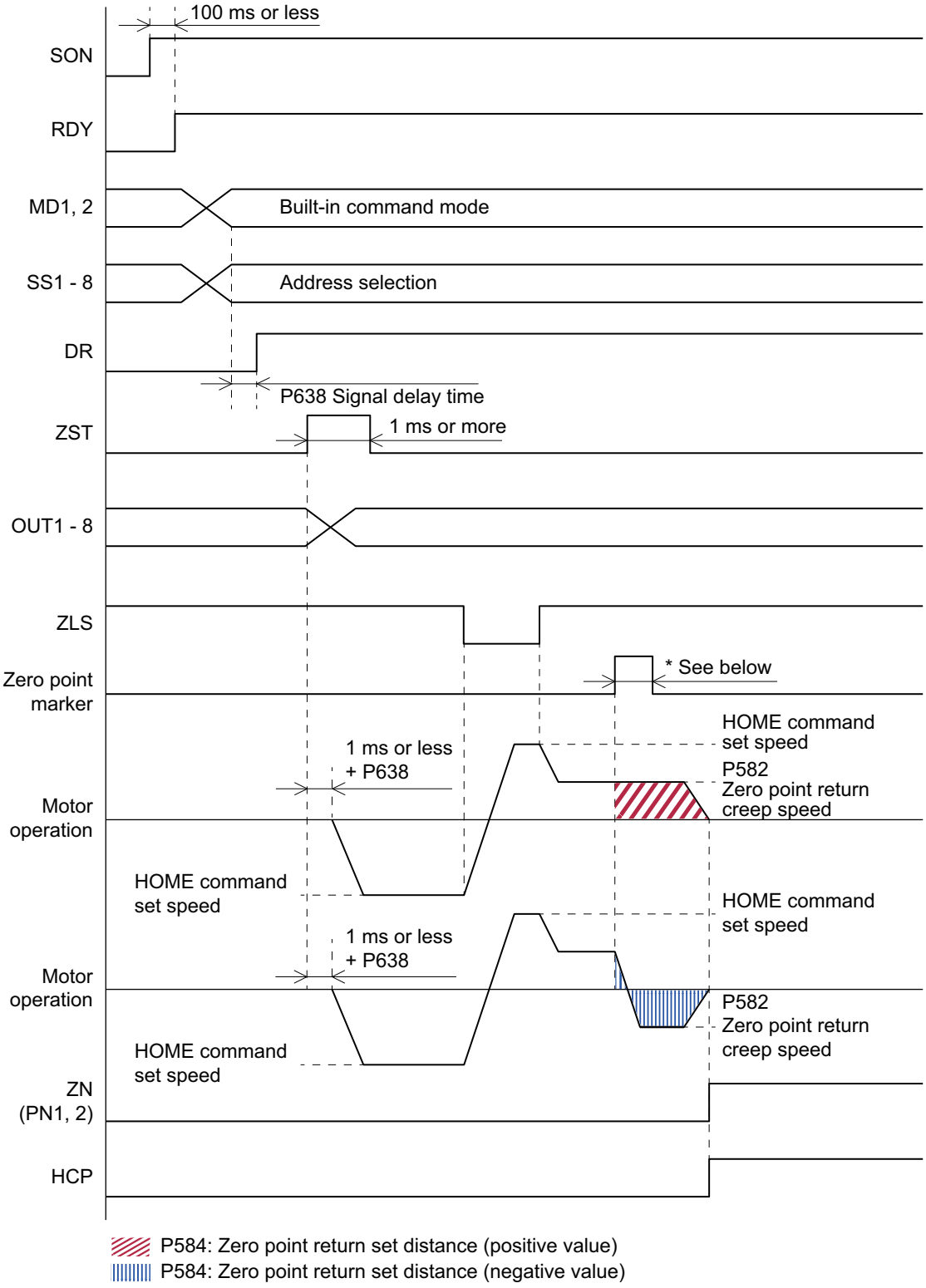
When [P584: Zero point return set distance] is set



* Select the zero point marker to use from [P581 (1st digit): Zero point marker selection for homing].
Feedback marker: 0.5 µs or more, external marker: 1 ms or more

Figure 5-10 STD HOME time chart ②

If the command is executed when the ZLS signal is in the ON state

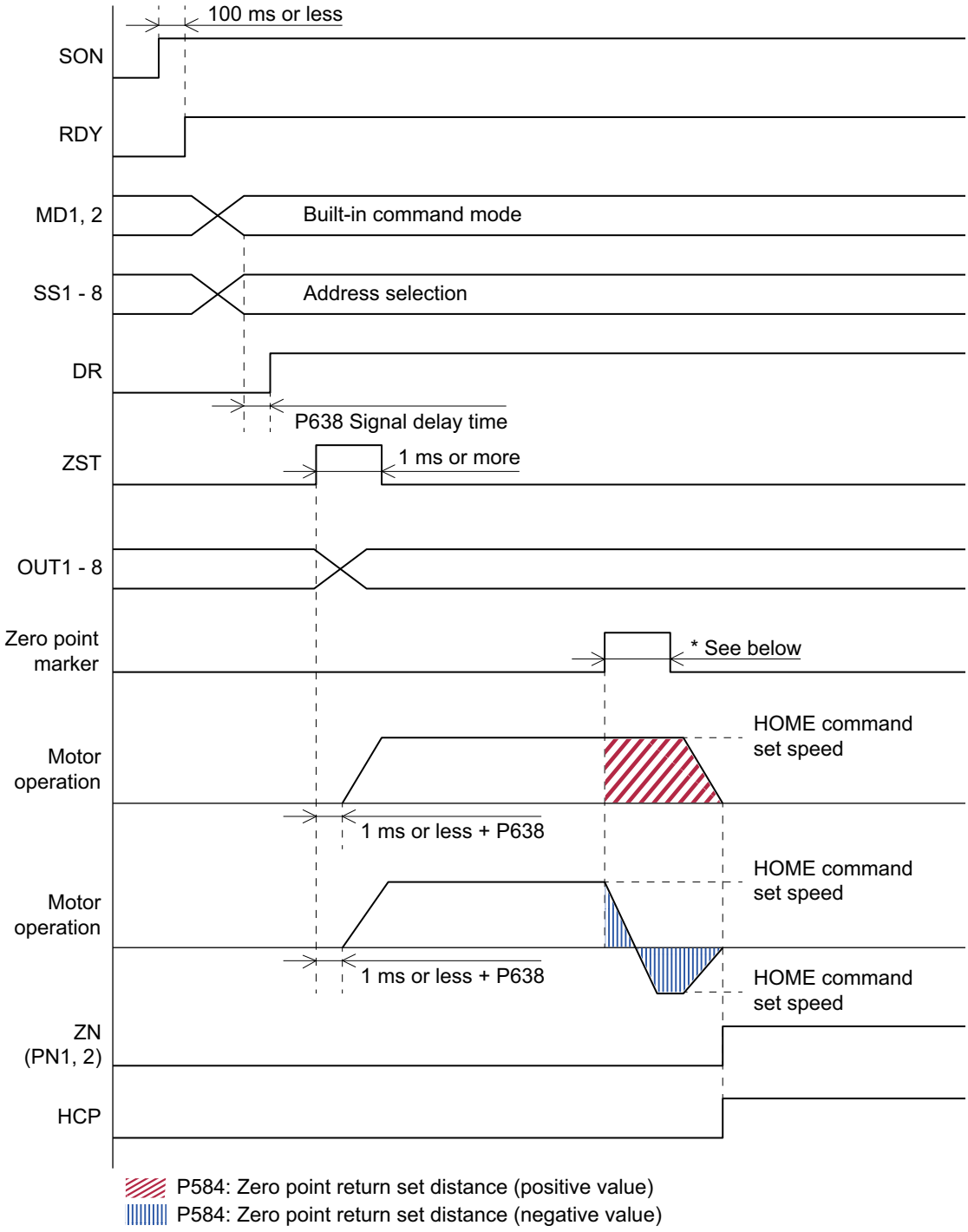


* Select the zero point marker to use from [P581 (1st digit): Zero point marker selection for homing].
Feedback marker: 0.5 µs or more, external marker: 1 ms or more

Figure 5-11 STD HOME time chart ③

• LS LESS

Detects the marker without using zero point deceleration, and sets the zero point.



* Select the zero point marker to use from [P581 (1st digit): Zero point marker selection for homing].
Feedback marker: 0.5 µs or more, external marker: 1 ms or more

Figure 5-12 LS LESS time chart

- STOP HOME

  Sets the current position of the motor as the zero point without operation.

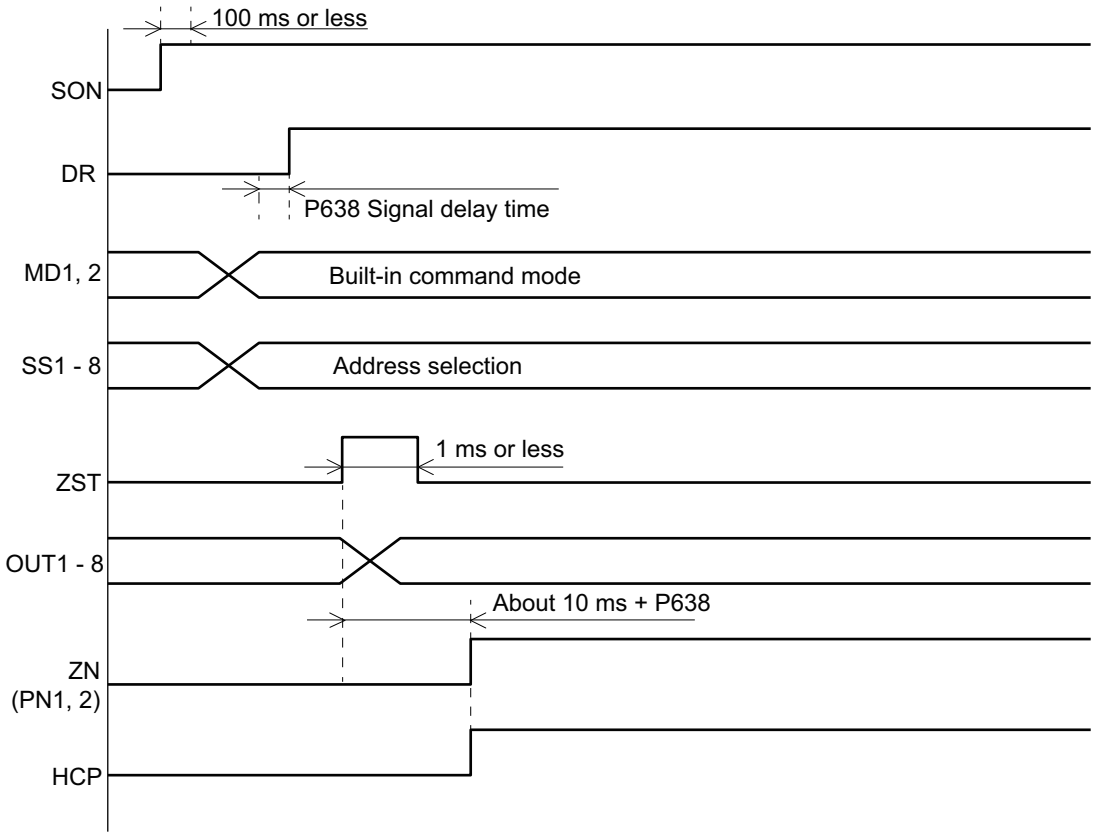
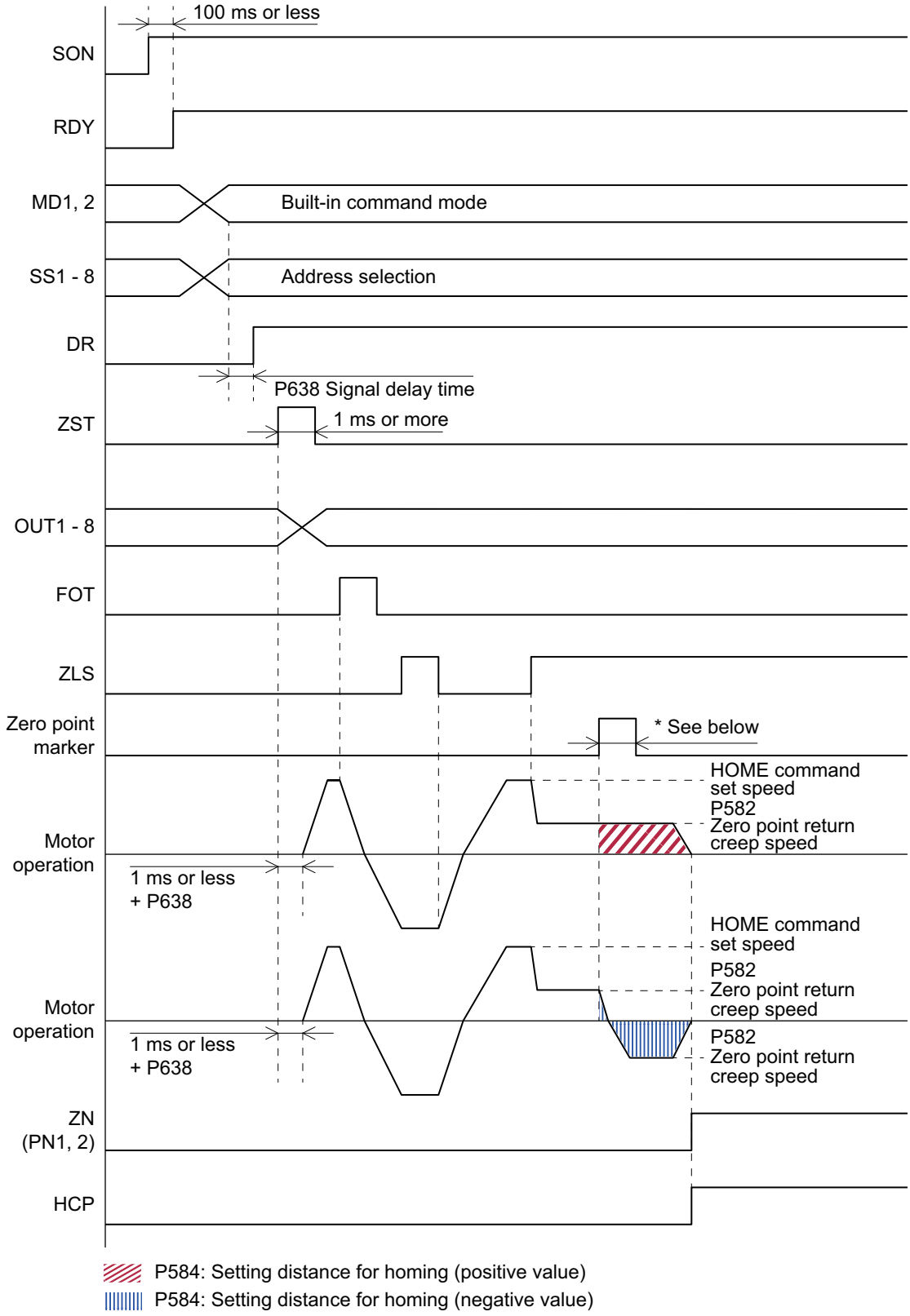


Figure 5-13 STOP HOME time chart

• OT HOME

Detects the marker after zero point deceleration, and sets the zero point.

If ZLS is detected beyond FOT, the device stops after decelerating to the creep speed.

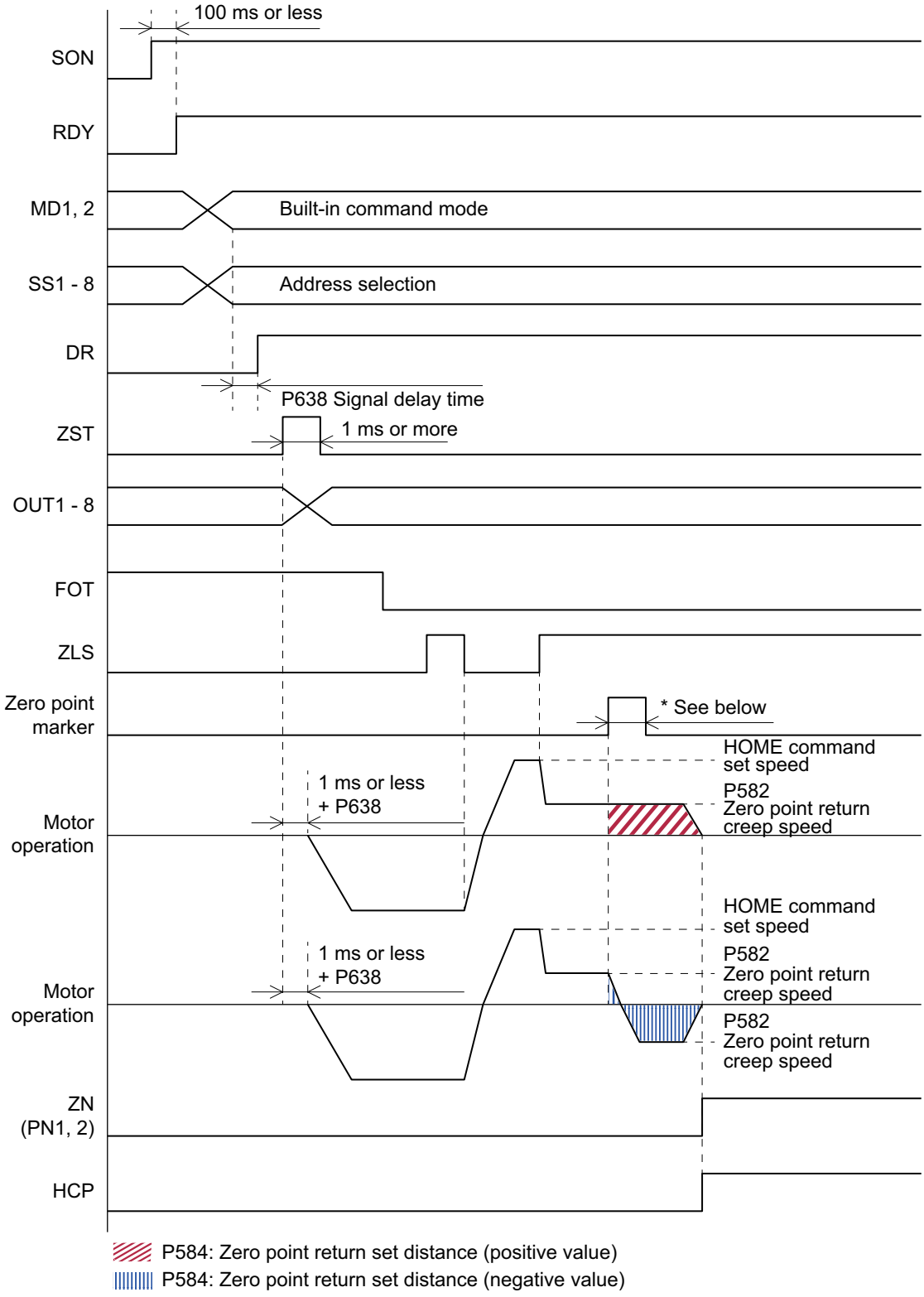


* Select the zero point marker to use from [P581 (1st digit): Zero point marker selection for homing].

Feedback marker: 0.5 µs or more, external marker: 1 ms or more

Figure 5-14 OT HOME time chart ①

If the command is executed when the FOT signal is in the ON state

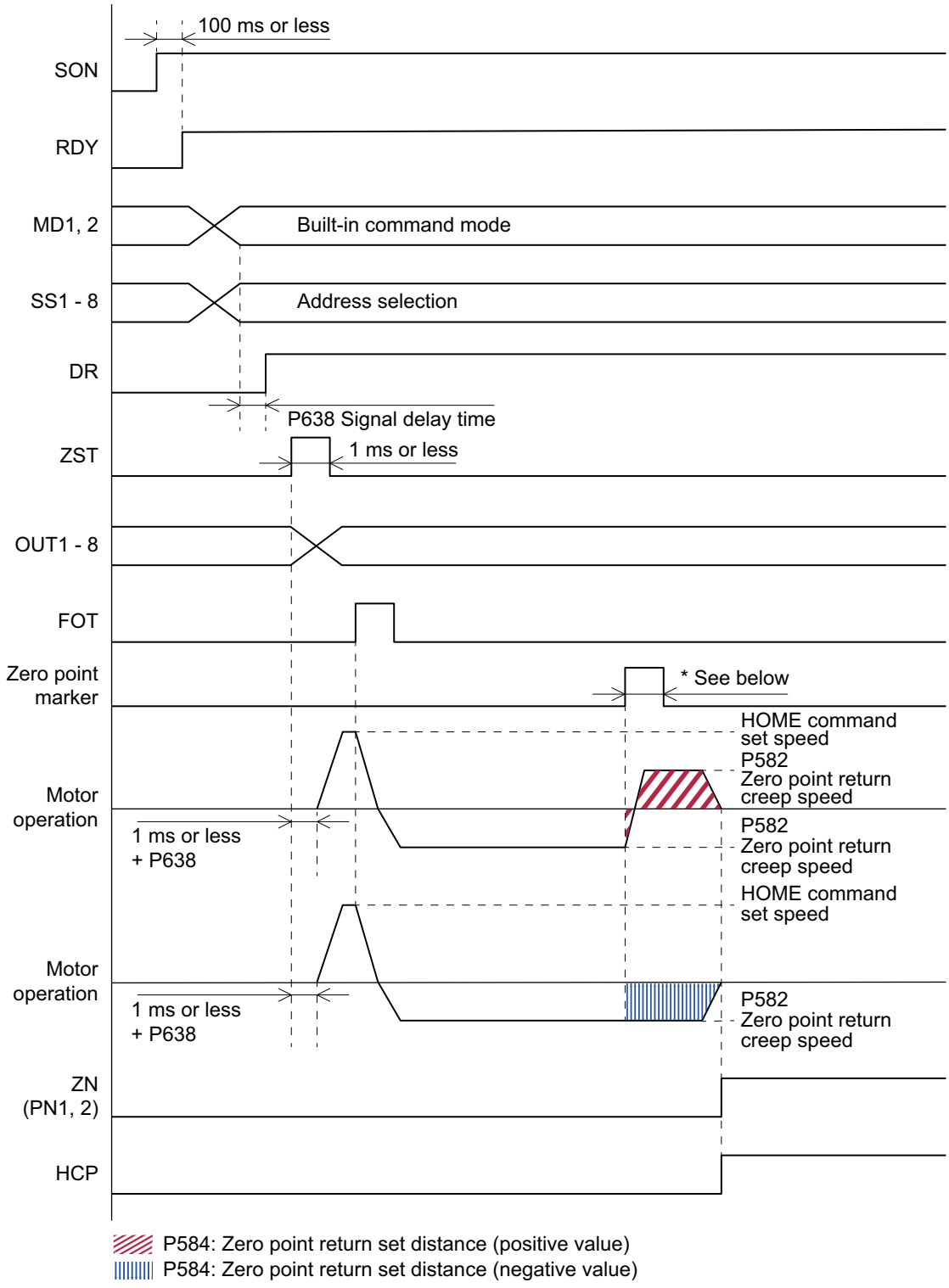


* Select the zero point marker to use from [P581 (1st digit): Zero point marker selection for homing].
  Feedback marker: 0.5 μs or more, external marker: 1 ms or more

Figure 5-15 OT HOME time chart ②

• OT LS LESS

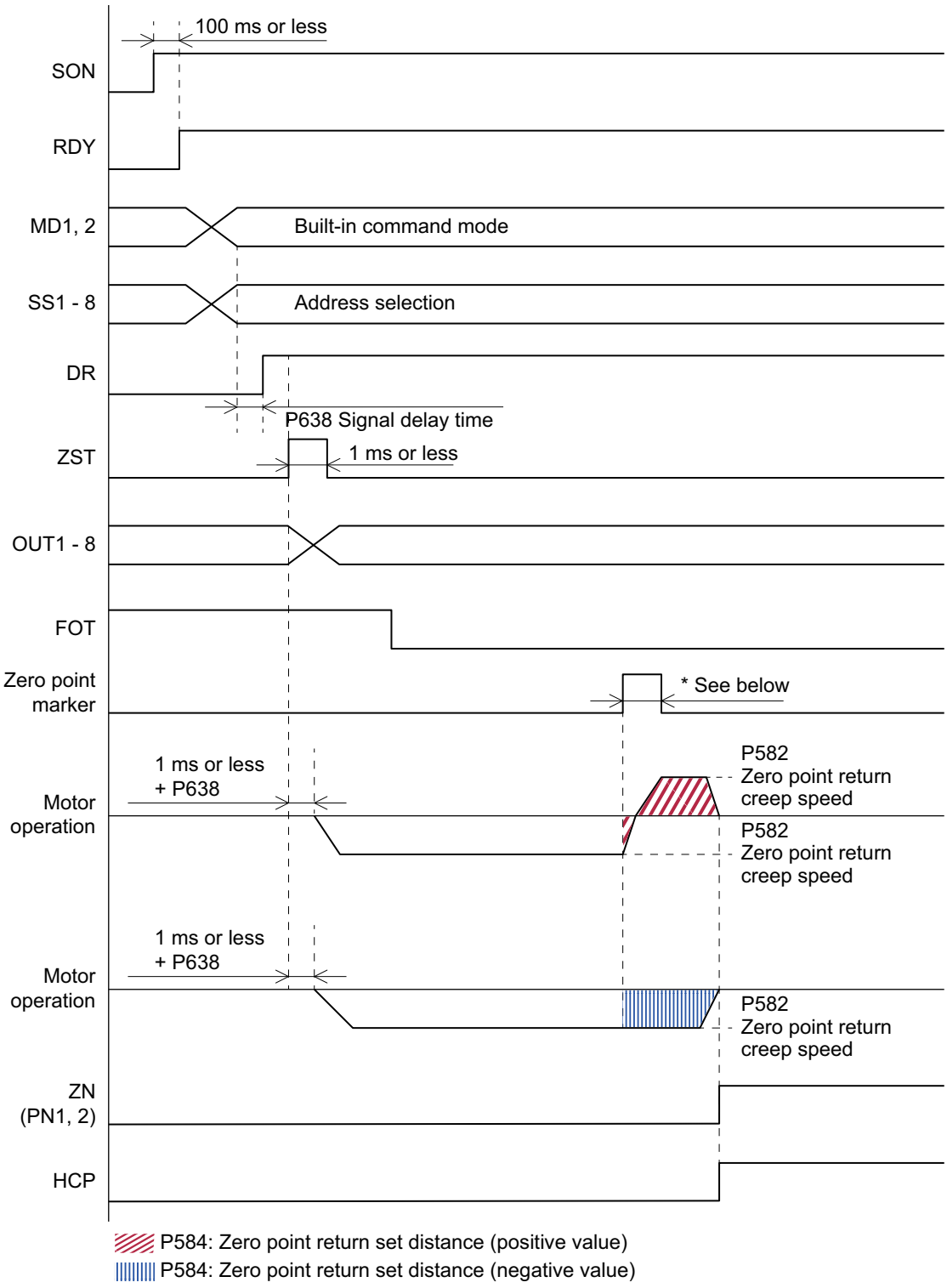
Reverses the direction, detects the marker, and sets the zero point when OT is detected.



* Select the zero point marker to use from [P581 (1st digit): Zero point marker selection for homing].
Feedback marker: 0.5 µs or more, external marker: 1 ms or more

Figure 5-16 OT LS LESS time chart ①

If the command is executed when the FOT signal is in the ON state



* Select the zero point marker to use from [P581 (1st digit): Zero point marker selection for homing].
Feedback marker: 0.5 µs or more, external marker: 1 ms or more

Figure 5-17 OT LS LESS time chart ②

- SET ABS
  When SET ABS is executed, the value of the encoder position (C024) is set in [P168: ABS standard data].
  SET ABS can be executed even in the servo off status.
  For details of the setting method, refer to "6-4 Adjustment of the mechanical position of the ABS encoder".

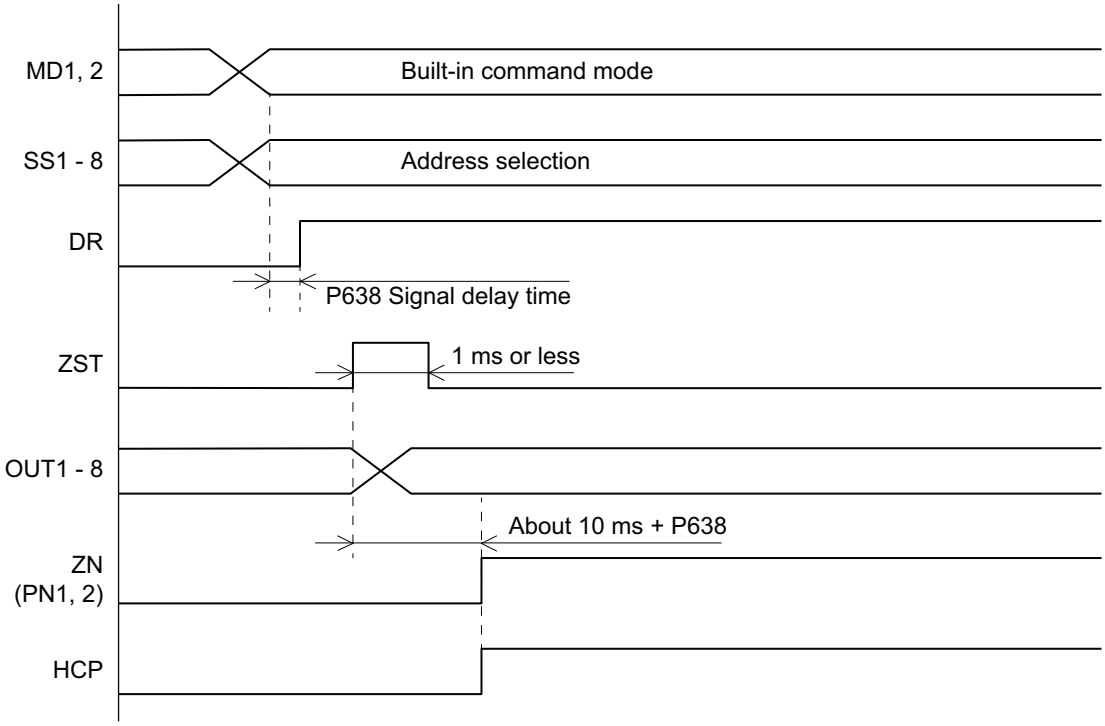


Figure 5-18 SET ABS time chart

5-4-4 Index positioning

When the INDX command is executed in program run, index positioning operation is started. Index positioning operation is executed by specifying an address where the INDX command is set and switching the positioning start signal (ZST) ON. Upon the completion of the operation, the command complete signal (ZN) is switched ON.
By setting [P516: Positioning approval selection when homing is not completed], it is possible to disable the execution of positioning operation before the completion of zero point return.

To execute the INDX command, set the following parameters:
- P165: Rotation position range — Set a value other than "0".
- P166: Rotation position range sign switching position — Set "0".

a. Index positioning operation input data

Data name	Data function	Input range	Unit
POS	Positioning position	0 to 2147483647 IX00 to IX99	P161 unit

Set a positioning amount. If a value outside the range is set, [AL.433: 1 rotation short cut positioning position setting error] occurs. For indirect data assignment, If a value outside the range is set in indirect data, [AL.432: Positioning command incorrect] occurs.

Data name	Data function	Input range	Unit
F	Positioning speed	0 to 300000000 IX00 to IX99	P161 unit/s

Set a positioning speed. If "0" is set, the motor does not operate with the command being under execution. To disable the command, switch the positioning cancel signal (ZCAN) ON. For indirect data assignment, if a value outside the range is set in indirect data, the positioning speed is set to "0".

Data name	Data function	Input range	Unit
OUT	Common output	00000000 to 11111111 IX00 to IX99	Binary

Set a common output. A common output is possible at the start of operation.

Data name	Data function	Input range	Unit
DIR	Positioning direction	SHORT/FORWARD/REVERSE	None

Select a positioning amount type.
- SHORT: Operation is performed in the direction in which the positioning travel distance is shorter.
- FORWARD: Operation is performed in the forward direction.
- REVERSE: Operation is performed in the reverse direction.

Data name	Data function	Input range	Unit
UPDN	SEL selection	SEL 0 to 7	None

Select the SEL number used for positioning operation.
The following setting values follow the selected SEL number.
Acceleration/deceleration time, S-curve acceleration/deceleration time, torque limit value, Gain No., and PN signal selection

b. Positioning operation time chart

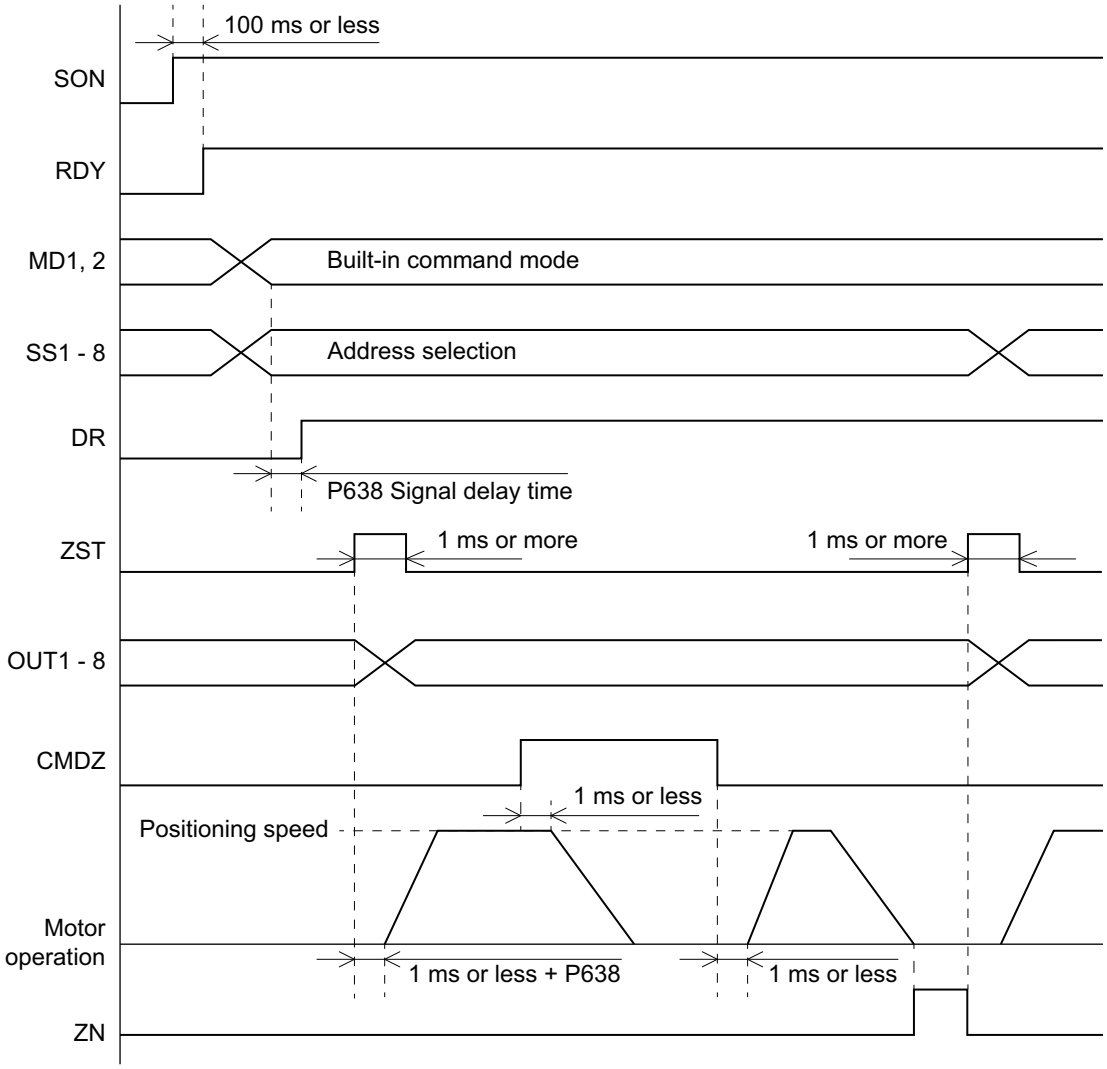


Figure 5-19 INDX command time chart

Chapter 6 Additional functions

6-1 Switching between the normal speed gain and the low speed gain

There are gain adjustment parameters for the gain during normal operation and the gain during low speed operation. The timing for switching between the normal gain and the low speed gain can be set with a parameter.
For information about the adjustment method, refer to the "VPH Series Servo Adjustment Manual".

6-1-1 Gain switching-related parameters

Table 6-1 Gain switching -related parameters

No.	Name	Input range [unit]
P210	Gain No. 0 Low speed gain switching speed	0.000 to 99999.999 [rpm]
P211	Gain No. 0 Low speed gain switching deviation pulse	0 to 99999999 [FB pulse]
P212	Gain No. 0 Normal speed → Low speed gain switching filter time constant	0.0 to 99.9 [ms]
	Gain No. 0 Low speed → Normal speed gain switching filter time constant	0.0 to 99.9 [ms]
	Gain No. 0 Low speed gain switching spec 1 selection	0: Speed and deviation pulse interlocking 1: Speed and deviation pulse separate 1 2: Speed and deviation pulse separate 2
	Gain No. 0 Low speed gain switching spec 2 selection	0: During command input, switching is ineffective. 1: Switching is effective regardless of the command.
P213	Gain No. 1 Low speed gain switching delay time	0.0 to 999.9 [ms]
	Gain No. 1 Low speed gain holding time after switching	0.0 to 9999.9 [ms]
P240	Gain No. 1 Low speed gain switching speed	0.000 to 99999.999 [rpm]
P241	Gain No. 1 Low speed gain switching deviation pulse	0 to 99999999 [FB pulse]

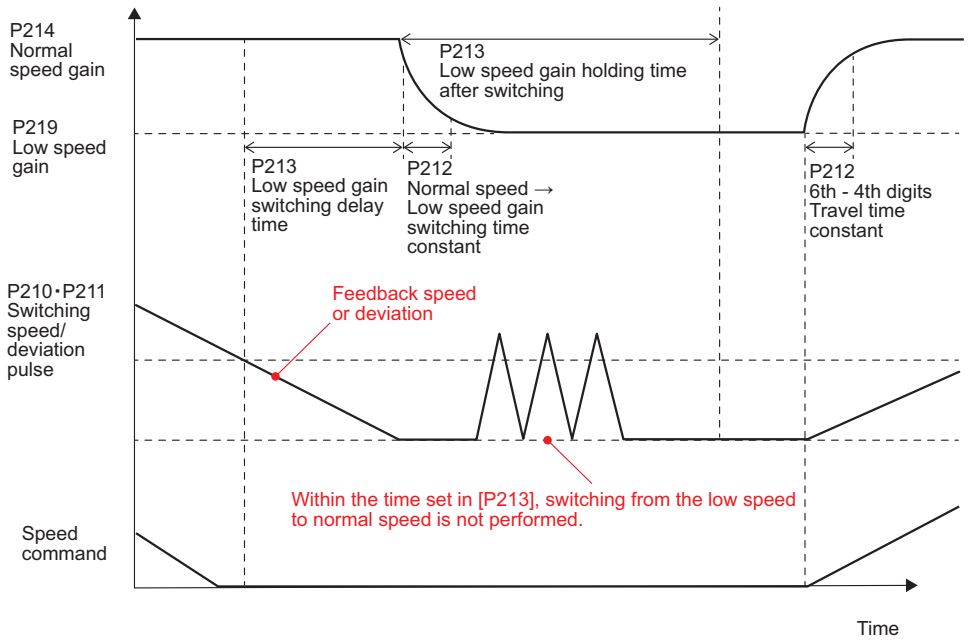
No.	Name	Input range [unit]
P242	Gain No. 1 Normal speed → Low speed gain switching filter time constant	0.0 to 99.9 [ms]
	Gain No. 1 Low speed → Normal speed gain switching filter time constant	0.0 to 99.9 [ms]
	Gain No. 1 Low speed gain switching spec 1 selection	0: Speed and deviation pulse interlocking 1: Speed and deviation pulse separate 1 2: Speed and deviation pulse separate 2
	Gain No. 1 Low speed gain switching spec 2 selection	0: During command input, switching is ineffective. 1: Switching is effective regardless of the command.
P243	Gain No. 2 Low speed gain switching delay time	0.0 to 999.9 [ms]
	Gain No. 2 Low speed gain holding time after switching	0.0 to 9999.9 [ms]
P270	Gain No. 2 Low speed gain switching speed	0.000 to 99999.999 [rpm]
P271	Gain No. 2 Low speed gain switching deviation pulse	0 to 99999999 [FB pulse]
P272	Gain No. 2 Normal speed → Low speed gain switching filter time constant	0.0 to 99.9 [ms]
	Gain No. 2 Low speed → Normal speed gain switching filter time constant	0.0 to 99.9 [ms]
	Gain No. 2 Low speed gain switching spec 1 selection	0: Speed and deviation pulse interlocking 1: Speed and deviation pulse separate 1 2: Speed and deviation pulse separate 2
	Gain No. 2 Low speed gain switching spec 2 selection	0: During command input, switching is ineffective. 1: Switching is effective regardless of the command.
P273	Gain No. 3 Low speed gain switching delay time	0.0 to 999.9 [ms]
	Gain No. 3 Low speed gain holding time after switching	0.0 to 9999.9 [ms]
P300	Gain No. 3 Low speed gain switching speed	0.000 to 99999.999 [rpm]
P301	Gain No. 3 Low speed gain switching deviation pulse	0 to 99999999 [FB pulse]

No.	Name	Input range [unit]
P302	Gain No. 3 Normal speed → Low speed gain switching filter time constant	0.0 to 99.9 [ms]
	Gain No. 3 Low speed → Normal speed gain switching filter time constant	0.0 to 99.9 [ms]
	Gain No. 3 Low speed gain switching spec 1 selection	0: Speed and deviation pulse interlocking 1: Speed and deviation pulse separate 1 2: Speed and deviation pulse separate 2
	Gain No. 3 Low speed gain switching spec 2 selection	0: During command input, switching is ineffective. 1: Switching is effective regardless of the command.
P303	Gain No. 3 Low speed gain switching delay time	0.0 to 999.9 [ms]
	Gain No. 3 Low speed gain holding time after switching	0.0 to 9999.9 [ms]

6-1-2 Gain switching operation

The timing for gain switching can be set with a parameter.
In the following example, the gain No. is 0.

[Switching between the normal speed gain and the low speed gain]
P212: Low speed gain switching spec 1 selection = 0 Speed and deviation pulse interlocking
P212: Low speed gain switching spec 2 selection = 0 During command input, low speed gain switching ineffective.



6-2 Auto magnetic pole detection operation

The functions for detecting the magnetic pole position of the motor in the device include auto magnetic pole detection operation. This operation is effective if [P068: Magnetic pole sensor type] is "Auto magnetic pole sensing", and is executed in the following operations:

- In the initial Servo On operation after the power-on
- In the initial Servo On operation after recovery from encoder errors

6-2-1 Auto magnetic pole detection-related parameters

Table 6-2 Auto magnetic pole detection operation-related parameters

No.	Name	Input range [unit]
P380	Magnetic pole detection torque limit value	0 to 799 [%]
P381	Magnetic pole detection gain 1	0 to 9999
P382	Magnetic pole detection integration time constant	0.1 to 999.9 [ms]
P383	Magnetic pole detection gain 2	0 to 9999 [s-1]
P384	Magnetic pole detection complete range	0.0 to 30.0 [deg]
P385	Magnetic pole detection filter order selection	0: Primary, 1: Secondary
	Magnetic pole detection filter frequency	0 to 9999 [Hz]
P386	Landing torque	0 to 799 [%]
	Landing torque holding time	0.00 to 99.99 [s]
P387	Magnetic pole detection torque minimum value	0 to 799 [%]
	Magnetic pole detection torque attenuation pattern selection	0: Soft damping, 1: Rapid damping

6-2-2 Auto magnetic pole detection operation

a. Auto magnetic pole detection operation pattern

The operation pattern in auto magnetic pole detection is as shown below. In actual operation, the following pattern is repeated two or three times. When this operation terminates normally, the servo ready signal (RDY) is output.

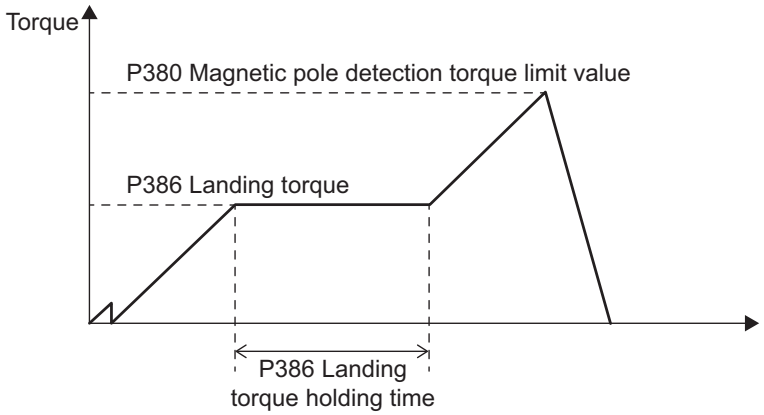


Figure 6-1 Single pattern operation of auto magnetic pole detection

* The time required for auto magnetic pole detection operation is four seconds plus the time set in [P386: Landing torque holding time].

* When the [P386] setting is "0", the slope of output torque is linear until it reaches the [P380] setting from the "0" status. The time required to reach the [P380] setting from the "0" status is 500 ms.

b. Auto magnetic pole detection operation pattern examples

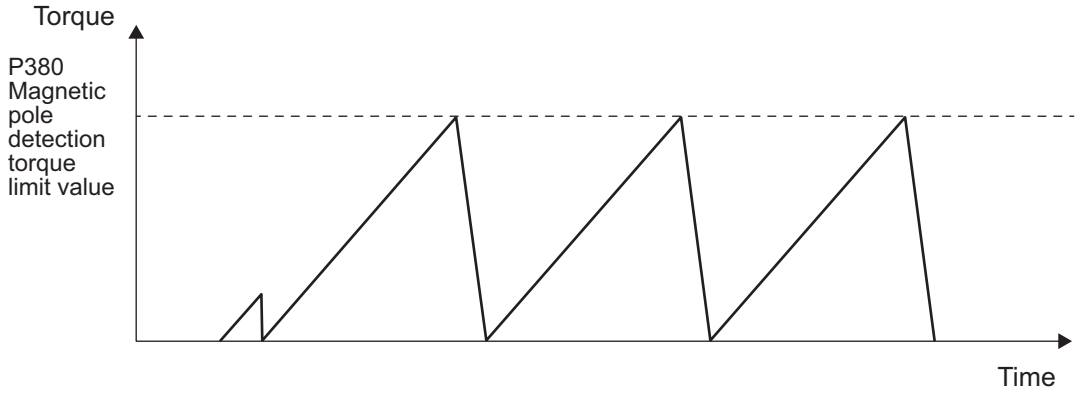
Depending on the load inertia, the proper values of the auto magnetic pole detection-related parameters differ. Set them referring to the following setting examples as rough guides.

- Example 1: If the load inertia is equal to or less than several tens of times the motor inertia

  A non-zero value is set in P380.

  P386 = 0

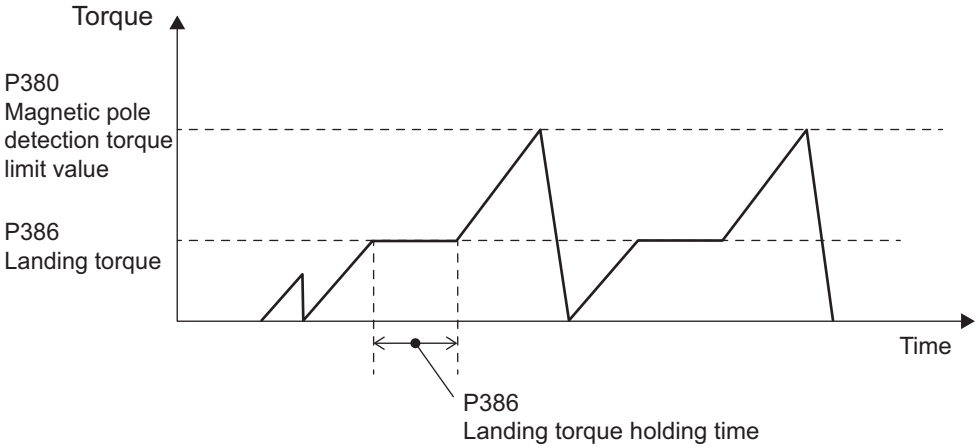
  P387 = 0



- Example 2: If the load inertia is equal to or greater than several tens of times the motor inertia

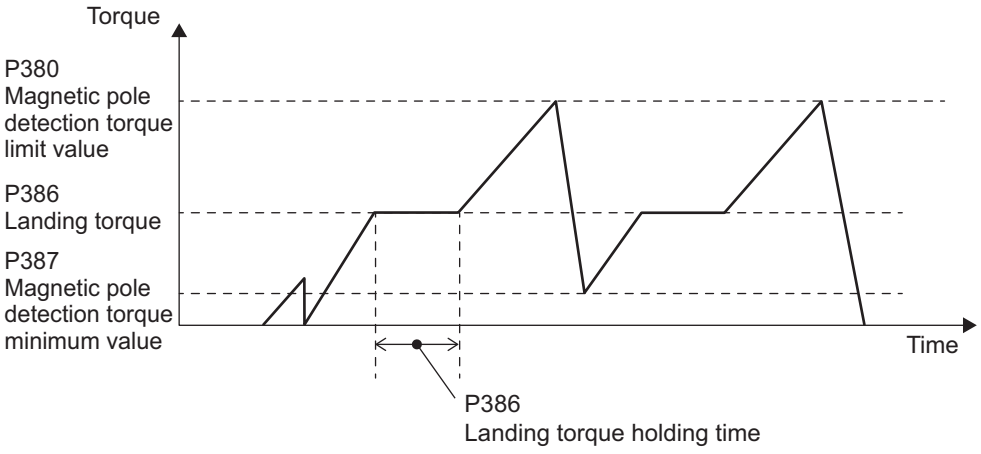
  A non-zero value is set in P380 and P386.

  P387 = 0



- Example 3: If the load inertia is equal to or greater than several tens of times the motor inertia, and the load is slightly unbalanced

  A non-zero value is set in P380, P386, and P387.



6-2-3 Auto magnetic pole-related error

If this operation cannot terminate normally, "AL.303 Auto magnetic pole detection error" occurs and the servo off status is assumed. Followings are possible causes.

- The gain adjustment of the auto magnetic pole is not an appropriate value.
  Adjust the gain, referring to "6-2-4 Auto magnetic pole adjustment".
- Detection fails due to the influence of the mechanical system.
  Due to conditions of the mechanical system, such as large load inertia, low rigidity, and imbalanced load, automatic magnetic pole detection may fail. Take measures such as adjusting the gain. Also, check that there is no play in the mechanical system. If the error is not removed, you may need to review the mechanical system.

6-2-4 Auto magnetic pole adjustment

If the auto magnetic pole operation is not completed normally due to, for example, the occurrence of an error, adjust the gain.

a. P380: Magnetic pole detection torque limit value
- Set the torque limit value according to the motor to use.
- The larger the setting value, the larger the torque output by the motor and the quicker the response.
- If the setting value is decreased too much, the response becomes slow, making it difficult to achieve magnetic pole detection.

b. P381: Magnetic pole detection gain 1
- The larger the value, the quicker the response.
- If the setting value is increased too much, vibration occurs.
- If the setting value is decreased too much, the response becomes slow, making it difficult to achieve magnetic pole detection.

c. P382: Magnetic pole detection integration time constant
- The smaller the setting value, the quicker the response.
- If the setting value is decreased too much, vibration (chatter vibration) occurs.
- If the setting value is increased too much, the response becomes slow, making it difficult to achieve magnetic pole detection.

d. P383: Magnetic pole detection gain 2
- The larger the value, the quicker the response.
- If the setting value is increased too much, over-shoot, under-shoot, or vibration occurs.
- If the setting value is decreased too much, the response becomes slow, making it difficult to achieve magnetic pole detection.

e. P385: Magnetic pole detection filter frequency
- If machine resonance occurs, enter a filter for the torque command to fix it.
- The larger the value, the quicker the response.
- If the setting value is decreased too much, the response becomes slow, making it difficult to achieve magnetic pole detection.

f. P386: Landing torque
- Set the landing torque value according to the torque limit value at magnetic pole detection.
- If the setting value is decreased too much or too close in comparison to the torque limit value at magnetic pole detection, this makes it difficult to achieve magnetic pole detection.

g. P386: Landing torque holding time
- Set the landing torque holding time according to the torque limit value at magnetic pole detection.
- The larger the setting value, the more stable the magnetic pole detection operation in the landing torque, but the longer the magnetic pole detection time.

⚠Caution
• In the case of machine that cannot carry out "auto magnetic pole detection operation (swing motion of the motor)" at the power-on (due to interference between works, etc.), use the "magnetic pole sensor". • Note that motor performs swing motion in the auto magnetic pole detection operation.

6-3 Vibration control filter

This device is equipped with the vibration control filter function to cope with resonant frequency caused by minute vibration or to cope with low-rigidity machines. This function can suppress resonance in the case of low frequency vibration.

6-3-1 Vibration control filter-related parameters

Table 6-3 Vibration control filter-related parameters

No.	Name	Input range [unit]
P340	Vibration control filter ineffective speed range *	0.00 to 99999.999 [rpm]
P341	Vibration control filter center frequency *	0 to 4999 [Hz]
	Vibration control filter band width ratio *	0 to 100 [%]
	Vibration control filter depth	0 to 99 [-dB]

* If either P340 or P341 is "0", the vibration control filter is ineffective.

6-3-2 Vibration control filter operation pattern

Operation with the vibration control filter being set is as follows.

* Filter values can be set only in manual manner.
* Filter values can be determined based on the torque, speed, and deviation waveform.

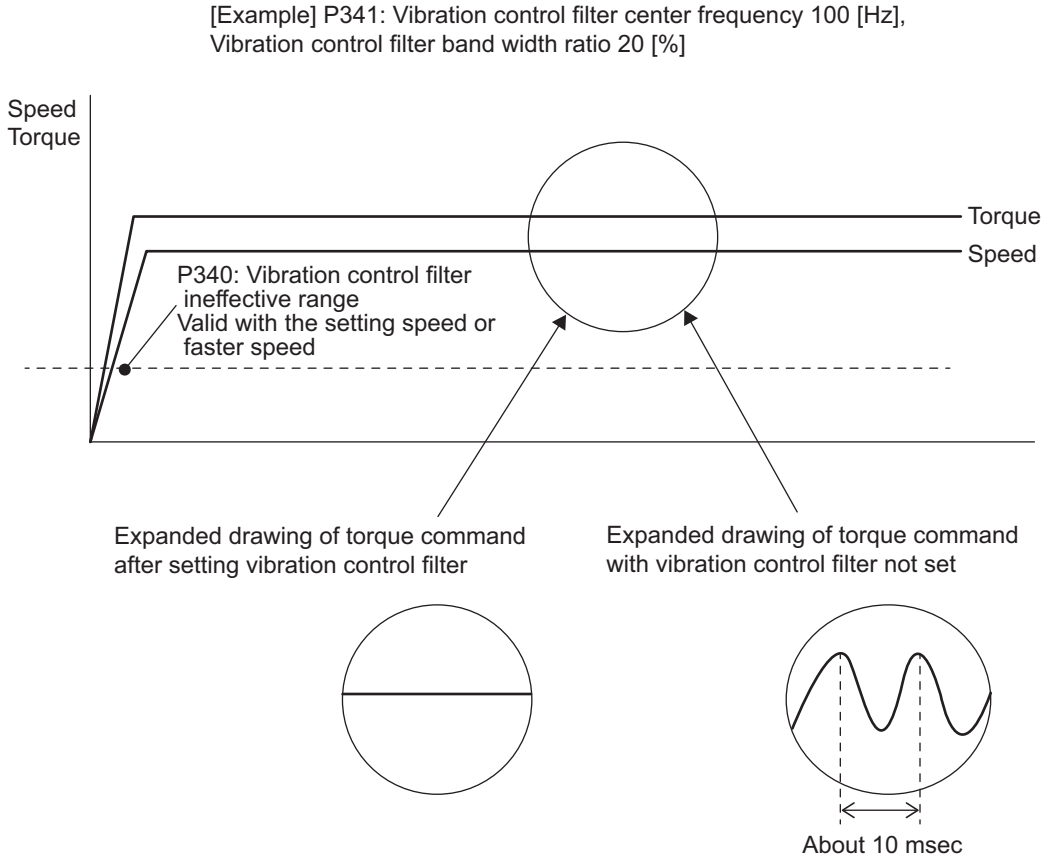


Figure 6-2 Vibration control filter setting example in the case of 100 [Hz] vibration

When effective, this function can influence the acceleration/deceleration operation of the motor. Set a correct value in [P340] according to the details of the operation.

6-4 Adjustment of the mechanical position of the ABS encoder

6-4-1 ABS encoder position setting

If using the ABS encoder, you can change the display of the current position (C020) at will. Two setting methods are available, manual setting method in which you change parameters directly and automatic setting method with commands. For information about the automatic setting method, refer to "6-4-2 ABS encoder position setting using a command".

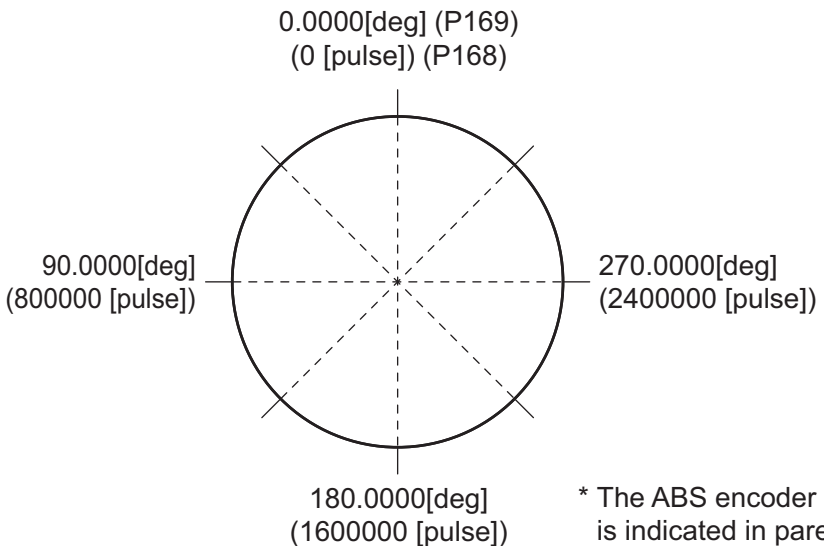
1. Encoder setting
Start VPH DES, and set the connected encoder.

2. Mechanical position setting
- ABS standard data setting
  Set [P168: ABS standard data].
  From the status display of VPH DES, check the value displayed for the encoder position (C024), and set the position you want to be standard data in [P168: ABS standard data].
- ABS standard mechanical position
  Set [P169: ABS standard mechanical position]. For the position that is set in [P168], set the value displayed for the current position (C020) in [P169: ABS standard mechanical position].

* If changing [P161 (1st digit): Moving direction selection] after the completion of the setting, follow "3) Mechanical position setting" again.
* If zero point return is executed after the completion of the above setting, the setting becomes ineffective.
  To make effective the mechanical position setting with [P168] and [P169], turn the power off, then on again.

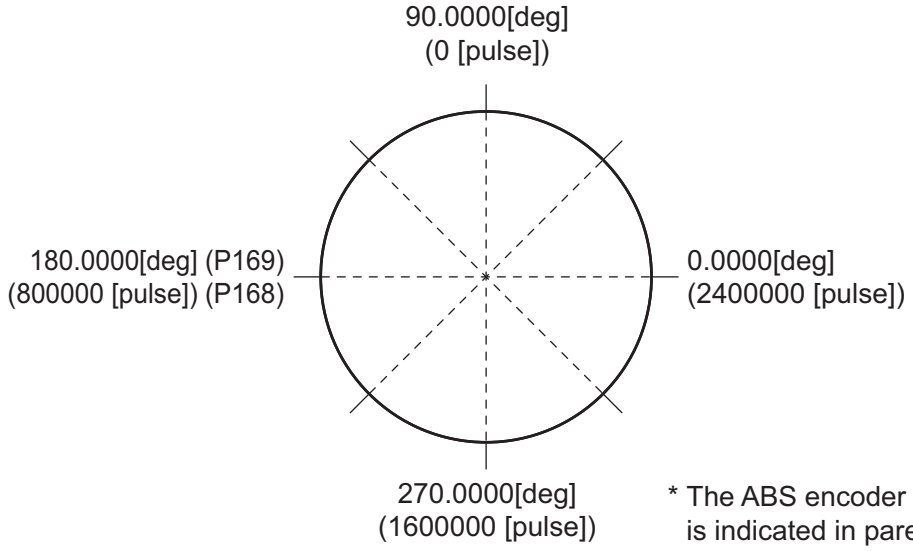
[Example 1]

P061: Number of encoder pulses of rotary type motor = 3200000 [ppr]
P161: Position unit selection = deg
P161: Position decimal point unit selection = 0.0001
P165: Rotation position range = 360.0000 [deg]
P168: ABS standard data = 0 [pulse]
P169: ABS standard mechanical position = 0.0000 [deg]



[Example 2]

P061: Number of encoder pulses of rotary type motor = 3200000 [ppr]
P161: Position unit selection = deg
P161: Position decimal point unit selection = 0.0001
P165: Rotation position range = 360.0000 [deg]
P168: ABS standard data = 800000 [pulse]
P169: ABS standard mechanical position = 180.0000 [deg]



6-4-2 ABS encoder position setting using a command

By executing the HOME command at any position, adjust the mechanical position.

1. Command selection
Select HOME, and set TYPE [zero point return method] to "SET ABS".

2. Movement to the standard position
Using jog operation, etc., move the motor to the standard position of the machine system.

3. ABS standard mechanical position setting
At the position of "2. Movement to the standard position", set the value you want displayed as the current position in [P169: ABS standard mechanical position].

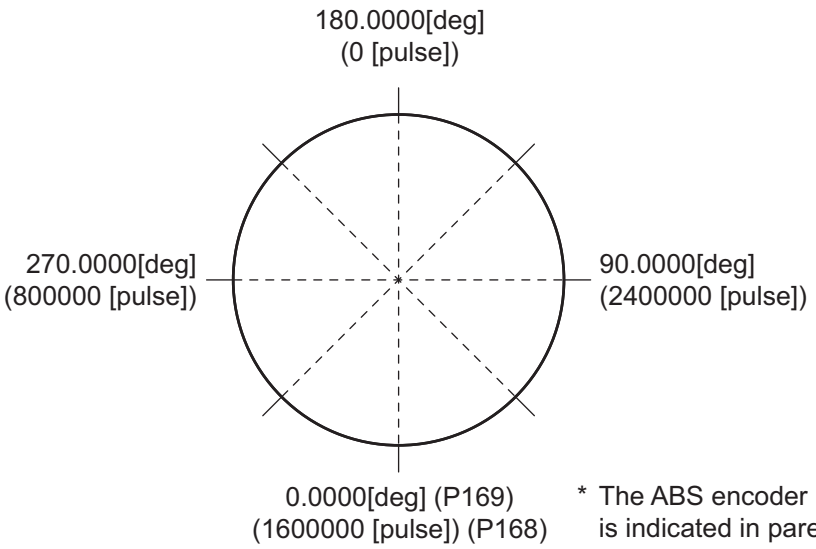
4. Command execution
Execute the HOME command, SET ABS.
The value of the current encoder position (C024) of the motor is automatically set in [P168: ABS standard data]. The value of [P169: ABS standard mechanical position] is displayed as the current position (C020).

[Example]
If you want to set the position of the encoder position 1600000 [pulse] as the current position 0 [deg]
Set [P169: ABS standard mechanical position] to "0", and execute SET ABS at the position of the encoder position 1600000 [pulse].

P061: Number of encoder pulses of rotary type motor	= 3200000 [ppr]
P161: Position unit selection	= deg
P161: Position decimal point unit selection	= 0.0001
P165: Rotation position range	= 360.0000 [deg]
P169: ABS standard mechanical position	= 0.0000 [deg]

[P168] is automatically set after the execution of SET ABS.

P168: ABS standard data	= 1600000 [pulse]



* The ABS encoder position is indicated in parentheses.

6-5 Motor overheat detection function

Using parameters, set the "AL.116 Motor overheat error"and "FL.907 Motor overheat warning" specifications.

6-5-1 Motor overheat detection-related parameters

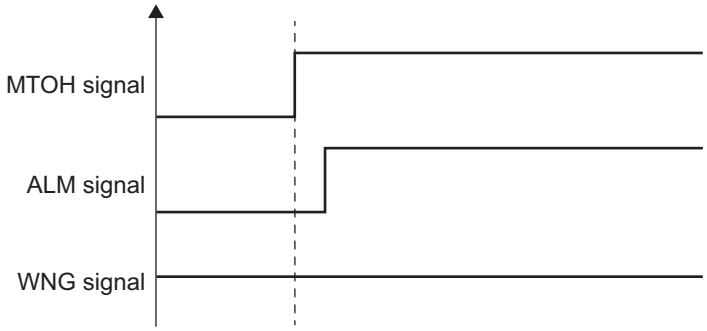
Table 6-4 Motor overheat detection-related parameters

No.	Name	Input range [unit]
P129	Motor overheat detection spec selection	0: Warning 1: No warning 2: Warning only
	Motor overheat detection time	0 to 999 [s]

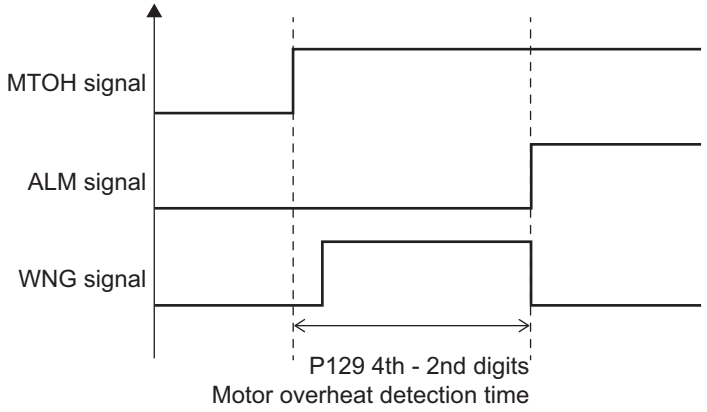
6-5-2 Motor overheat detection

Motor overheat detection examples are shown below.

a. If the detection time is "0"
With the MTOH signal being ON, [AL.116: Motor overheat error] occurs.
- P129[1st digit]: No warning
- P129[4th - 2nd digits]: 0

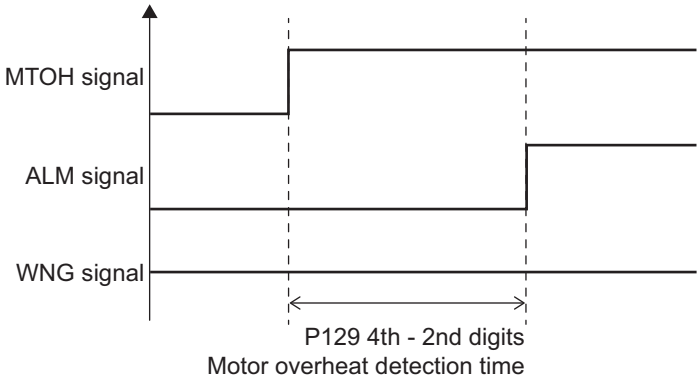


b. If the detection specification is "Warning"and the detection time is "1 to 999"
With the MTOH signal being ON, [FL.907: Motor overheat warning] occurs, and after the period during which the MTOH signal is continuously ON reaches the set time, [AL.116: Motor overheat error] occurs.
- P129[1st digit]: Warning
- P129[4th - 2nd digits]: 1 to 999



c. If the detection specification is "No warning"and the detection time is "1 to 999"
After the period during which the MTOH signal is continuously ON reaches the set time, [AL.116: Motor overheat error] occurs.
[FL.907: Motor overheat warning] does not occur.

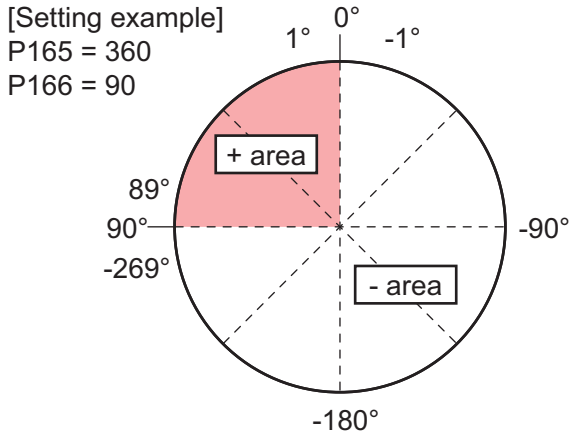
- P129[1st digit]: No warning
- P129[4th - 2nd digits]: 1 to 999



6-6 Rotation position range setting

Relation between the rotation position range and the sign switching position

- If P165 is a positive value (1 to 999999999)
  At power ON, the present position is acquired according to the [P165] and [P166] settings.
  Subsequently, the present position is rounded within the [P165] range.



- If P165 is a negative value (-99999999 to -1)
  At power ON, the present position is acquired according to the [P165] and [P166] settings.
  Subsequently, rounding within the range is not performed.

* Effective if [P170] is set to "0: Reflected" when the ABS encoder is connected.
If a negative value is set under other conditions, the present position is rounded within the [P165] range.

6-7 Software overtravel detection function

Using parameters, set overtravel detection.

6-7-1 Software overtravel-related parameters

The operation in this operation depends on the values of the software overtravel-related parameters.

Table 6-5 Software overtravel-related parameters

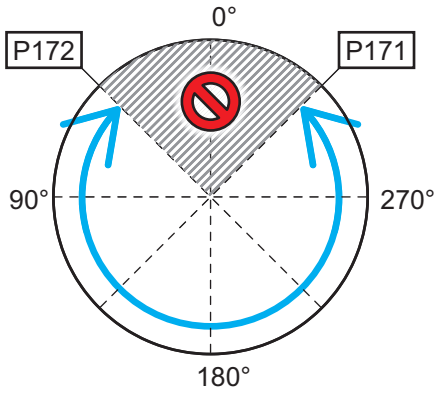
No.	Name	Input range [unit]
P171	Forward direction software OT limit	-2147483648 to 2147483647 [P161 unit]
P172	Reverse direction software OT limit	-2147483648 to 2147483647 [P161 unit]
P585	Position data standard point	-2147483648 to 2147483647 [P161 unit]

6-7-2 Software overtravel setting examples

Examples of the motor operation range due to the soft OT limit are shown below.

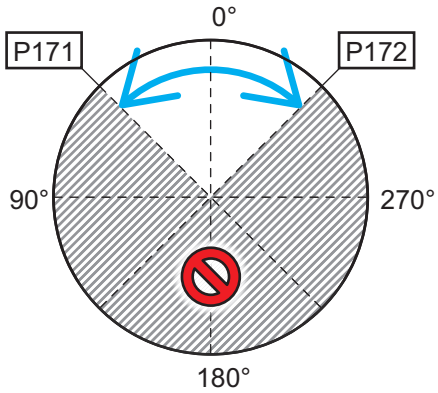
- If a rotation range is set

[Setting example]
P161 = 0.001deg
P162, P163 = 1/1
P164 = 360.000
P165 = 360.000
P166 = 0.000
P171 = 315.000
P172 = 45.000



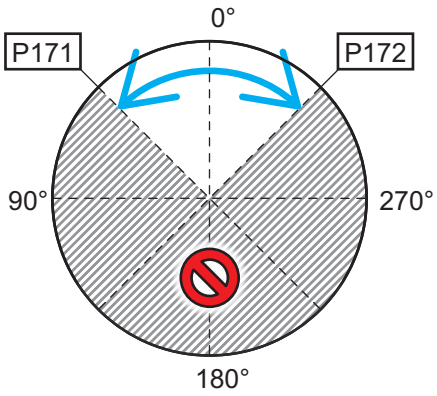
- If the rotation range and the sign switching position are ineffective

[Setting example]
P161 = 0.001deg
P162, P163 = 1/1
P164 = 360.000
P165 = 0.000
P166 = 0.000
P171 = 45.000
P172 = -45.000



- If a rotation range and a sign switching position are set

[Setting example]
P161 = 0.001deg
P162, P163 = 1/1
P164 = 360.000
P165 = 360.000
P166 = 180.000
P171 = 45.000
P172 = -45.000



6-8 Notch filter

Using parameters, set a notch filter.

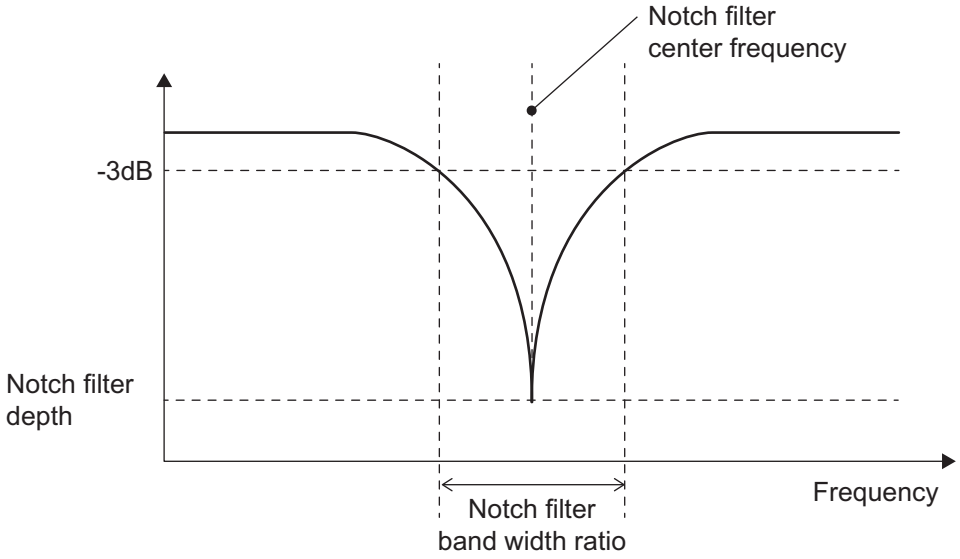
6-8-1 Notch filter-related parameters

Table 6-6 Notch filter-related parameters

No.	Name	Input range [unit]
P236	Gain No. 0 Notch filter center frequency	0 to 9999 [Hz]
	Gain No. 0 Notch filter band width ratio	0 to 200[%]
	Gain No. 0 Notch filter depth	0 to 99[-dB]
P266	Gain No. 1 Notch filter center frequency	0 to 9999 [Hz]
	Gain No. 1 Notch filter band width ratio	0 to 200[%]
	Gain No. 1 Notch filter depth	0 to 99[-dB]
P296	Gain No. 2 Notch filter center frequency	0 to 9999 [Hz]
	Gain No. 2 Notch filter band width ratio	0 to 200[%]
	Gain No. 2 Notch filter depth	0 to 99[-dB]
P326	Gain No. 3 Notch filter center frequency	0 to 9999 [Hz]
	Gain No. 3 Notch filter band width ratio	0 to 200[%]
	Gain No. 3 Notch filter depth	0 to 99[-dB]
P331	Notch filter center frequency 1	0 to 9999 [Hz]
	Notch filter band width ratio 1	0 to 200[%]
	Notch filter depth 1	0 to 99[-dB]
P332	Notch filter center frequency 2	0 to 9999 [Hz]
	Notch filter band width ratio 2	0 to 200[%]
	Notch filter depth 2	0 to 99[-dB]
P333	Notch filter center frequency 3	0 to 9999 [Hz]
	Notch filter band width ratio 3	0 to 200[%]
	Notch filter depth 3	0 to 99[-dB]
P334	Notch filter center frequency 4	0 to 9999 [Hz]
	Notch filter band width ratio 4	0 to 200[%]
	Notch filter depth 4	0 to 99[-dB]

6-8-2 Notch filter function

The relation of the notch filter function is shown below.



6-9 Brake function

This section explains the brake release and brake activation function of this device.

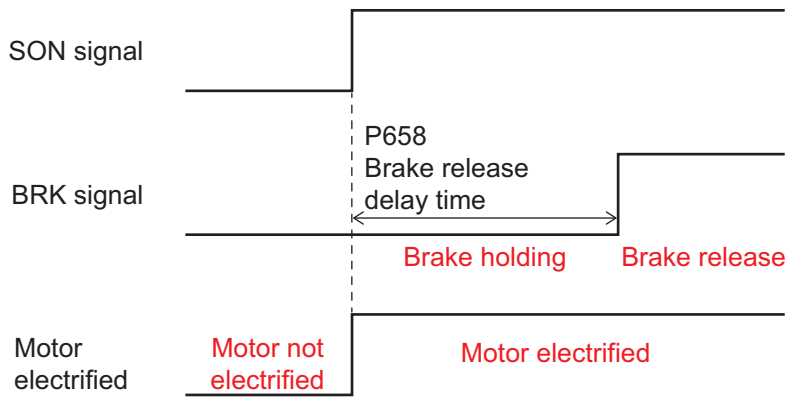
6-9-1 Brake function-related parameters

Table 6-7 Brake function-related parameters

No.	Name	Input range [unit]
P121	Main power OFF error detection spec selection	0: Servo OFF after braking stop 1: Servo OFF
P633	Stopping selection when EMG signal is ON	0: Servo OFF after braking stop 1: Servo OFF
	Deceleration time after EMG signal braking stoppage	0.00 to 99.99 [s]
	Servo OFF delay time after EMG signal braking stoppage	0.00 to 9.99 [s]
P651	SZ signal speed range	0 to 300000000 [P161 unit/s]
P658	Brake release delay time	0.000 to 9.999 [s]
	Brake activation delay time	0.000 to 9.999 [s]
P659	Brake activation effective low speed range	0 to 300000000 [P161 unit/s]
P660	Brake enforced activation delay time	0.000 to 9.999 [s]

6-9-2 Brake release delay time

As soon as the servo on signal (SON) is turned ON, the motor electrified status is assumed. After the elapse of the time that is set in [P658 (4th - 1st digits)], the brake release signal (BRK) turns ON.



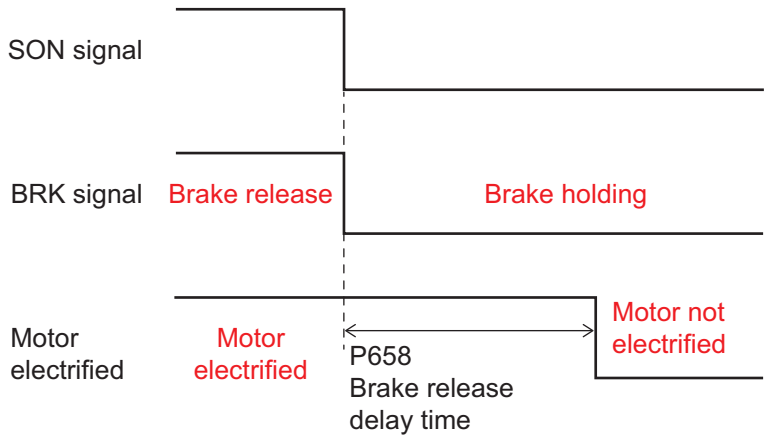
6-9-3 Brake activation delay time

The brake release signal (BRK) output timing differs between when the motor is stopped and when it is operating.
To judge whether the motor is stopped, use the speed zero signal (SZ). Adjust the [P651] setting so that the speed zero signal (SZ) becomes stable when the brake release signal (BRK) is operated.

a. When the motor is stopped (if the SZ signal is ON)

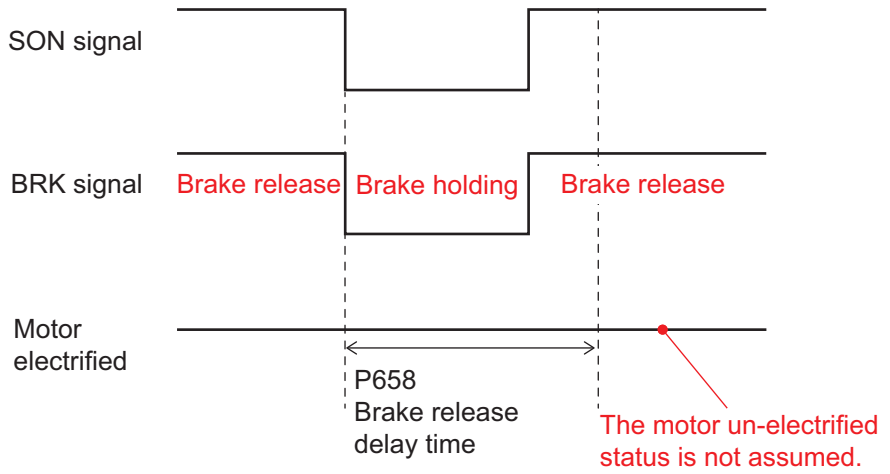
① If the servo on signal (SON) is OFF (if it is longer than the [P658 (8th - 5th digits)] setting)
After the servo on signal (SON) is turned OFF, the brake release signal (BRK) is turned OFF, and after the elapse of the time that is set in [P658 (8th - 5th digits)], the servo off status is assumed.
(The brake release signal (BRK) is turned OFF in the servo on status, thereby preventing the vertical shafts from dropping.)

Example)



② If the servo on signal (SON) is OFF (if it is shorter than the [P658 (8th - 5th digits)] setting)
After the servo on signal (SON) is turned OFF, the brake release signal (BRK) is turned OFF, and after the elapse of the time that is set in [P658 (8th - 5th digits)], the servo off status is assumed.
If the interval of switching the servo on signal (SON) from OFF to ON is shorter than the time that is set in [P658 (8th - 5th digits)], the brake release signal (BRK) is turned OFF as soon as the servo on signal (SON) is turned OFF, and the brake release signal (BRK) is turned ON as soon as the servo on signal (SON) is turned ON.
In this case, the motor un-electrified status is not assumed because the [P658 (8th - 5th digits)] time has not elapsed.

Example)



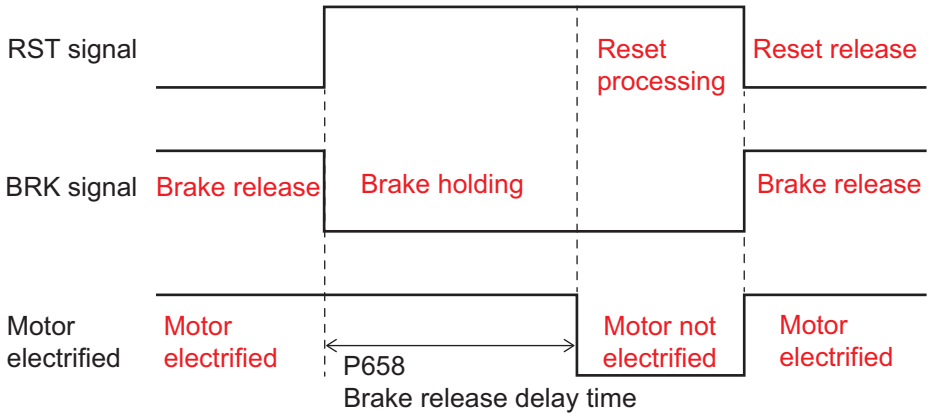
③ If the reset signal (RST) is turned ON (if it is held ON for a time longer than the [P658 (8th - 5th digits)] setting)

After the reset signal (RST) is turned ON, the brake release signal (BRK) is turned OFF, and after the elapse of [P658 (8th - 5th digits)], a reset (servo off status) occurs.

With the reset signal (RST) being turned OFF, the brake release signal (BRK) and the motor electrification in-process signal (MTON) are turned ON (servo on status) again.

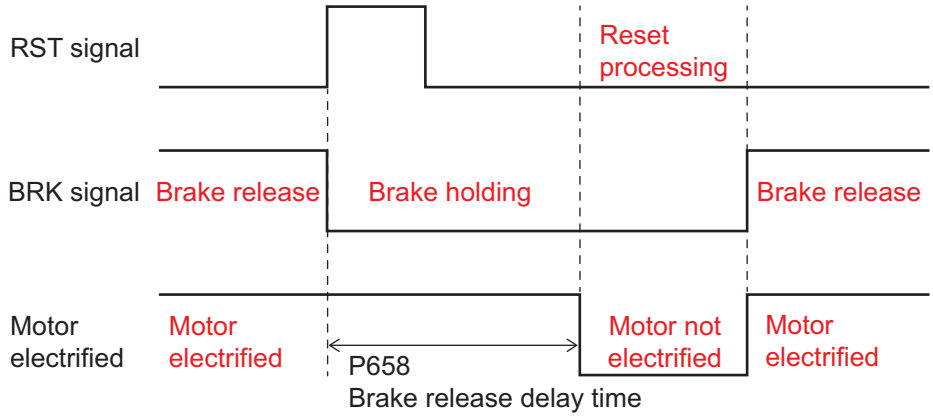
* The operation starts with the SON signal being ON (servo on status).

Example)



④ If the reset signal (RST) is turned ON (if it is held ON for a time shorter than the [P658 (8th - 5th digits)] setting)
After the reset signal (RST) is turned ON, the brake release signal (BRK) is turned OFF, and because the reset signal (RST) is turned OFF before the [P658 (8th - 5th digits)] setting, the servo off status is assumed in internal reset processing time only.
* The operation starts with the SON signal being ON (servo on status).

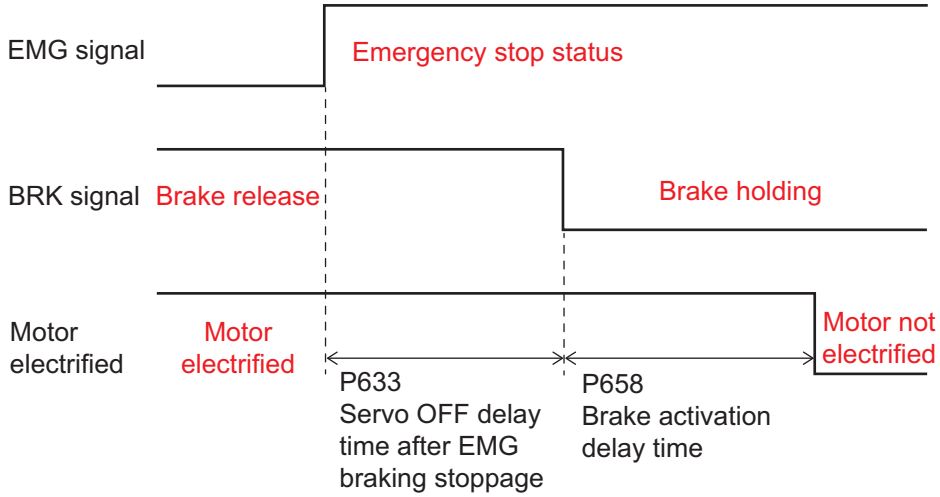
Example)



After the elapse of the time that is set in [P658 (8th - 5th digits)] from an ON edge of the reset signal (RST), reset processing is performed.
During reset processing, the servo off status (MTON signal OFF) is assumed.

⑤ If the emergency stop signal (EMG) is turned ON
After the emergency stop signal (EMG) is turned ON, the brake release signal (BRK) is turned OFF, and after the elapse of [P658 (8th - 5th digits)], the emergency stop status is assumed.
(The BRK signal is turned OFF in the servo on status, thereby preventing the vertical shafts from dropping.)

Example)

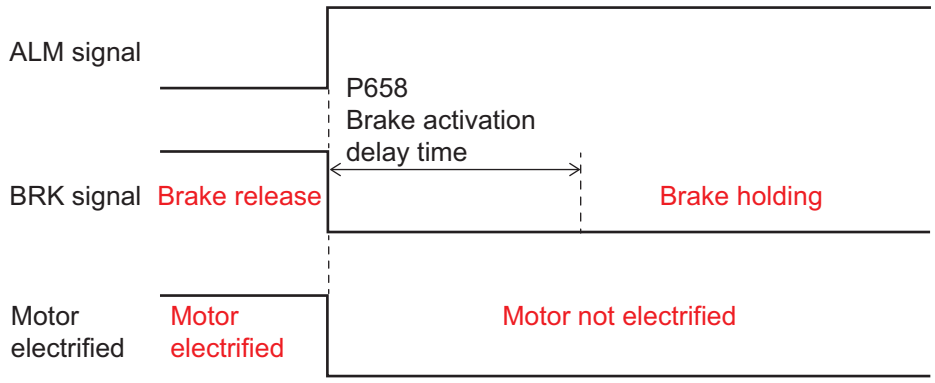


⑥ When a torque free alarm and a warning occurs

If a torque free alarm or a warning occurs, the brake holding status is assumed and the motor is un-electrified at the time of its occurrence.

It takes time for brake holding to be actually effective (the holding of the electromagnetic brake to be effective), so during that time, the motor is in the dropping status.

Example)



b. When the motor is operating (if the SZ signal is OFF)

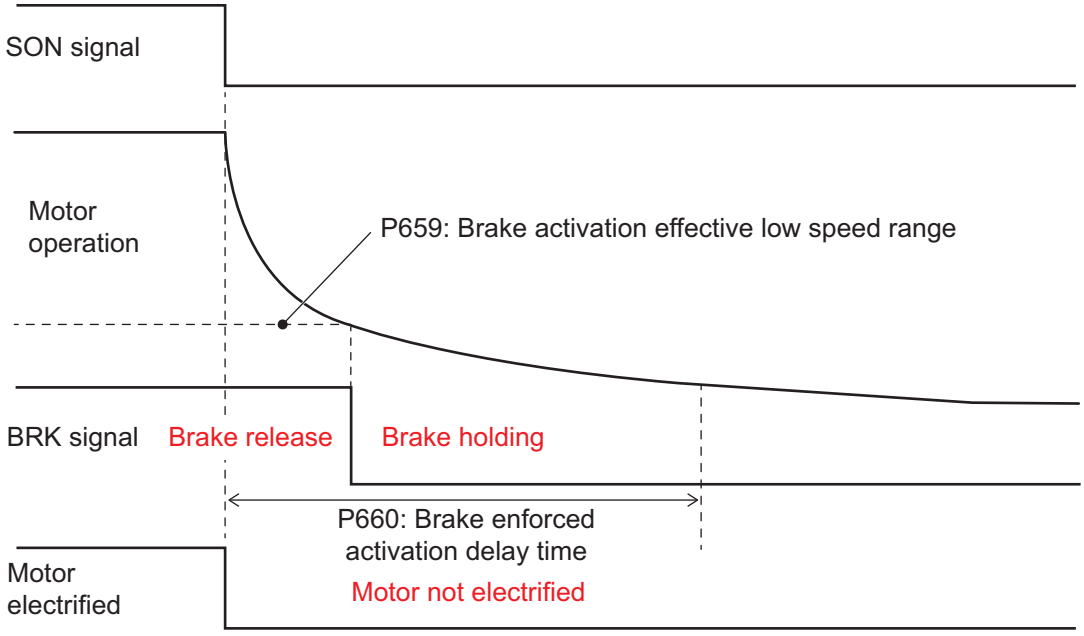
During motor operation, the brake release signal (BRK) is turned OFF when either [P659] or [P660] meets the condition.

* During motor operation, there is no time at which braking holding is performed in the servo on status.

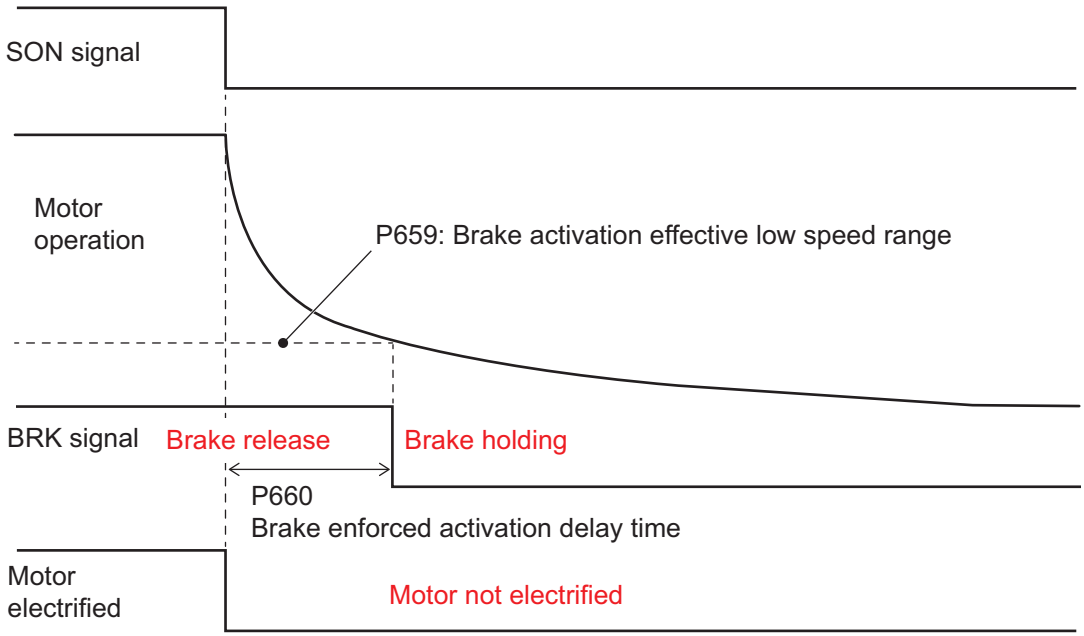
The time that can be set is a time when the motor can hold the brake while it is in the servo off status.

① If [P659] meets the condition first

Example)

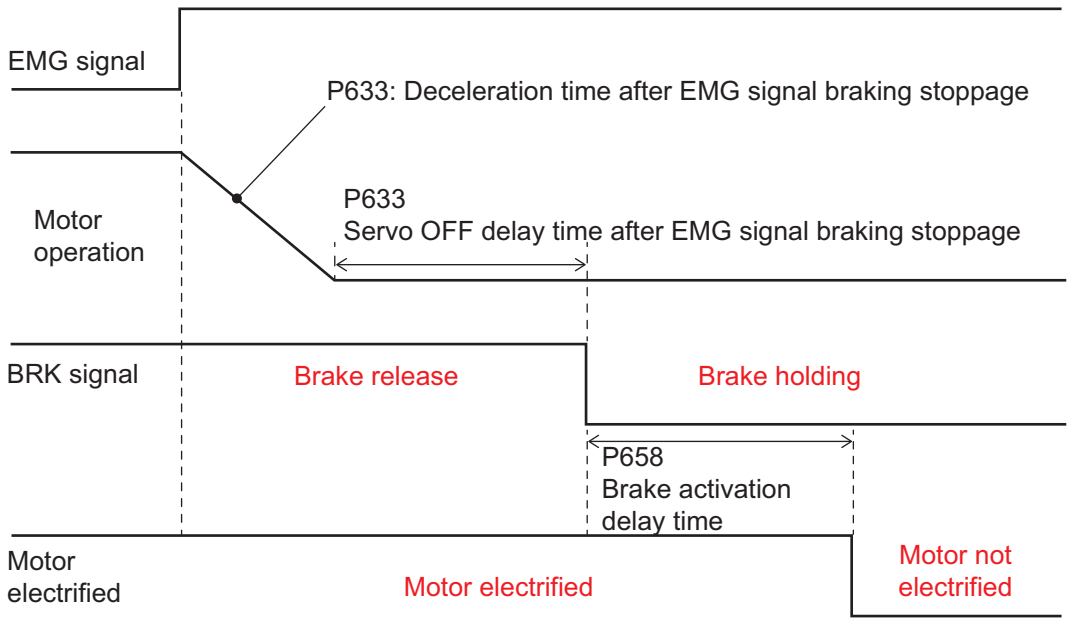


② If [P660] meets the condition first
Example)



③ If the emergency stop signal (EMG) is turned ON during motor operation
* This operation is effective if [P633 (1st digit)] is set to "Braking stop".
After the emergency stop signal (EMG) is turned OFF, the motor performs braking stoppage with [P633 (5th - 2nd digits)], and after the elapse of the time that is set in [P633 (8th - 6th digits)], the brake release signal (BRK) is turned OFF and the brake holding status is assumed. After the elapse of the time that is set in [P658 (8th - 5th digits)], the servo off status is assumed.
(The BRK signal is turned OFF in the servo on status, thereby preventing the vertical shafts from dropping.)

Example)

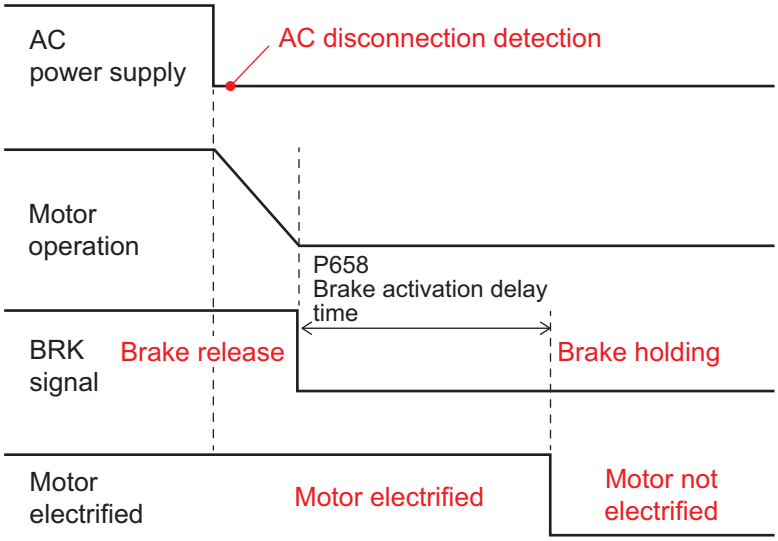


* In the case of coasting to stop ([P633 (1st digit)] = Servo OFF), the motor operates as described in ① or ② above.

④ Power discontinuity

To prevent dropping during power discontinuity, operation is possible by setting [P121 (1st digit)] to 0 (Braking).

Example)



* Depending on the status of the device, the motor un-electrified status may be assumed before the elapse of the [P658 (8th - 5th digits)] time.

6-10 Indirect data

6-10-1 Index data setting method

a. Range in which indirect data can be assigned with a parameter

To assign indirect data with a parameter, set a minus value. The setting range is "-1" to "-89", and it corresponds to the indirect data "IX01" to "IX89". In parameter setting, "0" is handled as a numeric value, so "IX00" cannot be specified.

b. Indirect data assignment method

The assignment method differs depending on whether [P161: Position decimal point unit selection] is applied to the parameter unit.

- If using indirect data for a parameter to which [P161: Position decimal point unit selection] is applied

  Set the indirect data number in the integer digits. For details on "parameter to which [P161: Position decimal point unit selection] is applied", refer to "9-2 Parameter list". Those parameters for which "P161" is contained in the Unit column are such parameters.

  Example) To specify IX15 for [P411: SPDSEL0 Speed command value], with [P161] being set to 0.01, set "-15.00".
- If using indirect data for a parameter to which [P161: Position decimal point unit selection] is not applied

  Set the indirect data number in the lower two digits, regardless of the decimal point.

  Example) To specify IX15 for [P412: SPDSEL0 Torque limit value], set "-1.5".

c. Notes on assigning indirect data

- Do not assign an indirect data number outside the assignment range.
- To set a value in indirect data, do not set a value beyond the parameter setting range.

6-10-2 Indirect data list

The type of indirect data depends on the number.

Table 6-8 Indirect data number list

Indirect data No.	Indirect data name	Type	Function
IX00 to IX49	Indirect data 00 to Indirect data 49	Holding	Indirect data also sustained after power off. Can be rewritten up to 1 billion times.
IX50 to IX89	Indirect data 50 to Indirect data 89	0 cleared	Arbitrary indirect data not sustained after power off. Cleared to "0" at power on.
IX90 to IX99	Indirect data 90 to Indirect data 99		Reserved

6-10-3 List of parameters corresponding to indirect data

Table 6-9 Speed command-related parameters

No.	Name	Input range	P161 application
P411	SPD SEL 0 Speed command value	-990000000 to -100000000	○
P412	SPD SEL 0 Torque limit value	-9.9 to 799.9	
P414	SPD SEL 1 Speed command value	-990000000 to -100000000	○
P415	SPD SEL 1 Torque limit value	-9.9 to 799.9	
P417	SPD SEL 2 Speed command value	-990000000 to -100000000	○
P418	SPD SEL 2 Torque limit value	-9.9 to 799.9	
P420	SPD SEL 3 Speed command value	-990000000 to -100000000	○
P421	SPD SEL 3 Torque limit value	-9.9 to 799.9	
P423	SPD SEL 4 Speed command value	-990000000 to -100000000	○
P424	SPD SEL 4 Torque limit value	-9.9 to 799.9	
P426	SPD SEL 5 Speed command value	-990000000 to -100000000	○
P427	SPD SEL 5 Torque limit value	-9.9 to 799.9	
P429	SPD SEL 6 Speed command value	-990000000 to -100000000	○
P430	SPD SEL 6 Torque limit value	-9.9 to 799.9	
P432	SPD SEL 7 Speed command value	-990000000 to -100000000	○
P433	SPD SEL 7 Torque limit value	-9.9 to 799.9	

Table 6-10 Torque command-related parameters

No.	Name	Input range	P161 application
P442	TRQ SEL 0 Torque command value	-9.9 to -0.1	○
P443	TRQ SEL 0 Speed limit value	-990000000 to 300000000	
P445	TRQ SEL 1 Torque command value	-9.9 to -0.1	○
P446	TRQ SEL 1 Speed limit value	-990000000 to 300000000	
P448	TRQ SEL 2 Torque command value	-9.9 to -0.1	○
P449	TRQ SEL 2 Speed limit value	-990000000 to 300000000	
P451	TRQ SEL 3 Torque command value	-9.9 to -0.1	○
P452	TRQ SEL 3 Speed limit value	-990000000 to 300000000	
P454	TRQ SEL 4 Torque command value	-9.9 to -0.1	○
P455	TRQ SEL 4 Speed limit value	-990000000 to 300000000	
P457	TRQ SEL 5 Torque command value	-9.9 to -0.1	○
P458	TRQ SEL 5 Speed limit value	-990000000 to 300000000	
P460	TRQ SEL 6 Torque command value	-9.9 to -0.1	○
P461	TRQ SEL 6 Speed limit value	-990000000 to 300000000	
P463	TRQ SEL 7 Torque command value	-9.9 to -0.1	○
P464	TRQ SEL 7 Speed limit value	-990000000 to 300000000	

Table 6-11 Built-in command-related parameters

No.	Name	Input range	P161 application
P518	SEL 0 Acceleration standard speed	-9900000000 to -100000000	○
P519	SEL 0 Deceleration standard speed	-9900000000 to -100000000	○
P520	SEL 0 Acceleration time	-9.9 to -0.1	
P521	SEL 0 Deceleration time	-9.9 to -0.1	
P522	SEL 0 S-curve time 1	-9.9 to -0.1	
P523	SEL 0 Torque limit value	-9.9 to -0.1	
P525	SEL 1 Acceleration standard speed	-9900000000 to -100000000	○
P526	SEL 1 Deceleration standard speed	-9900000000 to -100000000	○
P527	SEL 1 Acceleration time	-9.9 to -0.1	
P528	SEL 1 Deceleration time	-9.9 to -0.1	
P529	SEL 1 S-curve time 1	-9.9 to -0.1	
P530	SEL 1 Torque limit value	-9.9 to -0.1	
P532	SEL 2 Acceleration standard speed	-9900000000 to -100000000	○
P533	SEL 2 Deceleration standard speed	-9900000000 to -100000000	○
P534	SEL 2 Acceleration time	-9.9 to -0.1	
P535	SEL 2 Deceleration time	-9.9 to -0.1	
P536	SEL 2 S-curve time 1	-9.9 to -0.1	
P537	SEL 2 Torque limit value	-9.9 to -0.1	
P539	SEL 3 Acceleration standard speed	-9900000000 to -100000000	○
P540	SEL 3 Deceleration standard speed	-9900000000 to -100000000	○
P541	SEL 3 Acceleration time	-9.9 to -0.1	
P542	SEL 3 Deceleration time	-9.9 to -0.1	
P543	SEL 3 S-curve time 1	-9.9 to -0.1	
P544	SEL 3 Torque limit value	-9.9 to -0.1	
P546	SEL 4 Acceleration standard speed	-9900000000 to -100000000	○
P547	SEL 4 Deceleration standard speed	-9900000000 to -100000000	○
P548	SEL 4 Acceleration time	-9.9 to -0.1	
P549	SEL 4 Deceleration time	-9.9 to -0.1	
P550	SEL 4 S-curve time 1	-9.9 to -0.1	
P551	SEL 4 Torque limit value	-9.9 to -0.1	
P553	SEL 5 Acceleration standard speed	-9900000000 to -100000000	○
P554	SEL 5 Deceleration standard speed	-9900000000 to -100000000	○
P555	SEL 5 Acceleration time	-9.9 to -0.1	
P556	SEL 5 Deceleration time	-9.9 to -0.1	
P557	SEL 5 S-curve time 1	-9.9 to -0.1	
P558	SEL 5 Torque limit value	-9.9 to -0.1	
P560	SEL 6 Acceleration standard speed	-9900000000 to -100000000	○
P561	SEL 6 Deceleration standard speed	-9900000000 to -100000000	○
P562	SEL 6 Acceleration time	-9.9 to -0.1	
P563	SEL 6 Deceleration time	-9.9 to -0.1	
P564	SEL 6 S-curve time 1	-9.9 to -0.1	
P565	SEL 6 Torque limit value	-9.9 to -0.1	

No.	Name	Input range	P161 application
P567	SEL 7 Acceleration standard speed	-9900000000 to -100000000	○
P568	SEL 7 Deceleration standard speed	-9900000000 to -100000000	○
P569	SEL 7 Acceleration time	-9.9 to -0.1	
P570	SEL 7 Deceleration time	-9.9 to -0.1	
P571	SEL 7 S-curve time 1	-9.9 to -0.1	
P572	SEL 7 Torque limit value	-9.9 to -0.1	

Table 6-12 Jog operation-related parameters

No.	Name	Input range	P161 application
P573	Jog speed 0	-99 to -1	
P574	Jog speed 1	-99 to -1	
P575	Jog speed 2	-99 to -1	
P576	Jog speed 3	-99 to -1	
P577	Jog speed 4	-99 to -1	
P578	Jog speed 5	-99 to -1	
P579	Jog speed 6	-99 to -1	
P580	Jog speed 7	-99 to -1	

Table 6-13 Self-diagnosis- and input and output-related parameters

No.	Name	Input range	P161 application
P636	TL signal torque limit value +	-9.9 to -0.1	
P637	TL signal torque limit value -	-9.9 to -0.1	

6-11 Torque limit function when the power supply voltage drops (compatible with the SEMI F47 standard)

This is a function that limits the torque when the DC voltage inside the device drops due to a temporary drop in the power supply voltage, thereby avoiding a main power supply undervoltage error.

⚠Caution

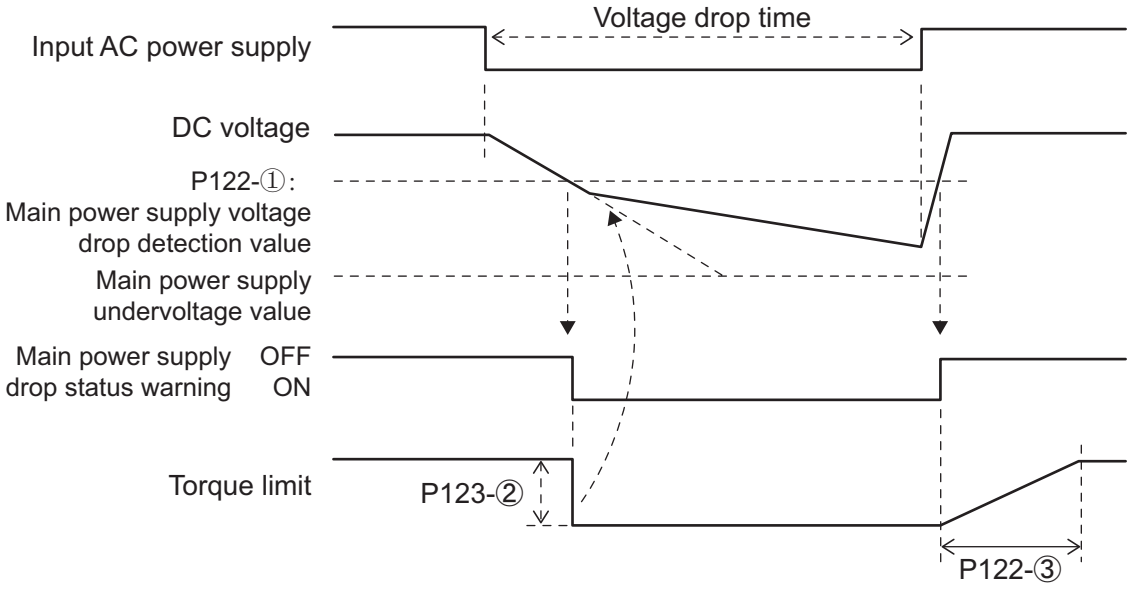
- It supports only the voltage drop level and the duration time required by the SEMI F47 standard.
- The input main power supply must be a 3-phase power supply. It does not support a single-phase power supply.
- This function does not support all load conditions or operating conditions. If the load is too large, a main power supply undervoltage error may occur. Be sure to perform an operation check with an actual machine, and set the [P124] parameter, if necessary.
- During torque limit and during return, motor speed or torque fluctuations may occur.
- If, during acceleration for positioning operation, for example, position deviation exorbitance occurs, adjust the position deviation exorbitance detection pulse settings ([P175], [P176], [P177], and [P178]).
- Do not limit the torque below the held torque.
- In the initial status, this function is disabled. To enable it, set [P122] and [P123].
- When an external dynamic brake is used, this function cannot be used.

6-11-1 Parameters related to the torque limit when the power supply voltage drops

Table 6-14 Parameters related to the torque limit when the power supply voltage drops

No.		Item	Setting value	Initial value	Unit	Remarks
P122	①	Main power supply voltage drop detection value	80	0	%	To enable this function, set 80.
	②	Reserved	—	—	—	This parameter is reserved.
	③	Main power supply torque drop limit Fluctuation changing time	0 to 999	50	ms	Change time for 100% motor rated torque
P123	①	Reserved	—	—	—	
	②	Main power supply drop toque limit value	0 to 300	100	%	The lowest of other torque limit values is given priority.

6-11-2 Torque limit function when the power supply voltage drops (compatible with the SEMI F47 standard)



Chapter 7 Maintenance

7-1 Inspection

The device and the motor are maintenance-free; however, in order to prevent breakdown by the change in the use conditions, periodically inspect them.

⚠Caution
• The responsible worker should switch ON/OFF the power. • Even when power supply is shut down, high voltage is charged in the main circuit capacitor. Wait for a certain period of time (5 minutes for 3.3 kW or less and 10 minutes for 7 kW or more) after power shutdown (the "CHARGE" LED on the front of the device goes off), then start work. • Never apply insulation test to the device with the mega tester. <The device will be damaged.> When measuring insulation of the motor, completely disconnect wiring (U, V, W) between the motor and device, and then carry it out.

7-1-1 Daily inspection items

Carry out the following daily inspections.

a. If motor runs normally.

b. If no unusual factors are found in the environment of the installed place (power supply, temperature, humidity, dusts, etc.).

c. If no malfunctions are found in the cooling system.

d. If no loosening is found on the terminals and connectors.

e. If there are no unusual sounds and vibrations.

f. If no excessive heating and discoloration are found.

g. If no error is found in the regenerative resistor and other components.

7-1-2 Periodic inspection items

Carry out the following periodic inspections at the interval of designated operating time or at the fixed interval (for such as a half year or one year).

a. If no loosening is found at the block connected with load, no slack in belts, no play in the shaft key, no unusual sound in the motor bearing.

b. If no unusual factors are found in the environment of the installed place (power supply, temperature, humidity, dusts, etc.).

c. If no malfunctions are found in the cooling system.

d. If no loosening is found on the terminals and connectors.

e. If there are no unusual sounds and vibrations.

f. If no excessive heating and discoloration are found.

g. If there are no foreign substances and dusts inside the device.

h. If there are no scratches and wear on cables.

i. If no error is found in the regenerative resistor and other components.

j. Inspection on the radiator fan of the control panel, cleaning of the air filter, and inspection or replacement of relays, etc.

7-2 Suggestions for parts replacement

Suggestions for parts replacement are as follows.

Table 7-1 Parts replacement guide 1

Part name	Replacement guide	Use conditions
Smoothing capacitor	10 years	• Ambient temperature: Annual average temperature 30 ℃ • Loading rate: 80% or less • Working rate: 20 hours or less/day
Cooling fan	2 or 3 years	
Fuse	10 years	
Internal device memory	10 years	

* For the smoothing capacitor or fuse, it may be necessary to replace the board containing it with a new one depending on the use condition.

For other parts that have lifetime, the suggestive interval of parts replacement is indicated in the following table.

Table 7-2 Parts replacement guide 2

Part name	Replacement guide	Use conditions
Relays	10 years	• Power-on: 10 times/day

* For a relay, it may be necessary to replace the board containing it with a new one depending on the use condition.

⚠Caution
Temperature and humidity conditions greatly affect lifetime. Thus, avoid the use under a high temperature and high humidity condition. Generally, it is said that 10 ℃ increase in the operating temperature can shorten the equipment lifetime by half.

Chapter 8 Protective function

8-1 Error code list

When an error occurs, the relevant error code is displayed on the data display LED panel on the device front panel.
For details of the data display LED panel, refer to "Chapter 10 Status display" and "Chapter 12 Operation panel".
The following tables list error codes.

8-1-1 Alarm list

a. Error related to device hardware

Table 8-1 Error related to device hardware

Error code	Description of error
hALt	Driver system error
AL.001	RAM error
AL.002	FRAM write error
AL.003	Driver error
AL.004	Main power supply voltage detection element error
AL.005	CPU start error
AL.006	CPU error
AL.010	Maker data sustain error
AL.011	Parameter sustain error
AL.012	Command data sustain error
AL.013	Indirect data sustain error
AL.015	Absolute position compensation data sustain error
AL.020	Error in matching of firmware and manufacturer data

b. Servo-related error

Table 8-2 Servo-related error

Error code	Description of error
AL.100	Power element error
AL.101	Main power supply discontinuity error
AL.102	Main power supply undervoltage error
AL.103	Main power supply excessive voltage error
AL.104	Over speed error
AL.105	Motor overload error
AL.106	Driver overload error
AL.107	Regenerative resistor overload error
AL.108	Control power supply momentary stop error
AL.109	Regenerative overcurrent error
AL.110	Servo control error
AL.112	Motor power cable disconnection error
AL.113	Overcurrent error
AL.115	Driver overheat error
AL.116	Motor overheat error

Error code	Description of error
AL.117	Main power supply open-phase error
AL.118	Control power supply discontinuity detected error
AL.119	Motor power cable disconnection error 2
AL.120	Control power supply error

c. Error related to parameter setting

Table 8-3 Error related to parameter setting

Error code	Description of error
AL.200	Motor unselection
AL.201	Motor selection incorrect 1 (invalid device output capacity combination)
AL.202	Motor selection incorrect 2 (invalid device power voltage combination)
AL.203	Motor selection incorrect 3 (invalid device single-phase power supply combination)
AL.204	Motor selection incorrect 4 (invalid device specification or revision combination)
AL.205	Motor selection incorrect 5 (invalid motor type combination)
AL.208	Carrier frequency setting error
AL.209	Inverter output frequency error
AL.210	Maximum speed command higher limit incorrect
AL.211	Maximum speed command lower limit incorrect
AL.213	1 rotation position range incorrect
AL.216	Motor information incorrect error
AL.217	Motor combination mismatch error 1
AL.218	Motor combination mismatch error 2
AL.219	Motor combination mismatch error 3

d. Encoder-related error

Table 8-4 Encoder-related error

Error code	Description of error
AL.301	Magnetic pole signal pattern error
AL.302	Error in matching of magnetic pole signal and encoder resolution
AL.303	Auto magnetic pole detection error
AL.304	Encoder signal disconnection error
AL.305	Encoder velocity error
AL.307	Absolute position compensation data unregistered
AL.308	Absolute position compensation data collation error
AL.309	Absolute position compensation data none error
AL.310	IPU communication error
AL.312	Communication error between encoder IPU
AL.313	Cable disconnection error between encoder IPU
AL.314	Encoder position detection signal error
AL.315	1 rotation position detection speed error
AL.316	Photo acceptance unit error

Error code	Description of error
AL.317	Light emitting element error
AL.318	IPU backup error
AL.319	Absolute position compensation encoder pulse number error
AL.320	Magnetic pole signal disconnection error
AL.321	Encoder identification error
AL.322	Unregistered encoder selection error
AL.325	Encoder communication timeout
AL.326	Absolute position compensation data IPU registration error
AL.380	Encoder data sustain error 1
AL.381	Encoder data sustain error 2
AL.382	Encoder position detection signal error 1
AL.383	Encoder position detection signal error 2
AL.384	Encoder communication timeout/Re-introduction-of-unit power release
AL.385	Encoder communication error/Re-introduction-of-unit power release
AL.386	Encoder position mismatch error
AL.387	Encoder shipment data error

e. NC-related error

Table 8-5 NC-related error

Error code	Description of error
AL.400	Forward direction overtravel / Automatic release
AL.401	Reverse direction overtravel / Automatic release
AL.402	Forward direction software overtravel / Automatic release
AL.403	Reverse direction software overtravel / Automatic release
AL.404	Forward direction overtravel / Reset release
AL.405	Reverse direction overtravel / Reset release
AL.406	Forward direction software overtravel / Reset release
AL.407	Reverse direction software overtravel / Reset release
AL.408	Forward direction positioning amount over
AL.409	Reverse direction positioning amount over
AL.410	Address setting error
AL.420	Position deviation excess 1 (maximum position deviation over)
AL.421	Position deviation excess 2 (theoretical position deviation over)
AL.422	Position deviation excess 3 (servo-on position deviation over)
AL.424	Main power supply voltage is lowered by the excessive deviation
AL.431	1 rotation data un-setup error
AL.432	Positioning command incorrect
AL.433	1 rotation short cut positioning position setting error
AL.434	Indirect data number incorrect
AL.435	Zero point position setting run error
AL.436	Pulse output selection setting error

f. Error related to communication network

Table 8-6 Error related to communication network

Error code	Description of error
AL.505	USB communication disconnected error
AL.520	MECHATROLINK-III ASIC error
AL.521	MECHATROLINK-III system error
AL.522	MECHATROLINK-III communication cycle / transmission cycle setting error
AL.523	MECHATROLINK-III data size setting error
AL.524	MECHATROLINK-III station address setting error
AL.525	MECHATROLINK-III synchronous error
AL.526	MECHATROLINK-III communication error
AL.527	MECHATROLINK-III transmission cycle error
AL.528	MECHATROLINK-III FCS error
AL.529	MECHATROLINK-III synchronization frame un-receiving

g. STO-related error

Table 8-7 STO-related error

Error code	Description of error
AL.600	Safety input timing error
AL.601	Safety input error during operation

8-1-2 Warning list

Table 8-8 Warning

Warning code	Description of warning
FL.900	Motor overload notice
FL.902	Main power supply undervoltage detection warning
FL.903	Zero point return uncompleted automatic start warning
FL.904	Driver input emergency stop
FL.905	Controller input emergency stop
FL.906	Main power supply voltage is lowered
FL.907	Motor overheat warning
FL.908	Driver overheat warning
FL.912	Encoder position detection parts deterioration warning
FL.920	Forward direction overtravel
FL.921	Reverse direction overtravel
FL.922	Forward direction software overtravel
FL.923	Reverse direction software overtravel
FL.932	MECHATROLINK-III CMD warning
FL.933	MECHATROLINK-III COMM warning
FL.934	Mode switching status change warning
FL.941	MECHATROLINK-III transmission byte setting SW warning
FL.942	MECHATROLINK-III station address setting SW warning

8-2 Error code specifications

The following table describes each item in the tables listing details of each error code.

Error code Error item

Indicates the error name corresponding to the error code.
(Example) Main power supply voltage detection element error

a. Description
Describes the nature of the error.
(Example) An error occurs in the voltage detection element and the main power supply voltage cannot be read normally.

b. Causes and measures
Indicates the cause(s) of the error and measure(s).

c. Operation at an error
Indicates the operation of the device (motor) when the error occurs.
(Example) Servo OFF

d. Release method
Indicates the method for releasing the error status.
(Example) Turn the power off, then on again.

e. Related display
Indicates the status display on the device that is related to the error.
(Example) –
When there is no status display related to the error, "–" is indicated.

f. Related parameter
Indicates the parameter related to the error.
(Example) –
When there is no status display related to the error, "–" is indicated.

g. Output signal status
Indicates the status of each typical output signal.
○ : ON/ ● : OFF/ ― : Follows other status. (Not switched ON or OFF due to the occurrence of the error.)

(Example) ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

8-2-1 Alarm specifications

⚠Caution
If repair or replacement is necessary due to a failure in the device or a part, contact our sales representative.

hALt Driver system error

a. Description

The control circuit does not operate normally.

* This alarm is not recorded in the alarm history.

b. Causes and measures

- The control power supply suffered from voltage fluctuations beyond the permissible voltage fluctuation range.
  Check that the voltage of the control power supply does not exceed the permissible voltage fluctuation range.
- The device is faulty.
  Turn the power off, then on again. If the error still occurs, repair is necessary.

c. Operation at an error

Servo OFF

d. Release method

Turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ー /WNG: ー /RDY: ー /ZRDY: ー /BRK: ー

AL.001 RAM error

a. Description

The RAM (memory) in the device cannot be read or written normally.

* This alarm is not recorded in the alarm history.

b. Causes and measures

- The device is faulty.

  Turn the power off, then on again. If the error still occurs, repair is necessary.

c. Operation at an error

Servo OFF

d. Release method

Turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ー /WNG: ー /RDY: ー /ZRDY: ー /BRK: ー

AL.002 FRAM write error

a. Description

Data cannot be written in the FRAM in the device.

* This alarm is not recorded in the alarm history.

b. Causes and measures

- The device is faulty.

  Turn the power off, then on again. If the error still occurs, repair is necessary.

c. Operation at an error

The motor immediately stops, and after having stopped, enters the servo off status

d. Release method

Turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.003 Driver error

a. Description
A DSP peripheral device does not operate normally.

b. Causes and measures
- The device is faulty.
  Turn the power off, then on again. If the error still occurs, repair is necessary.

c. Operation at an error
Servo OFF

d. Release method
Turn the power off, then on again.

e. Related display
–

f. Related parameter
–

g. Output signal status
ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.004 Main power supply voltage detection element error

a. Description
An error occurs in the voltage detection element and the main power supply voltage cannot be read normally.

b. Causes and measures
- The voltage detection element is faulty.
  Turn the power off, then on again. If the error still occurs, repair is necessary.

c. Operation at an error
Servo OFF

d. Release method
Turn the power off, then on again.

e. Related display
–

f. Related parameter
–

g. Output signal status
ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.005 CPU start error

a. Description

An error occurred at the start of the CPU and the CPU could not be operated normally.

b. Causes and measures

- The device is faulty.
  Turn the power off, then on again. If the error still occurs, repair is necessary.

c. Operation at an error

Servo OFF

d. Release method

Turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.006 CPU error

a. Description

An error occurred in the CPU and communication processing does not operate.

b. Causes and measures

- The device is faulty.
  Turn the power off, then on again. If the error still occurs, repair is necessary.

c. Operation at an error

The motor immediately stops, and after having stopped, enters the servo off status

d. Release method

Turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.010 Maker data sustain error

a. Description
An error occurred in the stored factory-set maker data.

b. Causes and measures
- The maker data is damaged.
  Repair is necessary.

c. Operation at an error
Servo OFF

d. Release method
Repair is necessary.

e. Related display
–

f. Related parameter
–

g. Output signal status
ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.011 Parameter sustain error

a. Description
An error occurred in the stored parameter data.

b. Causes and measures
- Parameter data is damaged.
  From VPH DES self-diagnosis, execute [H000: data initialization] to clear the data. Then, set parameter and command data and indirect data again.

c. Operation at an error
Servo OFF

d. Release method
Remove the cause and turn the power off, then on again.

e. Related display
–

f. Related parameter
–

g. Output signal status
ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.012 Command data sustain error

a. Description

The stored command data is corrupted.

b. Causes and measures

- The stored command data is damaged.
  From VPH DES self-diagnosis, execute [H000: data initialization] to clear the data. Then, set parameter and command data and indirect data again.

c. Operation at an error

Servo OFF

d. Release method

Remove the cause and turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.013 Indirect data sustain error

a. Description

The stored indirect data (IX00 to IX49) is corrupted.

b. Causes and measures

- The stored indirect data is damaged.
  From VPH DES self-diagnosis, execute [H000: data initialization] to clear the data. Then, set parameter and command data and indirect data again.

c. Operation at an error

Servo OFF

d. Release method

Remove the cause and turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.015 Absolute position compensation data sustain error

a. Description
The stored absolute position compensation data is corrupted.

b. Causes and measures
- The stored ABS position compensation data is damaged.
  From VPH DES self-diagnosis, execute [H000: ABS position compensation data initialization] to clear the data. Then, register the ABS position compensation data in the device using the VPH ABS position compensation data transfer program (VPH APE).

c. Operation at an error
Servo OFF

d. Release method
Remove the cause and turn the power off, then on again.

e. Related display
–

f. Related parameter
–

g. Output signal status
ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.020 Error in matching of firmware and manufacturer data

a. Description
Software controlling the device is inconsistent with the data used by the software.

b. Causes and measures
- The matching of firmware and data is wrong.
  Repair is necessary.

c. Operation at an error
Servo OFF

d. Release method
Repair is necessary.

e. Related display
–

f. Related parameter
–

g. Output signal status
ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.100 Power element error

a. Description

Excessive current flowed in the device power element.
Or, the cooling heat sink of the device power element got overheated.

b. Causes and measures

When this error occurred, excessive current may have flowed in the device power element. If this error frequently occurs, the device may be damaged. Be sure to remove the cause of the error, then restart the device.
When the device power element is overheated, remove the cause of the error, cool it for a while (about 30 minutes), waiting for the temperature of the radiator to fall, and then restart the device.

- Incorrect wiring of the zero-phase reactor
  Check that the zero-phase reactor is wound with a motor power cable (U/V/W phases) in the same direction and with the same number of turns.
- A short-circuit occurs in the motor power cable.
  Check that there are no short-circuits.
- The overload status continued due to excess of permissible repetition frequency.
  Take measures such as reducing the load inertia and increasing the acceleration time. Also, check and adjust the gain, as well as the play in the mechanical system.
- The ambient temperature of the device rises.
  Check the installation environment, and improve cooling and ventilation.
- An error occurred in the radiator.
  Some devices have a function to radiate the heat generated from the power element. A possible cause is that an error occurred in the radiation function, causing overheat. Check the radiator to see if it is clogged. If the cooling fan of the radiator is faulty, repair or replace it.

c. Operation at an error

Servo OFF

d. Release method

Remove the cause and execute one of the following operations:

- Input the ARST signal.
- Input the RST signal.
- Turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.101 Main power supply discontinuity error

a. Description

- During the main power-off status, servo on continues for more than the time set in [P121 (4th - 2nd digits): Main power OFF error detection time].
- During the servo on status, the main power-off status continues for more than the time set in [P121 (4th - 2nd digits): Main power OFF error detection time].

b. Causes and measures

- The main power supply is shut off.
  Check the power supply used.
- Wiring error
  Check, for example, that the electric wire diameter is thick enough and that the screws of the power supply terminals are tight.

c. Operation at an error

The motor stops with the setting of [P121(1st digit): Main power OFF error detection spec selection] and enters the servo off status.

d. Release method

Remove the cause and execute one of the following operations:

- Input the ARST signal.
- Input the RST signal.
- Turn the power off, then on again.

e. Related display

–

f. Related parameter

P121[1st digit]: Main power OFF error detection spec selection
P121[4th - 2nd digits]: Main power OFF error detection time

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.102 Main power supply undervoltage error

a. Description

The DC voltage of the main power supply is lower than the specified value in the servo on status.

When the setting of [P124 (1st digit): Main power supply undervoltage error spec selection] is "1: Anomaly detection among the servo ON 1" or "2: Anomaly detection among the servo ON 2", this error may occur.

The following table lists the DC voltage values of the main power supply in the device with which this error occurs.

Table 8-9 Main power supply undervoltage error detection value

Input power supply specification	Voltage detected as an error
100 VAC	90 V or less
200 VAC	177 V or less

⚠Caution

After an instantaneous power failure occurs and the protective function is activated, if the power failure status continues, no control power is supplied and the protective circuit is reset. After that, when the power is recovered, various commands (including the speed command and pulse train command) are input. If the motor runs immediately after power recovery in a sequence, it is dangerous. Do not design such a sequence. Design an external sequence in which each signal is switched OFF and the execution of each command is stopped when the protective function is activated and an alarm occurs (is output).

b. Causes and measures

- A voltage drop occurred due to an insufficient power supply capacity.
  Check the power supply used.
- An instantaneous power failure (power failure for at least about 10 ms) occurred.
  Check the power supply used.
- Servo-on operation is performed immediately after power-on.
  After power-on, wait for some time, then execute servo-on operation.
- In a device of 1.5 kW or greater, the shorting bar between "L1 and L2/P" of the power supply terminals is removed.
  Install the shorting bar between "L1 and L2/P".

c. Operation at an error

Servo OFF

d. Release method

Remove the cause and execute one of the following operations:

- Input the ARST signal.
- Input the RST signal.
- Turn the power off, then on again.

e. Related display

C016: Main power supply DC voltage

f. Related parameter

P124[1st digit]: Main power supply undervoltage error spec selection

P124[5th - 2nd digits]: Detection allowed time for main power supply undervoltage error

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.103 Main power supply excessive voltage error

a. Description

The main power supply DC voltage exceeds the specified value.

The following table lists the detection voltage values of the main power supply DC voltage in the device with which this error occurs.

Table 8-10 Main power supply excessive voltage error detection value

Input power supply specification	Voltage detected as an error
100 VAC	210 V or more
200 VAC	410 V or more

b. Causes and measures

- The power supply voltage is high.
  Check the power supply used.
- The regeneration processing capacity is exceeded due to excessive load inertia.
  Make improvements such as attaching a regenerative resistor, reducing the load inertia, increasing the deceleration time, and reducing the operation speed.
- The ground current rises due to a ground fault in the motor or excessive leak current.
  Check if a ground fault occurred in the motor. For excessive leak current, make improvements such as inserting a zero-phase reactor.
- Runaway or vibration occurred due to a failure in the encoder.
  Repair or replace the encoder.

c. Operation at an error

Servo OFF

d. Release method

Remove the cause and execute one of the following operations:

- Input the ARST signal.
- Input the RST signal.
- Turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.104 Over speed error

a. Description

The motor operation speed reaches the value set in [P127(4th - 2nd digits): Over speed error detection speed].

b. Causes and measures

- Incorrect wiring of motor power cable (U/V/W) or encoder feedback signal cable
  Check the wiring and correct it.
- The overshoot becomes large due to conditions such as large load inertia.
  Take measures such as reducing the load inertia and increasing the acceleration time.
  Also, check and adjust the gain, as well as the play in the mechanical system.
- The encoder feedback signal is influenced by noises.
  Remove the noise source, and take noise protection measures.

c. Operation at an error

Servo OFF

d. Release method

Remove the cause and execute one of the following operations:

- Input the ARST signal.
- Input the RST signal.
- Turn the power off, then on again.

e. Related display

–

f. Related parameter

P127[4th - 2nd digits]: Over speed error detection speed

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.105 Motor overload error

a. Description

The motor torque actual value exceeds the motor electronic thermal detection actual value. For the motor electronic thermal detection actual value, a detection value is set by assuming that the motor rated torque is 100%. To prevent thermal failures that may occur due to the concentration of current to a single phase of the motor, switching is performed during 1 phase concentration. During 1 phase concentration, an error is detected with a value equal to 70% of the motor electronic thermal detection actual value. For the switching during 1 phase concentration, a switching range with the 1 electric angle motor rotation of the motor assumed to be 1 rev, is set, as well as a switching speed with the 1 electric angle rotation of the motor assumed to be 1 rps. If either becomes equal to or less than the setting value, the 1 phase concentration status is assumed.

The following table lists the detection values (initial values) with which this error occurs.

Table 8-11 Motor overload error detection value

Motor	Detection actual value	1 phase concentration range	1 phase concentration speed
τDISC	110%	0.3 rev or less	0.3 rps or less

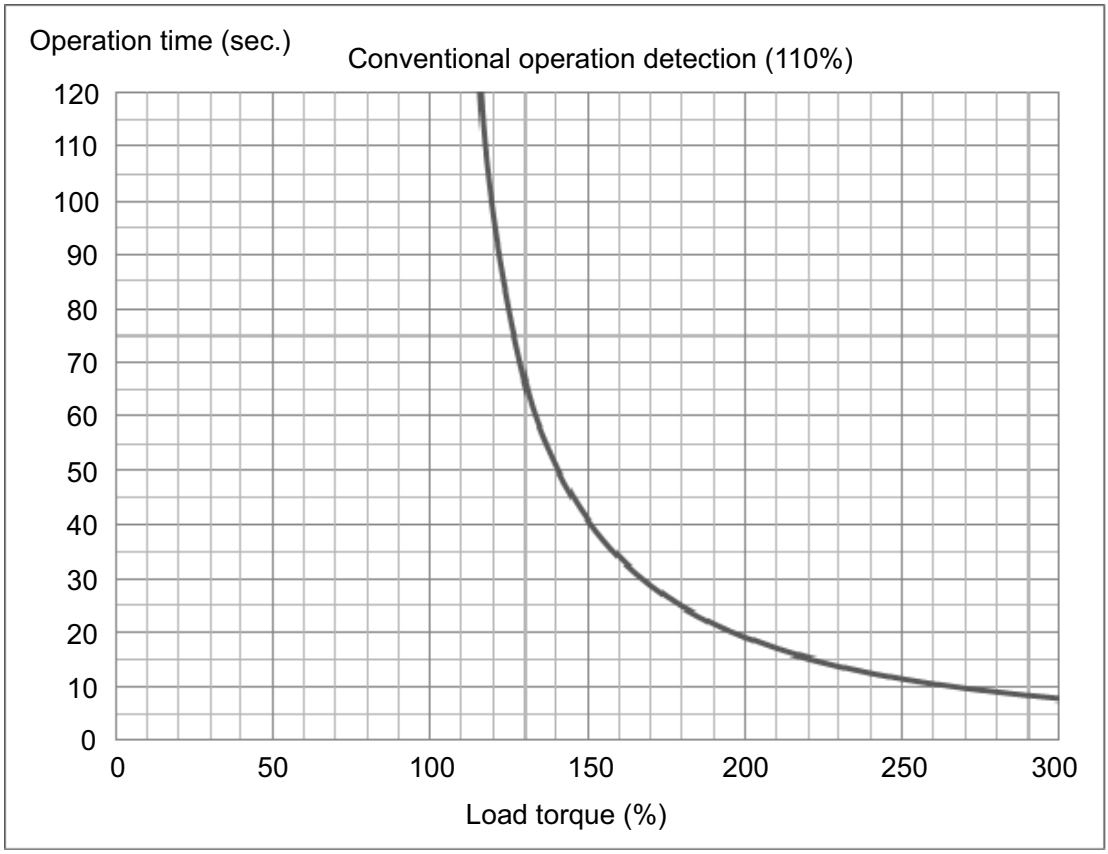


Figure 8-1 Load torque in relation to detection time

b. Causes and measures

After removing the cause of the overload, wait for the cooling time (about 30 minutes). If alarm reset and operation are repeated in a short period of time, temperature in device power element and in motor goes up abnormally, which leads to breakage.

- Excessive load
  Take measures such as reducing the load.
- The frequency of starting and stopping the motor is high.
  Reduce the starting and stopping frequency, and operate it in the range in which it is not overloaded.
- Current vibration due to the vibration or instable operation of the motor
  Check and adjust the gain, as well as the play in the mechanical system.
- Incorrect wiring of motor power cable (U/V/W)
  Check the wiring and correct it.
- Mechanical lock due to the brake, etc.
  Check the brake and the mechanical configuration, and remove the cause of the lock.
- The ambient temperature is high, or the ventilation is bad.
  Check the installation environment, and improve cooling and ventilation.
- Runaway or vibration occurred due to a failure in the encoder.
  Repair or replace the encoder.

c. Operation at an error

The motor stops as selected in [P126(1st digit): Overload abnormal motion selection] and enters the servo off status.

d. Release method

Remove the cause and execute one of the following operations:

- Input the ARST signal.
- Input the RST signal.
- Turn the power off, then on again.

* The load ratio is sustained even after the power is turned OFF. For this reason, if the power is turned OFF immediately after an overload error is detected, an overload error may occur shortly after the power is turned on again.

e. Related display

C012: Thermal trip rate of motor

f. Related parameter

P083[3rd - 1st digits]: Motor electronic thermal detected actual value
P084[3rd - 1st digits]: Motor 1 phase concentration electronic thermal detection ratio
P126[1st digit]: Overload abnormal motion selection

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.106 Driver overload error

a. Description

The load became excessive for the device power element.
Current 180% or higher than the device rated current flows for at least the specified time while the motor is running at low speed.
After removing the cause of the overload, wait for the cooling time (about 30 minutes). If alarm reset and operation are repeated in a short period of time, temperature in device power element and in motor goes up abnormally, which leads to breakage.

b. Causes and measures

- Excessive load
  Take measures such as reducing the load.
- The frequency of starting and stopping the motor is high.
  Reduce the starting and stopping frequency, and operate it in the range in which it is not overloaded.
- Current vibration due to the vibration or instable operation of the motor
  Check and adjust the gain, as well as the play in the mechanical system.
- Incorrect wiring of motor power cable (U/V/W)
  Check the wiring and correct it.
- Mechanical lock due to the brake, etc.
  Check the brake and the mechanical configuration, and remove the cause of the lock.
- The ambient temperature is high, or the ventilation is bad.
  Check the installation environment, and improve cooling and ventilation.

c. Operation at an error

The motor stops as selected in [P126(1st digit): Overload abnormal motion selection] and enters the servo off status.

d. Release method

Remove the cause and execute one of the following operations:

- Input the ARST signal.
- Input the RST signal.
- Turn the power off, then on again.

* The load ratio is sustained even after the power is turned OFF. For this reason, if the power is turned OFF immediately after an overload error is detected, an overload error may occur shortly after the power is turned on again.

e. Related display

C014: Thermal trip ratio of driver

f. Related parameter

P126[1st digit]: Overload abnormal motion selection

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.107 Regenerative resistor overload error

a. Description

Regenerative power generated in deceleration of load inertia exceeded the permissible power range of the regenerative resistor connected to the device.

b. Causes and measures

- The regeneration processing capacity is exceeded due to excessive load inertia.
  Make improvements such as replacing the regenerative resistor to one with a larger power, reducing the load inertia, increasing the deceleration time, and reducing the operation speed.
- Parameter setting error
  Check the regenerative resistor used, and set it for the parameter.

c. Operation at an error

The motor stops as selected in [P126(1st digit): Overload abnormal motion selection] and enters the servo off status.

d. Release method

Remove the cause and execute one of the following operations:

- Input the ARST signal.
- Input the RST signal.
- Turn the power off, then on again.

* The load ratio is sustained even after the power is turned OFF. For this reason, if the power is turned OFF immediately after an overload error is detected, an overload error may occur shortly after the power is turned on again.

e. Related display

C018: Load ratio of regenerative resistor

f. Related parameter

P086[3rd - 1st digits]: Regenerative resistor overload detection ratio
P126[1st digit]: Overload abnormal motion selection

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.108 Control power supply momentary stop error

a. Description

The voltage of the control power supply is lower than the specified value for at least 50ms.

b. Causes and measures

- Wiring error
  Check, for example, that the electric wire diameter is thick enough and that the screws of the power supply terminals are tight.

c. Operation at an error

The motor immediately stops, and after having stopped, enters the servo off status.

d. Release method

Remove the cause and execute one of the following operations:

- Input the ARST signal.
- Input the RST signal.
- Turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.109 Regenerative overcurrent error

a. Description

Current higher than the specified value flowed in the transistor in the regenerative circuit.

b. Causes and measures

- The regeneration processing capacity is exceeded due to excessive load inertia.
  Make improvements such as replacing the regenerative resistor to one with a large resistance value, reducing the load inertia, increasing the deceleration time, and reducing the operation speed.

c. Operation at an error

Servo OFF

d. Release method

Remove the cause and execute one of the following operations:

- Input the ARST signal.
- Input the RST signal.
- Turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.110 Servo control error

a. Description

The motor rotated in a direction opposite to that expected for the torque output by the device.

b. Causes and measures

- The wiring has an error.
  Check the wiring of the motor power cable (U/V/W) and the encoder feedback signal cable.
- Current vibration due to the vibration or instable operation of the motor
  Check and adjust the gain, as well as the play in the mechanical system.
- Parameter setting error
  Check the encoder-related parameters (such as motor type and resolution).
- The motor is operated with external force.
  This error may occur if external force (such as load or tension) is applied to the motor, causing the motor to operate. The detection is relaxed by adjusting [P120: Servo control error detection dead band torque].

c. Operation at an error

Servo OFF

d. Release method

Remove the cause and execute one of the following operations:

- Input the ARST signal.
- Input the RST signal.
- Turn the power off, then on again.

e. Related display

C017: Peak servo control error ratio

f. Related parameter

P120: Servo control error detection dead band torque

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.112 Motor power cable disconnection error

a. Description

A problem occurred in the motor power cable.
Or, the current detection sensor for motor power does not operate normally.

b. Causes and measures

- Wiring error
  Check that the motor power cable (U/V/W) is not broken but connected and wired correctly, etc.

c. Operation at an error

Servo OFF

d. Release method

Remove the cause and execute one of the following operations:

- Input the ARST signal.
- Input the RST signal.
- Turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.113 Overcurrent error

a. Description

Abnormal current was detected by the current FB detection for at least 50 ms.

b. Causes and measures

- Excessive load
  Take measures such as reducing the load.
- The frequency of starting and stopping the motor is high.
  Reduce the starting and stopping frequency, and operate it in the range in which it is not overloaded.
- Current vibration due to the vibration or instable operation of the motor
  Check and adjust the gain, as well as the play in the mechanical system.
- Incorrect wiring of motor power cable (U/V/W)
  Check the wiring and correct it.
- Mechanical lock due to the brake, etc.
  Check the brake and the mechanical configuration, and remove the cause of the lock.
- The ambient temperature is high, or the ventilation is bad.
  Check the installation environment, and improve cooling and ventilation.

c. Operation at an error

Servo OFF

d. Release method

Remove the cause and execute one of the following operations:

- Input the ARST signal.
- Input the RST signal.
- Turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.115 Driver overheat error

a. Description

The device temperature exceeds the allowable range.

b. Causes and measures

- The ambient temperature of the device rises.
  Place it so that the heat can escape, considering the ventilation characteristics and the ambient temperature.
- The cooling fan is clogged.
  Clean the fan with air blow, etc. to remove clogging.
- The cooling fan is faulty.
  Repair or replace it.

c. Operation at an error

Servo OFF

d. Release method

Remove the cause and execute one of the following operations:

- Input the ARST signal.
- Input the RST signal.
- Turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.116 Motor overheat error

a. Description

The motor overheat (MTOH) signal is detected.
Or, in the motor equipped with a temperature sensor, motor overheat is detected.
Remove the cause of the error, then wait for the cooling time (about 30 minutes).

b. Causes and measures

- Insufficient cooling of the motor
  Install the motor on a surface having a sufficient radiation area so that the motor comes into contact with the entire surface with no floating.
- Motor setting error
  A motor parameter selected in the device may be inconsistent with the installed motor. Check the motor settings.

c. Operation at an error

The motor stops with the setting of [P126(1st digit): Overload abnormal motion selection] and enters the servo off status.

d. Release method

Remove the cause and execute one of the following operations:

- Input the ARST signal.
- Input the RST signal.
- Turn the power off, then on again.

e. Related display

C102: Internal control input signal 2

f. Related parameter

P126[1st digit]: Overload abnormal motion selection
P129[1st digit]: Motor overheat detection spec selection
P129[4th - 2nd digits]: Motor overheat detection time
P620: Control input signal allocation 1
P621: Control input signal allocation 2
P627: Control input signal condition setting 5

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.117 Main power supply open-phase error

a. Description

When a 3-phase power supply is specified in the motor specification, a problem occurred for at least one phase.

b. Causes and measures

- Wiring error

  When a 3-phase power supply is specified, a problem including disconnection, no connection, or wrong wiring occurred for at least one phase. Check the wiring.

c. Operation at an error

Servo OFF

d. Release method

Remove the cause and execute one of the following operations:

- Input the ARST signal.
- Input the RST signal.
- Turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.118 Control power supply discontinuity detected error

a. Description

The control power supply detection circuit is damaged.

b. Causes and measures

- Wiring error

  Check, for example, that the electric wire diameter is thick enough and that the screws of the power supply terminals are tight.

c. Operation at an error

The motor immediately stops, and after having stopped, enters the servo off status

d. Release method

Turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.119 Motor power cable disconnection error 2

a. Description

An error occurred in the motor power cable.
Or, the current detection sensor for motor power does not operate normally.
This error occurs after the elapse of the time that is set in [P045: Motor power cable disconnection detection time].

b. Causes and measures

- Wiring error
  Check that the motor power cable (U/V/W) is not broken but connected and wired correctly, etc.
- Parameter setting error
  Check, for example, that the detection time that is set in [P045: Motor power cable disconnection detection time] is not too early.

c. Operation at an error

Servo OFF

d. Release method

Remove the cause and execute one of the following operations:

- Input the ARST signal.
- Input the RST signal.
- Turn the power off, then on again.

e. Related display

–

f. Related parameter

P045: Motor power cable disconnection detection time

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.120 Control power supply error

* Occurs only when no encoder is selected or S-iABS is selected.

a. Description
At power ON, the voltage of the control power supply is lower than the specified value for at least 100 ms.

b. Causes and measures
- Wiring error
  Check, for example, that the electric wire diameter is thick enough and that the screws of the power supply terminals are tight.

c. Operation at an error
Servo OFF

d. Release method
Turn the power off, then on again.

e. Related display
–

f. Related parameter
–

g. Output signal status
ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.200 Motor unselection

a. Description
The motor parameter is not set.

b. Causes and measures
- Parameter not set
  From the VPH DES "Driver/Motor selection" window, set the motor.

c. Operation at an error
Servo OFF

d. Release method
Remove the cause and turn the power off, then on again.

e. Related display
–

f. Related parameter
–

g. Output signal status
ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.201 Motor selection incorrect 1 (invalid device output capacity combination)

a. Description

The device output capacity is not consistent with the motor specification.

b. Causes and measures

- Wrong motor selected
  Check the motor selection from the VPH DES "Driver/Motor selection" window.
- Check of the device to connect
  Check if the device to use matches the motor combination to connect.
- Wrong parameter file
  When sending a saved parameter file, check if the file is correct.

c. Operation at an error

Servo OFF

d. Release method

Turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.202 Motor selection incorrect 2 (invalid device power voltage combination)

a. Description

The device power voltage is not consistent with the motor specification.

b. Causes and measures

- Wrong motor selected
  Check the motor selection from the VPH DES "Driver/Motor selection" window.
- Check of the device to connect
  Check if the device to use matches the motor combination to connect.
- Wrong parameter file
  When sending a saved parameter file, check if the file is correct.

c. Operation at an error

Servo OFF

d. Release method

Turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.203 Motor selection incorrect 3 (invalid device single-phase power supply combination)

a. Description

The device power supply type is not consistent with the motor specification.

b. Causes and measures

- Wrong motor selected
  Check the motor selection from the VPH DES "Driver/Motor selection" window.
- Check of the device to connect
  Check if the device to use matches the motor combination to connect.
- Wrong parameter file
  When sending a saved parameter file, check if the file is correct.

c. Operation at an error

Servo OFF

d. Release method

Turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.204 Motor selection incorrect 4 (invalid device specification or revision combination)

a. Description

The device specification is not consistent with the motor specification.

b. Causes and measures

- Wrong motor selected
  Check the motor selection from the VPH DES "Driver/Motor selection" window.
- Check of the device to connect
  Check if the device to use matches the motor combination to connect.
- Wrong parameter file
  When sending a saved parameter file, check if the file is correct.

c. Operation at an error

Servo OFF

d. Release method

Turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.205 Motor selection incorrect 5 (invalid motor type combination)

a. Description

Motor type error

b. Causes and measures

- Wrong motor selected
  Check the motor selection from the VPH DES "Driver/Motor selection" window.
- Check of the device to connect
  Check if the device to use matches the motor combination to connect.
- Wrong parameter file
  When sending a saved parameter file, check if the file is correct.

c. Operation at an error

Servo OFF

d. Release method

Remove the cause and turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.208 Carrier frequency setting error

a. Description

A carrier frequency not supported by the device is set.

b. Causes and measures

- Parameter setting error
  Check if an unsupported value is set in [P100: Carrier frequency setting]. If the appropriate value is unknown, set "0".

c. Operation at an error

Servo OFF

d. Release method

Remove the cause and turn the power off, then on again.

e. Related display

–

f. Related parameter

P100: Carrier frequency setting

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.209 Inverter output frequency error

a. Description
An attempt was made to use a motor of which the maximum electric angle frequency (inverter output frequency) is 600Hz or higher.

b. Causes and measures
- The maximum electric frequency is high.
  In [P082: Motor max speed special setting], set a value lower than "72000/[P016: Number of motor poles]".

c. Operation at an error
Servo OFF

d. Release method
Remove the cause and turn the power off, then on again.

e. Related display
–

f. Related parameter
P016: Number of motor poles
P082: Motor max speed special setting

g. Output signal status
ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.210 Maximum speed command higher limit incorrect

a. Description
The speed that is set in the motor maximum speed mode exceeds 2G (P161 setting unit/sec).

b. Causes and measures
- The motor maximum speed is high.
  It is considered that the maximum speed calculated by the settings of [P162: Electronic gear numerator ratio], [P163: Electronic gear denominator ratio], and [P164: Mechanical movement] is out of the range of 100 to 2G [setting unit/sec]. Change the parameter settings so that the calculated value falls within the range.

c. Operation at an error
Servo OFF

d. Release method
Remove the cause and execute one of the following operations:
- Input the RST signal.
- Turn the power off, then on again.

e. Related display
–

f. Related parameter
P162: Electronic gear numerator ratio
P163: Electronic gear denominator ratio
P164: Mechanical movement

g. Output signal status
ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.211 Maximum speed command lower limit incorrect

a. Description

The speed that is set in the motor maximum speed mode does not reach 100 (P161 setting unit/sec).

b. Causes and measures

- The motor maximum speed is low.
  It is considered that the maximum speed calculated by the settings of [P162: Electronic gear numerator ratio], [P163: Electronic gear denominator ratio], and [P164: Mechanical movement] is out of the range of 100 to 2G [setting unit/sec]. Change the parameter settings so that the calculated value falls within the range.

c. Operation at an error

Servo OFF

d. Release method

Remove the cause and execute one of the following operations:

- Input the RST signal.
- Turn the power off, then on again.

e. Related display

–

f. Related parameter

P162: Electronic gear numerator ratio
P163: Electronic gear denominator ratio
P164: Mechanical movement

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.213 1 rotation position range incorrect

a. Description
The setting of the 1 rotation position range is incorrect.

b. Causes and measures
- Parameter setting error
  The relation between the settings of [P165: Rotation position range] and [P166: Rotation position range sign switching position] may be contradictory. Check the parameter settings.

c. Operation at an error
Servo OFF

d. Release method
Remove the cause and execute one of the following operations:
- Input the RST signal.
- Turn the power off, then on again.

e. Related display
–

f. Related parameter
P165: Rotation position range
P166: Rotation position range sign switching position

g. Output signal status
ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.216 Motor information incorrect error

* Occurs only when no encoder is selected or S-iABS is selected.

a. Description
The motor information in the encoder is not appropriate data.

b. Causes and measures
- The encoder is faulty.
  Turn the power off, then on again. If the error still occurs, encoder repair is necessary.

c. Operation at an error
Servo OFF

d. Release method
Turn the power off, then on again.

e. Related display
–

f. Related parameter
–

g. Output signal status
ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.217 Motor combination mismatch error 1

* Occurs only when no encoder is selected or S-iABS is selected.

a. Description
The input power supply specification or the output capacity of the device does not match the connected motor.

b. Causes and measures
- Check of the device to connect
  Check that the device to use matches the motor combination to connect.

c. Operation at an error
Servo OFF

d. Release method
Remove the cause and turn the power off, then on again.

e. Related display
–

f. Related parameter
–

g. Output signal status
ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.218 Motor combination mismatch error 2

* Occurs only when S-iABS is selected.

a. Description
S-iABS is selected for the encoder type, but a non-S-iABS motor is connected.

b. Causes and measures
- Motor type setting
  Check the motor to connect, and set the type of the motor to connect, with VPH DES.

c. Operation at an error
Servo OFF

d. Release method
Remove the cause and turn the power off, then on again.

e. Related display
–

f. Related parameter
P060: Encoder type

g. Output signal status
ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.219 Motor combination mismatch error 3

* Occurs only when S-ABS2, S-ABS4, or S-MABS is selected.

a. Description

An item other than S-iABS is selected for the encoder type, but an S-iABS is connected.

b. Causes and measures

- Motor type setting

  Check the motor to connect, and set the type of the motor to connect, with VPH DES.

c. Operation at an error

Servo OFF

d. Release method

Remove the cause and turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.301 Magnetic pole signal pattern error

a. Description

When the magnetic pole sensor was used, the signal from the magnetic pole sensor could not be read normally.

When the magnetic pole sensor itself is faulty, a magnetic sensor error may not be detected. In this case, an error including an overload error occurs while the motor is running.

b. Causes and measures

- It was not possible to determine the magnetic pole because the operating speed was too high.
  Reduce the operating speed.
- A problem occurred with the encoder cable connection.
  Check that the encoder cable is not broken or loose but is connected correctly, etc.
- Incorrect wiring
  Check the wiring of the motor power cable (U/V/W) and the encoder feedback signal cable.
- The magnetic pole signal is influenced by noises.
  Remove the noise source, and take noise protection measures.
- Parameter setting error
  Check the magnetic pole sensor and encoder used, and set parameters.
- The magnetic pole sensor is faulty.
  Repair or replace the magnetic pole sensor.

c. Operation at an error

Servo OFF

d. Release method

Remove the cause and turn the power off, then on again.

e. Related display

–

f. Related parameter

P068: Magnetic pole sensor type

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.302 Error in matching of magnetic pole signal and encoder resolution

a. Description

When the magnetic pole sensor was used, the motor electric angle rotated one turn before the magnetic pole signal pattern went through one cycle.
When the magnetic pole sensor itself is faulty, a magnetic sensor error may not be detected. In this case, an error including an overload error occurs while the motor is running.

b. Causes and measures

- It was not possible to determine the magnetic pole because the operating speed was too high.
  Reduce the operating speed.
- A problem occurred with the encoder cable connection.
  Check that the encoder cable is not broken or loose but is connected correctly, etc.
- Incorrect wiring
  Check the wiring of the motor power cable (U/V/W) and the encoder feedback signal cable.
- The magnetic pole signal is influenced by noises.
  Remove the noise source, and take noise protection measures.
- Parameter setting error
  Check the magnetic pole sensor and encoder used, and set parameters.
- The magnetic pole sensor is faulty.
  Repair or replace the magnetic pole sensor.

c. Operation at an error

Servo OFF

d. Release method

Remove the cause and turn the power off, then on again.

e. Related display

–

f. Related parameter

P016: Number of motor poles
P017: Distance between motor pole opposite
P061: Number of encoder pulses of rotary type motor
P062: Scale resolution
P063: Scale pitch distance
P064: Number of pulse per scale pitch
P068: Magnetic pole sensor type

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.303 Auto magnetic pole detection error

a. Description

In the automatic magnetic pole detection mode, automatic magnetic pole detection operation was not completed normally.

b. Causes and measures

- A problem occurred with the encoder cable connection.
  Check that the encoder cable is not broken or loose but is connected correctly, etc.
- Incorrect wiring
  Check the wiring of the motor power cable (U/V/W) and the encoder feedback signal cable.
- Parameter setting error
  Set [P068: Magnetic pole sensor type] to "0: Auto magnetic pole". Check the encoder used and set the parameter.
- The gain adjustment of the auto magnetic pole is not an appropriate value.
  For details, refer to "6-2-3 Auto magnetic pole-related error".
- Detection fails due to the influence of the mechanical system.
  For details, refer to "6-2-3 Auto magnetic pole-related error".

c. Operation at an error

Servo OFF

d. Release method

Remove the cause and execute one of the following operations:

- Input the ARST signal.
- Input the RST signal.
- Turn the power off, then on again.

e. Related display

–

f. Related parameter

P060: Encoder type
P068: Magnetic pole sensor type
P380: Magnetic pole detection torque limit value
P381: Magnetic pole detection gain 1
P382: Magnetic pole detection integration time constant
P383: Magnetic pole detection gain 2
P384: Magnetic pole detection complete range
P385[1st digit]: Magnetic pole detection filter order selection
P385[5th - 2nd digits]: Magnetic pole detection filter frequency
P386[3rd - 1st digits]: Landing torque
P386[7th - 4th digits]: Landing torque holding time
P387[3rd - 1st digits]: Magnetic pole detection torque minimum value
P387[4th digit]: Magnetic pole detection torque attenuation pattern selection

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.304 Encoder signal disconnection error

a. Description

An error occurred in the encoder cable.
Or, in the encoder type "C-SEN2", the encoder frequency exceeds 24Mpps.
When the encoder itself is faulty, an encoder error may not be detected. In this case, an error including an overload error occurs while the motor is running.

b. Causes and measures

- A problem occurred with the encoder cable connection.
  Check that the encoder cable is not broken or loose but is connected correctly, etc.
- Parameter setting error
  Check if the encoder used is set in [P060: Encoder type]. If it is not set, set the encoder from the VPH DES "Driver/Motor selection" window.
- Not recognized due to a failure in the encoder.
  Repair or replace the encoder.

c. Operation at an error

Servo OFF

d. Release method

Remove the cause and turn the power off, then on again.

e. Related display

–

f. Related parameter

P060: Encoder type

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.305 Encoder speed error

a. Description

The maximum feedback signal speed exceeds the speed that the device can detect.
For the specification of the feedback signal, refer to "13-1-3 Functional specifications".

b. Causes and measures

- The maximum speed is high.
  Set [P082: Motor max speed special setting] within the maximum speed specification of the motor and feedback signal.
  - Serial method: 4194M resolution/sec
  - 90 deg phase difference method: 163Mpps

  This maximum speed does not guarantee operation of the device.
  For the specification of the feedback signal, refer to "13-1-3 Functional specifications".

c. Operation at an error

Servo OFF

d. Release method

Remove the cause and turn the power off, then on again.

e. Related display

–

f. Related parameter

P082: Motor max speed special setting

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.307 Absolute position compensation data unregistered

a. Description

Although ABS position compensation is set effective, no ABS position compensation data is registered in the device.

b. Causes and measures

- No ABS position compensation data is registered.
  Use the VPH ABS position compensation data transfer program (VPH APE) to register ABS position compensation data in the device.
- ABS position compensation is set effective although it is not used.
  If not using ABS position compensation, set [P104: Absolute position compensation action entry] to "0: Absolute position compensation function ineffective".

c. Operation at an error

Servo OFF

d. Release method

Remove the cause and turn the power off, then on again.

e. Related display

L021: Whether ABS position compensation data is valid or invalid

f. Related parameter

P104: Absolute position compensation action entry

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.308 Absolute position compensation data collation error

* The error occurs only when the IPU exists (S-ABS2, S-ABS3, S-ABS4).

a. Description

The absolute position compensation data registered in the device is inconsistent with the data registered in the IPU.

b. Causes and measures

- The ABS position compensation data is inconsistent.
  Input the RST signal or turn the power off, then on again. The ABS position compensation data registered in the IPU is automatically in the device.

c. Operation at an error

Servo OFF

d. Release method

Execute one of the following operations:

- Input the ARST signal.
- Input the RST signal.
- Turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.309 Absolute position compensation data none error

* The error occurs only when the IPU exists (S-ABS2, S-ABS3, S-ABS4).

a. Description

No ABS position compensation data is registered in the IPU.
ABS position compensation data for another model is registered.

b. Causes and measures

- No ABS position compensation data is registered in the device.
  Use the VPH ABS position compensation data transfer program (VPH APE) to register ABS position compensation data in the device.
- ABS position compensation data is registered in the device, but is not transferred to the IPU.
  From VPH DES, execute [d015: Transfer the absolute position compensation data to IPU] to transfer the data from the device to the IPU.
- No ABS position compensation data is possessed.
  Contact our sales representative.

c. Operation at an error

Servo OFF

d. Release method

Remove the cause and turn the power off, then on again.

e. Related display

L021: Whether ABS position compensation data is valid or invalid

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.310 IPU communication error

* The error occurs only when the IPU exists (S-ABS2, S-ABS3, S-ABS4).

a. Description

An error occurred in communication between device and IPU.

b. Causes and measures

- A problem occurred with the cable connection.
  Check that the cable between device and IPU is not broken or loose but is connected correctly, etc.
- Parameter setting error
  Check if the encoder used is set in [P060: Encoder type]. If it is not set, set the encoder from the VPH DES "Driver/Motor selection" window.

c. Operation at an error

Servo OFF

d. Release method

Remove the cause and turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.312 Communication error between encoder IPU

* The error occurs only when the IPU exists (S-ABS2, S-ABS3, S-ABS4).

a. Description

An error occurred in the communication circuit between the encoder and IPU.

b. Causes and measures

- A problem occurred with the encoder cable connection.
  Check that the encoder cable is not broken or loose but is connected correctly, etc.
- Communication between encoder and IPU is influenced by noises.
  Remove the noise source, and take noise protection measures.
- Data cannot be transmitted or received due to a failure in the IPU.
  If this error occurs when ABS position compensation data, user data, or IPU parameters are transmitted or received, another possible cause is a failure in the IPU. Repair or replace it.

c. Operation at an error

Servo OFF

d. Release method

Remove the cause and turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.313 Cable disconnection between encoder IPU

* The error occurs only when the IPU exists (S-ABS2, S-ABS3, S-ABS4).

a. Description

An error occurred in the cable between encoder and IPU.

b. Causes and measures

- A problem occurred with the encoder cable connection.
  Check that the encoder cable is not broken or loose but is connected correctly, etc.
- Communication between encoder and IPU is influenced by noises.
  Remove the noise source, and take noise protection measures.
- Data cannot be transmitted or received due to a failure in the IPU.
  If this error occurs when ABS position compensation data, user data, or IPU parameters are transmitted or received, another possible cause is a failure in the IPU. Repair or replace it.

c. Operation at an error

Servo OFF

d. Release method

Remove the cause and turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.314 Encoder position detection signal error

* The error occurs only when the IPU exists (S-ABS2, S-ABS3, S-ABS4).

a. Description

The encoder cannot read the positional signal detection waveform normally.

b. Causes and measures

- Incorrect mounting of the encoder position detection section
  When the encoder is mounted additionally, the sensor may be mounted incorrectly. Check the mounting status.

Repair or replace the sensor or the IPU in the following cases:

- Failure in the encoder position detection section
- A signal error occurred due to the deterioration of the encoder position detection section.
- Failure in the IPU detection parts
- The encoder scale mounting position is changed due to the overloading or uneven loading of the motor.

c. Operation at an error

Servo OFF

d. Release method

Remove the cause and turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.315 1 rotation position detection speed error

* The error occurs only when the IPU exists (S-ABS2, S-ABS3, S-ABS4).

a. Description

When an ABS encoder is used and the power is turned on or when a serial encoder communication error is released, the motor rotates or vibrates, making it impossible to detect the position normally.

Usually, the error is detected at the following speed.

For S-ABS2 and S-ABS3: 1rpm or more

For S-ABS4: 15rpm or more

With a combination of motor and encoder, the above speeds may be changed with a parameter.

b. Causes and measures

- The position cannot be detected due to vibration.
  It is considered that when an ABS encoder is used and the power is turned on or when a serial encoder communication error is released, the motor rotates or vibrates, making it impossible to detect the position normally. Usually, the error is detected at the following speed.
  - For S-ABS2 and S-ABS3: 1rpm or more
  - For S-ABS4: 15rpm or more

  With a combination of motor and encoder, the above speeds may be changed with a parameter.

c. Operation at an error

Servo OFF

d. Release method

Remove the cause and turn the power off, then on again.

- Input the ARST signal.
- Input the RST signal.
- Turn the power off, then on again.

e. Related display

–

f. Related parameter

P071[2nd & 1st digits]: 1 rotation position detection speed error detection speed

P089[2nd & 1st digits]: 1 rotation position detection speed error detection speed special setting

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.316 Photo acceptance unit error

* The error occurs only when the IPU exists (S-ABS2, S-ABS3, S-ABS4).

a. Description

An error occurred in a component in the ABS encoder.

b. Causes and measures

- A signal error occurred due to a failure in or the deterioration of the encoder position detection section.
  Repair or replace the motor.
- Failure in the IPU detection parts
  Repair or replace the IPU.
- A problem occurred with the connection of the cable between encoder and IPU.
  Check that the cable is not broken or loose but is connected correctly, etc. If the error still occurs, repair or replace it.
- The encoder scale mounting position is changed due to the overloading or uneven loading of the motor.
  Review the load conditions.

c. Operation at an error

Servo OFF

d. Release method

Remove the cause and turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.317 Light emitting element error

* The error occurs only when the IPU exists (S-ABS2, S-ABS3, S-ABS4).

a. Description
An error occurred in a component in the ABS encoder.

b. Causes and measures
- A signal error occurred due to a failure in or the deterioration of the encoder position detection section.
  Repair or replace the motor.
- The encoder scale mounting position is changed due to the overloading or uneven loading of the motor.
  Review the load conditions.

c. Operation at an error
Servo OFF

d. Release method
Remove the cause and turn the power off, then on again.

e. Related display
–

f. Related parameter
–

g. Output signal status
ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.318 IPU backup error

* The error occurs only when the IPU exists (S-ABS2, S-ABS3, S-ABS4).

a. Description
IPU backup data is damaged.
Magnetic encoder backup data is damaged.

b. Causes and measures
- Failure or deterioration
  A possible cause is a failure in the IPU. Repair or replace it.

c. Operation at an error
Servo OFF

d. Release method
Remove the cause and turn the power off, then on again.

e. Related display
–

f. Related parameter
–

g. Output signal status
ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.319 Absolute position compensation encoder pulse number error

a. Description

The number of encoder pulses set in the device is not the same as the number set in ABS position compensation data.

b. Causes and measures

- ABS position compensation data setting error
  Use the VPH ABS position compensation data transfer program (VPH APE) to register ABS position compensation data in the device.
- Parameter setting error
  Check if the number of encoder pulses of the encoder used is set in [P061: Encoder pulse of rotary type motor]. If it is not set, set the encoder resolution from the VPH DES "Driver/Motor selection" window.

c. Operation at an error

Servo OFF

d. Release method

Remove the cause and turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.320 Magnetic pole signal disconnection error

a. Description

When the magnetic pole sensor was used, the signal from the magnetic pole sensor could not be read normally.

When the magnetic pole sensor itself is faulty, this error may not be detected. In this case, an error including an overload error occurs while the motor is running.

b. Causes and measures

- It was not possible to determine the magnetic pole because the operating speed was too high.
  Reduce the operating speed.
- A problem occurred with the encoder cable connection.
  Check that the encoder cable is not broken or loose but is connected correctly, etc.
- Incorrect wiring
  Check the wiring of the motor power cable (U/V/W) and the encoder feedback signal cable.
- The magnetic pole signal is influenced by noises.
  Remove the noise source, and take noise protection measures.
- Parameter setting error
  Check the magnetic pole sensor and encoder used, and set parameters.
- The magnetic pole sensor is faulty.
  Repair or replace the magnetic pole sensor.

c. Operation at an error

Servo OFF

d. Release method

Remove the cause and turn the power off, then on again.

e. Related display

–

f. Related parameter

P068: Magnetic pole sensor type

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.321 Encoder identification error

a. Description

If an "ENSIS" or "EnDat" encoder is connected, encoder information cannot be referred to due to a communication error during initialization at power ON.

b. Causes and measures

- A problem occurred with the encoder cable connection.
  Check that the encoder cable is not broken or loose but is connected correctly, etc.
- An encoder not compliant with the device is connected.
  Connect an encoder that is compliant with the device.

c. Operation at an error

Servo OFF

d. Release method

Remove the cause and turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.322 Unregistered encoder selection error

a. Description

An attempt is made to select and start an encoder not compliant with the device.

b. Causes and measures

- Parameter setting error
  Check if the encoder used is set in [P060: Encoder type]. If it is not set, set the encoder from the VPH DES "Driver/Motor selection" window.
- An encoder not compliant with the device is connected.
  Connect an encoder that is compliant with the device.

c. Operation at an error

Servo OFF

d. Release method

Remove the cause and turn the power off, then on again.

e. Related display

–

f. Related parameter

P060: Encoder type

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.325 Encoder communication timeout

a. Description

Reception of data from the encoder could not be checked, causing a timeout.

b. Causes and measures

- Parameter setting error
  Check if the encoder used is set in [P060: Encoder type]. If it is not set, set the encoder from the VPH DES "Device and motor selection" window.
- A problem occurred with the encoder cable connection.
  Check that the encoder cable is not broken or loose but is connected correctly, etc.
- The encoder is faulty.
  Repair or replace the encoder.
- Encoder communication is affected by noise.
  Remove the noise source, and take noise protection measures.

c. Operation at an error

Servo OFF

d. Release method

Remove the cause and turn the power off, then on again.

(If the error still occurs, replacement or repair is necessary.)

e. Related display

–

f. Related parameter

P060: Encoder type

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.326 Absolute position compensation data IPU registration error

a. Description

The ABS position compensation data written in the IPU is not consistent with the data of the write source.

The ABS position compensation data was not written normally due to the influence of noises, etc.

b. Causes and measures

- ABS position compensation data error
  Use the VPH ABS position compensation data transfer program (VPH APE) to register ABS position compensation data in the device.
- The cable is influenced by noises.
  Remove the noise source, and take noise protection measures. Then, use the VPH ABS position compensation data transfer program (VPH APE) to register ABS position compensation data in the device.

c. Operation at an error

Servo OFF

d. Release method

Remove the cause and turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.380 Encoder data sustain error 1

* Occurs only when S-iABS is selected.

a. Description

Shipment adjustment data 1 in the encoder is damaged.

b. Causes and measures

- The encoder is faulty.
  Turn the power off, then on again. If the error still occurs, encoder repair or replacement is necessary.

c. Operation at an error

Servo OFF

d. Release method

Remove the cause and turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.381 Encoder data sustain error 2

* Occurs only when S-iABS is selected.

a. Description
Shipment adjustment data 2 in the encoder is damaged.

b. Causes and measures
- The encoder is faulty.
  Turn the power off, then on again. If the error still occurs, encoder repair or replacement is necessary.

c. Operation at an error
Servo OFF

d. Release method
Remove the cause and turn the power off, then on again.

e. Related display
–

f. Related parameter
–

g. Output signal status
ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.382 Encoder position detection signal error 1

* Occurs only when S-iABS is selected.

a. Description
The rough position detection signal of the encoder cannot be read normally.

b. Causes and measures
- The encoder is faulty.
  Turn the power off, then on again. If the error still occurs, encoder repair or replacement is necessary.

c. Operation at an error
Servo OFF

d. Release method
Remove the cause and turn the power off, then on again.

e. Related display
–

f. Related parameter
–

g. Output signal status
ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.383 Encoder position detection signal error 2

* Occurs only when S-iABS is selected.

a. Description
The precise position detection signal of the encoder cannot be read normally.

b. Causes and measures
- The encoder is faulty.
  Turn the power off, then on again. If the error still occurs, encoder repair or replacement is necessary.

c. Operation at an error
Servo OFF

d. Release method
Remove the cause and turn the power off, then on again.

e. Related display
–

f. Related parameter
–

g. Output signal status
ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.384 Encoder communication timeout/Re-introduction-of-unit power release

* Occurs only when S-iABS is selected.

a. Description
There is no response from the encoder.

b. Causes and measures
- A problem occurred with the encoder cable connection.
  Check that the encoder cable is not broken or loose but is connected correctly, etc.
- Parameter setting error
  Check the motor to connect, and set the type of the motor to connect, with VPH DES.
- The encoder is faulty.
  Turn the power off, then on again. If the error still occurs, encoder repair or replacement is necessary.

c. Operation at an error
Servo OFF

d. Release method
Remove the cause and turn the power off, then on again.

e. Related display
–

f. Related parameter
–

g. Output signal status
ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.385 Encoder communication error /Re-introduction-of-unit power release

* Occurs only when S-iABS is selected.

a. Description
An error occurred in communication between device and encoder.

b. Causes and measures
- A problem occurred in encoder cable connection.
  Check that the encoder cable is not broken or loose but is connected correctly, etc.
- The encoder is faulty.
  Turn the power off, then on again. If the error still occurs, encoder repair or replacement is necessary.

c. Operation at an error
Servo OFF

d. Release method
Remove the cause and turn the power off, then on again.

e. Related display
–

f. Related parameter
–

g. Output signal status
ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.386 Encoder position mismatch error

* Occurs only when S-iABS is selected.

a. Description
The rough position of the encoder does not match the precise position.

b. Causes and measures
- The encoder is faulty.
  Turn the power off, then on again. If the error still occurs, encoder repair or replacement is necessary.

c. Operation at an error
Servo OFF

d. Release method
Remove the cause and turn the power off, then on again.

e. Related display
–

f. Related parameter
–

g. Output signal status
ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.387 Encoder shipment data error

* Occurs only when S-iABS is selected.

a. Description

The shipment data in the encoder contained an error.

b. Causes and measures

- The encoder is faulty.
  Turn the power off, then on again. If the error still occurs, encoder repair or replacement is necessary.

c. Operation at an error

Servo OFF

d. Release method

Remove the cause and turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.400 Forward direction overtravel / Automatic release

a. Description

The forward direction overtravel signal (FOT) was detected.

b. Causes and measures

- The overtravel detection spot is reached.
  Using jog operation, etc., execute reverse direction operation to move the motor in the operation range.
- Incorrect setting of the positioning command
  Check if the travel distance with the positioning command exceeds the overtravel detection spot.
- Incorrect external sequence
  Check the external sequence and use the motor in the operation range.
- Wiring or connector insertion error
  Check that the control signal cable is not broken or does not have a contact failure but is connected correctly, etc.

c. Operation at an error

The motor stops after the time of [P634(5th - 2nd digits): Deceleration time after OT signal braking stoppage] and enters the servo lock status.
For a torque command, the torque becomes zero without deceleration stop.

d. Release method

Automatic release by moving the motor to the operation range

e. Related display

–

f. Related parameter

P410[3rd digit]: SPDSEL0 Overtravel spec selection
P413[3rd digit]: SPDSEL1, P416[3rd digit]: SPDSEL2, P419[3rd digit]: SPDSEL3, P422[3rd digit]: SPDSEL4, P425[3rd digit]: SPDSEL5, P428[3rd digit]: SPDSEL6, P431[3rd digit]: SPDSEL7
P441[3rd digit]: TLQSEL0 Overtravel spec selection
P444[3rd digit]: TLQSEL1, P447[3rd digit]: TLQSEL2, P450[3rd digit]: TLQSEL3, P453[3rd digit]: TLQSEL4, P456[3rd digit]: TLQSEL5, P459[3rd digit]: TLQSEL6, P462[3rd digit]: TLQSEL7
P517[3rd digit]: SEL0 Overtravel spec selection
P524[3rd digit]: SEL1, P531[3rd digit]: SEL2, P538[3rd digit]: SEL3, P545[3rd digit]: SEL4, P552[3rd digit]: SEL5, P559[3rd digit]: SEL6, P566[3rd digit]: SEL7
P634[5th - 2nd digits]: Deceleration time after OT signal braking stoppage
P634[8th - 6th digits]: OT condition holding time
P811: Overtravel spec selection

g. Output signal status

ALM: ○ /WNG: ● /RDY: Follows [P650]./ZRDY: ○ (in the built-in command mode)/BRK: ○

AL.401 Reverse direction overtravel / Automatic release

a. Description

The reverse direction overtravel signal (ROT) was detected.

b. Causes and measures

- The overtravel detection spot is reached.
  Using jog operation, etc., execute forward direction operation to move the motor in the operation range.
- Incorrect setting of the positioning command
  Check if the travel distance with the positioning command exceeds the overtravel detection spot.
- Incorrect external sequence
  Check the external sequence and use the motor in the operation range.
- Wiring or connector insertion error
  Check that the control signal cable is not broken or does not have a contact failure but is connected correctly, etc.

c. Operation at an error

The motor stops after the time of [P634(5th - 2nd digits): Deceleration time after OT signal braking stoppage] and enters the servo lock status.
For a torque command, the torque becomes zero without deceleration stop.

d. Release method

Automatic release by moving the motor to the operation range

e. Related display

–

f. Related parameter

P410[3rd digit]: SPDSEL0 Overtravel spec selection
P413[3rd digit]: SPDSEL1, P416[3rd digit]: SPDSEL2, P419[3rd digit]: SPDSEL3, P422[3rd digit]: SPDSEL4, P425[3rd digit]: SPDSEL5, P428[3rd digit]: SPDSEL6, P431[3rd digit]: SPDSEL7
P441[3rd digit]: TLQSEL0 Overtravel spec selection
P444[3rd digit]: TLQSEL1, P447[3rd digit]: TLQSEL2, P450[3rd digit]: TLQSEL3, P453[3rd digit]: TLQSEL4, P456[3rd digit]: TLQSEL5, P459[3rd digit]: TLQSEL6, P462[3rd digit]: TLQSEL7
P517[3rd digit]: SEL0 Overtravel spec selection
P524[3rd digit]: SEL1, P531[3rd digit]: SEL2, P538[3rd digit]: SEL3, P545[3rd digit]: SEL4, P552[3rd digit]: SEL5, P559[3rd digit]: SEL6, P566[3rd digit]: SEL7
P634[5th - 2nd digits]: Deceleration time after OT signal braking stoppage
P634[8th - 6th digits]: OT condition holding time
P811: Overtravel spec selection

g. Output signal status

ALM: ○ /WNG: ● /RDY: Follows [P650]./ZRDY: ○ (in the built-in command mode)/BRK: ○

AL.402 Forward direction software overtravel / Automatic release

a. Description

The status display [C020: Current position] is beyond the setting of [P171].

b. Causes and measures

- The overtravel detection spot is reached.
  Using jog operation, etc., execute reverse direction operation to move the motor in the operation range.
- Incorrect setting of the positioning command
  Check if the travel distance with the positioning command exceeds the overtravel detection spot.
- Parameter setting error
  Check if the setting of [P171: Forward direction software OT limit] is appropriate.
- Incorrect external sequence
  Check the external sequence and use the motor in the operation range.
- Wiring or connector insertion error
  Check that the control signal cable is not broken or does not have a contact failure but is connected correctly, etc.

c. Operation at an error

The motor stops after the time of [P635(5th - 2nd digits): Soft OT braking stoppage deceleration time] and enters the servo lock status.
For a torque command, the torque becomes zero without deceleration stop.

d. Release method

Automatic release by moving the motor to the operation range

e. Related display

C020: Current position

f. Related parameter

P171: Forward direction software OT limit
P410[3rd digit]: SPDSEL0 Overtravel spec selection
P413[3rd digit]: SPDSEL1, P416[3rd digit]: SPDSEL2, P419[3rd digit]: SPDSEL3, P422[3rd digit]: SPDSEL4, P425[3rd digit]: SPDSEL5, P428[3rd digit]: SPDSEL6, P431[3rd digit]: SPDSEL7
P441[3rd digit]: TLQSEL0 Overtravel spec selection
P444[3rd digit]: TLQSEL1, P447[3rd digit]: TLQSEL2, P450[3rd digit]: TLQSEL3, P453[3rd digit]: TLQSEL4, P456[3rd digit]: TLQSEL5, P459[3rd digit]: TLQSEL6, P462[3rd digit]: TLQSEL7
P517[3rd digit]: SEL0 Overtravel spec selection
P524[3rd digit]: SEL1, P531[3rd digit]: SEL2, P538[3rd digit]: SEL3, P545[3rd digit]: SEL4, P552[3rd digit]: SEL5, P559[3rd digit]: SEL6, P566[3rd digit]: SEL7
P635[5th - 2nd digits]: Soft OT signal braking stoppage deceleration time
P635[8th - 6th digits]: Soft OT condition holding time
P811: Overtravel spec selection

g. Output signal status

ALM: ○ /WNG: ● /RDY: Follows [P650]./ZRDY: ○ (in the built-in command mode)/BRK: ○

AL.403 Reverse direction software overtravel / Automatic release

a. Description

The status display [C020: Current position] is beyond the setting of [P172].

b. Causes and measures

- The overtravel detection spot is reached.
  Using jog operation, etc., execute forward or reverse direction operation to move the motor in the operation range.
- Incorrect setting of the positioning command
  Check if the travel distance with the positioning command exceeds the overtravel detection spot.
- Parameter setting error
  Check if the setting of [P172: Reverse direction software OT limit] is appropriate.
- Incorrect external sequence
  Check the external sequence and use the motor in the operation range.
- Wiring or connector insertion error
  Check that the control signal cable is not broken or does not have a contact failure but is connected correctly, etc.

c. Operation at an error

The motor stops after the time of [P635(5th - 2nd digits): Soft OT braking stoppage deceleration time] and enters the servo lock status.
For a torque command, the torque becomes zero without deceleration stop.

d. Release method

Automatic release by moving the motor to the operation range

e. Related display

C020: Current position

f. Related parameter

P172: Reverse direction software OT limit
P410[3rd digit]: SPDSEL0 Overtravel spec selection
P413[3rd digit]: SPDSEL1, P416[3rd digit]: SPDSEL2, P419[3rd digit]: SPDSEL3, P422[3rd digit]: SPDSEL4, P425[3rd digit]: SPDSEL5, P428[3rd digit]: SPDSEL6, P431[3rd digit]: SPDSEL7
P441[3rd digit]: TLQSEL0 Overtravel spec selection
P444[3rd digit]: TLQSEL1, P447[3rd digit]: TLQSEL2, P450[3rd digit]: TLQSEL3, P453[3rd digit]: TLQSEL4, P456[3rd digit]: TLQSEL5, P459[3rd digit]: TLQSEL6, P462[3rd digit]: TLQSEL7
P517[3rd digit]: SEL0 Overtravel spec selection
P524[3rd digit]: SEL1, P531[3rd digit]: SEL2, P538[3rd digit]: SEL3, P545[3rd digit]: SEL4, P552[3rd digit]: SEL5, P559[3rd digit]: SEL6, P566[3rd digit]: SEL7
P635[5th - 2nd digits]: Soft OT signal braking stoppage deceleration time
P635[8th - 6th digits]: Soft OT condition holding time
P811: Overtravel spec selection

g. Output signal status

ALM: ○ /WNG: ● /RDY: Follows [P650]./ZRDY: ○ (in the built-in command mode)/BRK: ○

AL.404 Forward direction overtravel / Reset release

a. Description

The forward direction overtravel signal (FOT) was detected.

b. Causes and measures

- The overtravel detection spot is reached.
  Using jog operation, etc., execute reverse direction operation to move the motor in the operation range.
- Incorrect setting of the positioning command
  Check if the travel distance with the positioning command exceeds the overtravel detection spot.
- Incorrect external sequence
  Check the external sequence and use the motor in the operation range.
- Wiring or connector insertion error
  Check that the control signal cable is not broken or does not have a contact failure but is connected correctly, etc.

c. Operation at an error

The motor stops after the time of [P634(5th - 2nd digits): Deceleration time after OT signal braking stoppage] and enters the servo lock status.
For a torque command, the torque becomes zero without deceleration stop.

d. Release method

Execute one of the following operations, then move the motor to the operation range.

- Input the ARST signal.
- Input the RST signal.

e. Related display

–

f. Related parameter

P410[3rd digit]: SPDSEL0 Overtravel spec selection
P413[3rd digit]: SPDSEL1, P416[3rd digit]: SPDSEL2, P419[3rd digit]: SPDSEL3, P422[3rd digit]: SPDSEL4, P425[3rd digit]: SPDSEL5, P428[3rd digit]: SPDSEL6, P431[3rd digit]: SPDSEL7
P441[3rd digit]: TLQSEL0 Overtravel spec selection
P444[3rd digit]: TLQSEL1, P447[3rd digit]: TLQSEL2, P450[3rd digit]: TLQSEL3, P453[3rd digit]: TLQSEL4, P456[3rd digit]: TLQSEL5, P459[3rd digit]: TLQSEL6, P462[3rd digit]: TLQSEL7
P517[3rd digit]: SEL0 Overtravel spec selection
P524[3rd digit]: SEL1, P531[3rd digit]: SEL2, P538[3rd digit]: SEL3, P545[3rd digit]: SEL4, P552[3rd digit]: SEL5, P559[3rd digit]: SEL6, P566[3rd digit]: SEL7
P634[5th - 2nd digits]: Deceleration time after OT signal braking stoppage
P634[8th - 6th digits]: OT condition holding time
P811: Overtravel spec selection

g. Output signal status

ALM: ○ /WNG: ● /RDY: Follows [P650]./ZRDY: ○ (in the built-in command mode)/BRK: ○

AL.405 Reverse direction overtravel / Reset release

a. Description

The reverse direction overtravel signal (ROT) was detected.

b. Causes and measures

- The overtravel detection spot is reached.
  Using jog operation, etc., execute forward direction operation to move the motor in the operation range.
- Incorrect setting of the positioning command
  Check if the travel distance with the positioning command exceeds the overtravel detection spot.
- Incorrect external sequence
  Check the external sequence and use the motor in the operation range.
- Wiring or connector insertion error
  Check that the control signal cable is not broken or does not have a contact failure but is connected correctly, etc.

c. Operation at an error

The motor stops after the time of [P634(5th - 2nd digits): Deceleration time after OT signal braking stoppage] and enters the servo lock status.
For a torque command, the torque becomes zero without deceleration stop.

d. Release method

Execute one of the following operations, then move the motor to the operation range.

- Input the ARST signal.
- Input the RST signal.

e. Related display

–

f. Related parameter

P410[3rd digit]: SPDSEL0 Overtravel spec selection
P413[3rd digit]: SPDSEL1, P416[3rd digit]: SPDSEL2, P419[3rd digit]: SPDSEL3, P422[3rd digit]: SPDSEL4, P425[3rd digit]: SPDSEL5, P428[3rd digit]: SPDSEL6, P431[3rd digit]: SPDSEL7
P441[3rd digit]: TLQSEL0 Overtravel spec selection
P444[3rd digit]: TLQSEL1, P447[3rd digit]: TLQSEL2, P450[3rd digit]: TLQSEL3, P453[3rd digit]: TLQSEL4, P456[3rd digit]: TLQSEL5, P459[3rd digit]: TLQSEL6, P462[3rd digit]: TLQSEL7
P517[3rd digit]: SEL0 Overtravel spec selection
P524[3rd digit]: SEL1, P531[3rd digit]: SEL2, P538[3rd digit]: SEL3, P545[3rd digit]: SEL4, P552[3rd digit]: SEL5, P559[3rd digit]: SEL6, P566[3rd digit]: SEL7
P634[5th - 2nd digits]: Deceleration time after OT signal braking stoppage
P634[8th - 6th digits]: OT condition holding time
P811: Overtravel spec selection

g. Output signal status

ALM: ○ /WNG: ● /RDY: Follows [P650]./ZRDY: ○ (in the built-in command mode)/BRK: ○

AL.406 Forward direction software overtravel / Reset release

a. Description

The status display [C020: Current position] is beyond the setting of [P171].

b. Causes and measures

- The overtravel detection spot is reached.
  Using jog operation, etc., execute reverse direction operation to move the motor in the operation range.
- Incorrect setting of the positioning command
  Check if the travel distance with the positioning command exceeds the overtravel detection spot.
- Parameter setting error
  Check if the setting of [P171: Forward direction software OT limit] is appropriate.
- Incorrect external sequence
  Check the external sequence and use the motor in the operation range.
- Wiring or connector insertion error
  Check that the control signal cable is not broken or does not have a contact failure but is connected correctly, etc.

c. Operation at an error

The motor stops after the time of [P635(5th - 2nd digits): Soft OT braking stoppage deceleration time] and enters the servo lock status.
For a torque command, the torque becomes zero without deceleration stop.

d. Release method

Execute one of the following operations, then move the motor to the operation range.

- Input the ARST signal.
- Input the RST signal.

e. Related display

C020: Current position

f. Related parameter

P171: Forward direction software OT limit
P410[3rd digit]: SPDSEL0 Overtravel spec selection
P413[3rd digit]: SPDSEL1, P416[3rd digit]: SPDSEL2, P419[3rd digit]: SPDSEL3, P422[3rd digit]: SPDSEL4, P425[3rd digit]: SPDSEL5, P428[3rd digit]: SPDSEL6, P431[3rd digit]: SPDSEL7
P441[3rd digit]: TLQSEL0 Overtravel spec selection
P444[3rd digit]: TLQSEL1, P447[3rd digit]: TLQSEL2, P450[3rd digit]: TLQSEL3, P453[3rd digit]: TLQSEL4, P456[3rd digit]: TLQSEL5, P459[3rd digit]: TLQSEL6, P462[3rd digit]: TLQSEL7
P517[3rd digit]: SEL0 Overtravel spec selection
P524[3rd digit]: SEL1, P531[3rd digit]: SEL2, P538[3rd digit]: SEL3, P545[3rd digit]: SEL4, P552[3rd digit]: SEL5, P559[3rd digit]: SEL6, P566[3rd digit]: SEL7
P635[5th - 2nd digits]: Soft OT signal braking stoppage deceleration time
P635[8th - 6th digits]: Soft OT condition holding time
P811: Overtravel spec selection

g. Output signal status

ALM: ○ /WNG: ● /RDY: Follows [P650]./ZRDY: ○ (in the built-in command mode)/BRK: ○

AL.407 Reverse direction software overtravel / Reset release

a. Description

The status display [C020: Current position] is beyond the setting of [P172].

b. Causes and measures

- The overtravel detection spot is reached.
  Using jog operation, etc., execute forward direction operation to move the motor in the operation range.
- Incorrect setting of the positioning command
  Check if the travel distance with the positioning command exceeds the overtravel detection spot.
- Parameter setting error
  Check if the setting of [P172: Reverse direction software OT limit] is appropriate.
- Incorrect external sequence
  Check the external sequence and use the motor in the operation range.
- Wiring or connector insertion error
  Check that the control signal cable is not broken or does not have a contact failure but is connected correctly, etc.

c. Operation at an error

The motor stops after the time of [P635(5th - 2nd digits): Soft OT braking stoppage deceleration time] and enters the servo lock status.
For a torque command, the torque becomes zero without deceleration stop.

d. Release method

Execute one of the following operations, then move the motor to the operation range.

- Input the ARST signal.
- Input the RST signal.

e. Related display

C020: Current position

f. Related parameter

P172: Reverse direction software OT limit
P410[3rd digit]: SPDSEL0 Overtravel spec selection
P413[3rd digit]: SPDSEL1, P416[3rd digit]: SPDSEL2, P419[3rd digit]: SPDSEL3, P422[3rd digit]: SPDSEL4, P425[3rd digit]: SPDSEL5, P428[3rd digit]: SPDSEL6, P431[3rd digit]: SPDSEL7
P441[3rd digit]: TLQSEL0 Overtravel spec selection
P444[3rd digit]: TLQSEL1, P447[3rd digit]: TLQSEL2, P450[3rd digit]: TLQSEL3, P453[3rd digit]: TLQSEL4, P456[3rd digit]: TLQSEL5, P459[3rd digit]: TLQSEL6, P462[3rd digit]: TLQSEL7
P517[3rd digit]: SEL0 Overtravel spec selection
P524[3rd digit]: SEL1, P531[3rd digit]: SEL2, P538[3rd digit]: SEL3, P545[3rd digit]: SEL4, P552[3rd digit]: SEL5, P559[3rd digit]: SEL6, P566[3rd digit]: SEL7
P635[5th - 2nd digits]: Soft OT signal braking stoppage deceleration time
P635[8th - 6th digits]: Soft OT condition holding time
P811: Overtravel spec selection

g. Output signal status

ALM: ○ /WNG: ● /RDY: Follows [P650]./ZRDY: ○ (in the built-in command mode)/BRK: ○

AL.408 Forward direction positioning amount over

a. Description

An attempt was made to execute the positioning command with a positioning quantity greater than the value set in [P173].

b. Causes and measures

- Parameter setting error
  Check if the setting of [P173: Max travel amount for forward direction positioning] is appropriate.
- Positioning amount setting error
  Check if the positioning amount of the command is appropriate.

c. Operation at an error

Servo lock

d. Release method

Remove the cause and execute one of the following operations:

- Input the ARST signal.
- Input the RST signal.
- Turn the power off, then on again.

e. Related display

–

f. Related parameter

P173: Max travel amount for forward direction positioning

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ○

AL.409 Reverse direction positioning amount over

a. Description

An attempt was made to execute the positioning command with a positioning amount greater than the value set in [P174].

b. Causes and measures

- Parameter setting error
  Check if the setting of [P174: Max travel amount for reverse direction positioning] is appropriate.
- Positioning amount setting error
  Check if the positioning amount of the command is appropriate.

c. Operation at an error

Servo lock

d. Release method

Remove the cause and execute one of the following operations:

- Input the ARST signal.
- Input the RST signal.
- Turn the power off, then on again.

e. Related display

–

f. Related parameter

P174: Max travel amount for reverse direction positioning

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ○

AL.410 Address setting error

a. Description

An attempt was made to specify a command address other than 0 to 255 and execute a command.

b. Causes and measures

- Address setting error

  Check if the command of the command address is appropriate.

c. Operation at an error

Servo lock

d. Release method

Remove the cause and execute one of the following operations:

- Input the ARST signal.
- Input the RST signal.
- Turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: /ZRDY: ● /BRK: ○

AL.420 Position deviation excess 1 (maximum position deviation over)

a. Description

The position deviation exceeds the value set in [P176].

b. Causes and measures

- The overshoot becomes large due to conditions such as large load inertia.
  Take measures such as reducing the load inertia and increasing the acceleration time.
  Also, check and adjust the gain, as well as the play in the mechanical system.
- Runaway or vibration occurred due to a failure in the encoder.
  Repair or replace the encoder.
- The encoder feedback signal or the command pulse is influenced by noises.
  Remove the noise source, and take noise protection measures.
- Mechanical lock due to the brake, etc.
  Check the brake and the mechanical configuration, and remove the cause of the lock.
- Incorrect setting of parameters
  Check the related parameters.

c. Operation at an error

The motor immediately stops, and after having stopped, enters the servo off status

d. Release method

Remove the cause and execute one of the following operations:

- Input the ARST signal.
- Input the RST signal.
- Turn the power off, then on again.

e. Related display

–

f. Related parameter

P176: Position deviation exorbitance detection pulse Max value

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.421 Position deviation excess 2 (theoretical position deviation over)

a. Description

The position deviation exceeds the amount based on the value set in [P178].

b. Causes and measures

- The overshoot becomes large due to conditions such as large load inertia.
  Take measures such as reducing the load inertia and increasing the acceleration time.
  Also, check and adjust the gain, as well as the play in the mechanical system.
- Runaway or vibration occurred due to a failure in the encoder.
  Repair or replace the encoder.
- The encoder feedback signal or the command pulse is influenced by noises.
  Remove the noise source, and take noise protection measures.
- Mechanical lock due to the brake, etc.
  Check the brake and the mechanical configuration, and remove the cause of the lock.
- Incorrect setting of parameters
  Check the related parameters.

c. Operation at an error

The motor immediately stops, and after having stopped, enters the servo off status

d. Release method

Remove the cause and execute one of the following operations:

- Input the ARST signal.
- Input the RST signal.
- Turn the power off, then on again.

e. Related display

–

f. Related parameter

P177: Position deviation exorbitance detection pulse Min value
P178: Position deviation exorbitance detection ratio

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.422 Position deviation excess 3 (servo-on position deviation over)

a. Description

When the position deviation exceeded the value set in [P175], servo-on operation was performed.

b. Causes and measures

- The overshoot becomes large due to conditions such as large load inertia.
  Take measures such as reducing the load inertia and increasing the acceleration time.
  Also, check and adjust the gain, as well as the play in the mechanical system.
- Runaway or vibration occurred due to a failure in the encoder.
  Repair or replace the encoder.
- The encoder feedback signal or the command pulse is influenced by noises.
  Remove the noise source, and take noise protection measures.
- Mechanical lock due to the brake, etc.
  Check the brake and the mechanical configuration, and remove the cause of the lock.
- Incorrect setting of parameters
  Check the related parameters.

c. Operation at an error

Servo OFF

d. Release method

Remove the cause and execute one of the following operations:

- Input the ARST signal.
- Input the RST signal.
- Turn the power off, then on again.

e. Related display

–

f. Related parameter

P175: Position deviation exorbitance detection pulse at Servo OFF → Servo ON

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.424 Main power supply voltage is lowered by the excessive deviation

a. Description
When the DC voltage of the main power supply is lower than the specified value, the amount of commands accumulated due to the speed limit set in [P123] exceeds 2.1 billion.

b. Operation at an error
The motor immediately stops, and after having stopped, enters the servo off status

c. Release method
Remove the cause and execute one of the following operations:
- Input the ARST signal.
- Input the RST signal.
- Turn the power off, then on again.

d. Related display
–

e. Related parameter
–

f. Output signal status
ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.431 1 rotation data un-setup error

a. Description
An attempt was made to execute an INDX command when [P165] was not set.

b. Causes and measures
- Parameter setting error
  Set a value other than "0" in [P165: Rotation position range].

c. Operation at an error
Servo lock

d. Release method
Remove the cause and execute one of the following operations:
- Input the ARST signal.
- Input the RST signal.
- Turn the power off, then on again.

e. Related display
–

f. Related parameter
P165: Rotation position range

g. Output signal status
ALM: ○ /WNG: ● /RDY: Follows [P650]./ZRDY: ● /BRK: ●

AL.432 Positioning command incorrect

a. Description

A value outside the range is set in the positioning command.

b. Causes and measures

- Positioning command setting error

  Check if the positioning command value of the command is appropriate.

c. Operation at an error

Servo lock

d. Release method

Remove the cause and execute one of the following operations:

- Input the ARST signal.
- Input the RST signal.
- Turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: Follows [P650]./ZRDY: ● /BRK: ●

AL.433 1 rotation short cut positioning position setting error

a. Description

A value greater than that set in [P165] is specified as the positioning position in the INDX command.

Or, an attempt was made to execute the INDX command when sign switching was enabled according to the setting in [P166].

b. Causes and measures

- Positioning command value setting error
  Check if the positioning command value of the INDX command is appropriate.
- Parameter setting error
  Check if the setting of [P165: Rotation position range] or [P166: Rotation position range sign switching position] is appropriate.

c. Operation at an error

Servo lock

d. Release method

Correct the command setting or set 0 in [P166] and execute one of the following operations:

- Input the ARST signal.
- Input the RST signal.
- Turn the power off, then on again.

e. Related display

–

f. Related parameter

P165: Rotation position range

P166: Rotation position range sign switching position

g. Output signal status

ALM: ○ /WNG: ● /RDY: Follows [P650]./ZRDY: ● /BRK: ●

AL.434 Indirect data number incorrect

a. Description

An attempt was made to specify an indirect data number other than IX00 to IX99 and execute a command.

b. Causes and measures

- Indirect data specification error
  Check if the specification of the indirect data number is appropriate.

c. Operation at an error

Servo lock

d. Release method

Remove the cause and execute one of the following operations:

- Input the ARST signal.
- Input the RST signal.
- Turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: Follows [P650]./ZRDY: ● /BRK: ●

AL.435 Zero point position setting run error

a. Description

When other than the ABS encoder was used, the HOME command, SET ABS, was executed.

b. Causes and measures

- Command specification error
  The HOME command, SET ABS, is effective only when the ABS encoder is used.

c. Operation at an error

Servo lock

d. Release method

Execute one of the following operations:

- Input the ARST signal.
- Input the RST signal.
- Turn the power off, then on again.

e. Related display

–

f. Related parameter

P060: Encoder type

g. Output signal status

ALM: ○ /WNG: ● /RDY: Follows [P650]./ZRDY: ● /BRK: ●

AL.436 Pulse output selection setting error

a. Description

An attempt is made to execute zero point return OUT POS when [P140] is set to other than "6: P141/P142 dividing output".

b. Causes and measures

- Parameter setting error
  Set [P140(2nd & 1st digits): Pulse output selection] to "6: P141/P142 dividing output".

c. Operation at an error

Servo lock

d. Release method

Remove the cause and execute one of the following operations:

- Input the ARST signal.
- Input the RST signal.
- Turn the power off, then on again.

e. Related display

–

f. Related parameter

P140[2nd & 1st digits]: Pulse output selection

g. Output signal status

ALM: ○ /WNG: ● /RDY: Follows [P650]./ZRDY: ● /BRK: ●

AL.505 USB communication disconnected error

a. Description

USB communication was disconnected during VPH DES test run.

b. Causes and measures

- Wiring error
  Check that the USB cable is not broken or does not have a contact failure but is connected correctly, etc.
- Incorrect insertion of the connector
  Check that the connector is inserted.

c. Operation at an error

The motor immediately stops, and after having stopped, enters the servo off status

d. Release method

Remove the cause and execute one of the following operations:

- Input the ARST signal.
- Input the RST signal.
- Turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.520 MECHATROLINK-III ASIC error

a. Description

An error occurred in the IC part controlling MECHATROLINK-III communication.

b. Causes and measures

- The IC part is faulty.

  Turn the power off, then on again. If the error still occurs, repair is necessary.

c. Operation at an error

Servo OFF

d. Release method

Turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.521 MECHATROLINK-III system error

a. Description

An error occurred in the processing sequence for MECHATROLINK-III communication.

b. Causes and measures

- The device is faulty.

  Turn the power off, then on again. If the error still occurs, repair is necessary.

c. Operation at an error

Servo OFF

d. Release method

Turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.522 MECHATROLINK-III communication cycle / transmission cycle setting error

a. Description

The MECHATROLINK-III communication cycle and transmission cycle settings are outside the specification.

b. Causes and measures

- Setting error
  Check if the settings of the communication cycle and the transmission cycle are appropriate.

c. Operation at an error

Servo OFF

d. Release method

Remove the cause and execute one of the following operations:

- Switch ON the CMD_CTRL.ALM_CLR bit.
- Execute the ALM_CLR command.
- Turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.523 MECHATROLINK-III data size setting error

a. Description

The MECHATROLINK-III transmission byte setting does not match the transmission bytes on the controller.

b. Causes and measures

- The number of transmission bytes does not match.
  Check if the settings of the transmission byte setting switch (S3) and the transmission bytes on the controller are appropriate.

c. Operation at an error

Servo OFF

d. Release method

Remove the cause and turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.524 MECHATROLINK-III station address setting error

a. Description

The MECHATROLINK-III station address setting is outside the specification.
The same station address exists on the communication network.

b. Causes and measures

- Station address setting error
  Check if the station address setting switches (S1/S2) are appropriate.

c. Operation at an error

Servo OFF

d. Release method

Remove the cause and turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.525 MECHATROLINK-III synchronous error

a. Description

An error occurred in updating the WDT data for the master controller.

b. Causes and measures

- Wiring error
  Check that the communication cable is not broken or does not have a contact failure but is connected correctly, etc.
- Communication error
  Check if the settings on the master controller are appropriate.

c. Operation at an error

The motor immediately stops and enters the servo off status.

d. Release method

Remove the cause and execute one of the following operations:

- Switch ON the CMD_CTRL.ALM_CLR bit.
- Execute the ALM_CLR command.
- Turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.526 MECHATROLINK-III communication error

a. Description

An error occurred in MECHATROLINK-III communication.

b. Causes and measures

- Wiring error
  Check that the communication cable is not broken or does not have a contact failure but is connected correctly, etc.
- Incorrect insertion of the connector
  Check that the connector is inserted.
- The communication cable is influenced by noises.
  Remove the noise source, and take noise protection measures.

c. Operation at an error

The motor immediately stops and enters the servo off status.

d. Release method

Remove the cause and execute one of the following operations:

- Switch ON the CMD_CTRL.ALM_CLR bit.
- Execute the ALM_CLR command.
- Turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.527 MECHATROLINK-III transmission cycle error

a. Description

The transmission cycle interrupt interval has fluctuated.

b. Causes and measures

- Wiring error
  Check that the communication cable is not broken or does not have a contact failure but is connected correctly, etc.
- Incorrect insertion of the connector
  Check that the connector is inserted.
- The communication cable is influenced by noises.
  Remove the noise source, and take noise protection measures.

c. Operation at an error

The motor immediately stops and enters the servo off status.

d. Release method

Remove the cause and execute one of the following operations:

- Switch ON the CMD_CTRL.ALM_CLR bit.
- Execute the ALM_CLR command.
- Turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.528 MECHATROLINK-III FCS error

a. Description

An error occurred in MECHATROLINK-III communication.

b. Causes and measures

- Wiring error
  Check that the communication cable is not broken or does not have a contact failure but is connected correctly, etc.
- Incorrect insertion of the connector
  Check that the connector is inserted.
- The communication cable is influenced by noises.
  Remove the noise source, and take noise protection measures.

c. Operation at an error

The motor immediately stops and enters the servo off status.

d. Release method

Remove the cause and execute one of the following operations:

- Switch ON the CMD_CTRL.ALM_CLR bit.
- Execute the ALM_CLR command.
- Turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.529 MECHATROLINK-III synchronization frame un-receiving error

a. Description

An error occurred in MECHATROLINK-III communication, resulting in a receive error.

b. Causes and measures

- Wiring error
  Check that the communication cable is not broken or does not have a contact failure but is connected correctly, etc.
- Incorrect insertion of the connector
  Check that the connector is inserted.
- The communication cable is influenced by noises.
  Remove the noise source, and take noise protection measures.

c. Operation at an error

The motor immediately stops and enters the servo off status.

d. Release method

Remove the cause and execute one of the following operations:

- Switch ON the CMD_CTRL.ALM_CLR bit.
- Execute the ALM_CLR command.
- Turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.600 Safety input timing error

a. Description

Ten or more seconds elapse after either of the safety input signal 1 (SF1*) and safety input signal 2 (SF2*) is turned OFF, but the other signal does not turn OFF.

b. Causes and measures

- Wiring error

  Check that safety input signal 1 (SF1*) and safety input signal 2 (SF2*) are not broken or do not have a contact failure but are connected correctly, etc.

c. Operation at an error

Servo OFF

d. Release method

Remove the cause, turn OFF either safety input signal 1 (SF1*) or safety input signal 2 (SF2*), and execute one of the following operations:

- Input the ARST signal.
- Input the RST signal.
- Turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

AL.601 Safety input error during operation

a. Description

In the case where the motor was operating and the speed zero signal (SZ) was OFF, either safety input signal 1 (SF1*) or safety input signal 2 (SF2*) turned OFF.

b. Causes and measures

- During motor operation, an error occurred in safety input.

  This STO function is assumed to be used when the motor is stopped.

c. Operation at an error

Servo OFF

d. Release method

Check that the speed zero signal (SZ) is ON, turn OFF safety input signal 1 (SF1*) and safety input signal 2 (SF2*), and execute one of the following operations:

- Input the ARST signal.
- Input the RST signal.
- Turn the power off, then on again.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ○ /WNG: ● /RDY: ● /ZRDY: ● /BRK: ●

8-2-2 Warning specifications

FL.900 Motor overload notice

a. Description

The load factor rises, and the status display [C012: Thermal trip rate of motor] reaches 90%. If the load factor keeps rising and [C012: Thermal trip rate of motor] reaches 100%, [AL.105: Motor overload error] will occur.

b. Causes and measures

- Excessive load
  Take measures such as reducing the load.
- The frequency of starting and stopping the motor is high.
  Reduce the starting and stopping frequency, and operate it in the range in which it is not overloaded.
- Current vibration due to the vibration or instable operation of the motor
  Check and adjust the gain, as well as the play in the mechanical system.
- Incorrect wiring of motor power cable (U/V/W)
  Check the wiring and correct it.
- Mechanical lock due to the brake, etc.
  Check the brake and the mechanical configuration, and remove the cause of the lock.
- The ambient temperature is high, or the ventilation is bad.
  Check the installation environment, and improve cooling and ventilation.
- Runaway or vibration occurred due to a failure in the encoder.
  Repair or replace the encoder.

c. Operation at an error

Continue current operation

d. Release method

Automatic release at the point when the thermal trip rate of motor becomes less than 90%

e. Related display

C012: Thermal trip rate of motor

f. Related parameter

P083[3rd - 1st digits]: Motor electronic thermal detected actual value
P084[3rd - 1st digits]: Motor 1 phase concentration electronic thermal detection ratio

g. Output signal status

ALM: ● /WNG: ○ /RDY: ― /ZRDY: ― /BRK: ―

FL.902 Main power supply undervoltage detection warning

a. Description

The status display [C016: Main power supply DC voltage value] is lower than the specified value in the servo on status.

When the setting of [P124(1st digit): Main power supply undervoltage error spec selection] is "0" or "1", this warning is effective.

b. Causes and measures

- A voltage drop occurred due to an insufficient power supply capacity.
  Check the power supply used.
- An instantaneous power failure (power failure for at least about 10 ms) occurred.
  Check the power supply used.
- Servo-on operation is performed immediately after power-on.
  After power-on, wait for some time, then execute servo-on operation.
- In a device of 1.5 kW or greater, the shorting bar between "L1 and L2/P" of the power supply terminals is removed.
  Install the shorting bar between "L1 and L2/P".

c. Operation at an error

Continue current operation

d. Release method

Remove the cause and recover the main power supply voltage to the normal range.

e. Related display

C016: Main power supply DC voltage value

f. Related parameter

P124[1st digit]: Main power supply undervoltage error spec selection

P124[5th - 2nd digits]: Detection allowed time for main power supply undervoltage error

g. Output signal status

ALM: ● /WNG: ○ /RDY: ● /ZRDY: ● /BRK: ●

FL.903 Zero point return uncompleted automatic start warning

a. Description

When [P516] was set to the value indicating positioning not allowed, an attempt was made to start a positioning command (POS/INDX) before zero point return was completed.

b. Causes and measures

- Zero point return is uncompleted.
  Complete zero point return and execute the positioning command.
- The setting of the parameter is Positioning not allowed.
  If [P516: Positioning approval selection when homing is not completed] is set to other than Positioning not allowed, the positioning command can be executed even in the status where zero point return is uncompleted.

c. Operation at an error

The positioning drive signal is ignored.

d. Release method

Remove the cause and execute one of the following operations:

- Zero point return
- Jog operation
- Change the run mode.
- Input the ARST signal.
- Input the RST signal.
- Turn the power off, then on again.

e. Related display

–

f. Related parameter

P516: Positioning approval selection when homing is not completed

g. Output signal status

ALM: ● /WNG: ○ /RDY: ○ /ZRDY: ○ /BRK: ○

FL.904 Driver input emergency stop

a. Description

The emergency stop signal (EMG), a control input signal, was input.

b. Causes and measures

- The emergency stop signal (EMG) was input.
  Check that restarting the operation does not present any problems and turn OFF the emergency stop signal (EMG).

c. Operation at an error

The motor stops as selected in [P633] and enters the servo off status.

d. Release method

Release the emergency stop signal and execute one of the following operations:

- Input the RST signal.
- Turn the power off, then on again.

e. Related display

–

f. Related parameter

P633[1st digit]: Stopping selection when EMG signal is ON
P633[5th - 2nd digits]: Deceleration time after EMG signal braking stoppage
P633[8th - 6th digits]: Servo OFF delay time after EMG braking stoppage

g. Output signal status

ALM: ● /WNG: ○ /RDY: ー /ZRDY: ー /BRK: ー

FL.905 Controller input emergency stop

a. Description

In communication, the emergency stop signal (EMG) was input.

b. Causes and measures

- The emergency stop signal (EMG) was input.
  Check that restarting the operation does not present any problems and turn OFF the emergency stop signal (EMG).

c. Operation at an error

The motor stops as selected in [P633] and enters the servo off status.

d. Release method

Release the emergency stop signal and execute one of the following operations:

- Input the RST signal.
- Turn the power off, then on again.

e. Related display

–

f. Related parameter

P633[1st digit]: Stopping selection when EMG signal is ON
P633[5th - 2nd digits]: Deceleration time after EMG signal braking stoppage
P633[8th - 6th digits]: Servo OFF delay time after EMG braking stoppage

g. Output signal status

ALM: ● /WNG: ○ /RDY: ー /ZRDY: ー /BRK: ー

FL.906 Main power supply voltage is lowered

a. Description

The main power supply voltage is lower than the value set in [P122].

b. Causes and measures

- The power supply voltage low (or the capacity is insufficient).
  Check the power supply used.
- A fuse blowout occurred in the power section.
- Wiring error
  Check, for example, that the electric wire diameter is thick enough and that the screws of the power supply terminals are tight.
- Servo-on operation is performed immediately after power-on.
- Incorrect setting of parameters
  Check the value of [P122(2nd & 1st digits): Main power supply voltage drop detection value].
- An instantaneous power failure for at least about 10 ms occurred.
  After an instantaneous power failure occurs and the protective function is activated, if the power failure status continues, no control power is supplied and the protective circuit is reset. After that, when the power is recovered, various commands (including the speed command and pulse train command) are input. If the motor runs immediately after power recovery in a sequence, it is dangerous. Do not design such a sequence. Design an external sequence in which each signal is switched OFF and the execution of each command is stopped when the protective function is activated and an alarm occurs (is output).

c. Operation at an error

Continue current operation

d. Release method

Automatic release by removing the cause and recovering the main power supply voltage to the normal range.

e. Related display

–

f. Related parameter

P122[2nd & 1st digits]: Main power supply voltage drop detection value

g. Output signal status

ALM: ● /WNG: ○ /RDY: ― /ZRDY: ― /BRK: ―

FL.907 Motor overheat warning

a. Description

The motor overheat (MTOH) signal is detected.
Or, in the motor equipped with a temperature sensor, motor overheat is detected.
When the setting of [P129(1st digit): Motor overheat detection spec selection] is "0: Warning", this warning is effective.

b. Causes and measures

- Insufficient cooling of the motor
  Install the motor on a surface having a sufficient radiation area so that the motor comes into contact with the entire surface with no floating.
- Motor setting error
  A motor parameter selected in the device may be inconsistent with the installed motor. Check motor settings.

c. Operation at an error

Continue current operation

d. Release method

Cool the motor until the motor overheat signal is switched OFF.

e. Related display

–

f. Related parameter

P129[1st digit]: Motor overheat detection spec selection
P129[4th - 2nd digits]: Motor overheat detection time

g. Output signal status

ALM: ● /WNG: ○ /RDY: ー /ZRDY: ー /BRK: ー

FL.908 Driver overheat warning

a. Description

The device temperature exceeds the allowable range.

b. Causes and measures

- The ambient temperature of the device rises.
  Place it so that the heat can escape, considering the ventilation characteristics and the ambient temperature.
- The cooling fan is clogged.
  Clean the fan with air blow, etc. to remove clogging.
- The cooling fan is faulty.
  Repair or replace it.

c. Operation at an error

Continue current operation

d. Release method

Cool the device until the warning is released.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ● /WNG: ○ /RDY: ー /ZRDY: ー /BRK: ー

FL.912 Encoder position detection parts deterioration warning

* The error occurs only when the IPU exists (S-ABS2, S-ABS3, S-ABS4).

a. Description

Deterioration of the positional signal detection parts of the encoder has progressed.

b. Causes and measures

- A signal error occurred due to the deterioration of the encoder position detection section.
  Repair or replace the motor.

c. Operation at an error

Continue current operation

d. Release method

Motor replacement or repair is necessary.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ● /WNG: ○ /RDY: ー /ZRDY: ー /BRK: ー

FL.920 Forward direction overtravel

a. Description

The forward direction overtravel signal (FOT) was detected.

b. Causes and measures

- The overtravel detection spot is reached.
  Using jog operation, etc., execute reverse direction operation to move the motor in the operation range.
- Incorrect setting of the positioning command
  Check if the travel distance with the positioning command exceeds the overtravel detection spot.
- Incorrect external sequence
  Check the external sequence and use the motor in the operation range.
- Wiring or connector insertion error
  Check that the control signal cable is not broken or does not have a contact failure but is connected correctly, etc.

c. Operation at an error

The motor stops after the time of [P634(5th - 2nd digits): Deceleration time after OT signal braking stoppage] and enters the servo lock status.
For a torque command, the torque becomes zero without deceleration stop.

d. Release method

Automatic release by moving the motor to the operation range

e. Related display

–

f. Related parameter

P410[3rd digit]: SPDSEL0 Overtravel spec selection
P413[3rd digit]: SPDSEL1, P416[3rd digit]: SPDSEL2, P419[3rd digit]: SPDSEL3, P422[3rd digit]: SPDSEL4, P425[3rd digit]: SPDSEL5, P428[3rd digit]: SPDSEL6, P431[3rd digit]: SPDSEL7)
P441[3rd digit]: TLQSEL0 Overtravel spec selection
P444[3rd digit]: TLQSEL1, P447[3rd digit]: TLQSEL2, P450[3rd digit]: TLQSEL3, P453[3rd digit]: TLQSEL4, P456[3rd digit]: TLQSEL5, P459[3rd digit]: TLQSEL6, P462[3rd digit]: TLQSEL7)
P517[3rd digit]: SEL0 Overtravel spec selection
P524[3rd digit]: SEL1, P531[3rd digit]: SEL2, P538[3rd digit]: SEL3, P545[3rd digit]: SEL4, P552[3rd digit]: SEL5, P559[3rd digit]: SEL6, P566[3rd digit]: SEL7
P634[5th - 2nd digits]: Deceleration time after OT signal braking stoppage
P634[8th - 6th digits]: OT condition holding time
P811: Overtravel spec selection

g. Output signal status

ALM: ● /WNG: ○ /RDY: Follows [P650]./ZRDY: ○ (in the built-in command mode)/BRK: －

FL.921 Reverse direction overtravel

a. Description

The reverse direction overtravel signal (ROT) was detected.

b. Causes and measures

- The overtravel detection spot is reached.
  Using jog operation, etc., execute forward direction operation to move the motor in the operation range.
- Incorrect setting of the positioning command
  Check if the travel distance with the positioning command exceeds the overtravel detection spot.
- Incorrect external sequence
  Check the external sequence and use the motor in the operation range.
- Wiring or connector insertion error
  Check that the control signal cable is not broken or does not have a contact failure but is connected correctly, etc.

c. Operation at an error

The motor stops after the time of [P634(5th - 2nd digits): Deceleration time after OT signal braking stoppage] and enters the servo lock status.
For a torque command, the torque becomes zero without deceleration stop.

d. Release method

Automatic release by moving the motor to the operation range

e. Related display

–

f. Related parameter

P410[3rd digit]: SPDSEL0 Overtravel spec selection
P413[3rd digit]: SPDSEL1, P416[3rd digit]: SPDSEL2, P419[3rd digit]: SPDSEL3, P422[3rd digit]: SPDSEL4, P425[3rd digit]: SPDSEL5, P428[3rd digit]: SPDSEL6, P431[3rd digit]: SPDSEL7)
P441[3rd digit]: TLQSEL0 Overtravel spec selection
P444[3rd digit]: TLQSEL1, P447[3rd digit]: TLQSEL2, P450[3rd digit]: TLQSEL3, P453[3rd digit]: TLQSEL4, P456[3rd digit]: TLQSEL5, P459[3rd digit]: TLQSEL6, P462[3rd digit]: TLQSEL7)
P517[3rd digit]: SEL0 Overtravel spec selection
P524[3rd digit]: SEL1, P531[3rd digit]: SEL2, P538[3rd digit]: SEL3, P545[3rd digit]: SEL4, P552[3rd digit]: SEL5, P559[3rd digit]: SEL6, P566[3rd digit]: SEL7
P634[5th - 2nd digits]: Deceleration time after OT signal braking stoppage
P634[8th - 6th digits]: OT condition holding time
P811: Overtravel spec selection

g. Output signal status

ALM: ● /WNG: ○ /RDY: Follows [P650]./ZRDY: ○ (in the built-in command mode)/BRK: —

FL.922 Forward direction software overtravel

a. Description

The status display [C020: Current position] is beyond the setting of [P171].

b. Causes and measures

- The overtravel detection spot is reached.
  Using jog operation, etc., execute reverse direction operation to move the motor in the operation range.
- Incorrect setting of the positioning command
  Check if the travel distance with the positioning command exceeds the overtravel detection spot.
- Incorrect external sequence
  Check the external sequence and use the motor in the operation range.
- Wiring or connector insertion error
  Check that the control signal cable is not broken or does not have a contact failure but is connected correctly, etc.

c. Operation at an error

The motor stops after the time of [P635(5th - 2nd digits): Soft OT braking stoppage deceleration time] and enters the servo lock status.
For a torque command, the torque becomes zero without deceleration stop.

d. Release method

Automatic release by moving the motor to the operation range

e. Related display

C020: Current position

f. Related parameter

P171: Forward direction software OT limit
P410[3rd digit]: SPDSEL0 Overtravel spec selection
P413[3rd digit]: SPDSEL1, P416[3rd digit]: SPDSEL2, P419[3rd digit]: SPDSEL3, P422[3rd digit]: SPDSEL4, P425[3rd digit]: SPDSEL5, P428[3rd digit]: SPDSEL6, P431[3rd digit]: SPDSEL7)
P441[3rd digit]: TLQSEL0 Overtravel spec selection
P444[3rd digit]: TLQSEL1, P447[3rd digit]: TLQSEL2, P450[3rd digit]: TLQSEL3, P453[3rd digit]: TLQSEL4, P456[3rd digit]: TLQSEL5, P459[3rd digit]: TLQSEL6, P462[3rd digit]: TLQSEL7)
P517[3rd digit]: SEL0 Overtravel spec selection
P524[3rd digit]: SEL1, P531[3rd digit]: SEL2, P538[3rd digit]: SEL3, P545[3rd digit]: SEL4, P552[3rd digit]: SEL5, P559[3rd digit]: SEL6, P566[3rd digit]: SEL7
P635[5th - 2nd digits]: Soft OT signal braking stoppage deceleration time
P635[8th - 6th digits]: Soft OT condition holding time
P811: Overtravel spec selection

g. Output signal status

ALM: ● /WNG: ○ /RDY: Follows [P650]./ZRDY: ○ (in the built-in command mode)/BRK: －

FL.923 Reverse direction software overtravel

a. Description

The status display [C020: Current position] is beyond the setting of [P172: Reverse direction software OT limit].

b. Causes and measures

- The overtravel detection spot is reached.
  Using jog operation, etc., execute forward direction operation to move the motor in the operation range.
- Incorrect setting of the positioning command
  Check if the travel distance with the positioning command exceeds the overtravel detection spot.
- Incorrect external sequence
  Check the external sequence and use the motor in the operation range.
- Wiring or connector insertion error
  Check that the control signal cable is not broken or does not have a contact failure but is connected correctly, etc.

c. Operation at an error

The motor stops after the time of [P635(5th - 2nd digits): Soft OT braking stoppage deceleration time] and enters the servo lock status.
For a torque command, the torque becomes zero without deceleration stop.

d. Release method

Automatic release by moving the motor to the operation range

e. Related display

C020: Current position

f. Related parameter

P172: Reverse direction software OT limit
P410[3rd digit]: SPDSEL0 Overtravel spec selection
P413[3rd digit]: SPDSEL1, P416[3rd digit]: SPDSEL2, P419[3rd digit]: SPDSEL3, P422[3rd digit]: SPDSEL4, P425[3rd digit]: SPDSEL5, P428[3rd digit]: SPDSEL6, P431[3rd digit]: SPDSEL7)
P441[3rd digit]: TLQSEL0 Overtravel spec selection
P444[3rd digit]: TLQSEL1, P447[3rd digit]: TLQSEL2, P450[3rd digit]: TLQSEL3, P453[3rd digit]: TLQSEL4, P456[3rd digit]: TLQSEL5, P459[3rd digit]: TLQSEL6, P462[3rd digit]: TLQSEL7)
P517[3rd digit]: SEL0 Overtravel spec selection
P524[3rd digit]: SEL1, P531[3rd digit]: SEL2, P538[3rd digit]: SEL3, P545[3rd digit]: SEL4, P552[3rd digit]: SEL5, P559[3rd digit]: SEL6, P566[3rd digit]: SEL7
P635[5th - 2nd digits]: Soft OT signal braking stoppage deceleration time
P635[8th - 6th digits]: Soft OT condition holding time
P811: Overtravel spec selection

g. Output signal status

ALM: ● /WNG: ○ /RDY: Follows [P650]./ZRDY: ○ (in the built-in command mode)/BRK: －

FL.932 MECHATROLINK-III CMD warning

a. Description
The MECHATROLINK-III communication command status (CMD_STAT), "CMD_ALM", is switched ON.

b. Operation at an error
Continue current operation

c. Release method
Receive a normal command.

d. Related display
–

e. Related parameter
–

f. Output signal status
ALM: ● /WNG: ○ /RDY: ー /ZRDY: ー /BRK: ー

FL.933 MECHATROLINK-III COMM warning

a. Description
Bits 1 to 7 of the MECHATROLINK-III communication command status (CMD_STAT), "COMM_ALM", are switched ON.

b. Operation at an error
Continue current operation

c. Release method
MECHATROLINK-III communication is returned to normal.

d. Related display
–

e. Related parameter
–

f. Output signal status
ALM: ● /WNG: ○ /RDY: ー /ZRDY: ー /BRK: ー

FL.934 Mode switching status change warning

a. Description

The mode switch is operated during device operation.

b. Causes and measures

- The mode switch is operated during device operation
  It cannot be changed during operation. Return the mode switch to the setting it had when the device started. To change it, make sure that the device is not in operation.

c. Operation at an error

Continue current operation

d. Release method

Return the mode switch setting to that at the start of the device.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ● /WNG: ○ /RDY: ー /ZRDY: ー /BRK: ー

FL.941 MECHATROLINK-III transmission byte setting SW change warning

a. Description

The transmission byte setting is operated during device operation.

b. Causes and measures

- An attempt was made to change the transmission byte during device operation.
  It cannot be changed during operation. Return the transmission byte setting switch to the setting it had when the device started. To change it, make sure that the device is not in operation.

c. Operation at an error

Continue current operation

d. Release method

Return the transmission byte setting to that at the start of the device.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ● /WNG: ○ /RDY: ー /ZRDY: ー /BRK: ー

FL.942 MECHATROLINK-III station address setting SW change warning

a. Description

The station address setting is operated during device operation.

b. Causes and measures

- An attempt was made to change the station address during device operation.
  It cannot be changed during operation. Return the station address setting switch to the setting it had when the device started. To change it, make sure that the device is not in operation.

c. Operation at an error

Continue current operation

d. Release method

Return the station address setting to that at the start of the device.

e. Related display

–

f. Related parameter

–

g. Output signal status

ALM: ● /WNG: ○ /RDY: ー /ZRDY: ー /BRK: ー

Chapter 9 Parameters

9-1 Parameter group list

They are grouped according to parameter number.

* The numerical value following the P in "Parameter range" is a parameter number.

Parameter group	Parameter group name	
	Parameter range	Classification in the parameter group
0	Motor- and encoder-related parameters	
	P000 -	Motor parameters
	P060 -	Encoder and magnetic pole parameters
	P080 -	Motor characteristic change parameters
	* P000 - P079 can be automatically set with the "control device and motor selection" of VPH DES.	
1	Device- and machine specification-related parameters	
	P100 -	Device specification parameters
	P120 -	Error specification parameters
	P140 -	Pulse output parameters
	P150 -	Reserved
	P160 -	Unit and coordinate parameters
2, 3	Servo adjustment-related parameters	
	P200 -	Gain-related parameters
	P210 -	Gain No. 0 parameters
	P240 -	Gain No. 1 parameters
	P270 -	Gain No. 2 parameters
	P300 -	Gain No. 3 parameters
	P330 -	Common filter parameters
	P380 -	Automatic magnetic pole detection adjustment parameters
4, 5	Command-related parameters	
	P400 -	Speed command parameters
	P434 -	Torque command parameters
	P515 -	Built-in command parameters
	P573 -	Jog and zero point return command parameters
6	Self-diagnosis- and input and output-related parameters	
	P600 -	Front panel- and self-diagnosis-related parameters
	P620 -	Input and output signal parameters
7	Communication-related parameters	
	P700 -	USB communication, general-purpose communication, and field net parameters
8	Network-related parameters	
	P800 -	Network parameters
9	Dedicated & special specification-related parameters	
	P900 -	Special spec parameters

9-2 Parameter list

9-2-1 Parameter list configuration

Each of the items in the parameter list is described below.

a. No.
Shows the number of the parameter.

b. Target digit
If a single parameter No. has multiple functions, shows the target digit(s).

c. Parameter name
Shows the name of the parameter.

d. Activating timing
Shows the timing with which the setting becomes effective if the parameter is changed.
- I: Real-time
- R: Reset or power ON
- P: Power ON
- E: When the command is executed or the power is turned off, then on again

* If a parameter to be reflected in real-time is changed during motor operation, vibration, sudden starting, sudden stopping, and so on may occur. Confirm safety before changing it.

e. Edit type
Shows the type of parameter edit method.
- Blank:Editing with numeric value input
- r: Editing with numeric value inputor operation panel-based real-time editing
  For details of operation panel-based real-time editing, refer to "Figure 12-8 Changing P214 parameter value (up to 5 digits) from 00043 to 00052 and to 00038".
- S: Editing enabled only if [P000] is set to "19999 (special motor)"
  * For a parameter of this type, set the value presented from the manufacturer.
- H: Display enabled only if [P000] is set to "19999 (special motor)"
  * Editing is always disabled.

f. Level
Shows whether the motor can be operated with the initial value.
- F: Can be run with the initial value.
- S: Setting required.

g. Effective run mode
Shows the run mode in which the parameter is effective.
- Communication: At communication mode
- Maintenance: At maintenance mode

9-2-2 Motor- and encoder-related parameters (group 0)

Run mode ○ : Effective, — : Ineffective

No.	Target digit	Parameter name	Activating timing	Edit type	Level	Run mode	
						Communication	Maintenance
P000		Motor Identification code	P		F	○	○
P006		Driver combination rated output	P	H	F	○	○
P007		Driver combination power voltage	P	H	F	○	○
P008	1	Driver combination main power supply single phase / 3 phase	P	S	F	○	○
	2	Driver combination main power supply AC /DC power source	P	S	F	○	○
P009	3 - 1	Driver combination revision	P	S	F	○	○
	7 - 4	Driver combination special spec code	P	S	F	○	○
P010	1	Motor type identification	P	S	F	○	○
	2	Main power supply type for the driver to match with motor	P	S	F	○	○
P011		Motor rated output	P	S	F	○	○
P012		Motor rated current	P	S	F	○	○
P013		Motor momentary max current	P	S	F	○	○
P014		Motor rated speed	P	H	F	○	○
P015		Motor torque/thrust constant	P	S	F	○	○
P016		Number of motor poles	P	S	F	○	○
P017		Distance between motor pole opposite	P	S	F	○	○
P018		Motor phase resistance	P	S	F	○	○
P019		Motor phase inductance (Lq)	P	S	F	○	○
P020		Motor phase inductance (Ld)	P	S	F	○	○
P021		Current cut off frequency	P	S	F	○	○
P028	3 - 1	Phase control division ratio	P	S	F	○	○
	6 - 4	Phase control integrated limit value	P	S	F	○	○
P030	3 - 1	Motor electronic thermal detection actual value	I	S	F	○	○
	7 - 4	Motor electronic thermal detection time	I	S	F	○	○
P031	3 - 1	Motor 1 phase concentration electronic thermal detection ratio	I	S	F	○	○
	5 - 4	Motor 1 phase concentration electronic thermal detection motion range	I	S	F	○	○
	7 - 6	Motor 1 phase concentration electronic thermal detection low speed range	I	S	F	○	○
P032	3 - 1	Dead time compensation factor	P	S	F	○	○
	6 - 4	Dead time compensation low current control range	P	S	F	○	○

No.	Target digit	Parameter name	Activating timing	Edit type	Level	Run mode	
						Communication	Maintenance
P033		Dead time compensation invalid speed	P	S	F	○	○
P034	3 - 1	Current command variation limit value	P	S	F	○	○
	6 - 4	Voltage output limit value	P	S	F	○	○
	9 - 7	Current loop integral stop voltage	P	S	F	○	○
P035	3 - 1	Induced electromotive force compensation rate	P	S	F	○	○
P036	3 - 1	Incoherence compensation ratio	P	S	F	○	○
P037	3 - 1	Torque electric angle position phase correction angle	P	S	F	○	○
	6 - 4	Torque electric angle position phase correction start speed	P	S	F	○	○
	9 - 7	Torque electric angle position phase correction complete speed	P	S	F	○	○
P038	3 - 1	Speed electric angle phase correction angle	P	S	F	○	○
	6 - 4	Speed electric angle phase correction starting speed	P	S	F	○	○
	9 - 7	Speed electric angle phase correction complete speed	P	S	F	○	○
P039	3 - 1	d axis current ratio	P	S	F	○	○
	6 - 4	d axis current start speed	P	S	F	○	○
	9 - 7	d axis current complete speed	P	S	F	○	○
P040	3 - 1	1st torque correction value	P	S	F	○	○
	6 - 4	1st torque correction value start speed	P	S	F	○	○
	9 - 7	1st torque correction value complete speed	P	S	F	○	○
P041	3 - 1	2nd torque correction value	P	S	F	○	○
	6 - 4	2nd torque correction value start speed	P	S	F	○	○
	9 - 7	2nd torque correction value complete speed	P	S	F	○	○
P042	3 - 1	Torque correction ratio for 6th harmonic	I	S	F	○	○
	6 - 4	Torque correction shift electric angle for 6th harmonic	I	S	F	○	○
P043	3 - 1	Reserved					
	6 - 4	PWM drive circuit fully charged waiting time	P	S	F	○	○
	8 - 7	PWM drive circuit charging time	P	S	F	○	○
P044	1	Field weakening control selection	P	S	F	○	○
	4 - 2	Field weakening start speed	P	S	F	○	○
	7 - 5	d-axis max current	P	S	F	○	○
P045	2 - 1	Motor power cable disconnection detection time	P	S	F	○	○

No.	Target digit	Parameter name	Activating timing	Edit type	Level	Run mode	
						Communication	Maintenance
P046		Motor NT characteristic max speed	P	S	F	○	○
P047	3 - 1	Motor NT characteristic max speed at rated current	P	S	F	○	○
	6 - 4	Motor NT characteristic max speed at momentary max current	P	S	F	○	○
P048	3 - 1	Rated current decay start speed	P	S	F	○	○
	6 - 4	Instantaneous max current decay start speed	P	S	F	○	○
P060		Encoder type	P	H	S	○	○
P061		Number of encoder pulses of rotary type motor	P	H	S	○	○
P062		Scale resolution	P	S	F	○	○
P063		Scale pitch distance	P	S	F	○	○
P064		Number of pulses per scale pitch	P	S	F	○	○
P066		Encoder input direction switching	P	S	F	○	○
P067		Max speed of motor	P	H	F	○	○
P068		Magnetic pole sensor type	P	S	S	○	○
P069		Magnetic pole position offset	P	S	F	○	○
P070		Encoder wire breakage detection filter selection	P	S	F	○	○
P071	2 - 1	1 rotation position detection speed error detection speed	P	S	F	○	○
	3	Feedback smooth	P	S	F	○	○
P072	1	Manufacturer exclusive use	P	S	F	○	○
	3 - 2	Manufacturer exclusive use	P	S	F	○	○
P080		Max torque limit value +	I		F	○	○
P081		Max torque limit value -	I		F	○	○
P082		Motor max speed special setting	P		F	○	○
P083	3 - 1	Motor electronic thermal detection actual value	I		F	○	○
	7 - 4	Motor electronic thermal time constant	I		F	○	○
P084	3 - 1	Motor 1 phase concentration electronic thermal detection ratio	I		F	○	○
	5 - 4	Motor 1 phase concentration electronic thermal detection motion range	I		F	○	○
	7 - 6	Motor 1 phase concentration electronic thermal detection low speed range	I		F	○	○
P085	3 - 1	Regenerative resistor	I		F	○	○
	9 - 4	Regenerative resistor capacity	I		F	○	○
P086	3 - 1	Regenerative resistor overload detection ratio	I		F	○	○
	9 - 4	Regenerative resistor load time constant	I		F	○	○

No.	Target digit	Parameter name	Activating timing	Edit type	Level	Run mode	
						Communication	Maintenance
P087		Magnetic pole position offset special setting	P		F	○	○
P088	1	ABS encoder data use range selection	P		F	○	○
	2	ABS encoder overflow error detection selection	P		F	○	○
P089	2 - 1	1 rotation position detection speed error detection speed special setting	P		F	○	○
	3	Feedback smooth special setting	P		F	○	○
P090	1	Manufacturer exclusive use	P		F	○	○
P091	2 - 1	Encoder power supply OFF retention extension time	P		F	○	○

9-2-3 Device- and machine specification-related parameters (group 1)

Run mode ○ : Effective, — : Ineffective

No.	Target digit	Parameter name	Activating timing	Edit type	Level	Run mode	
						Communication	Maintenance
P100		Carrier frequency setting	P		F	○	○
P103	1	Dynamic brake spec selection	I		F	○	○
	3 - 2	Servo On delay time after dynamic brake is off	I		F	○	○
P104		Absolute position compensation action entry	P		F	○	○
P120		Servo control error detection dead band torque	I		F	○	○
P121	1	Main power OFF error detection spec selection	I		F	○	○
	4 - 2	Main power OFF error detection time	I		F	○	○
P122	2 - 1	Main power supply voltage drop detection value	I		F	○	○
	6 to 3	Reserved					
	9 - 7	Main power supply torque drop limit Fluctuation changing time	I		F	○	○
P123	6 - 1	Reserved					
	9 - 7	Main power supply drop toque limit value	I		F	○	○
P124	1	Main power supply undervoltage error spec selection	I		F	○	○
	5 - 2	Detection allowed time for main power supply undervoltage error	I		F	○	○
P126	1	Overload abnormal motion selection	I		F	○	○
	4 - 2	Overload abnormal deceleration torque limit value	I		F	○	○

No.	Target digit	Parameter name	Activating timing	Edit type	Level	Run mode	
						Communication	Maintenance
P127	1	Over speed error spec selection	I		F	○	○
	4 - 2	Over speed error detection speed	I		F	○	○
P129	1	Motor overheat detection spec selection	I		F	○	○
	4 - 2	Motor overheat detection time	I		F	○	○
P140	2 - 1	Pulse output selection	I		F	○	○
	3	Marker output width	I		F	○	○
	4	Magnetic pole sensor signal pulse output selection	P		F	○	○
P141		Pulse output dividing numerator	I		F	○	○
P142		Pulse output dividing denominator	I		F	○	○
P143		Marker output position	I		F	○	○
P160	1	Inertia and viscous friction range selection	I		F	○	○
P161	1	Moving direction selection	R		F	○	○
	2	Position unit selection	R		F	—	—
	3	Position decimal point unit selection	R		F	—	—
P162		Electronic gear numerator ratio	R		F	○	○
P163		Electronic gear denominator ratio	R		F	○	○
P164		Mechanical movement	R		F	○	○
P165		Rotation position range	R		F	○	○
P166		Rotation position range sign switching position	R		F	○	○
P167	5 - 1	ABS multi turn limit	I		F	○	○
P168		ABS standard data	E		F	○	○
P169		ABS standard mechanical position	E		F	○	○
P170	1	Present position reflection selection after main power of ABS is ON	P		F	○	○
P171		Forward direction software OT limit	I		F	○	○
P172		Reverse direction software OT limit	I		F	○	○
P173		Max travel amount for forward direction positioning	I		F	○	○
P174		Max travel amount for reverse direction positioning	I		F	○	○
P175		Position deviation exorbitance detection pulse at Servo OFF → Servo ON	I		F	○	○
P176		Position deviation exorbitance detection pulse Max value	I		F	○	○
P177		Position deviation exorbitance detection pulse Min value	I		F	○	○
P178		Position deviation exorbitance detection ratio	I		F	○	○
P179		S-curve time 2	R		F	○	○

9-2-4 Servo adjustment-related parameters (groups 2 and 3)

Run mode ○ : Effective, — : Ineffective

No.	Target digit	Parameter name	Activating timing	Edit type	Level	Run mode	
						Communication	Maintenance
P200	3 - 1	Speed detection filter time constant for gain switching	I			○	○
	6 - 4	Position deviation detection filter time constant for gain switching	I			○	○
P210		Gain No. 0 Low speed gain switching speed	I			○	○
P211		Gain No. 0 Low speed gain switching deviation pulse	I			○	○
P212	3 - 1	Gain No. 0 Normal speed → Low speed gain switching filter time constant	I		F	○	○
	6 - 4	Gain No. 0 Low speed → Normal speed gain switching filter time constant	I		F	○	○
	7	Gain No. 0 Low speed gain switching spec 1 selection	I		F	○	○
	8	Gain No. 0 Low speed gain switching spec 2 selection	I		F	○	○
P213	4 - 1	Gain No. 0 Low speed gain switching delay time	I		F	○	○
	9 - 5	Gain No. 0 Low speed gain holding time after switching	I		F	○	○
P214		Gain No. 0 Speed loop proportional gain	I	r	F	○	○
P215		Gain No. 0 Speed loop integral time constant	I	r	F	○	○
P216		Gain No. 0 Speed loop derivative time constant	I	r	F	○	○
P217		Gain No. 0 Speed loop proportional gain distribution factor	I	r	F	○	○
P218		Gain No. 0 Speed loop derivative gain distribution factor	I	r	F	○	○
P219		Gain No. 0 Low speed loop proportional gain	I	r	F	○	○
P220		Gain No. 0 Low speed loop integral time constant	I	r	F	○	○
P221		Gain No. 0 Low speed loop derivative time constant	I	r	F	○	○
P222		Gain No. 0 Low speed loop proportional gain distribution factor	I	r	F	○	○
P223		Gain No. 0 Low speed loop derivative gain distribution factor	I	r	F	○	○
P224		Gain No. 0 Speed loop integral torque limit value	I		F	○	○

No.	Target digit	Parameter name	Activating timing	Edit type	Level	Run mode	
						Communication	Maintenance
P225		Gain No. 0 Position loop gain	I	r	F	○	○
P226		Gain No. 0 Low speed position loop gain	I	r	F	○	○
P227	4 - 1	Gain No. 0 Position loop derivative time constant	I		F	○	○
	8 - 5	Gain No. 0 Low speed position loop derivative time constant	I		F	○	○
P228	4 - 1	Reserved					
	6 - 5	Gain No. 0 Positioning command delay time	I		F	○	○
P229	4 - 1	Gain No. 0 Speed feed forward ratio	I		F	○	○
	8 - 5	Gain No. 0 Speed feed forward shift ratio	I		F	○	○
P230		Gain No. 0 speed feed forward filter time constant	I		F	○	○
P231		Gain No. 0 Inertia	I		F	○	○
P232		Gain No. 0 Viscous friction	I		F	○	○
P233	4 - 1	Gain No. 0 Inertia feed forward ratio	I		F	○	○
	8 - 5	Gain No. 0 Viscous friction feed forward ratio	I		F	○	○
P234		Gain No. 0 Torque feed forward filter time constant	I		F	○	○
P235	3 - 1	Gain No. 0 Filter derivative coefficient while stopping	I		F	○	○
	6 - 4	Gain No. 0 Filter time constant while stopping	I		F	○	○
P236	4 - 1	Gain No. 0 Notch filter center frequency	I		F	○	○
	7 - 5	Gain No. 0 Notch filter band width ratio	I		F	○	○
	9 - 8	Gain No. 0 Notch filter depth	I		F	○	○
P240		Gain No. 1 Low speed gain switching speed	I		F	○	○
P241		Gain No. 1 Low speed gain switching deviation pulse	I		F	○	○
P242	3 - 1	Gain No. 1 Normal speed → Low speed gain switching filter time constant	I		F	○	○
	6 - 4	Gain No. 1 Low speed → Normal speed gain switching filter time constant	I		F	○	○
	7	Gain No. 1 Low speed gain switching spec 1 selection	I		F	○	○
	8	Gain No. 1 Low speed gain switching spec 2 selection	I		F	○	○

No.	Target digit	Parameter name	Activating timing	Edit type	Level	Run mode	
						Communication	Maintenance
P243	4 - 1	Gain No. 1 Low speed gain switching delay time	I		F	○	○
	9 - 5	Gain No. 1 Low speed gain holding time after switching	I		F	○	○
P244		Gain No. 1 Speed loop proportional gain	I		F	○	○
P245		Gain No. 1 Speed loop integral time constant	I		F	○	○
P246		Gain No. 1 Speed loop derivative time constant	I		F	○	○
P247		Gain No. 1 Speed loop proportional gain distribution factor	I		F	○	○
P248		Gain No. 1 Speed loop derivative gain distribution factor	I		F	○	○
P249		Gain No. 1 Low speed loop proportional gain	I		F	○	○
P250		Gain No. 1 Low speed loop integral time constant	I		F	○	○
P251		Gain No. 1 Low speed loop derivative time constant	I		F	○	○
P252		Gain No. 1 Low speed loop proportional gain distribution factor	I		F	○	○
P253		Gain No. 1 Low speed loop derivative gain distribution factor	I		F	○	○
P254		Gain No. 1 Speed loop integral torque limit value	I		F	○	○
P255		Gain No. 1 Position loop gain	I		F	○	○
P256		Gain No. 1 Low speed position loop gain	I		F	○	○
P257	4 - 1	Gain No. 1 Position loop derivative time constant	I		F	○	○
	8 - 5	Gain No. 1 Low speed position loop derivative time constant	I		F	○	○
P258	4 - 1	Reserved					
	6 - 5	Gain No. 1 Positioning command delay time	I		F	○	○
P259	4 - 1	Gain No. 1 Speed feed forward ratio	I		F	○	○
	8 - 5	Gain No. 1 speed feed forward shift ratio	I		F	○	○
P260		Gain No. 1 Speed feed forward filter time constant	I		F	○	○
P261		Gain No. 1 Inertia	I		F	○	○
P262		Gain No. 1 Viscous friction	I		F	○	○
P263	4 - 1	Gain No. 1 Inertia feed forward ratio	I		F	○	○
	8 - 5	Gain No. 1 Viscous friction feed forward ratio	I		F	○	○

No.	Target digit	Parameter name	Activating timing	Edit type	Level	Run mode	
						Communication	Maintenance
P264		Gain No. 1 Torque feed forward filter time constant	I		F	○	○
P265	3 - 1	Gain No. 1 Filter derivative coefficient while stopping	I		F	○	○
	6 - 4	Gain No. 1 Filter time constant while stopping	I		F	○	○
P266	4 - 1	Gain No. 1 Notch filter center frequency	I		F	○	○
	7 - 5	Gain No. 1 Notch filter band width ratio	I		F	○	○
	9 - 8	Gain No. 1 Notch filter depth	I		F	○	○
P270		Gain No. 2 Low speed gain switching speed	I		F	○	○
P271		Gain No. 2 Low speed gain switching deviation pulse	I		F	○	○
P272	3 - 1	Gain No. 2 Normal speed → Low speed gain switching filter time constant	I		F	○	○
	6 - 4	Gain No. 2 Low speed → Normal speed gain switching filter time constant	I		F	○	○
	7	Gain No. 2 Low speed gain switching spec 1 selection	I		F	○	○
	8	Gain No. 2 Low speed gain switching spec 2 selection	I		F	○	○
P273	4 - 1	Gain No. 2 Low speed gain switching delay time	I		F	○	○
	9 - 5	Gain No. 2 Low speed gain holding time after switching	I		F	○	○
P274		Gain No. 2 Speed loop proportional gain	I		F	○	○
P275		Gain No. 2 Speed loop integral time constant	I		F	○	○
P276		Gain No. 2 Speed loop derivative time constant	I		F	○	○
P277		Gain No. 2 Speed loop proportional gain distribution factor	I		F	○	○
P278		Gain No. 2 Speed loop derivative gain distribution factor	I		F	○	○
P279		Gain No. 2 Low speed loop proportional gain	I		F	○	○
P280		Gain No. 2 Low speed loop integral time constant	I		F	○	○
P281		Gain No. 2 Low speed loop derivative time constant	I		F	○	○
P282		Gain No. 2 Low speed loop proportional gain distribution factor	I		F	○	○

No.	Target digit	Parameter name	Activating timing	Edit type	Level	Run mode	
						Communication	Maintenance
P283		Gain No. 2 Low speed loop derivative gain distribution factor	I		F	○	○
P284		Gain No. 2 Speed loop integral torque limit value	I		F	○	○
P285		Gain No. 2 Position loop gain	I		F	○	○
P286		Gain No. 2 Low speed position loop gain	I		F	○	○
P287	4 - 1	Gain No. 2 Position loop derivative time constant	I		F	○	○
	8 - 5	Gain No. 2 Low speed position loop derivative time constant	I		F	○	○
P288	4 - 1	Reserved					
	6 - 5	Gain No. 2 Positioning command delay time	I		F	○	○
P289	4 - 1	Gain No. 2 Speed feed forward ratio	I		F	○	○
	- 5	Gain No. 2 Speed feed forward filter time constant	I		F	○	○
P290		Gain No. 2 Speed feed forward filter time constant	I		F	○	○
P291		Gain No. 2 Inertia	I		F	○	○
P292		Gain No. 2 Viscous friction	I		F	○	○
P293	4 - 1	Gain No. 2 Inertia feed forward ratio	I		F	○	○
	8 - 5	Gain No. 2 Viscous friction feed forward ratio	I		F	○	○
P294		Gain No. 2 Torque feed forward filter time constant	I		F	○	○
P295	3 - 1	Gain No. 2 Filter derivative coefficient while stopping	I		F	○	○
	6 - 4	Gain No. 2 Filter time constant while stopping	I		F	○	○
P296	4 - 1	Gain No. 2 Notch filter center frequency	I		F	○	○
	7 - 5	Gain No. 2 Notch filter band width ratio	I		F	○	○
	9 - 8	Gain No. 2 Notch filter depth	I		F	○	○
P300		Gain No. 3 Low speed gain switching speed	I		F	○	○
P301		Gain No. 3 Low speed gain switching deviation pulse	I		F	○	○

No.	Target digit	Parameter name	Activating timing	Edit type	Level	Run mode	
						Communication	Maintenance
P302	3 - 1	Gain No. 3 Normal speed → Low speed gain switching filter time constant	I		F	○	○
	6 - 4	Gain No. 3 Low speed → Normal speed gain switching filter time constant	I		F	○	○
	7	Gain No. 3 Low speed gain switching spec 1 selection	I		F	○	○
	8	Gain No. 3 Low speed gain switching spec 2 selection	I		F	○	○
P303	4 - 1	Gain No. 3 Low speed gain switching delay time	I		F	○	○
	9 - 5	Gain No. 3 Low speed gain holding time after switching	I		F	○	○
P304		Gain No. 3 Speed loop proportional gain	I		F	○	○
P305		Gain No. 3 Speed loop integral time constant	I		F	○	○
P306		Gain No. 3 Speed loop derivative time constant	I		F	○	○
P307		Gain No. 3 Speed loop proportional gain distribution factor	I		F	○	○
P308		Gain No. 3 Speed loop derivative gain distribution factor	I		F	○	○
P309		Gain No. 3 Low speed loop proportional gain	I		F	○	○
P310		Gain No. 3 Low speed loop integral time constant	I		F	○	○
P311		Gain No. 3 Low speed loop derivative time constant	I		F	○	○
P312		Gain No. 3 Low speed loop proportional gain distribution factor	I		F	○	○
P313		Gain No. 3 Low speed loop derivative gain distribution factor	I		F	○	○
P314		Gain No. 3 Speed loop integral torque limit value	I		F	○	○
P315		Gain No. 3 Position loop gain	I		F	○	○
P316		Gain No. 3 Low speed position loop gain	I		F	○	○
P317	4 - 1	Gain No. 3 Position loop derivative time constant	I		F	○	○
	8 - 5	Gain No. 3 Low speed position loop derivative time constant	I		F	○	○
P318	4 - 1	Reserved					
	6 - 5	Gain No. 3 Positioning command delay time	I		F	○	○

No.	Target digit	Parameter name	Activating timing	Edit type	Level	Run mode	
						Communication	Maintenance
P319	4 - 1	Gain No. 3 Speed feed forward ratio	I		F	○	○
	8 - 5	Gain No. 3 Speed feed forward shift ratio	I		F	○	○
P320		Gain No. 3 Speed feed forward filter time constant	I		F	○	○
P321		Gain No. 3 Inertia	I		F	○	○
P322		Gain No. 3 Viscous friction	I		F	○	○
P323	4 - 1	Gain No. 3 Inertia feed forward ratio	I		F	○	○
	8 - 5	Gain No. 3 Viscous friction feed forward ratio	I		F	○	○
P324		Gain No. 3 Torque feed forward filter time constant	I		F	○	○
P325	3 - 1	Gain No. 3 Filter derivative coefficient while stopping	I		F	○	○
	6 - 4	Gain No. 3 Filter time constant while stopping	I		F	○	○
P326	4 - 1	Gain No. 3 Notch filter center frequency	I		F	○	○
	7 - 5	Gain No. 3 Notch filter band width ratio	I		F	○	○
	9 - 8	Gain No. 3 Notch filter depth	I		F	○	○
P330	1	Torque command filter order selection	I		F	○	○
	5 - 2	Torque command filter frequency	I		F	○	○
P331	4 - 1	Notch filter center frequency 1	I		F	○	○
	7 - 5	Notch filter band width ratio 1	I		F	○	○
	9 - 8	Notch filter depth 1	I		F	○	○
P332	4 - 1	Notch filter center frequency 2	I		F	○	○
	7 - 5	Notch filter band width ratio 2	I		F	○	○
	9 - 8	Notch filter depth 2	I		F	○	○
P333	4 - 1	Notch filter center frequency 3	I		F	○	○
	7 - 5	Notch filter band width ratio 3	I		F	○	○
	9 - 8	Notch filter depth 3	I		F	○	○
P334	4 - 1	Notch filter center frequency 4	I		F	○	○
	7 - 5	Notch filter band width ratio 4	I		F	○	○
	9 - 8	Notch filter depth 4	I		F	○	○
P340		Vibration control filter ineffective speed range	I		F	○	○
P341	4 - 1	Vibration control filter center frequency	I		F	○	○
	7 - 5	Vibration control filter band width ratio	I		F	○	○
	9 - 8	Vibration control filter depth	I		F	○	○
P342	1	Feedback filter order selection	I		F	○	○
	5 - 2	Feedback filter frequency	I		F	○	○
P348	3 - 1	Vibration control model gain	I		F	○	○
	6 - 4	Vibration control damping gain	I		F	○	○

No.	Target digit	Parameter name	Activating timing	Edit type	Level	Run mode	
						Communication	Maintenance
P349	1	Vibration control order selection	I		F	○	○
	5 - 2	Vibration control lower limit frequency	I		F	○	○
	9 - 6	Vibration control higher limit frequency	I		F	○	○
P380		Magnetic pole detection torque limit value	I		F	○	○
P381		Magnetic pole detection gain 1	I		F	○	○
P382		Magnetic pole detection integration time constant	I		F	○	○
P383		Magnetic pole detection gain 2	I		F	○	○
P384		Magnetic pole detection complete range	I		F	○	○
P385	1	Magnetic pole detection filter order selection	I		F	○	○
	5 - 2	Magnetic pole detection filter frequency	I		F	○	○
P386	3 - 1	Landing torque	I		F	○	○
	7 - 4	Landing torque holding time	I		F	○	○
P387	3 - 1	Magnetic pole detection torque minimum value (second and subsequent sessions)	I		F	○	○
	4	Magnetic pole detection torque attenuation pattern selection	I		F	○	○

9-2-5 Command-related parameters (groups 4 and 5)

Run mode ○ : Effective, — : Ineffective

No.	Target digit	Parameter name	Activating timing	Edit type	Level	Run mode	
						Communication	Maintenance
P404		Speed command acceleration standard time	I		F	○	○
P405		Speed command deceleration standard time	I		F	○	○
P408		Internal speed command acceleration standard time	I		F	○	○
P409		Internal speed command deceleration standard time	I		F	○	○
P410	1	SPD SEL 0 Speed command value spec selection	I		F	—	○
	2	SPD SEL 0 Gain No. selection	I		F	—	○
	3	SPD SEL 0 Overtravel spec selection	I		F	—	○
P411		SPD SEL 0 Speed command value	I		F	—	○
P412		SPD SEL 0 Torque limit value	I		F	—	○

No.	Target digit	Parameter name	Activating timing	Edit type	Level	Run mode	
						Communication	Maintenance
P413	1	SPD SEL 1 Speed command value spec selection	I		F	—	○
	2	SPD SEL 1 Gain No. selection	I		F	—	○
	3	SPD SEL 1 Overtravel spec selection	I		F	—	○
P414		SPD SEL 1 Speed command value	I		F	—	○
P415		SPD SEL 1 Torque limit value	I		F	—	○
P416	1	SPD SEL 2 Speed command value spec selection	I		F	—	○
	2	SPD SEL 2 Gain No. selection	I		F	—	○
	3	SPD SEL 2 Overtravel spec selection	I		F	—	○
P417		SPD SEL 2 Speed command value	I		F	—	○
P418		SPD SEL 2 Torque limit value	I		F	—	○
P419	1	SPD SEL 3 Speed command value spec selection	I		F	—	○
	2	SPD SEL 3 Gain No. selection	I		F	—	○
	3	SPD SEL 3 Overtravel spec selection	I		F	—	○
P420		SPD SEL 3 Speed command value	I		F	—	○
P421		SPD SEL 3 Torque limit value	I		F	—	○
P422	1	SPD SEL 4 Speed command value spec selection	I		F	—	○
	2	SPD SEL 4 Gain No. selection	I		F	—	○
	3	SPD SEL 4 Overtravel spec selection	I		F	—	○
P423		SPD SEL 4 Speed command value	I		F	—	○
P424		SPD SEL 4 Torque limit value	I		F	—	○
P425	1	SPD SEL 5 Speed command value spec selection	I		F	—	○
	2	SPD SEL 5 Gain No. selection	I		F	—	○
	3	SPD SEL 5 Overtravel spec selection	I		F	—	○
P426		SPD SEL 5 Speed command value	I		F	—	○
P427		SPD SEL 5 Torque limit value	I		F	—	○
P428	1	SPD SEL 6 Speed command value spec selection	I		F	—	○
	2	SPD SEL 6 Gain No. selection	I		F	—	○
	3	SPD SEL 6 Overtravel spec selection	I		F	—	○
P429		SPD SEL 6 Speed command value	I		F	—	○
P430		SPD SEL 6 Torque limit value	I		F	—	○
P431	1	SPD SEL 7 Speed command value spec selection	I		F	—	○
	2	SPD SEL 7 Gain No. selection	I		F	—	○
	3	SPD SEL 7 Overtravel spec selection	I		F	—	○
P432		SPD SEL 7 Speed command value	I		F	—	○
P433		SPD SEL 7 Torque limit value	I		F	—	○
P439		Internal torque command Increase/ Decrease change time	I		F	—	○
P440		Speed limit value at torque command mode	I		F	—	○

No.	Target digit	Parameter name	Activating timing	Edit type	Level	Run mode	
						Communication	Maintenance
P441	1	TRQ SEL 0 Torque command value spec selection	I		F	—	○
	2	TRQ SEL 0 Gain No. selection	I		F	—	○
	3	TRQ SEL 0 Overtravel spec selection	I		F	—	○
P442		TRQ SEL 0 Torque command value	I		F	—	○
P443		TRQ SEL 0 Speed limit value	I		F	—	○
P444	1	TRQ SEL 1 Torque command value spec selection	I		F	—	○
	2	TRQ SEL 1 Gain No. selection	I		F	—	○
	3	TRQ SEL 1 Overtravel spec selection	I		F	—	○
P445		TRQ SEL 1 Torque command value	I		F	—	○
P446		TRQ SEL 1 Speed limit value	I		F	—	○
P447	1	TRQ SEL 2 Torque command value spec selection	I		F	—	○
	2	TRQ SEL 2 Gain No. selection	I		F	—	○
	3	TRQ SEL 2 Overtravel spec selection	I		F	—	○
P448		TRQ SEL 2 Torque command value	I		F	—	○
P449		TRQ SEL 2 Speed limit value	I		F	—	○
P450	1	TRQ SEL 3 Torque command value spec selection	I		F	—	○
	2	TRQ SEL 3 Gain No. selection	I		F	—	○
	3	TRQ SEL 3 Overtravel spec selection	I		F	—	○
P451		TRQ SEL 3 Torque command value	I		F	—	○
P452		TRQ SEL 3 Speed limit value	I		F	—	○
P453	1	TRQ SEL 4 Torque command value spec selection	I		F	—	○
	2	TRQ SEL 4 Gain No. selection	I		F	—	○
	3	TRQ SEL 4 Overtravel spec selection	I		F	—	○
P454		TRQ SEL 4 Torque command value	I		F	—	○
P455		TRQ SEL 4 Speed limit value	I		F	—	○
P456	1	TRQ SEL 5 Torque command value spec selection	I		F	—	○
	2	TRQ SEL 5 Gain No. selection	I		F	—	○
	3	TRQ SEL 5 Overtravel spec selection	I		F	—	○
P457		TRQ SEL 5 Torque command value	I		F	—	○
P458		TRQ SEL 5 Speed limit value	I		F	—	○
P459	1	TRQ SEL 6 Torque command value spec selection	I		F	—	○
	2	TRQ SEL 6 Gain No. selection	I		F	—	○
	3	TRQ SEL 6 Overtravel spec selection	I		F	—	○
P460		TRQ SEL 6 Torque command value	I		F	—	○
P461		TRQ SEL 6 Speed limit value	I		F	—	○
P462	1	TRQ SEL 7 Torque command value spec selection	I		F	—	○
	2	TRQ SEL 7 Gain No. selection	I		F	—	○
	3	TRQ SEL 7 Overtravel spec selection	I		F	—	○

No.	Target digit	Parameter name	Activating timing	Edit type	Level	Run mode	
						Communication	Maintenance
P463		TRQ SEL 7 Torque command value	I		F	—	○
P464		TRQ SEL 7 Speed limit value	I		F	—	○
P516	1	Positioning approval selection when homing is not completed	I		F	○	○
P517	1	SEL 0 Homing complete signal selection	I		F	—	○
	2	SEL 0 Gain No. selection	I		F	—	○
	3	SEL 0 Overtravel spec selection	I		F	—	○
P518		SEL 0 Acceleration standard speed	I		F	—	○
P519		SEL 0 Deceleration standard speed	I		F	—	○
P520		SEL 0 Acceleration time	I		F	—	○
P521		SEL 0 Deceleration time	I		F	—	○
P522		SEL 0 S-curve time 1	I		F	—	○
P523		SEL 0 Torque limit value	I		F	—	○
P524	1	SEL 1 Homing complete signal selection	I		F	—	○
	2	SEL 1 Gain No. selection	I		F	—	○
	3	SEL 1 Overtravel spec selection	I		F	—	○
P525		SEL 1 Acceleration standard speed	I		F	—	○
P526		SEL 1 Deceleration standard speed	I		F	—	○
P527		SEL 1 Acceleration time	I		F	—	○
P528		SEL 1 Deceleration time	I		F	—	○
P529		SEL 1 S-curve time 1	I		F	—	○
P530		SEL 1 Torque limit value	I		F	—	○
P531	1	SEL 2 Homing complete signal selection	I		F	—	○
	2	SEL 2 Gain No. selection	I		F	—	○
	3	SEL 2 Overtravel spec selection	I		F	—	○
P532		SEL 2 Acceleration standard speed	I		F	—	○
P533		SEL 2 Deceleration standard speed	I		F	—	○
P534		SEL 2 Acceleration time	I		F	—	○
P535		SEL 2 Deceleration time	I		F	—	○
P536		SEL 2 S-curve time 1	I		F	—	○
P537		SEL 2 Torque limit value	I		F	—	○
P538	1	SEL 3 Homing complete signal selection	I		F	—	○
	2	SEL 3 Gain No. selection	I		F	—	○
	3	SEL 3 Overtravel spec selection	I		F	—	○
P539		SEL 3 Acceleration standard speed	I		F	—	○
P540		SEL 3 Deceleration standard speed	I		F	—	○
P541		SEL 3 Acceleration time	I		F	—	○
P542		SEL 3 Deceleration time	I		F	—	○
P543		SEL 3 S-curve time 1	I		F	—	○
P544		SEL 3 Torque limit value	I		F	—	○

No.	Target digit	Parameter name	Activating timing	Edit type	Level	Run mode	
						Communication	Maintenance
P545	1	SEL 4 Homing complete signal selection	I		F	—	○
	2	SEL 4 Gain No. selection	I		F	—	○
	3	SEL 4 Overtravel spec selection	I		F	—	○
P546		SEL 4 Acceleration standard speed	I		F	—	○
P547		SEL 4 Deceleration standard speed	I		F	—	○
P548		SEL 4 Acceleration time	I		F	—	○
P549		SEL 4 Deceleration time	I		F	—	○
P550		SEL 4 S-curve time 1	I		F	—	○
P551		SEL 4 Torque limit value	I		F	—	○
P552	1	SEL 5 Homing complete signal selection	I		F	—	○
	2	SEL 5 Gain No. selection	I		F	—	○
	3	SEL 5 Overtravel spec selection	I		F	—	○
P553		SEL 5 Acceleration standard speed	I		F	—	○
P554		SEL 5 Deceleration standard speed	I		F	—	○
P555		SEL 5 Acceleration time	I		F	—	○
P556		SEL 5 Deceleration time	I		F	—	○
P557		SEL 5 S-curve time 1	I		F	—	○
P558		SEL 5 Torque limit value	I		F	—	○
P559	1	SEL 6 Homing complete signal selection	I		F	—	○
	2	SEL 6 Gain No. selection	I		F	—	○
	3	SEL 6 Overtravel spec selection	I		F	—	○
P560		SEL 6 Acceleration standard speed	I		F	—	○
P561		SEL 6 Deceleration standard speed	I		F	—	○
P562		SEL 6 Acceleration time	I		F	—	○
P563		SEL 6 Deceleration time	I		F	—	○
P564		SEL 6 S-curve time 1	I		F	—	○
P565		SEL 6 Torque limit value	I		F	—	○
P566	1	SEL 7 Homing complete signal selection	I		F	—	○
	2	SEL 7 Gain No. selection	I		F	—	○
	3	SEL 7 Overtravel spec selection	I		F	—	○
P567		SEL 7 Acceleration standard speed	I		F	—	○
P568		SEL 7 Deceleration standard speed	I		F	—	○
P569		SEL 7 Acceleration time	I		F	—	○
P570		SEL 7 Deceleration time	I		F	—	○
P571		SEL 7 S-curve time 1	I		F	—	○
P572		SEL 7 Torque limit value	I		F	—	○
P573		Jog speed 0	I		F	—	○
P574		Jog speed 1	I		F	—	○
P575		Jog speed 2	I		F	—	○
P576		Jog speed 3	I		F	—	○
P577		Jog speed 4	I		F	—	○

No.	Target digit	Parameter name	Activating timing	Edit type	Level	Run mode	
						Communication	Maintenance
P578		Jog speed 5	I		F	—	○
P579		Jog speed 6	I		F	—	○
P580		Jog speed 7	I		F	—	○
P581	1	Zero point marker selection for homing	E		F	○	○
	2	Homing acceleration/deceleration control in reverse direction	I		F	○	○
	3	Zero point return set distance operation selection	I		F	○	○
P582		Zero point return creep speed	I		F	○	○
P583		Zero point position constant	I		F	○	○
P584		Zero point return set distance	I		F	○	○
P585		Position data standard point	I		F	○	○
P586		OT deceleration time at OT HOME	I		F	○	○

9-2-6 Self-diagnosis- and input and output-related parameters (group 6)

Run mode ○ : Effective, — : Ineffective

No.	Target digit	Parameter name	Activating timing	Edit type	Level	Run mode	
						Communication	Maintenance
P600	3 - 1	Status display C000 display item selection	I		F	○	○
	4	Reserved					
	5	Status display C000 display multiplier factor selection	I		F	○	○
	6	STO operation status indication selection	I		F	○	
P601	1	Auto tuning moving direction	I		F	—	○
	4 - 2	Auto tuning test operation ratio	I		F	—	○
	7 - 5	Max torque at auto tuning	I		F	—	○
	8	Auto tuning inertia multiplying selection	I		F	—	○
P604	1	Test run starting position assignment	I		F	—	○
	2	Test run traveling direction	I		F	—	○
	3	Test run SEL selection	I		F	—	○
	9 - 4	Test run stopping time	I		F	—	○
P605		Test run starting position	I		F	—	○
P606		Test run positioning amount	I		F	—	○
P607		Test run positioning speed	I		F	—	○
P608		Test run starting position movement speed	I		F	—	○

No.	Target digit	Parameter name	Activating timing	Edit type	Level	Run mode	
						Communication	Maintenance
P620	2 - 1	Control input signal allocation 1(DI1)	I		F	○	○
	4 - 3	Control input signal allocation 1(DI2)	I		F	○	○
	6 - 5	Control input signal allocation 1(DI3)	I		F	○	○
	8 - 7	Control input signal allocation 1(DI4)	I		F	○	○
P621	2 - 1	Control input signal allocation 2(DI5)	I		F	○	○
	4 - 3	Reserved					
	6 - 5	Reserved					
	8 - 7	Reserved					
P622	2 - 1	Control output signal allocation 1(DO1)	I		F	○	○
	4 - 3	Control output signal allocation 1(DO2)	I		F	○	○
	6 - 5	Control output signal allocation 1(DO3)Reserved	I		F	○	○
	8 - 7	Reserved					
P623	1	Control input signal condition setting 1(RST)	I		F	○	○
	2	Control input signal condition setting 1(ARST)	I		F	○	○
	3	Control input signal condition setting 1(EMG)	I		F	○	○
	4	Control input signal condition setting 1(SON)	I		F	○	○
	5	Control input signal condition setting 1(DR)	I		F	○	○
	6	Control input signal condition setting 1(CLR)	I		F	○	○
	7	Control input signal condition setting 1(Reserved)					
	8	Control input signal condition setting 1(TL)	I		F	○	○
P624	1	Control input signal condition setting 2(FOT)	I		F	○	○
	2	Control input signal condition setting 2(ROT)	I		F	○	○
	3	Control input signal condition setting 2(MD1)	I		F	○	○
	4	Control input signal condition setting 2(MD2)	I		F	○	○
	5	Control input signal condition setting 2(GSL1)	I		F	○	○
	6	Control input signal condition setting 2(GSL2)	I		F	○	○
	7	Control input signal condition setting 2(Reserved)					
	8	Control input signal condition setting 2(RVS)	I		F	○	○

No.	Target digit	Parameter name	Activating timing	Edit type	Level	Run mode	
						Communication	Maintenance
P625	1	Control input signal condition setting 3(SS1)	I		F	○	○
	2	Control input signal condition setting 3(SS2)	I		F	○	○
	3	Control input signal condition setting 3(SS3)	I		F	○	○
	4	Control input signal condition setting 3(SS4)	I		F	○	○
	5	Control input signal condition setting 3(SS5)	I		F	○	○
	6	Control input signal condition setting 3(SS6)	I		F	○	○
	7	Control input signal condition setting 3(SS7)	I		F	○	○
	8	Control input signal condition setting 3(SS8)	I		F	○	○
P626	1	Control input signal condition setting 4(ZST)	I		F	○	○
	2	Control input signal condition setting 4(ZLS)	I		F	○	○
	3	Control input signal condition setting 4(ZMK)	I		F	○	○
	4	Control input signal condition setting 4(TRG)	I		F	○	○
	5	Control input signal condition setting 4(CMDZ)	I		F	○	○
	6	Control input signal condition setting 4(ZCAN)	I		F	○	○
	7	Control input signal condition setting 4(FJOG)	I		F	○	○
	8	Control input signal condition setting 4(RJOG)	I		F	○	○
P627	1	Control input signal condition setting 5(Reserved)					○
	2	Control input signal condition setting 5(Reserved)					○
	3	Control input signal condition setting 5(Reserved)					
	4	Control input signal condition setting 5(Reserved)					
	5	Control input signal condition setting 5(MTOH)	I		F	○	○
	6	Control input signal condition setting 5(Reserved)					
	7	Control input signal condition setting 5(Reserved)					
	8	Control input signal condition setting 5(Reserved)					

No.	Target digit	Parameter name	Activating timing	Edit type	Level	Run mode	
						Communication	Maintenance
P628	1	Control input signal condition setting 6(EXT1)	I		F	○	○
	2	Control input signal condition setting 6(EXT2)	I		F	○	○
	3	Control input signal condition setting 6(EXT3)	I		F	○	○
	4	Control input signal condition setting 6(Reserved)					
	5	Control input signal condition setting 6(Reserved)					
	6	Control input signal condition setting 6(Reserved)					
	7	Control input signal condition setting 6(Reserved)					
	8	Control input signal condition setting 6(Reserved)					
P631	1	Deviation clear selection when SON signal is OFF	I		F	○	○
P633	1	Stopping selection when EMG signal is ON	I		F	○	○
	5 - 2	Deceleration time after EMG signal braking stoppage	I		F	○	○
	8 - 6	Servo OFF delay time after EMG signal braking stoppage	I		F	○	○
P634	1	Reserved					
	5 - 2	Deceleration time after OT signal braking stoppage	I		F	○	○
	8 - 6	OT condition holding time	I		F	○	○
P635	1	Reserved					
	5 - 2	Soft OT braking stoppage deceleration time	I		F	○	○
	8 - 6	Soft OT condition holding time	I		F	○	○
P636		TL signal torque limit value +	I		F	○	○
P637		TL signal torque limit value -	I		F	○	○
P638	3 - 1	MD signal delay time	I		F	○	○
	6 - 4	SS signal delay time	I		F	○	○
	9 - 7	ZST signal delay time	I		F	○	○
P650	1	RDY signal specifications Selection of OT ALM signal is ON	R		F	○	○
	2	RDY signal specifications Selection of motor electrification ALM signal other than OT is ON	R		F	○	○
P651		SZ signal speed range	I		F	○	○
P652		VCP signal speed deviation range	I		F	○	○
P653		PE1 signal deviation range	I		F	○	○
P654		PE1 signal delay time	I		F	○	○
P655		PE2 signal deviation range	I		F	○	○

No.	Target digit	Parameter name	Activating timing	Edit type	Level	Run mode	
						Communication	Maintenance
P656		PE2 signal delay time	I		F	○	○
P657		PRF signal distance	I		F	○	○
P658	4 - 1	Brake release delay time	I		F	○	○
	8 - 5	Brake activation delay time	I		F	○	○
P659		Brake activation effective low speed range	I		F	○	○
P660		Brake enforced activation delay time	I		F	○	○

9-2-7 Network-related parameters (group 8)

Run mode ○ : Effective, ― : Ineffective

No.	Target digit	Parameter name	Activating timing	Edit type	Level	Run mode	
						Communication	Maintenance
P800	1	Forward direction overtravel run selection	R		F	○	―
	2	Reverse direction overtravel run selection	R		F	○	―
	3	Forward direction software limit run selection	R		F	○	―
	4	Reverse direction software limit run selection	R		F	○	―
P801		Torque base unit selection	R		F	○	―
P803		Zero point return approach speed	I		F	○	―
P804		Fixed monitor selection 1	I		F	○	―
P805		Fixed monitor selection 2	I		F	○	―
P806		Monitor select for SEL_MON1	I		F	○	―
P807		Monitor select for SEL_MON2	I		F	○	―
P808		Zero point position detection range	I		F	○	―
P809		Acceleration basic unit selection	R		F	○	―
P810		Zero point return selection	I		F	○	―
P811		Overtravel spec selection	I		F	○	―
P814	1	WDT error detection selection	I		F	○	―
	2	Communication error detection selection	I		F	○	―
P815	1	Select positioning mode	R		F	○	―
	2	Command abort selection	R		F	○	―
P820	1	NET SEL 0 Gain No. selection	I		F	○	―
P823		NET SEL 0 S-curve time 1	I		F	○	―
P824	4 - 1	NET SEL 0 Delay compensation	I		F	○	―
	8 - 5	NET SEL 0 Lead compensation	I		F	○	―
P830	1	NET SEL 1 Gain No. selection	I		F	○	―
P833		NET SEL 1 S-curve time 1	I		F	○	―

No.	Target digit	Parameter name	Activating timing	Edit type	Level	Run mode	
						Communication	Maintenance
P834	4 - 1	NET SEL 1 Delay compensation	I		F	○	—
	8 - 5	NET SEL 1 Lead compensation	I		F	○	—
P840	1	NET SEL 2 Gain No. selection	I		F	○	—
P843		NET SEL 2 S-curve time 1	I		F	○	—
P844	4 - 1	NET SEL 2 Delay compensation	I		F	○	—
	8 - 5	NET SEL 2 Lead compensation	I		F	○	—
P850	1	NET SEL 3 Gain No. selection	I		F	○	—
P853		NET SEL 3 S-curve time 1	I		F	○	—
P854	4 - 1	NET SEL 3 Delay compensation	I		F	○	—
	8 - 5	NET SEL 3 Lead compensation	I		F	○	—
P860	1	NET SEL 4 Gain No. selection	I		F	○	—
P863		NET SEL 4 S-curve time 1	I		F	○	—
P864	4 - 1	NET SEL 4 Delay compensation	I		F	○	—
	8 - 5	NET SEL 4 Lead compensation	I		F	○	—
P870	1	NET SEL 5 Gain No. selection	I		F	○	—
P873		NET SEL 5 S-curve time 1	I		F	○	—
P874	4 - 1	NET SEL 5 Delay compensation	I		F	○	—
	8 - 5	NET SEL 5 Lead compensation	I		F	○	—
P880	1	NET SEL 6 Gain No. selection	I		F	○	—
P883		NET SEL 6 S-curve time 1	I		F	○	—
P884	4 - 1	NET SEL 6 Delay compensation	I		F	○	—
	8 - 5	NET SEL 6 Lead compensation	I		F	○	—
P890	1	NET SEL 7 Gain No. selection	I		F	○	—
P893		NET SEL 7 S-curve time 1	I		F	○	—
P894	4 - 1	NET SEL 7 Delay compensation	I		F	○	—
	8 - 5	NET SEL 7 Lead compensation	I		F	○	—

9-3 Parameter specification

The initial values of parameters are set so that the motor operates without any load (trial run). To operate by connecting to the machine system, adjust the operation speed, gain, and so on according to the load status.

9-3-1 Parameter setting method

Values to input in the parameter editing window of VPH DES are of the types below.

a. Parameter setting (supported by all parameters)

An input value will directly become a setting.

[Example] If wishing to set 360 in [P411: SPDSEL0 Speed command value]

In the parameter editing window, set "360" in the P411 setting column.

b. Indirect data number assigned value (supported by some parameters only)

An input value will become the assigned value of the indirect data number. Set the value for the specified indirect data number.

[Example] If wishing to use indirect data IX01 to set 360 in [P411: SPDSEL0 Speed command value]

In the parameter editing window, set "-1" in the P411 setting column (specify an indirect data number as a negative value), and in the indirect data editing window, set "360" in the IX01 setting column.

9-3-2 Definition of terms

The following terms, as used in this chapter, are defined as below.

- Maximum speed

  Usually, the rated speed in the motor specification. If a value other than "0" is set in [P082: Motor max speed special setting], the setting of [P082] is assumed to be the maximum speed.

  When the special parameter is specified, the priority of settings is [P082] > [P064] > [P014]. If a value lower than the maximum speed in the specification is set in [P440: Speed limit value at torque command mode] or the speed limit value to be set for each command, it is clamped to the minimum speed that is set.

- Peak torque

  Usually, the peak torque value in the motor specification.

  If a value lower than the peak torque value in the specification is set in [P080 (P081): Max torque limit value + (-)] or for the torque limit value to be set for each command run, the parameter value is assumed to be the peak torque value.

  When the special parameter is specified, the smallest of the settings of [P013], [P080 (P081)], and the torque limit value for each command run is assumed to be the peak torque.

9-4 Parameter details

The following provides the details of each parameter. Each item in the parameter descriptions is as described below.

a. Setting item

- Activating timing
  Timing with which the setting becomes effective if the parameter is changed.
- Setting range
  Range of values that can be set.
- Initial value
  Value that is set before shipment.
- Common parameter
  Parameter numbers defined in the standard servo profile of MECHATROLINK-III. If a common parameter is set via communication, it is reflected in the relevant parameter of this device.

b. Function

Describes the function of the parameter.

c. Setting selection

Describes the choices offered by the parameter, if any.

d. Reference

Describes the reference related to the parameter.

9-4-1 Motor- and encoder-related parameters (group 0)

P000: Motor Identification code

a. Setting item

Activating timing: Power ON

Setting range: -2147483648 to 2147483647

Initial value: 0

b. Function

Set the identification code of the motor used.

If a motor identification code has been registered, it will automatically be set when you select the motor from VPH DES.

* From the operation panel, only "19999 (special motor)" can be input.
* Set the value presented from the manufacturer.

c. Setting selection

0: Motor unregistered

19999: [P006] to [P059] can be input individually with VPH DES.

P006: Driver combination rated output

a. Setting item

Activating timing: Power ON

Setting unit: kW

Setting range: 0.000 to 9999.999

Initial value: 0.000

b. Function

Set the rated output of the device used.

* Set the value presented from the manufacturer.

P007: Driver combination power voltage

a. Setting item

Activating timing: Power ON

Setting unit: V

Setting range: 0 to 9999

Initial value: 0

b. Function

Set the power voltage of the device used.

* Set the value presented from the manufacturer.

P008[1st digit]: Driver combination main power supply single phase / 3 phase

a. Setting item

Activating timing: Power ON

Setting range: 0 to 3

Initial value: 0

b. Function

Select the main power supply type of the device used.

* Set the value presented from the manufacturer.

c. Setting selection

0: No selection

1: Single phase

2: 3 phase

3: 3 phase power supply regeneration

P008[2nd digit]: Driver combination main power supply AC /DC power source

a. Setting item

Activating timing: Power ON

Setting range: 0 to 2

Initial value: 0

b. Function

Select the power supply of the device used.

* Set the value presented from the manufacturer.

c. Setting selection

0: No selection

1: AC power supply

2: DC power supply

P009[3rd - 1st digits]: Driver combination revision

a. Setting item

Activating timing: Power ON

Setting range: 000 to 999

Initial value: 0

b. Function

Set the revision of the device used.

* Set the value presented from the manufacturer.

P009[7th - 4th digits]: Driver combination special spec code

a. Setting item

Activating timing: Power ON

Setting range: 0000 to 9999

Initial value: 0

b. Function

Set the specification code to use if combining with a special motor and a special device.

* Set the value presented from the manufacturer.

P010[1st digit]: Motor type identification

a. Setting item

Activating timing: Power ON

Setting range: 0 to 5

Initial value: 0

b. Function

Select the type of motor used.

* Set the value presented from the manufacturer.

c. Setting selection

0: No selection

1: τDISC

2: τlinear

3: Reserved

4: Reserved

5: Reserved

P010[2nd digit]: Main power supply type for the driver to match with motor

a. Setting item

Activating timing: Power ON

Setting range: 0 to 4

Initial value: 0

b. Function

Select the main power supply type of the device that corresponds to the motor used.

* Set the value presented from the manufacturer.

c. Setting selection

0: No selection

1: Common type

2: Single phase only

3: 3 phase only

4: Power regeneration only

P011: Motor rated output

a. Setting item

Activating timing: Power ON

Setting unit: kW

Setting range: 0.001 to 9999.999

Initial value: 0.001

b. Function

Set the rated output of the motor used.

* Set the value presented from the manufacturer.

P012: Motor rated current

a. Setting item

Activating timing: Power ON

Setting unit: A

Setting range: 0.000 to 99999.999

Initial value: 0.000

b. Function

Set the rated current of the motor used.

* Set the value presented from the manufacturer.

P013: Motor momentary max current

a. Setting item

Activating timing: Power ON

Setting unit: %

Setting range: 100 to 799

Initial value: 100

b. Function

Set the momental maximum current ratio of the motor used.

* Set the value presented from the manufacturer.

P014: Motor rated speed

a. Setting item

Activating timing: Power ON

Setting unit: rpm

Setting range: 0.001 to 99999.999

Initial value: 0.001

b. Function

Set the rated speed of the motor used.

If [P067] or [P082] is not set, this setting will be the Maximum speed.

* Set the value presented from the manufacturer.

P015: Motor torque/thrust constant

a. Setting item

Activating timing: Power ON

Setting unit: Nm/A

Setting range: 0.0001 to 99999.9999

Initial value: 0.0001

b. Function

Set the torque constant or force constant of the motor used.

* Set the value presented from the manufacturer.

P016: Number of motor poles

a. Setting item

Activating timing: Power ON

Setting unit: Poles

Setting range: 2 to 10000

Initial value: 2

b. Function

Set the number of poles of the motor used.

* Set the value presented from the manufacturer.

P017: Distance between motor pole opposite

a. Setting item

Activating timing: Power ON

Setting unit: mm

Setting range: 0.001 to 999.999

Initial value: 0.001

b. Function

Set the distance between motor pole opposites of the motor used.

* Set the value presented from the manufacturer.

P018: Motor phase resistance

a. Setting item

Activating timing: Power ON

Setting unit: mΩ

Setting range: 0.001 to 99999.999

Initial value: 0.001

b. Function

Set the phase resistance value of the motor used.

* Set the value presented from the manufacturer.

P019: Motor phase inductance (Lq)

a. Setting item

Activating timing: Power ON

Setting unit: mH

Setting range: 0.001 to 999.999

Initial value: 0.001

b. Function

Set the motor phase inductance (Lq).

* Set the value presented from the manufacturer.

P020: Motor phase inductance (Ld)

a. Setting item

Activating timing: Power ON

Setting unit: mH

Setting range: 0.001 to 999.999

Initial value: 0.001

b. Function

Set the motor phase inductance (Ld).

* Set the value presented from the manufacturer.

P021: Current cut off frequency

a. Setting item

Activating timing: Power ON

Setting unit: Hz

Setting range: 1 to 5000

Initial value: 1000

b. Function

Set the current cut off frequency.

* Set the value presented from the manufacturer.

P028[3rd - 1st digits]: Phase control division ratio

a. Setting item

Activating timing: Power ON

Setting unit: %

Setting range: 0 to 100

Initial value: 0

b. Function

Set the phase control division ratio.

* Set the value presented from the manufacturer.

P028[6th - 4th digits]: Phase control integrated limit value

a. Setting item

Activating timing: Power ON

Setting unit: %

Setting range: 0 to 999

Initial value: 0

b. Function

Set the phase control integrated limit value.

* Set the value presented from the manufacturer.

P030[3rd - 1st digits]: Motor electronic thermal detection actual value

a. Setting item

Activating timing: Power ON

Setting unit: %

Setting range: 0 to 799

Initial value: 110

b. Function

Set the load factor at which to detect [AL.105: Motor overload error].

* Set the value presented from the manufacturer.

P030[7th - 4th digits]: Motor electronic thermal detection time

a. Setting item

Activating timing: Real-time

Setting unit: s

Setting range: 0 to 9999

Initial value: 53

b. Function

Set the motor thermal time constant.

* Set the value presented from the manufacturer.

P031[3rd - 1st digits]: Motor 1 phase concentration electronic thermal detection ratio

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: 0 to 200

Initial value: 70

b. Function

Set the load factor at which to detect [AL.105: Motor overload error] during motor 1 phase concentration.

* Set the value presented from the manufacturer.

P031[5th & 4th digits]: Motor 1 phase concentration electronic thermal detection motion range

a. Setting item

Activating timing: Real-time

Setting unit: rev

Setting range: 0 to 9.9

Initial value: 1.0

b. Function

Set the operation range in which to detect a motor 1 phase concentration state.

* Set the value presented from the manufacturer.

P031[7th & 6th digits]: Motor 1 phase concentration electronic thermal detection low speed range

a. Setting item

Activating timing: Real-time

Setting unit: rps

Setting range: 0 to 9.9

Initial value: 1.0

b. Function

Set the speed at which to defect a low speed state.

* Set the value presented from the manufacturer.

P032[3rd - 1st digits]: Dead time compensation factor

a. Setting item

Activating timing: Power ON

Setting unit: %

Setting range: 0 to 200

Initial value: 50

b. Function

Set the dead time compensation factor.

* Set the value presented from the manufacturer.

P032[6th - 4th digits]: Dead time compensation low current control range

a. Setting item

Activating timing: Power ON

Setting unit: %

Setting range: 0.0 to 99.9

Initial value: 0.5

b. Function

Set the dead time compensation low current limit range.

* Set the value presented from the manufacturer.

P033: Dead time compensation invalid speed

a. Setting item

Activating timing: Power ON

Setting unit: rpm

Setting range: 0.000 to 99999.999

Initial value: 0.000

b. Function

Set the speed at which the dead time compensation is to become invalid.

* Set the value presented from the manufacturer.

P034[3rd - 1st digits]: Current command variation limit value

a. Setting item

Activating timing: Power ON

Setting unit: %

Setting range: 0 to 799

Initial value: 100

b. Function

Set the current command variation limiter ratio.

* Set the value presented from the manufacturer.

P034[6th - 4th digits]: Voltage output limit value

a. Setting item

Activating timing: Power ON

Setting unit: %

Setting range: 0 to 799

Initial value: 0

b. Function

Set the voltage output limit value.

* Set the value presented from the manufacturer.

P034[9th - 7th digits]: Current loop integral stop voltage

a. Setting item

Activating timing: Power ON

Setting unit: %

Setting range: 0 to 799

Initial value: 0

b. Function

Set the current loop integral stop voltage.

* Set the value presented from the manufacturer.

P035[3rd - 1st digits]: Induced electromotive force compensation rate

a. Setting item

Activating timing: Power ON

Setting unit: %

Setting range: 0 to 100

Initial value: 0

b. Function

Set the induced electromotive force compensation rate.

* Set the value presented from the manufacturer.

P036[3rd - 1st digits]: Incoherence compensation ratio

a. Setting item

Activating timing: Power ON

Setting unit: %

Setting range: 0 to 100

Initial value: 0

b. Function

Set the incoherence compensation ratio.

* Set the value presented from the manufacturer.

P037[3rd - 1st digits]: Torque electric angle position phase correction angle

a. Setting item

Activating timing: Power ON

Setting unit: deg

Setting range: 0.0 to 90.0

Initial value: 0.0

b. Function

Set the electric angle phase correction angle during rated torque output.

* Set the value presented from the manufacturer.

P037[6th - 4th digits]: Torque electric angle position phase correction start speed

a. Setting item

Activating timing: Power ON

Setting unit: %

Setting range: 0 to 999

Initial value: 0

b. Function

Set the speed at which to start torque electric angle phase correction.

* Set the value presented from the manufacturer.

P037[9th - 7th digits]: Torque electric angle position phase correction complete speed

a. Setting item

Activating timing: Power ON

Setting unit: %

Setting range: 0 to 999

Initial value: 0

b. Function

Set the speed at which to complete torque electric angle phase correction.

* Set the value presented from the manufacturer.

P038[3rd - 1st digits]: Speed electric angle phase correction angle

a. Setting item

Activating timing: Power ON

Setting unit: deg

Setting range: 0.0 to 90.0

Initial value: 0.0

b. Function

Set the speed electric angle phase correction angle.

* Set the value presented from the manufacturer.

P038[6th - 4th digits]: Speed electric angle phase correction starting speed

a. Setting item

Activating timing: Power ON

Setting unit: %

Setting range: 0 to 999

Initial value: 0

b. Function

Set the speed at which to start speed electric angle phase correction.

* Set the value presented from the manufacturer.

P038[9th - 7th digits]: Speed electric angle phase correction complete speed

a. Setting item

Activating timing: Power ON

Setting unit: %

Setting range: 0 to 999

Initial value: 0

b. Function

Set the speed at which to complete speed electric angle phase correction.

* Set the value presented from the manufacturer.

P039[3rd - 1st digits]: d axis current ratio

a. Setting item

Activating timing: Power ON

Setting unit: %

Setting range: 0.0 to 99.0 (field weakening)

Initial value: 0.0

b. Function

Set the d axis current value.

* Set the value presented from the manufacturer.

P039[6th - 4th digits]: d axis current start speed

a. Setting item

Activating timing: Power ON

Setting unit: %

Setting range: 0 to 999

Initial value: 0

b. Function

Set the speed at which to start the d axis current.

* Set the value presented from the manufacturer.

P039[9th - 7th digits]: d axis current complete speed

a. Setting item

Activating timing: Power ON

Setting unit: %

Setting range: 0 to 999

Initial value: 0

b. Function

Set the speed at which to complete the d axis current.

* Set the value presented from the manufacturer.

P040[3rd - 1st digits]: 1st torque correction value

a. Setting item

Activating timing: Power ON

Setting unit: %

Setting range: 0.0 to 99.0

Initial value: 0.0

b. Function

Set the 1st torque correction value.

* Set the value presented from the manufacturer.

P040[6th - 4th digits]: 1st torque correction value start speed

a. Setting item

Activating timing: Power ON

Setting unit: %

Setting range: 0 to 999

Initial value: 0

b. Function

Set the speed at which to start the 1st torque correction value.

* Set the value presented from the manufacturer.

P040[9th - 7th digits]: 1st torque correction value complete speed

a. Setting item

Activating timing: Power ON

Setting unit: %

Setting range: 0 to 999

Initial value: 0

b. Function

Set the speed at which to complete the 1st torque correction.

* Set the value presented from the manufacturer.

P041[3rd - 1st digits]: 2nd torque correction value

a. Setting item

Activating timing: Power ON

Setting unit: %

Setting range: 0.0 to 99.0

Initial value: 0.0

b. Function

Set the 2nd torque correction value.

* Set the value presented from the manufacturer.

P041[6th - 4th digits]: 2nd torque correction value start speed

a. Setting item

Activating timing: Power ON

Setting unit: %

Setting range: 0 to 999

Initial value: 0

b. Function

Set the speed at which to start the 2nd torque correction value.

* Set the value presented from the manufacturer.

P041[9th - 7th digits]: 2nd torque correction value complete speed

a. Setting item

Activating timing: Power ON

Setting unit: %

Setting range: 0 to 999

Initial value: 0

b. Function

Set the speed at which to complete the 2nd torque correction.

* Set the value presented from the manufacturer.

P042[3rd - 1st digits]: Torque correction ratio for 6th harmonic

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: 0.00 to 9.99

Initial value: 0.00

b. Function

Set the 6th harmonic torque correction ratio.

* Set the value presented from the manufacturer.

P042[6th - 4th digits]: Torque correction shift electric angle for 6th harmonic

a. Setting item

Activating timing: Real-time

Setting unit: deg

Setting range: 0 to 359

Initial value: 0

b. Function

Set the 6th harmonic torque correction shift electric angle.

* Set the value presented from the manufacturer.

P043[3rd - 1st digits]: Reserved

a. Setting item

b. Function

Reserved area. Set the initial value.

P043[6th - 4th digits]: PWM drive circuit fully charged waiting time

a. Setting item

Activating timing: Power ON

Setting unit: ms

Setting range: 0 to 999

Initial value: 0

b. Function

Set the waiting time after the PWM drive circuit has fully been charged.

Usually, set "0".

* Set the value presented from the manufacturer.

P043[8th - 7th digit]: PWM drive circuit charging time

a. Setting item

Activating timing: Power ON

Setting unit: ms

Setting range: 0.0 to 9.9

Initial value: 0.0

b. Function

Set the PWM drive circuit charging time.

Usually, set "0".

* Set the value presented from the manufacturer.

P044[1st digit]: Field weakening control selection

a. Setting item

Activating timing: Power ON

Setting range: 0 to 2

Initial value: 0

b. Function

Select field weakening control.

* Set the value presented from the manufacturer.

c. Setting selection

0: INVALID

1: Theoretical value

2: P044 (4th - 2nd digits)

Use the setting of the field weakening start speed.

P044[4th - 2nd digits]: Field weakening start speed

a. Setting item

Activating timing: Power ON

Setting unit: %

Setting range: 0 to 999

Initial value: 0

b. Function

Set the speed (base speed) at which to start field weakening.

Set it with the ratio of P014 Motor rated speed.

If "0" is set, "100%" is assumed.

* Set the value presented from the manufacturer.

P044[7th - 5th digits]: d-axis max current

a. Setting item

Activating timing: Power ON

Setting unit: %

Setting range: 0 to 799

Initial value: 0

b. Function

Set the maximum current for the d axis.

Set it with the ratio of P012 Motor rated current.

If "0" is set, "100%" is assumed.

* Set the value presented from the manufacturer.

P045[2nd & 1st digits]: Motor power cable disconnection detection time

a. Setting item

Activating timing: Power ON

Setting unit: sec

Setting range: 0.0 to 9.9

Initial value: 0

b. Function

Set the time at which to detect [AL.119: Motor power cable disconnection error 2].

If 0 is set, 2.0 sec is assumed.

If 9.9 is set, error detection is ineffective.

* Set the value presented from the manufacturer.

P046: Motor NT characteristic max speed

a. Setting item

Activating timing: Power ON

Setting unit: rpm

Setting range: 0.000 to 99999.999

Initial value: 0.000

b. Function

Set the motor NT characteristic maximum speed. Usually, set the initial value.

If [P067: Max speed of motor] or [P082: Motor max speed special setting] is set, it has priority.

* Set the value presented from the manufacturer.

P047[3rd - 1st digits]: Rated current at motor NT characteristic max speed

a. Setting item

Activating timing: Power ON

Setting unit: %

Setting range: 0 to 100

Initial value: 0

b. Function

Set the current corresponding to the rated torque at [P046: Motor NT characteristic max speed].

Set it with the ratio of [P012: Motor rated current] to the motor rated current.

Usually, set the initial value.

* Set the value presented from the manufacturer.

P047[6th - 4th digits]: Momentary max current at motor NT characteristic max speed

a. Setting item

Activating timing: Power ON

Setting unit: %

Setting range: 0 to 999

Initial value: 0

b. Function

Set the current corresponding to the momentary max current at [P046: Motor NT characteristic max speed].

Set it with the ratio of [P012: Motor rated current] to the motor rated current.

Usually, set the initial value.

* Set the value presented from the manufacturer.

P048[3rd - 1st digits]: Rated current decay start speed

a. Setting item

Activating timing: Power ON

Setting unit: %

Setting range: 0 to 999

Initial value: 0

b. Function

Set the speed at which the motor NT characteristic rated torque decays.

Set it with the ratio to [P014: Motor rated speed].

Usually, set the initial value.

* Set the value presented from the manufacturer.

P048[6th - 4th digits]: Instantaneous max current decay start speed

a. Setting item

Activating timing: Power ON

Setting unit: %

Setting range: 0 to 999

Initial value: 0

b. Function

Set the speed at which the maximum torque decays in the motor NT characteristic peak running range.

Set it with the ratio of [P014: Motor rated speed] to the motor rated speed.

Usually, set the initial value.

* Set the value presented from the manufacturer.

P060: Encoder type

a. Setting item

Activating timing: Turn the power off, then on again.

Setting range: Refer to the encoder selection table.

Initial value: 0

b. Function

Select the type of encoder used.

Depending on the encoder type, the frequency dividing and marker output method differs.

* Set the value presented from the manufacturer.

c. Setting selection

Setting value	VPH DES P060 item	Encoder type	Frequency dividing output method	Marker output method
0	No selection	Encoder not selected		
1	INC1	Reserved		
2	INC2	Reserved		
3	INC3	Reserved		
4	L-SEN	тlinear 90 deg phase difference pulse	Frequency output by hardware	Marker input
5	S-INC	NA80 serial incremental		
6	S-ABS	NA80 serial absolute	Frequency output by software	Serial
7	C-SEN1	Reserved		
8	C-SEN2	тDISC motor, with marker	Frequency output by hardware	Marker input
9	S-INC2	Reserved		
10	S-ABS2	Serial absolute 2	Frequency output by software	Serial
11	L-LESS	тlinear scaleless sensor	Frequency output by hardware	
12	ENSIS	Mitutoyo ABS linear scale	Frequency output by software	Serial
13	S-ABS3	Serial absolute 3	Frequency output by software	Serial
14	S-MABS	Multi turn serial absolute	Frequency output by software	Serial
15	L-BiSS	Linear BiSS encoder	Frequency output by software	Serial
16	R-BiSS	Rotary BiSS encoder	Frequency output by software	Serial
17	EnDat	HEIDENHAIN ABS encoder	Frequency output by software	Serial
18	S-ABS4	Serial absolute 4	Frequency output by software	Serial
19	S-iABS	Motor identification support serial absolute	Frequency output by software	Serial

d. Reference

For details of setting the frequency division and the marker width, refer to "P140[2nd & 1st digits]: Pulse output selection" and "Reference".

For details of the frequency dividing output method, refer to the "Circuit No. O-2: EA, EA*, EB, and EB* encoder pulse outputs" section in "3-2 Input/output interface".

P061: Number of encoder pulses of rotary type motor

a. Setting item

Activating timing: Power ON

Setting unit: Mppr (resolution)

Setting range: 0.000000 to 2147.483647

Initial value: 0.000000

Common parameter: 0Ah

b. Function

Set the number of encoder pulses per rotation of the rotary system motor.

* Set the value presented from the manufacturer.

P062: Scale resolution

a. Setting item

Activating timing: Power ON

Setting unit: μm

Setting range: 0.00000 to 999.99999

Initial value: 0.00000

b. Function

Set the scale resolution of the linear sensor to be used.

• For a rotary motor, this parameter is ineffective.

* Set the value presented from the manufacturer.

P063: Scale pitch distance

a. Setting item

Activating timing: Power ON

Setting unit: μm

Setting range: 0.00000 to 999.99999

Initial value: 0.00000

b. Function

Set the scale pitch distance of the linear sensor to be used.

The scale resolution is determined with the combination with [P064], with the formula below.

Scale resolution = [P063]/[P064]

* Set the value presented from the manufacturer.

P064: Number of pulse per scale pitch

a. Setting item

Activating timing: Power ON

Setting unit: Pulse

Setting range: 0 to 100000

Initial value: 0

b. Function

Set the number of pulses per scale pitch.

The scale resolution is determined with the combination with [P063].

* Set the value presented from the manufacturer.

P066: Encoder input direction switching

a. Setting item

Activating timing: Power ON

Setting range: 0 to 1

Initial value: 0

b. Function

Select the encoder input direction.

* Set the value presented from the manufacturer.

c. Setting selection

0: Non-reverse

1: Reversal

P067: Max speed of motor

a. Setting item

Activating timing: Power ON

Setting unit: rpm

Setting range: 0.000 to 99999.999

Initial value: 0.000

b. Function

Set the Maximum speed for the combination of the motor used and the encoder.

If [P082] is set, it has priority.

* Set the value presented from the manufacturer.

P068: Magnetic pole sensor type

a. Setting item

Activating timing: Power ON

Setting range: 0 to 11

Initial value: 0

b. Function

Select the magnetic pole sensor type.

* Set the value presented from the manufacturer.

c. Setting selection

0: Auto magnetic pole sensing

1: 2 phase (HA, HB signals)

2: 3 phase (HA, HB, HC signals)

3: 2 phase (serial communication signal)

4: 3 phase (serial communication signal)

5: IPU-MABS

6: IPU-ABS

7: ENSIS

8: BiSS

9: NA80 Type

10: NA70 Type

11: EnDat

12: iABS

13: IPU-ABSex

P069: Magnetic pole position offset

a. Setting item

Activating timing: Power ON

Setting unit: mm

Setting range: 0.000 to 999.999

Initial value: 0.000

b. Function

Set the magnetic pole position offset.

If a value is set in [P087], this setting is ineffective.

* Set the value presented from the manufacturer.

P070: Encoder wire breakage detection filter selection

a. Setting item

Activating timing: Power ON

Setting range: 0 to 1

Initial value: 0

b. Function

Select the encoder wire breakage detection filter.

* Set the value presented from the manufacturer.

c. Setting selection

0: 100 ns

1: 6.4 µs

P071 [2nd & 1st digits]: 1 rotation position detection speed error detection speed

a. Setting item

Activating timing: Power ON

Setting unit: rpm

Setting range: 0 to 99

Initial value: 0

b. Function

Set the speed at which a 1 rotation position detection speed error occurs.

This parameter is effective to encoder types S-ABS2, S-ABS3, and S-ABS4.

If "0" is set, the detection speed is "1 rpm".

* Set the value presented from the manufacturer.

P071 [3rd digit]: Feedback smooth

a. Setting item

Activating timing: Power ON

Setting range: 0 to 5

Initial value: 0

b. Function

Set the smoothing degree of the encoder feedback.

This parameter is effective to encoder types S-ABS2, S-ABS3, and S-ABS4.

The larger the setting, the larger the smoothing degree.

* Set the value presented from the manufacturer.

P072[1st digit]: Manufacturer exclusive use

a. Setting item

Activating timing: Turn the power off, then on again.

Setting range: 0 to 1

Initial value: 0

b. Function

Manufacturer exclusive use parameter. Unless otherwise specified by the manufacturer, set the initial value.

P072[3rd & 2nd digits]: Manufacturer exclusive use

a. Setting item

Activating timing: Turn the power off, then on again.

Setting range: 0 to 20

Initial value: 0

b. Function

Manufacturer exclusive use parameter. Unless otherwise specified by the manufacturer, set the initial value.

P080: Max torque limit value +

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: 0.0 to 799.9

Initial value: 300.0

b. Function

Set the forward direction motor output torque limit value.

If the setting exceeds the Peak torque of the motor, the output torque is clamped to the Peak torque.

If "0" is set, no forward direction torque is generated.

P081: Max torque limit value -

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: 0.0 to 799.9

Initial value: 300.0

b. Function

Set the reverse direction motor output torque limit value.

For a setting that exceeds the Peak torque of the motor, the output torque is clamped to the Peak torque.

If "0" is set, no reverse direction torque is generated.

P082: Motor max speed special setting

a. Setting item

Activating timing: Power ON

Setting unit: rpm

Setting range: 0.000 to 99999.999

Initial value: 0.000

b. Function

Set the Maximum speed of the motor used.

This setting has priority over [P067].

If "0" is set, the setting of [P067] is effective.

P083 [3rd - 1st digits]: Motor electronic thermal detected actual value

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: 0 to 200

Initial value: 0

b. Function

Set the load factor at which to detect [AL.105: Motor overload error].

The setting is the ratio to the motor rated current value, which is assumed "100%".

If a value greater than the device rated current is set, this setting will be device rated current value.

If "0" is set, the motor electronic thermal detected actual value (appropriate value when an ordinary motor is used) of [P030 (3rd - 1st digits)] is automatically set.

Usually, set the initial value.

[Electronic thermal settings]

For electric thermal, the parameters to be effective differ depending on the setting value of [P083(3rd - 1st digits): Motor electronic thermal detection actual value]. If [P083(3rd - 1st digits)] is "0", the electronic thermal settings of [P030] and [P031] are effective. If [P083(3rd - 1st digits)] is other than "0", the electronic thermal settings of [P083] and [P084] are effective.

Parameter name	Setting of the 3rd to 1st digits of P083	
	If "0"	If other than "0"
Motor electronic thermal detection actual value	3rd - 1st digits of P030	3rd - 1st digits of P083
Motor electronic thermal detection time	7th - 4th digits of P030	7th - 4th digits of P083
Motor 1 phase concentration electronic thermal detection ratio	3rd - 1st digits of P031	3rd - 1st digits of P084
Motor 1 phase concentration electronic thermal detection motion range	5th & 4th digits of P031	5th & 4th digits of P084
Motor 1 phase concentration electronic thermal detection low speed range	7th & 6th digits of P031	7th & 6th digits of P084

P083 [7th - 4th digits]: Motor electronic thermal time constant

a. Setting item

Activating timing: Real-time

Setting unit: s

Setting range: 0 to 9999

Initial value: 0

b. Function

Set the motor thermal time constant.

If [P083 (3rd - 1st digits)] is "0", this function is ineffective.

P084[3rd - 1st digits]: Motor 1 phase concentration electronic thermal detection ratio

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: 0 to 200

Initial value: 0

b. Function

Set the load factor at which to detect [AL.105: Motor overload error] during motor 1 phase concentration.

When the motor goes below the detection operation range or the detection low speed range, the detection ratio switches from [P083 (3rd - 1st digits)] to this setting.

If "0" is set, the detection ratio is "1".

If [P083 (3rd - 1st digits)] is "0", this function is ineffective.

P084[5th & 4th digits]: Motor 1 phase concentration electronic thermal detection motion range

a. Setting item

Activating timing: Real-time

Setting unit: rev

Setting range: 0.0 to 9.9

Initial value: 0.0

b. Function

Set the operation range in which to detect motor 1 phase concentration.

This setting is the value assumed if the one turn of the electric angle is assumed to be "1.0rev".

If "0" is set, detection is not performed.

If [P083 (3rd - 1st digits)] is "0", this function is ineffective.

P084[7th & 6th digits]: Motor 1 phase concentration electronic thermal detection low speed

a. Setting item

Activating timing: Real-time

Setting unit: rps

Setting range: 0.0 to 9.9

Initial value: 0.0

b. Function

Set the speed at which to defect a low speed state.

This setting is the value assumed if the one turn of the electric angle is assumed to be "1.0 rps".

If "0" is set, detection is not performed.

If [P083 (3rd - 1st digits)] is "0", this function is ineffective.

P085 [3rd - 1st digits]: Regenerative resistor

a. Setting item

Activating timing: Real-time

Setting unit: Ω

Setting range: 0 to 999

Initial value: 0

b. Function

Set the regenerative resistor value if a regenerative resistor is connected.

P085[9th - 4th digits]: Regenerative resistor capacity

a. Setting item

Activating timing: Real-time

Setting unit: kW

Setting range: 0.000 to 999.999

Initial value: 0.000

b. Function

Set the regenerative resistor capacity if a regenerative resistor is connected.

P086 [3rd - 1st digits]: Regenerative resistor overload detection ratio

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: 0 to 100

Initial value: 15

b. Function

Set the overload detection ratio if a regenerative resistor is connected.

Usually, set the initial value.

P086 [7th - 4th digits]: Regenerative resistor load time constant

a. Setting item

Activating timing: Real-time

Setting unit: s

Setting range: 0 to 9999

Initial value: 300

b. Function

Set the load time constant if a regenerative resistor is connected.

Usually, set the initial value.

P087: Magnetic pole position offset special setting

a. Setting item

Activating timing: Power ON

Setting unit: FB pulse

Setting range: 0 to 999999999

Initial value: 0

b. Function

Set the following magnetic position offsets.

- BiSS encoder
- 2-phase magnetic sensor
- 3-phase magnetic sensor

When using a BiSS encoder, make the setting with one of [d020: Auto magnetic pole detection magnetic offset setting], [d021: DC energization magnetic offset setting], and [d022: On-the-spot magnetic offset setting] in the self-diagnosis mode.

If "0" is set, the setting of [P069] is effective.

c. Reference

For details of self-diagnosis, refer to "Chapter 11 Self-diagnosis".

P088[1st digit]: ABS encoder data use range selection

a. Setting item

Activating timing: Power ON

Setting range: 0 to 1

Initial value: 0

b. Function

Set the ABS encoder data use range.

This function is effective only when a BiSS encoder is used.

c. Setting selection

0: 0 to 2147483647

1: -2147483648 to 2147483647

P088[2nd digit]: ABS encoder overflow error detection selection

a. Setting item
Activating timing: Power ON
Setting range: 0 to 1
Initial value: 0

b. Function
Select the error detection motion when the ABS encoder overflows.

c. Setting selection
0: Detection
1: No detection

P089 [2nd & 1st digits]: 1 rotation position detection speed error detection speed special setting

a. Setting item
Activating timing: Power ON
Setting unit: rpm
Setting range: 0 to 99
Initial value: 0

b. Function
Set the speed at which a 1 rotation position detection speed error occurs.
This parameter is effective to encoder types S-ABS2, S-ABS3, and S-ABS4.
This setting has priority over [P071].
If "0" is set, the setting of [P071] is effective.

P089[3rd digit]: Feedback smooth special setting

a. Setting item
Activating timing: Power ON
Setting range: 0 to 5
Initial value: 0

b. Function
Set the smoothing degree of the encoder feedback.
This parameter is effective to encoder types S-ABS2, S-ABS3, and S-ABS4.
The larger the setting, the larger the smoothing degree.
This setting has priority over [P071].
If "0" is set, the setting of [P071] is effective.

P090[1st digit]: Manufacturer exclusive use

a. Setting item
Activating timing: Turn the power off, then on again.
Setting range: 0 to 9
Initial value: 0

b. Function
Manufacturer exclusive use parameter. Unless otherwise specified by the manufacturer, set the initial value.

P091[2nd & 1st digits]: Encoder Power supply OFF retention extension time

a. Setting item

Activating timing: Turn the power off, then on again.

Setting unit: s

Setting range: 0 to 99

Initial value: 0

b. Function

Set the time for which to retain the OFF state of the encoder power supply, in addition to the normal encoder power supply OFF retention time, at restart with a software reset.

9-4-2 Device- and machine specification-related parameters (group 1)

P100: Carrier frequency setting

a. Setting item

Activating timing: Power ON

Setting unit: kHz

Setting range: 0 to 20

Initial value: 0

b. Function

Select the PWM carrier frequency.

To use this parameter in the communication mode, set "0".

If a value other than "0" is set, communication may not be connectable.

If a carrier frequency not supported by the device is set, [AL.208: Carrier frequency setting error] occurs.

c. Setting selection

0: Device standard frequency

P103 [1st digit]: Dynamic brake spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Select the dynamic brake specification.

c. Setting selection

0: INVALID (not connected)
Dynamic brake operation is not performed.

1: DMB ON (dynamic brake operation)
Normal dynamic brake operation is performed.

2: DMB OFF (operation with the SON signal disabled)
DMB operation by turning off the external input SON signal is not performed.
If SON is off due to an alarm and so on, operation is performed.

P103[3rd & 2nd digits]: Servo On delay time after dynamic brake is off

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0 to 10

Initial value: 10

b. Function

Set the time after which to enable servo on again after the status of motor operation stop with the dynamic brake is confirmed.

P104: Absolute position compensation action entry

a. Setting item

Activating timing: Power ON

Setting range: 0 to 3

Initial value: 0

b. Function

Specify the operation of the absolute position compensation function.

c. Setting selection

0: Absolute position compensation function ineffective

1: Standard absolute position compensation effective

2: Absolute position compensation after homing

3: With the start of standard absolute position compensation, resetting (present position acquisition) is implemented per marker.

P120: Servo control error detection dead band torque

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: -799 to 799

Initial value: 0

b. Function

Set the dead band torque value for relaxing the detection of [AL.110: Servo control error].

If the error is detected despite normal operation, make a setting so that the value of [C017: Peak servo control error ratio] is around 50.0%.

If a negative value is set, the value is displayed as [C017: Peak servo control error ratio], but the error is not detected.

P121[1st digit]: Main power OFF error detection spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 1

Initial value: 0

b. Function

Select the operation to perform when a main power OFF error is detected.

c. Setting selection

0: Servo OFF after braking stop

1: Servo OFF (if there is a dynamic brake, stop with the dynamic brake)

P121[4th - 2nd digits]: Main power OFF error detection time

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0 to 999

Initial value: 50

b. Function

If the main power OFF status continues for the time that is set, error detection is performed.

If "0" is set, error detection is ineffective.

P122[2nd & 1st digits]: Main power supply voltage drop detection value

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: 0 to 99

Initial value: 0

b. Function

Set the voltage value at which a main power supply drop is detected.

The setting is the ratio to the device main power supply standard voltage, which is assumed "100%".

c. Reference

For details, refer to "6-5 Motor overheat detection function".

P122[6th - 3rd digits]: Reserved

a. Setting item

b. Function

Reserved area. Set the initial value.

P122[9th - 7th digits]: Main power supply torque drop limit Fluctuation changing time

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0 to 999

Initial value: 50

b. Function

Set the torque limit changing ratio at the occurrence of a main power supply drop and at recovery.

This setting is the time required to reach the rated torque from the torque of zero.

c. Reference

For details, refer to "6-11 Torque limit function when the power supply voltage drops (compatible with the SEMI F47 standard)".

P123[6th - 1st digits]: Reserved

a. Setting item

b. Function

Reserved area. Set the initial value.

P123[9th - 7th digits]: Main power supply drop torque limit value

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: 0 to 300

Initial value: 100

b. Function

Set the main power supply drop torque limit value.

The setting is the ratio to the rated torque, which is assumed "100%".

c. Reference

For details, refer to "6-11 Torque limit function when the power supply voltage drops (compatible with the SEMI F47 standard)".

P124[1st digit]: Main power supply undervoltage error spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 2

b. Function

Select the error detection specification at a main power supply undervoltage.

c. Setting selection

0: Abnormal detection invalid (constant warning detection)

1: Anomaly detection among the servo ON 1

If a main power supply undervoltage status occurs when the servo is ON, this results in a main power supply undervoltage error.

If a main power supply undervoltage status occurs when the servo is OFF, this results in a main power supply undervoltage detection warning.

[P124 (5th - 2nd digits)] is effective.

2: Anomaly detection among the servo ON 2

If a main power supply undervoltage status occurs when the servo is ON, this results in a main power supply undervoltage error.

If a main power supply undervoltage status occurs when the servo is OFF, neither error nor warning occurs.

[P124 (5th - 2nd digits)] is effective.

P124[5th - 2nd digits]: Detection allowed time for main power supply undervoltage error

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0 to 9999

Initial value: 0

b. Function

Set the detection allowed time when a main power supply undervoltage error occurs.

When a main power supply undervoltage error occurs at servo ON, the error is not detected within the time set for this parameter.

In the main power supply undervoltage state, the motor enters the un-electrified status and the MTON signal is OFF.

This setting is effective when [P124 (1st digit)] is either "1: Anomaly detection among the servo ON 1" or "2: Anomaly detection among the servo ON 2".

If "0" is set, the following applies.

- [P124 (1st digit)] is "Anomaly detection among the servo ON 1" → Main power supply undervoltage detection warning
- [P124 (1st digit)] is "Anomaly detection among the servo ON 2 " → No error or warning occurs.

P126[1st digit]: Overload abnormal motion selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 1

Initial value: 0

b. Function

Select the motor operation to perform when an overload error and a motor overheat error are detected.

c. Setting selection

0: Servo OFF after braking stop

1: Servo OFF (if there is a dynamic brake, stop with the dynamic brake)

P126[4th - 2nd digits]: Overload abnormal deceleration torque limit value

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: 0 to 799

Initial value: 0

b. Function

Set the torque limit value after an overload error is detected.

If "0" is set, the torque limit value is "35%".

When an overload error occurs, the torque is also limited with the thermal detected/ detection actual value [%] of [P030] and [P083].

P127[1st digit]: Over speed error spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 1

Initial value: 0

b. Function

Select the specification when an over speed error is detected.

c. Setting selection

0: Re-magnetic pole detection invalid after release
Zero point return complete signal (HCP) condition not changed

1: Re-magnetic pole detection valid after release
Zero point return complete signal (HCP) OFF

P127[4th - 2nd digits]: Over speed error detection speed

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: 0 to 200

Initial value: 0

b. Function

Set the speed at which to detect an over speed error.

The setting is the ratio to the motor maximum speed, which is assumed "100%".

If "0" is set, the speed is "130%".

P129[1st digit]: Motor overheat detection spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 1

Initial value: 0

b. Function

Select the detection specification of [AL.116: Motor overheat error] and [FL.907: Motor overheat warning].

c. Setting selection

0: Warning

1: No warning

2: Warning only

P129[4th - 2nd digits]: Motor overheat detection time

a. Setting item

Activating timing: Real-time

Setting unit: s

Setting range: 0 to 999

Initial value: 0

b. Function

Set the time at which to detect [AL.116: Motor overheat error].

After the elapse of this setting from the time the MTOH signal turns ON, [AL.116: Motor overheat error] occurs.

P140[2nd & 1st digits]: Pulse output selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 7

Initial value: 0

b. Function

Select a pulse output method.

c. Setting selection

0: Thru 1/1 dividing output

1: Thru 1/2 dividing output

2: Thru 1/4 dividing output

3: Thru 1/8 dividing output

4: Thru 1/16 dividing output

5: Thru 1/32 dividing output

6: P141/P142 dividing output

Output the motor operation amount.

If absolute position compensation is effective, the absolute position compensation value is also included.

7: P141/P142 dividing output After ABS pos comp. pulse output

When absolute position compensation is effective, the value equal to the motor operation amount minus the absolute position compensation value is output.

d. Reference

For details, refer to the "Circuit No. O-2: EA, EA*, EB, and EB* encoder pulse outputs" section in "3-2 Input/output interface".

P140[3rd digit]: Marker output width

a. Setting item

Activating timing: Real-time

Setting range: 0 to 5

Initial value: 0

b. Function

Select the marker output width.

c. Setting selection

The width is as given below, depending on [P060] encoder type.

Setting	[P060] marker input	[P060] serial
0	Through output	50 µs
1	50 µs	50 µs
2	100 µs	100 µs
3	500 µs	500 µs
4	1 ms	1 ms
5	2 ms	2 ms

P140[4th digit]: Magnetic pole sensor signal pulse output selection

a. Setting item

Activating timing: Power ON

Setting range: 0 to 1

Initial value: 0

b. Function

Select the pulse output setting of the magnetic pole sensor signal.

Ineffective when a pulse encoder is used and 2 phase/3 phase is selected for the magnetic pole sensor type.

c. Setting selection

0: Ineffective

1: Effective

P141: Pulse output dividing numerator

a. Setting item

Activating timing: Real-time

Setting range: -99999999 to 99999999

Initial value: 1

b. Function

Set the numerator value of the pulse output frequency division.

This setting is effective if "P141/P142 dividing output" is selected with [P140 (2nd & 1st digit)]. If a negative value is set, the encoder feedback output is reversed.

P142: Pulse output dividing denominator

a. Setting item

Activating timing: Real-time

Setting range: 1 to 99999999

Initial value: 1

b. Function

Set the denominator value of the pulse output frequency division.

P143: Marker output position

a. Setting item

Activating timing: Real-time

Setting unit: FB position

Setting range: -2147483648 to 2147483647

Initial value: 0

b. Function

Set the encoder marker output position. (Effective only for the ABS encoder.)

The setting range of the 1-rotation ABS encoder is 0 to (1-rotation resolution of the encoder - 1).

The marker output occurs when [C024: Encoder position] matches this setting.

To perform zero point return with a built-in command, set the same value as that of [P168: ABS standard data].

P160[1st digit]: Inertia and viscous friction range selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 6

Initial value: 4

b. Function

Select the minimum setting unit of inertia and viscous friction data.

c. Setting selection

0: 1

1: 0.1

2: 0.01

3: 0.001

4: 0.0001

5: 0.00001

6: 0.000001

P161[1st digit]: Moving direction selection

a. Setting item

Activating timing: Reset or power ON

Setting range: 0 to 1

Initial value: 0

b. Function

Select the operating direction of the motor for commands.

c. Setting selection

0: Forward direction operation

1: Reverse direction operation

P161[2nd digit]: Position unit selection

a. Setting item

Activating timing: Reset or power ON

Setting range: 0 to 7

Initial value: 6

b. Function

Select the basic unit of positioning data and other settings.

All position and speed settings are made in this unit.

This setting is fixed to the initial value.

c. Setting selection

0: Reserved

1: Reserved

2: Reserved

3: Reserved

4: Reserved

5: Reserved

6: pulse

7: Reserved

P161[3rd digit]: Position decimal point unit selection

a. Setting item

Activating timing: Reset or power ON

Setting range: 0 to 7

Initial value: 0

b. Function

Select the minimum setting unit of positioning data.

This setting decides the decimal point position of position data and speed data, which is reflected in the display of the data.

This setting is fixed to the initial value.

c. Setting selection

0: 1

1: Reserved

2: Reserved

3: Reserved

4: Reserved

5: Reserved

6: Reserved

7: Reserved

P162: Electronic gear numerator ratio

a. Setting item

Activating timing: Reset or power ON

Setting range: 1 to 99999999

Initial value: 1

Common parameter: 22h

b. Function

Set the gear ratio between the drive shaft and the motor shaft of the machine system in combination with [P163].

The division ratio is set with the formula below.

Division ratio = [P162]/[P163]

P163: Electronic gear denominator ratio

a. Setting item

Activating timing: Reset or power ON

Setting range: 1 to 99999999

Initial value: 1

Common parameter: 21h

b. Function

Set the gear ratio between the drive shaft and the motor shaft of the mechanical system in combination with [P162].

c. Reference

For a setting example, refer to [P162].

P164: Mechanical movement

a. Setting item

Activating timing: Reset or power ON

Setting unit: P161 setting unit

Setting range: 0 to 2147483647

Initial value: 0

b. Function

Set the load travel volume per rotation of the drive shaft (load shaft) of the machine system.

P165: Rotation position range

a. Setting item

Activating timing: Reset or power ON

Setting unit: P161 setting unit

Setting range: -2147483648 to 2147483647

Initial value: 0

b. Function

Set the one rotation data range to the rotating machine.

With this, the absolute position (ABS) data range is the range from 0 to ([this setting] -1).

If "0" is set, the index positioning command (INDX) cannot be used.

If "0" is set and an attempt is made to execute the INDX command, an error will occur.

If the HOME command (except with SET ABS and OUT POS) is executed under either of the following conditions, this function is disabled.

- The ABS encoder is connected.
- The setting of [P170] is "0: Reflected".

P166: Rotation position range sign switching position

a. Setting item

Activating timing: Reset or power ON

Setting unit: P161 setting unit

Setting range: -2147483648 to 2147483647

Initial value: 0

b. Function

Set the sign switching position within motor 1 rotation range.

With any of the following settings or operations, this function is disabled.

- This setting is "0".
- A value equal to or greater than the [P165] setting is set.
- The rotation position range is ineffective.

* If using the INDX command, set "0".

P167[5th - 1st digits]: ABS multi turn limit

a. Setting item

Activating timing: Real-time

Setting unit: Rotation speed

Setting range: 0 to 32767

Initial value: 0

Common parameter: 24h

b. Function

At present, this function is disabled. Set the initial value.

P168: ABS standard data

a. Setting item

Activating timing: Command execution or power re-input

Setting unit: FB pulse

Setting range: -2147483648 to 2147483647

Initial value: 0

Common parameter: 23h

b. Function

Set the ABS data at the machine standard position. (Effective only for the ABS encoder.)

This is effective if "0" is set in [P170].

P169: ABS standard mechanical position

a. Setting item

Activating timing: Command execution or power re-input

Setting unit: P161 setting unit

Setting range: -2147483648 to 2147483647

Initial value: 0

b. Function

Set the machine position for the machine standard position. (Effective only for the ABS encoder.)

This is effective if "0" is set in [P170].

P170[1st digit]: Present position reflection selection after main power of ABS is ON

a. Setting item

Activating timing: Power ON

Setting range: 0 to 1

Initial value: 0

b. Function

Select the specification of the present position at power ON. (Effective only for the ABS encoder.)

c. Setting selection

0: Reflected

Set the present position based on the ABS encoder position at power ON.

1: No reflection

The present position at power ON is "0". Execute the HOME command to match the machine zero point.

P171: Forward direction software OT limit

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit

Setting range: -2147483648 to 2147483647

Initial value: 0

Common parameter: 26h

b. Function

Set the forward direction travel limit as the distance from [P585].

This is always effective after the power supply is turned on and homing is completed.

If "0" is set as [P170] for the ABS encoder, this takes effect as soon as the power supply is turned on.

If "0" is set, OT limit detection is not performed.

⚠Caution

After turning on the power supply, be sure to perform homing. (The ABS encoder is excluded.)

[P585] is set upon completion of homing, so before the completion of homing, soft OT limit detection is not performed.

The soft OT limit is detected with the command position, so if the delay deviation is large, a stop may occur before the soft OT limit position.

P172: Reverse direction software OT limit

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit

Setting range: -2147483648 to 2147483647

Initial value: 0

Common parameter: 28h

b. Function

Set the reverse direction travel limit as the distance from [P585].

This is always effective after the power supply is turned on and homing is completed.

If "0" is set as [P170] for the ABS encoder, this takes effect as soon as the power supply is turned on.

If "0" is set, OT limit detection is not performed.

⚠Caution

After turning on the power supply, be sure to perform homing. (The ABS encoder is excluded.)

[P585] is set upon completion of homing, so before the completion of homing, soft OT limit detection is not performed.

The soft OT limit is detected with the command position, so if the delay deviation is large, a stop may occur before the soft OT limit position.

P173: Max travel amount for forward direction positioning

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit

Setting range: 0 to 2147483647

Initial value: 0

b. Function

Set the maximum forward direction positioning quantity as an incremental quantity.

(The decimal point position depends on [P161 (3rd digit)].)

If the positioning quantity of the executed command is larger than this setting, the command is terminated with an alarm.

If "0" is set, the forward direction positioning quantity is not checked.

P174: Max travel amount for reverse direction positioning

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit

Setting range: -2147483648 to 0

Initial value: 0

b. Function

Set the maximum reverse direction positioning quantity as an incremental quantity.

(The decimal point position depends on [P161 (3rd digit)].)

If the positioning quantity of the executed command is larger than this setting, the command is terminated with an alarm.

If "0" is set, the reverse direction positioning quantity is not checked.

P175: Position deviation exorbitance detection pulse at Servo OFF → Servo ON

a. Setting item

Activating timing: Real-time

Setting unit: FB pulse

Setting range: 0 to 999999999

Initial value: 1000

b. Function

If the position deviation at a change from servo OFF to servo ON is equal to or greater than this setting, [AL.422: Position deviation excess 3] is detected.

If deviation clear is made ineffective with [P631], the position deviation is accumulated during servo OFF, so that if the position deviation at the time the servo is turned ON exceeds this setting, error detection is performed.

P176: Position deviation exorbitance detection pulse Max value

a. Setting item

Activating timing: Real-time

Setting unit: FB pulse

Setting range: 0 to 999999999

Initial value: 1000000

b. Function

Set the maximum value at which to perform error detection.

If the deviation pulse is equal to or greater than this setting, [AL.420: Position deviation excess 1] is detected

P177: Position deviation exorbitance detection pulse Min value

a. Setting item

Activating timing: Real-time

Setting unit: FB pulse

Setting range: 0 to 999999999

Initial value: 300000

b. Function

Set the minimum value at which to perform error detection.

If the deviation pulse is equal to or less than this setting, error detection is not performed.

This setting is effective when [P178] is effective.

P178: Position deviation exorbitance detection ratio

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: 0 to 999

Initial value: 150

b. Function

Set the detection ratio, with the theoretical deviation value when the motor tracks the speed (referred to simply as the "theoretical deviation value") being assumed "100%".

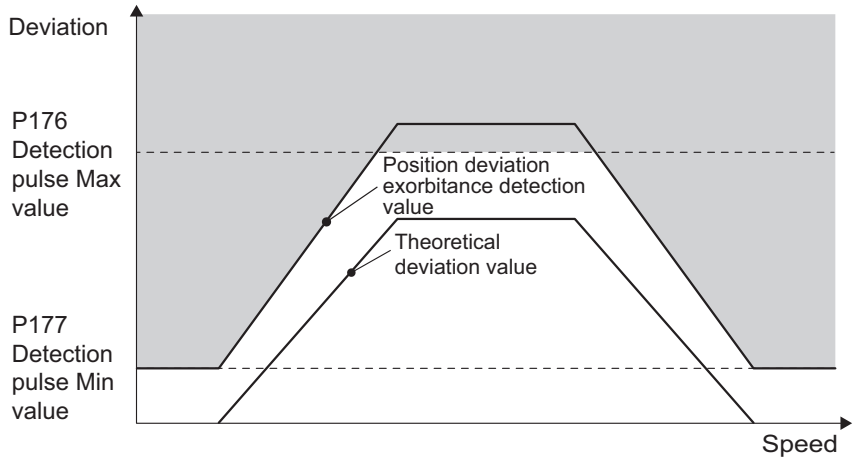
If the position deviation pulse exceeds the detection ratio, [AL.421: Position deviation excess 2] is detected

If "0" is set, error detection is ineffective.

[Position deviation pulse detection relation]

Set the deviation allowance for the theoretical deviation value, using [P178: Position deviation exorbitance detection ratio].

Position deviation exorbitance detection value = Theoretical deviation value x P178 + P177



P179: S-curve time 2

a. Setting item

Activating timing: Reset or power ON

Setting unit: ms

Setting range: 0 to 1000.0

Initial value: 3.0

b. Function

Set the acceleration/deceleration curve of the motor in each operation of the command/jog, with time if the curve is assumed to be an "S-curve".

For [P522, P529, P536, P543, P550, P557, P564, P571], an S-curve is further applied to S-curve time 1 to which an S-curve has been applied.

If "0" is set, this function is ineffective.

9-4-3 Servo adjustment-related parameters (groups 2 and 3)

P200[3rd - 1st digits]: Speed detection filter time constant for gain switching

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0.0 to 99.9

Initial value: 0.0

b. Function

Set the time constant for the speed for gain switching.

P200[6th - 4th digits]: Position deviation detection filter time constant for gain switching

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0.0 to 99.9

Initial value: 0.0

b. Function

Set the time constant for the position deviation for gain switching.

P210: Gain No. 0 Low speed gain switching speed

a. Setting item

Activating timing: Real-time

Setting unit: rpm

Setting range: 0.000 to 99999.999

Initial value: 1.000

b. Function

Set the speed at which to switch between the normal speed gain and the low speed gain.

When the operation speed is equal to or less than this speed, the gain is switched to the low speed gain.

If "0" is set, switching to the low speed gain is ineffective.

P211: Gain No. 0 Low speed gain switching deviation pulse

a. Setting item

Activating timing: Real-time

Setting unit: FB pulse

Setting range: 0 to 99999999

Initial value: 10

b. Function

Set the deviation pulse at which to switch between the normal speed gain and the low speed gain.

When the deviation pulse goes below this deviation range, the gain is switched to the low speed gain.

If "0" is set, switching to the low speed gain is ineffective.

P212[3rd - 1st digits]: Gain No. 0 Normal speed → Low speed gain switching filter time constant

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0.0 to 99.9

Initial value: 5.0

b. Function

Set the time constant when the gain is switched from the normal speed gain to the low speed gain.

- This setting is effective to the following parameters.
  - Speed loop proportional gain
  - Speed loop integral time constant
  - Speed loop derivative time constant
  - Speed loop proportional gain distribution factor
  - Speed loop derivative gain distribution factor
  - Position loop gain
  - Position loop derivative time constant
- For parameters other than the above, switching is performed without a filter time constant.
- For gain switching between gain numbers, switching is performed under the conditions of the selected gain number.

P212[6th - 4th digits]: Gain No. 0 Low speed → Normal speed gain switching filter time constant

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0.0 to 99.9

Initial value: 0.0

b. Function

Set the time constant when the gain is switched from the low speed gain to the normal speed gain.

- This setting is effective to the following parameters.
  - Speed loop proportional gain
  - Speed loop integral time constant
  - Speed loop derivative time constant
  - Speed loop proportional gain distribution factor
  - Speed loop derivative gain distribution factor
  - Position loop gain
  - Position loop derivative time constant
- For parameters other than the above, switching is performed without a filter time constant.
- For gain switching between gain numbers, switching is performed under the conditions of the selected gain number.

P212[7th digit]: Gain No. 0 Low speed gain switching spec 1 selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the low speed gain switching specification.

c. Setting selection

0: Speed and deviation pulse interlocking
The speed loop gain and the position loop gain are switched when both the switching speed range and the switching deviation range match.

1: Speed and deviation pulse separate 1
For the speed loop, the gain is switched when the switching speed range matches.
For the position loop, the gain is switched when the switching deviation range matches.

2: Speed and deviation pulse separate 2
For the position loop, the gain is switched when the switching deviation range matches.
For the speed loop, the gain is switched when the position loop is in a low speed gain status and the switching speed range matches.

P212[8th digit]: Gain No. 0 Low speed gain switching spec 2 selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 1

Initial value: 0

b. Function

Set the low speed gain switching specification.

c. Setting selection

0: During command input, low speed gain switching is ineffective.
In position command mode, switching during the position command is ineffective.
In speed command mode, switching during the speed command is ineffective.

1: Low speed gain switching is effective regardless of command input.

P213[4th - 1st digits]: Gain No. 0 Low speed gain switching delay time

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0.0 to 999.9

Initial value: 10.0

b. Function

Set the delay time when the gain switches from the normal speed gain to the low speed gain.

The gain switches to the low speed gain after the elapse of this time after the low speed gain switching condition is met.

P213[9th - 5th digits]: Gain No. 0 Low speed gain holding time after switching

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0.0 to 9999.9

Initial value: 0.0

b. Function

Within this time after switching to the low speed gain, the low speed gain status is held even if the normal speed gain switching condition is met.

If, however, "0" is set in [P212: Low speed gain switching spec 2 selection], and command input is performed, the normal speed gain is assumed by canceling the low speed gain holding time after switching.

P214: Gain No. 0 Speed loop proportional gain

a. Setting item

Activating timing: Real-time

Setting range: 0 to 99999

Initial value: 25

b. Function

Set the speed loop gain.

The larger the setting, the faster the response, but vibration is likely to occur.

If "0" is set, the motor is in the torque 0 status.

P215: Gain No. 0 Speed loop integral time constant

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0.0 to 9999.9

Initial value: 20.0

b. Function

Set the time constant of speed loop integral compensation.

The smaller the setting, the faster the response, but if it is too small, vibration will occur.

If "0" is set, integral compensation is ineffective.

P216: Gain No. 0 Speed loop derivative time constant

a. Setting item

Activating timing: Real-time

Setting unit: μs

Setting range: -999 to 999

Initial value: 0

b. Function

Set the time constant of speed loop derivative compensation.

The larger the setting, the faster the response, but vibration is likely to occur.

If "0" is set, derivative compensation is not performed.

If a negative value is set, the time constant will be a first-order delay time constant.

P217: Gain No. 0 Speed loop proportional gain distribution factor

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: -100.0 to 100.0

Initial value: 0.0

b. Function

Set the proportional compensation gain distribution factor of the two-degree-of-freedom PID speed control system.

The larger the setting, the faster the decrease in position deviation upon completion of positioning.

If it is too large, it will cause over-shoot.

P218: Gain No. 0 Speed loop derivative gain distribution factor

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: -100.0 to 100.0

Initial value: 0.0

b. Function

Set the derivative compensation gain distribution factor of the two-degree-of-freedom PID speed control system.

This is effective if a positive value is set in [P216: Speed loop derivative time constant]. The smaller the setting, the faster the decrease in position deviation upon completion of positioning.

If it is too small, it will cause over-shoot.

P219: Gain No. 0 Low speed loop proportional gain

a. Setting item

Activating timing: Real-time

Setting range: 0 to 99999

Initial value: 25

b. Function

Set the speed loop gain in the low speed gain range.

The larger the setting, the faster the response, but vibration is likely to occur.

If "0" is set, the motor is in the torque 0 status.

P220: Gain No. 0 Low speed loop integral time constant

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0.0 to 9999.9

Initial value: 20.0

b. Function

Set the time constant of speed loop integral compensation in the low speed gain range.

The smaller the setting, the faster the response, but if it is too small, vibration will occur.

If "0" is set, integral compensation is ineffective.

P221: Gain No. 0 Low speed loop derivative time constant

a. Setting item

Activating timing: Real-time

Setting unit: μs

Setting range: -999 to 999

Initial value: 0

b. Function

Set the time constant of speed loop derivative compensation in the low speed gain range.

The larger the setting, the faster the response, but vibration is likely to occur.

If "0" is set, derivative compensation is not performed.

If a negative value is set, the time constant will be a first-order delay time constant.

P222: Gain No. 0 Low speed loop proportional gain distribution factor

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: -100.0 to 100.0

Initial value: 0.0

b. Function

Set the proportional compensation gain distribution factor o of the two-degree-of freedom PID speed control system in the low speed gain range.

The larger the setting, the faster the decrease in position deviation upon completion of positioning.

If it is too large, it will cause over-shoot.

P223: Gain No. 0 Low speed loop derivative gain distribution factor

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: -100.0 to 100.0

Initial value: 0.0

b. Function

Set the derivative compensation gain distribution factor of the two-degree-of freedom PID speed control system in the low speed gain range.

This is effective if a positive value is set in [P221: Low speed loop derivative time constant].

The smaller the setting, the faster the decrease in position deviation upon completion of positioning.

If it is too small, it will cause over-shoot.

P224: Gain No. 0 Speed loop integral torque limit value

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: 0 to 799 (0 means no limit.)

Initial value: 0

b. Function

Set the output torque limit value of speed loop integral compensation.

For a setting that exceeds the Peak torque of the motor, the output torque is clamped to the Peak torque.

If "0" is set, the torque is limited with the torque limit value during operation.

P225: Gain No. 0 Position loop gain

a. Setting item

Activating timing: Real-time

Setting unit: s^{-1}

Setting range: 0.0 to 9999.9

Initial value: 20.0

b. Function

Set the position loop gain.

The larger the setting, the faster the response, but vibration is likely to occur.

If "0" is set, the following applies.

- Position loop control is not performed, but operation is performed with the speed command of [P229 Speed feed forward].
- Position deviation is fixed to "0".

P226: Gain No. 0 Low speed position loop gain

a. Setting item

Activating timing: Real-time

Setting unit: s^{-1}

Setting range: 0.0 to 9999.9

Initial value: 20.0

b. Function

Set the position loop gain in the low speed gain range.

The larger the setting, the faster the response, but vibration is likely to occur.

If "0" is set, normal positioning operation cannot be performed.

P227[4th - 1st digits]: Gain No. 0 Position loop derivative time constant

a. Setting item

Activating timing: Real-time

Setting unit: μs

Setting range: 0 to 9999

Initial value: 0

b. Function

Set the derivative compensation time constant of the position loop.

The larger the setting, the faster the response, but if the setting is too large, vibration is likely to occur.

If "0" is set, derivative compensation is not performed.

P227[8th - 5th digits]: Gain No. 0 Low speed position loop derivative time constant

a. Setting item

Activating timing: Real-time

Setting unit: μs

Setting range: 0 to 9999

Initial value: 0

b. Function

Set the position loop derivative time constant in the low speed gain range.

P228[4th - 1st digits]: Reserved

a. Setting item

b. Function

Reserved area. Set the initial value.

P228[6th & 5th digits]: Gain No. 0 Positioning command delay time

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0.0 to 1.0

Initial value: 0.0

b. Function

Set the delay time after which to output the position command.

P229[4th - 1st digits]: Gain No. 0 Speed feed forward ratio

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: 0.0 to 120.0

Initial value: 80.0

Common parameter: 64h

b. Function

Set the speed feed forward ratio.

The larger the setting, the higher the compliance, but over-shoot is likely to occur.

If this occurs, reduce the setting a little to allow for a slight deviation, thereby stabilizing operation.

If "0" is set, feed forward control is ineffective.

P229[8th - 5th digits]: Gain No. 0 Speed feed forward shift ratio

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: 0.0 to 100.0

Initial value: 0.0

b. Function

Reduce the feed forward speed.

If the sign of the feed forward speed in the formula below changes, the feed forward speed is "0".

Feed forward speed

= Speed based on P229 speed feed forward ratio - (Use maximum speed x Setting [%])

P230: Gain No. 0 Speed feed forward filter time constant

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: -100.0 to 100.0

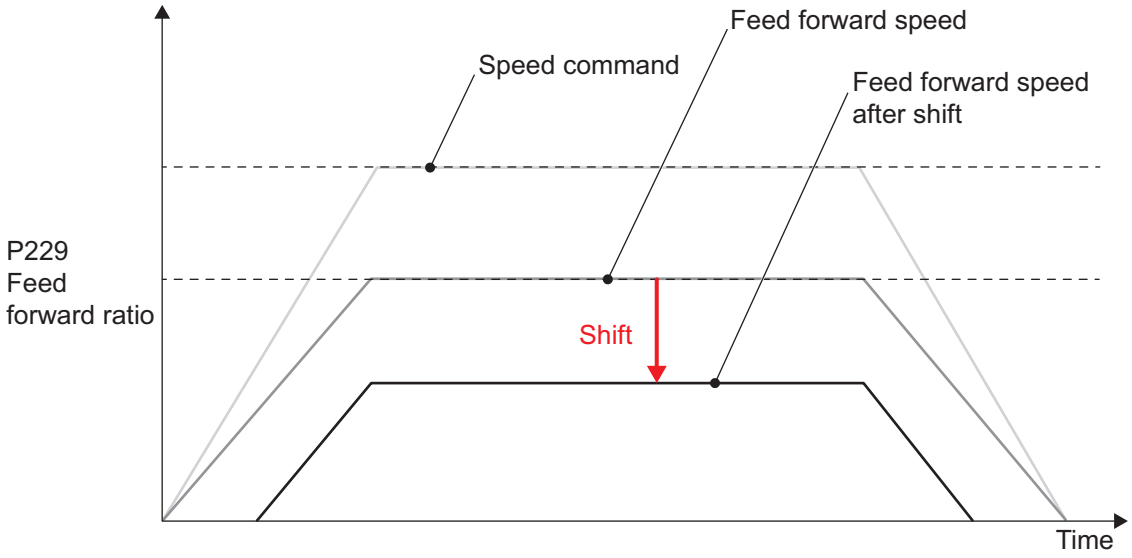
Initial value: 0.2

b. Function

Set the low pass filter time constant for the speed feed forward command.

- Positive value: The larger the setting, the smoother the speed feed forward command, but over-shoot is more likely to occur.
- Negative value: It will be the derivative control time constant for the speed feed forward command.

[Relation between speed feed forward parameters]



P231: Gain No. 0 Inertia

a. Setting item

Activating timing: Real-time

Setting unit: P160 range kgm^2

Setting range: 0 to 999999999

Initial value: 0

b. Function

Set the inertia of the control system.

With [P160: Inertia and viscous friction range selection], a range can be set.

Usually, it is set with auto tuning.

P232: Gain No. 0 Viscous friction

a. Setting item

Activating timing: Real-time

Setting unit: P160 range Nm/(rad/s)

Setting range: 0 to 999999999

Initial value: 0

b. Function

Set the viscous friction of the control system.

With [P160: Inertia and viscous friction range selection], a range can be set.

Usually, it is set with auto tuning.

P233[4th - 1st digits]: Gain No. 0 Inertia feed forward ratio

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: 0.0 to 200.0

Initial value: 0.0

b. Function

Set the feed forward ratio for [P231: Inertia].

If "100%" is set, the compliance increases, but vibration may occur depending on the mismatch with the machine system.

If the load inertia fluctuates, usually set "0".

If the load inertia does not fluctuate, set "100%" after servo adjustment.

If "0" is set, this feed forward control is not performed.

P233[8th - 5th digits]: Gain No. 0 Viscous friction feed forward ratio

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: 0.0 to 200.0

Initial value: 0.0

b. Function

Set the feed forward ratio for [P232: Viscous friction].

If "100%" is set, the compliance increases, but vibration may occur depending on the mismatch with the machine system.

If "0" is set, this feed forward control is not performed.

P234: Gain No. 0 Torque feed forward filter time constant

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: -100.0 to 100.0

Initial value: 0.1

b. Function

Set the low pass filter time constant for the torque feed forward command.

This torque feed forward command is the torque command output for load inertia and load viscous friction. Depending on the sign of the setting, the specification differs.

- Positive value: The larger the setting, the smoother the torque feed forward command, but over-shoot is more likely to occur.
- Negative value: It will be the derivative control time constant for the torque feed forward command.

P235[3rd - 1st digits]: Gain No. 0 Filter derivative coefficient while stopping

a. Setting item

Activating timing: Real-time

Setting range: 0.0 to 99.9

Initial value: 1.0

b. Function

Set the derivative coefficient for vibration while stopping.

Depending on the condition, make an adjustment as described below.

- If the load inertia is large and the friction is large, so the vibration while stopping cannot be suppressed even if the stopped filter time constant is adjusted, the vibration can be suppressed by setting in the range of 1.0 to 20.0.
- If there is hardly any friction and some sound is heard while stopping, decrease the setting.

P235[6th - 4th digits]: Gain No. 0 Filter time constant while stopping

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0.0 to 99.9

Initial value: 0.2

b. Function

Set the filter time constant for vibration while stopping.

Depending on the condition, make an adjustment as described below.

- If the load inertia is large and vibration occurs while stopping, the vibration can be suppressed by setting in the range of 0.3 to 9.0.
- If the load inertia is small and the static friction of the motor is large, set in the range of 0.0 to 0.3.

P236[4th - 1st digits]: Gain No. 0 Notch filter center frequency

a. Setting item

Activating timing: Real-time

Setting unit: Hz

Setting range: 0 to 9999

Initial value: 0

b. Function

Set the center frequency of the notch filter.

If resonance occurs depending on the combination with the machine system, set the resonance frequency, thereby preventing the resonance. Set the notch filter with a combination of notch filter center frequency, notch filter band width, and notch filter depth.

If "0" is set, the filter is ineffective.

P236[7th - 5th digits]: Gain No. 0 Notch filter band width ratio

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: 0 to 200

Initial value: 0

b. Function

Set the band width of notch filter.

Set it with a ratio to the notch filter center frequency.

If "0" is set, the filter is ineffective.

Example) Center frequency x This setting = Band width

1000 Hz×20%(0.20) ＝ 200 Hz

P236[9th & 8th digits]: Gain No. 0 Notch filter depth

a. Setting item

Activating timing: Real-time

Setting unit: -dB

Setting range: 0 to 99

Initial value: 0

b. Function

Set the depth of the notch filter.

If "0" is set, the notch depth is "- ∞ ".

Usually, set the initial value.

The maximum depth is limited by the operation accuracy of the device.

P240: Gain No. 1 Low speed gain switching speed

a. Setting item

Activating timing: Real-time

Setting unit: rpm

Setting range: 0.000 to 99999.999

Initial value: 1.000

b. Function

Set the speed at which to switch between the normal speed gain and the low speed gain.

When the operation speed is equal to or less than this speed, the gain is switched to the low speed gain.

If "0" is set, switching to the low speed gain is ineffective.

P241: Gain No. 1 Low speed gain switching deviation pulse

a. Setting item

Activating timing: Real-time

Setting unit: FB pulse

Setting range: 0 to 99999999

Initial value: 10

b. Function

Set the deviation pulse at which to switch between the normal speed gain and the low speed gain.

When the deviation pulse goes below this deviation range, the gain is switched to the low speed gain.

If "0" is set, switching to the low speed gain is ineffective.

P242[3rd - 1st digits]: Gain No. 1 Normal speed → Low speed gain switching filter time constant

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0.0 to 99.9

Initial value: 5.0

b. Function

Set the time constant when the gain is switched from the normal speed gain to the low speed gain.

- This setting is effective to the following parameters.
  - Speed loop proportional gain
  - Speed loop integral time constant
  - Speed loop derivative time constant
  - Speed loop proportional gain distribution factor
  - Speed loop derivative gain distribution factor
  - Position loop gain
  - Position loop derivative time constant
- For parameters other than the above, switching is performed without a filter time constant.
- For gain switching between gain numbers, switching is performed under the conditions of the selected gain number.

P242[6th - 4th digits]: Gain No. 1 Low speed → Normal speed gain switching filter time constant

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0.0 to 99.9

Initial value: 0.0

b. Function

Set the time constant when the gain is switched from the low speed gain to the normal speed gain.

- This setting is effective to the following parameters.
  - Speed loop proportional gain
  - Speed loop integral time constant
  - Speed loop derivative time constant
  - Speed loop proportional gain distribution factor
  - Speed loop derivative gain distribution factor
  - Position loop gain
  - Position loop derivative time constant
- For parameters other than the above, switching is performed without a filter time constant.
- For gain switching between gain numbers, switching is performed under the conditions of the selected gain number.

P242[7th digit]: Gain No. 1 Low speed gain switching spec 1 selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the low speed gain switching specification.

c. Setting selection

0: Speed and deviation pulse interlocking
The speed loop gain and the position loop gain are switched when both the switching speed range and the switching deviation range match.

1: Speed and deviation pulse separate 1
For the speed loop, the gain is switched when the switching speed range matches.
For the position loop, the gain is switched when the switching deviation range matches.

2: Speed and deviation pulse separate 2
For the position loop, the gain is switched when the switching deviation range matches.
For the speed loop, the gain is switched when the position loop is in a low speed gain status and the switching speed range matches.

P242[8th digit]: Gain No. 1 Low speed gain switching spec 2 selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 1

Initial value: 0

b. Function

Set the low speed gain switching specification.

c. Setting selection

0: During command input, low speed gain switching is ineffective.
In position command mode, switching during the position command is ineffective.
In speed command mode, switching during the speed command is ineffective.

1: Low speed gain switching is effective regardless of command input.

P243[4th - 1st digits]: Gain No. 1 Low speed gain switching delay time

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0.0 to 999.9

Initial value: 10.0

b. Function

Set the delay time when the gain switches from the normal speed gain to the low speed gain.

The gain switches to the low speed gain after the elapse of this time after the low speed gain switching condition is met.

P243[9th - 5 digits]: Gain No. 1 Low speed gain holding time after switching

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0.0 to 9999.9

Initial value: 0.0

b. Function

Within this time after switching to the low speed gain, the low speed gain status is held even if the normal speed gain switching condition is met.

If, however, "0" is set in [P242: Low speed gain switching spec 2 selection], and command input is performed, the normal speed gain is assumed by canceling the low speed gain holding time after switching.

P244: Gain No. 1 Speed loop proportional gain

a. Setting item

Activating timing: Real-time

Setting range: 0 to 99999

Initial value: 25

b. Function

Set the speed loop gain.

The larger the setting, the faster the response, but vibration is likely to occur.

If "0" is set, the motor is in the torque 0 status.

P245: Gain No. 1 Speed loop integral time constant

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0.0 to 9999.9

Initial value: 20.0

b. Function

Set the time constant of speed loop integral compensation.

The smaller the setting, the faster the response, but if it is too small, vibration will occur.

If "0" is set, integral compensation is ineffective.

P246: Gain No. 1 Speed loop derivative time constant

a. Setting item

Activating timing: Real-time

Setting unit: μs

Setting range: -999 to 999

Initial value: 0

b. Function

Set the time constant of speed loop derivative compensation.

The larger the setting, the faster the response, but vibration is likely to occur.

If "0" is set, derivative compensation is not performed.

If a negative value is set, the time constant will be a first-order delay time constant.

P247: Gain No. 1 Speed loop proportional gain distribution factor

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: -100.0 to 100.0

Initial value: 0.0

b. Function

Set the proportional compensation gain distribution factor of the two-degree-of-freedom PID speed control system.

The larger the setting, the faster the decrease in position deviation upon completion of positioning.

If it is too large, it will cause over-shoot.

P248: Gain No. 1 Speed loop derivative gain distribution factor

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: -100.0 to 100.0

Initial value: 0.0

b. Function

Set the derivative compensation gain distribution factor of the two-degree-of-freedom PID speed control system.

This is effective if a positive value is set in [P246: Speed loop derivative time constant]. The smaller the setting, the faster the decrease in position deviation upon completion of positioning.

If it is too small, it will cause over-shoot.

P249: Gain No. 1 Low speed loop proportional gain

a. Setting item

Activating timing: Real-time

Setting range: 0 to 99999

Initial value: 25

b. Function

Set the speed loop gain in the low speed gain range.

The larger the setting, the faster the response, but vibration is likely to occur.

If "0" is set, the motor is in the torque 0 status.

P250: Gain No. 1 Low speed loop integral time constant

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0.0 to 9999.9

Initial value: 20.0

b. Function

Set the time constant of speed loop integral compensation in the low speed gain range.

The smaller the setting, the faster the response, but if it is too small, vibration will occur.

If "0" is set, integral compensation is ineffective.

P251: Gain No. 1 Low speed loop derivative time constant

a. Setting item

Activating timing: Real-time

Setting unit: μs

Setting range: -999 to 999

Initial value: 0

b. Function

Set the time constant of speed loop derivative compensation in the low speed gain range.

The larger the setting, the faster the response, but vibration is likely to occur.

If "0" is set, derivative compensation is not performed.

If a negative value is set, the time constant will be a first-order delay time constant.

P252: Gain No. 1 Low speed loop proportional gain distribution factor

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: -100.0 to 100.0

Initial value: 0.0

b. Function

Set the proportional compensation gain distribution factor o of the two-degree-of freedom PID speed control system in the low speed gain range.

The larger the setting, the faster the decrease in position deviation upon completion of positioning.

If it is too large, it will cause over-shoot.

P253: Gain No. 1 Low speed loop derivative gain distribution factor

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: -100.0 to 100.0

Initial value: 0.0

b. Function

Set the derivative compensation gain distribution factor of the two-degree-of freedom PID speed control system in the low speed gain range.

This is effective if a positive value is set in [P251: Low speed loop derivative time constant].

The smaller the setting, the faster the decrease in position deviation upon completion of positioning.

If it is too small, it will cause over-shoot.

P254: Gain No. 1 Speed loop integral torque limit value

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: 0 to 799 (0 means no limit.)

Initial value: 0

b. Function

Set the output torque limit value of speed loop integral compensation.

For a setting that exceeds the Peak torque of the motor, the output torque is clamped to the Peak torque.

If "0" is set, the torque is limited with the torque limit value during operation.

P255: Gain No. 1 Position loop gain

a. Setting item

Activating timing: Real-time

Setting unit: s^{-1}

Setting range: 0.0 to 9999.9

Initial value: 20.0

b. Function

Set the position loop gain.

The larger the setting, the faster the response, but vibration is likely to occur.

If "0" is set, the following applies.

- Position loop control is not performed, but operation is performed with the speed command of [P259 Speed feed forward].
- Position deviation is fixed to "0".

P256: Gain No. 1 Low speed position loop gain

a. Setting item

Activating timing: Real-time

Setting unit: s^{-1}

Setting range: 0.0 to 9999.9

Initial value: 20.0

b. Function

Set the position loop gain in the low speed gain range.

The larger the setting, the faster the response, but vibration is likely to occur.

If "0" is set, normal positioning operation cannot be performed.

P257[4th - 1st digits]: Gain No. 1 Position loop derivative time constant

a. Setting item

Activating timing: Real-time

Setting unit: μs

Setting range: 0 to 9999

Initial value: 0

b. Function

Set the derivative compensation time constant of the position loop.

The larger the setting, the faster the response, but if the setting is too large, vibration is likely to occur.

If "0" is set, derivative compensation is not performed.

P257[8th - 5th digits]: Gain No. 1 Low speed position loop derivative time constant

a. Setting item

Activating timing: Real-time

Setting unit: μs

Setting range: 0 to 9999

Initial value: 0

b. Function

Set the position loop derivative time constant in the low speed gain range.

P258[4th - 1st digits]: Reserved

a. Setting item

b. Function

Reserved area. Set the initial value.

P258[6th & 5th digits]: Gain No. 1 Positioning command delay time

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0.0 to 1.0

Initial value: 0.0

b. Function

Set the delay time after which to output the position command.

P259[4th - 1st digits]: Gain No. 1 Speed feed forward ratio

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: 0.0 to 120.0

Initial value: 80.0

b. Function

Set the speed feed forward ratio.

The larger the setting, the higher the compliance, but over-shoot is likely to occur.

If this occurs, reduce the setting a little to allow for a slight deviation, thereby stabilizing operation.

If "0" is set, feed forward control is ineffective.

P259[8th - 5th digits]: Gain No. 1 Speed feed forward shift ratio

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: 0.0 to 100.0

Initial value: 0.0

b. Function

Reduce the feed forward speed.

If the sign of the feed forward speed in the formula below changes, the feed forward speed is "0".

Feed forward speed

= Speed based on P259 speed feed forward ratio - (Use maximum speed x Setting [%])

P260: Gain No. 1 Speed feed forward filter time constant

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: -100.0 to 100.0

Initial value: 0.2

b. Function

Set the low pass filter time constant for the speed feed forward command.

- Positive value: The larger the setting, the smoother the speed feed forward command, but over-shoot is more likely to occur.
- Negative value: It will be the derivative control time constant for the speed feed forward command.

P261: Gain No. 1 Inertia

a. Setting item

Activating timing: Real-time

Setting unit: P160 range kgm^2

Setting range: 0 to 999999999

Initial value: 0

b. Function

Set the inertia of the control system.

With [P160: Inertia and viscous friction range selection], a range can be set.

Usually, it is set with auto tuning.

P262: Gain No. 1 Viscous friction

a. Setting item

Activating timing: Real-time

Setting unit: P160 range Nm/(rad/s)

Setting range: 0 to 999999999

Initial value: 0

b. Function

Set the viscous friction of the control system.

With [P160: Inertia and viscous friction range selection], a range can be set.

Usually, it is set with auto tuning.

P263[4th - 1st digits]: Gain No. 1 Inertia feed forward ratio

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: 0.0 to 200.0

Initial value: 0.0

b. Function

Set the feed forward ratio for [P261: Inertia].

If "100%" is set, the compliance increases, but vibration may occur depending on the mismatch with the machine system.

If the load inertia fluctuates, usually set "0".

If the load inertia does not fluctuate, set "100%" after servo adjustment.

If "0" is set, this feed forward control is not performed.

P263[8th - 5th digits]: Gain No. 1 Viscous friction feed forward ratio

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: 0.0 to 200.0

Initial value: 0.0

b. Function

Set the feed forward ratio for [P262: Viscous friction].

If "100%" is set, the compliance increases, but vibration may occur depending on the mismatch with the machine system.

If "0" is set, this feed forward control is not performed.

P264: Gain No. 1 Torque feed forward filter time constant

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: -100.0 to 100.0

Initial value: 0.1

b. Function

Set the low pass filter time constant for the torque feed forward command.

This torque feed forward command is the torque command output for load inertia and load viscous friction. Depending on the sign of the setting, the specification differs.

- Positive value: The larger the setting, the smoother the torque feed forward command, but over-shoot is more likely to occur.
- Negative value: It will be the derivative control time constant for the torque feed forward command.

P265[3rd - 1st digits]: Gain No. 1 Filter derivative coefficient while stopping

a. Setting item

Activating timing: Real-time

Setting range: 0.0 to 99.9

Initial value: 1.0

b. Function

Set the derivative coefficient for vibration while stopping.

Depending on the condition, make an adjustment as described below.

- If the load inertia is large and the friction is large, so the vibration while stopping cannot be suppressed even if the stopped filter time constant is adjusted, the vibration can be suppressed by setting in the range of 1.0 to 20.0.
- If there is hardly any friction and some sound is heard while stopping, decrease the setting.

P265[6th - 4th digits]: Gain No. 1 Filter time constant while stopping

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0.0 to 99.9

Initial value: 0.2

b. Function

Set the filter time constant for vibration while stopping.

Depending on the condition, make an adjustment as described below.

- If the load inertia is large and vibration occurs while stopping, the vibration can be suppressed by setting in the range of 0.3 to 9.0.
- If the load inertia is small and the static friction of the motor is large, set in the range of 0.0 to 0.3.

P266[4th - 1st digits]: Gain No. 1 Notch filter center frequency

a. Setting item

Activating timing: Real-time

Setting unit: Hz

Setting range: 0 to 9999

Initial value: 0

b. Function

Set the center frequency of the notch filter.

If resonance occurs depending on the combination with the machine system, set the resonance frequency, thereby preventing the resonance. Set the notch filter with a combination of notch filter center frequency, notch filter band width, and notch filter depth.

If "0" is set, the filter is ineffective.

P266[7th - 5th digits]: Gain No. 1 Notch filter band width ratio

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: 0 to 200

Initial value: 0

b. Function

Set the band width of notch filter.

Set it with a ratio to the notch filter center frequency.

If "0" is set, the filter is ineffective.

Example) Center frequency x This setting = Band width

1000 Hz×20%(0.20) ＝ 200 Hz

P266[9th & 8th digits]: Gain No. 1 Notch filter depth

a. Setting item

Activating timing: Real-time

Setting unit: -dB

Setting range: 0 to 99

Initial value: 0

b. Function

Set the depth of the notch filter.

If "0" is set, the notch depth is "- ∞ ".

Usually, set the initial value.

The maximum depth is limited by the operation accuracy of the device.

P270: Gain No. 2 Low speed gain switching speed

a. Setting item

Activating timing: Real-time

Setting unit: rpm

Setting range: 0.000 to 99999.999

Initial value: 1.000

b. Function

Set the speed at which to switch between the normal speed gain and the low speed gain.

When the operation speed is equal to or less than this speed, the gain is switched to the low speed gain.

If "0" is set, switching to the low speed gain is ineffective.

P271: Gain No. 2 Low speed gain switching deviation pulse

a. Setting item

Activating timing: Real-time

Setting unit: FB pulse

Setting range: 0 to 99999999

Initial value: 10

b. Function

Set the deviation pulse at which to switch between the normal speed gain and the low speed gain.

When the deviation pulse goes below this deviation range, the gain is switched to the low speed gain.

If "0" is set, switching to the low speed gain is ineffective.

P272[3rd - 1st digits]: Gain No. 2 Normal speed → Low speed gain switching filter time constant

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0.0 to 99.9

Initial value: 5.0

b. Function

Set the time constant when the gain is switched from the normal speed gain to the low speed gain.

- This setting is effective to the following parameters.
  - Speed loop proportional gain
  - Speed loop integral time constant
  - Speed loop derivative time constant
  - Speed loop proportional gain distribution factor
  - Speed loop derivative gain distribution factor
  - Position loop gain
  - Position loop derivative time constant
- For parameters other than the above, switching is performed without a filter time constant.
- For gain switching between gain numbers, switching is performed under the conditions of the selected gain number.

P272[6th - 4th digits]: Gain No. 2 Low speed → Normal speed gain switching filter time constant

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0.0 to 99.9

Initial value: 0.0

b. Function

Set the time constant when the gain is switched from the low speed gain to the normal speed gain.

- This setting is effective to the following parameters.
  - Speed loop proportional gain
  - Speed loop integral time constant
  - Speed loop derivative time constant
  - Speed loop proportional gain distribution factor
  - Speed loop derivative gain distribution factor
  - Position loop gain
  - Position loop derivative time constant
- For parameters other than the above, switching is performed without a filter time constant.
- For gain switching between gain numbers, switching is performed under the conditions of the selected gain number.

P272[7th digit]: Gain No. 2 Low speed gain switching spec 1 selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the low speed gain switching specification.

c. Setting selection

0: Speed and deviation pulse interlocking
The speed loop gain and the position loop gain are switched when both the switching speed range and the switching deviation range match.

1: Speed and deviation pulse separate 1
For the speed loop, the gain is switched when the switching speed range matches.
For the position loop, the gain is switched when the switching deviation range matches.

2: Speed and deviation pulse separate 2
For the position loop, the gain is switched when the switching deviation range matches.
For the speed loop, the gain is switched when the position loop is in a low speed gain status and the switching speed range matches.

P272[8th digit]: Gain No. 2 Low speed gain switching spec 2 selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 1

Initial value: 0

b. Function

Set the low speed gain switching specification.

c. Setting selection

0: During command input, low speed gain switching is ineffective.
In position command mode, switching during the position command is ineffective.
In speed command mode, switching during the speed command is ineffective.

1: Low speed gain switching is effective regardless of command input.

P273[4th - 1st digits]: Gain No. 2 Low speed gain switching delay time

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0.0 to 999.9

Initial value: 10.0

b. Function

Set the delay time when the gain switches from the normal speed gain to the low speed gain.

The gain switches to the low speed gain after the elapse of this time after the low speed gain switching condition is met.

P273[9th - 5th digits]: Gain No. 2 Low speed gain holding time after switching

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0.0 to 9999.9

Initial value: 0.0

b. Function

Within this time after switching to the low speed gain, the low speed gain status is held even if the normal speed gain switching condition is met.

If, however, "0" is set in [P272: Low speed gain switching spec 2 selection], and command input is performed, the normal speed gain is assumed by canceling the low speed gain holding time after switching.

P274: Gain No. 2 Speed loop proportional gain

a. Setting item

Activating timing: Real-time

Setting range: 0 to 99999

Initial value: 25

b. Function

Set the speed loop gain.

The larger the setting, the faster the response, but vibration is likely to occur.

If "0" is set, the motor is in the torque 0 status.

P275: Gain No. 2 Speed loop integral time constant

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0.0 to 9999.9

Initial value: 20.0

b. Function

Set the time constant of speed loop integral compensation.

The smaller the setting, the faster the response, but if it is too small, vibration will occur.

If "0" is set, integral compensation is ineffective.

P276: Gain No. 2 Speed loop derivative time constant

a. Setting item

Activating timing: Real-time

Setting unit: μs

Setting range: -999 to 999

Initial value: 0

b. Function

Set the time constant of speed loop derivative compensation.

The larger the setting, the faster the response, but vibration is likely to occur.

If "0" is set, derivative compensation is not performed.

If a negative value is set, the time constant will be a first-order delay time constant.

P277: Gain No. 2 Speed loop proportional gain distribution factor

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: -100.0 to 100.0

Initial value: 0.0

b. Function

Set the proportional compensation gain distribution factor of the two-degree-of-freedom PID speed control system.

The larger the setting, the faster the decrease in position deviation upon completion of positioning.

If it is too large, it will cause over-shoot.

P278: Gain No. 2 Speed loop derivative gain distribution factor

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: -100.0 to 100.0

Initial value: 0.0

b. Function

Set the derivative compensation gain distribution factor of the two-degree-of-freedom PID speed control system.

This is effective if a positive value is set in [P276: Speed loop derivative time constant]. The smaller the setting, the faster the decrease in position deviation upon completion of positioning.

If it is too small, it will cause over-shoot.

P279: Gain No. 2 Low speed loop proportional gain

a. Setting item

Activating timing: Real-time

Setting range: 0 to 99999

Initial value: 25

b. Function

Set the speed loop gain in the low speed gain range.

The larger the setting, the faster the response, but vibration is likely to occur.

If "0" is set, the motor is in the torque 0 status.

P280: Gain No. 2 Low speed loop integral time constant

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0.0 to 9999.9

Initial value: 20.0

b. Function

Set the time constant of speed loop integral compensation in the low speed gain range.

The smaller the setting, the faster the response, but if it is too small, vibration will occur.

If "0" is set, integral compensation is ineffective.

P281: Gain No. 2 Low speed loop derivative time constant

a. Setting item

Activating timing: Real-time

Setting unit: μs

Setting range: -999 to 999

Initial value: 0

b. Function

Set the time constant of speed loop derivative compensation in the low speed gain range.

The larger the setting, the faster the response, but vibration is likely to occur.

If "0" is set, derivative compensation is not performed.

If a negative value is set, the time constant will be a first-order delay time constant.

P282: Gain No. 2 Low speed loop proportional gain distribution factor

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: -100.0 to 100.0

Initial value: 0.0

b. Function

Set the proportional compensation gain distribution factor o of the two-degree-of freedom PID speed control system in the low speed gain range.

The larger the setting, the faster the decrease in position deviation upon completion of positioning.

If it is too large, it will cause over-shoot.

P283: Gain No. 2 Low speed loop derivative gain distribution factor

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: -100.0 to 100.0

Initial value: 0.0

b. Function

Set the derivative compensation gain distribution factor of the two-degree-of freedom PID speed control system in the low speed gain range.

This is effective if a positive value is set in [P281: Low speed loop derivative time constant].

The smaller the setting, the faster the decrease in position deviation upon completion of positioning.

If it is too small, it will cause over-shoot.

P284: Gain No. 2 Speed loop integral torque limit value

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: 0 to 799 (0 means no limit.)

Initial value: 0

b. Function

Set the output torque limit value of speed loop integral compensation.

For a setting that exceeds the Peak torque of the motor, the output torque is clamped to the Peak torque.

If "0" is set, the torque is limited with the torque limit value during operation.

P285: Gain No. 2 Position loop gain

a. Setting item

Activating timing: Real-time

Setting unit: s^{-1}

Setting range: 0.0 to 9999.9

Initial value: 20.0

b. Function

Set the position loop gain.

The larger the setting, the faster the response, but vibration is likely to occur.

If "0" is set, the following applies.

- Position loop control is not performed, but operation is performed with the speed command of [P289 Speed feed forward].
- Position deviation is fixed to "0".

P286: Gain No. 2 Low speed position loop gain

a. Setting item

Activating timing: Real-time

Setting unit: s^{-1}

Setting range: 0.0 to 9999.9

Initial value: 20.0

b. Function

Set the position loop gain in the low speed gain range.

The larger the setting, the faster the response, but vibration is likely to occur.

If "0" is set, normal positioning operation cannot be performed.

P287[4th - 1st digits]: Gain No. 2 Position loop derivative time constant

a. Setting item

Activating timing: Real-time

Setting unit: μs

Setting range: 0 to 9999

Initial value: 0

b. Function

Set the derivative compensation time constant of the position loop.

The larger the setting, the faster the response, but if the setting is too large, vibration is likely to occur.

If "0" is set, derivative compensation is not performed.

P287[8th - 5th digits]: Gain No. 2 Low speed position loop derivative time constant

a. Setting item

Activating timing: Real-time

Setting unit: μs

Setting range: 0 to 9999

Initial value: 0

b. Function

Set the position loop derivative time constant in the low speed gain range.

P288[4th - 1st digits]: Reserved

a. Setting item

b. Function

Reserved area. Set the initial value.

P288[6th & 5th digits]: Gain No. 2 Positioning command delay time

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0.0 to 1.0

Initial value: 0.0

b. Function

Set the delay time after which to output the position command.

P289[4th - 1st digits]: Gain No. 2 Speed feed forward ratio

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: 0.0 to 120.0

Initial value: 80.0

b. Function

Set the speed feed forward ratio.

The larger the setting, the higher the compliance, but over-shoot is likely to occur.

If this occurs, reduce the setting a little to allow for a slight deviation, thereby stabilizing operation.

If "0" is set, feed forward control is ineffective.

P289[8th - 5th digits]: Gain No. 2 Speed feed forward shift ratio

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: 0.0 to 100.0

Initial value: 0.0

b. Function

Reduce the feed forward speed.

If the sign of the feed forward speed in the formula below changes, the feed forward speed is "0".

Feed forward speed

= Speed based on P289 speed feed forward ratio - (Use maximum speed x Setting [%])

P290: Gain No. 2 Speed feed forward filter time constant

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: -100.0 to 100.0

Initial value: 0.2

b. Function

Set the low pass filter time constant for the speed feed forward command.

- Positive value: The larger the setting, the smoother the speed feed forward command, but over-shoot is more likely to occur.
- Negative value: It will be the derivative control time constant for the speed feed forward command.

P291: Gain No. 2 Inertia

a. Setting item

Activating timing: Real-time

Setting unit: P160 range kgm^2

Setting range: 0 to 999999999

Initial value: 0

b. Function

Set the inertia of the control system.

With [P160: Inertia and viscous friction range selection], a range can be set.

Usually, it is set with auto tuning.

P292: Gain No. 2 Viscous friction

a. Setting item

Activating timing: Real-time
Setting unit: P160 range Nm/(rad/s)
Setting range: 0 to 999999999
Initial value: 0

b. Function

Set the viscous friction of the control system.
With [P160: Inertia and viscous friction range selection], a range can be set.
Usually, it is set with auto tuning.

P293[4th - 1st digits]: Gain No. 2 Inertia feed forward ratio

a. Setting item

Activating timing: Real-time
Setting unit: %
Setting range: 0.0 to 200.0
Initial value: 0.0

b. Function

Set the feed forward ratio for [P291: Inertia].
If "100%" is set, the compliance increases, but vibration may occur depending on the mismatch with the machine system.
If the load inertia fluctuates, usually set "0".
If the load inertia does not fluctuate, set "100%" after servo adjustment.
If "0" is set, this feed forward control is not performed.

P293[8th - 5th digits]: Gain No. 2 Viscous friction feed forward ratio

a. Setting item

Activating timing: Real-time
Setting unit: %
Setting range: 0.0 to 200.0
Initial value: 0.0

b. Function

Set the feed forward ratio for [P292: Viscous friction].
If "100%" is set, the compliance increases, but vibration may occur depending on the mismatch with the machine system.
If "0" is set, this feed forward control is not performed.

P294: Gain No. 2 Torque feed forward filter time constant

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: -100.0 to 100.0

Initial value: 0.1

b. Function

Set the low pass filter time constant for the torque feed forward command.

This torque feed forward command is the torque command output for load inertia and load viscous friction. Depending on the sign of the setting, the specification differs.

- Positive value: The larger the setting, the smoother the torque feed forward command, but over-shoot is more likely to occur.
- Negative value: It will be the derivative control time constant for the torque feed forward command.

P295[3rd - 1st digits]: Gain No. 2 Filter derivative coefficient while stopping

a. Setting item

Activating timing: Real-time

Setting range: 0.0 to 99.9

Initial value: 1.0

b. Function

Set the derivative coefficient for vibration while stopping.

Depending on the condition, make an adjustment as described below.

- If the load inertia is large and the friction is large, so the vibration while stopping cannot be suppressed even if the stopped filter time constant is adjusted, the vibration can be suppressed by setting in the range of 1.0 to 20.0.
- If there is hardly any friction and some sound is heard while stopping, decrease the setting.

P295[6th - 4th digits]: Gain No. 2 Filter time constant while stopping

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0.0 to 99.9

Initial value: 0.2

b. Function

Set the filter time constant for vibration while stopping.

Depending on the condition, make an adjustment as described below.

- If the load inertia is large and vibration occurs while stopping, the vibration can be suppressed by setting in the range of 0.3 to 9.0.
- If the load inertia is small and the static friction of the motor is large, set in the range of 0.0 to 0.3.

P296[4th - 1st digits]: Gain No. 2 Notch filter center frequency

a. Setting item

Activating timing: Real-time

Setting unit: Hz

Setting range: 0 to 9999

Initial value: 0

b. Function

Set the center frequency of the notch filter.

If resonance occurs depending on the combination with the machine system, set the resonance frequency, thereby preventing the resonance. Set the notch filter with a combination of notch filter center frequency, notch filter band width, and notch filter depth.

If "0" is set, the filter is ineffective.

P296[7th - 5th digits]: Gain No. 2 Notch filter band width ratio

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: 0 to 200

Initial value: 0

b. Function

Set the band width of notch filter.

Set it with a ratio to the notch filter center frequency.

If "0" is set, the filter is ineffective.

Example) Center frequency x This setting = Band width

1000 Hz×20%(0.20) ＝ 200 Hz

P296[9th & 8th digits]: Gain No. 2 Notch filter depth

a. Setting item

Activating timing: Real-time

Setting unit: -dB

Setting range: 0 to 99

Initial value: 0

b. Function

Set the depth of the notch filter.

If "0" is set, the notch depth is "- ∞ ".

Usually, set the initial value.

The maximum depth is limited by the operation accuracy of the device.

P300: Gain No. 3 Low speed gain switching speed

a. Setting item

Activating timing: Real-time

Setting unit: rpm

Setting range: 0.000 to 99999.999

Initial value: 1.000

b. Function

Set the speed at which to switch between the normal speed gain and the low speed gain.

When the operation speed is equal to or less than this speed, the gain is switched to the low speed gain.

If "0" is set, switching to the low speed gain is ineffective.

P301: Gain No. 3 Low speed gain switching deviation pulse

a. Setting item

Activating timing: Real-time

Setting unit: FB pulse

Setting range: 0 to 99999999

Initial value: 10

b. Function

Set the deviation pulse at which to switch between the normal speed gain and the low speed gain.

When the deviation pulse goes below this deviation range, the gain is switched to the low speed gain.

If "0" is set, switching to the low speed gain is ineffective.

P302[3rd - 1st digits]: Gain No. 3 Normal speed → Low speed gain switching filter time constant

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0.0 to 99.9

Initial value: 5.0

b. Function

Set the time constant when the gain is switched from the normal speed gain to the low speed gain.

- This setting is effective to the following parameters.
  - Speed loop proportional gain
  - Speed loop integral time constant
  - Speed loop derivative time constant
  - Speed loop proportional gain distribution factor
  - Speed loop derivative gain distribution factor
  - Position loop gain
  - Position loop derivative time constant
- For parameters other than the above, switching is performed without a filter time constant.
- For gain switching between gain numbers, switching is performed under the conditions of the selected gain number.

P302[6th - 4th digits]: Gain No. 3 Low speed → Normal speed gain switching filter time constant

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0.0 to 99.9

Initial value: 0.0

b. Function

Set the time constant when the gain is switched from the low speed gain to the normal speed gain.

- This setting is effective to the following parameters.
  - Speed loop proportional gain
  - Speed loop integral time constant
  - Speed loop derivative time constant
  - Speed loop proportional gain distribution factor
  - Speed loop derivative gain distribution factor
  - Position loop gain
  - Position loop derivative time constant
- For parameters other than the above, switching is performed without a filter time constant.
- For gain switching between gain numbers, switching is performed under the conditions of the selected gain number.

P302[7th digit]: Gain No. 3 Low speed gain switching spec 1 selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the low speed gain switching specification.

c. Setting selection

0: Speed and deviation pulse interlocking
The speed loop gain and the position loop gain are switched when both the switching speed range and the switching deviation range match.

1: Speed and deviation pulse separate 1
For the speed loop, the gain is switched when the switching speed range matches.
For the position loop, the gain is switched when the switching deviation range matches.

2: Speed and deviation pulse separate 2
For the position loop, the gain is switched when the switching deviation range matches.
For the speed loop, the gain is switched when the position loop is in a low speed gain status and the switching speed range matches.

P302[8th digit]: Gain No. 3 Low speed gain switching spec 2 selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 1

Initial value: 0

b. Function

Set the low speed gain switching specification.

c. Setting selection

0: During command input, low speed gain switching is ineffective.
In position command mode, switching during the position command is ineffective.
In speed command mode, switching during the speed command is ineffective.

1: Low speed gain switching is effective regardless of command input.

P303[4th - 1st digits]: Gain No. 3 Low speed gain switching delay time

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0.0 to 999.9

Initial value: 10.0

b. Function

Set the delay time when the gain switches from the normal speed gain to the low speed gain.

The gain switches to the low speed gain after the elapse of this time after the low speed gain switching condition is met.

P303[9th - 5th digits]: Gain No. 3 Low speed gain holding time after switching

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0.0 to 9999.9

Initial value: 0.0

b. Function

Within this time after switching to the low speed gain, the low speed gain status is held even if the normal speed gain switching condition is met.

If, however, "0" is set in [P302: Low speed gain switching spec 2 selection], and command input is performed, the normal speed gain is assumed by canceling the low speed gain holding time after switching.

P304: Gain No. 3 Speed loop proportional gain

a. Setting item

Activating timing: Real-time

Setting range: 0 to 99999

Initial value: 25

b. Function

Set the speed loop gain.

The larger the setting, the faster the response, but vibration is likely to occur.

If "0" is set, the motor is in the torque 0 status.

P305: Gain No. 3 Speed loop integral time constant

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0.0 to 9999.9

Initial value: 20.0

b. Function

Set the time constant of speed loop integral compensation.

The smaller the setting, the faster the response, but if it is too small, vibration will occur.

If "0" is set, integral compensation is ineffective.

P306: Gain No. 3 Speed loop derivative time constant

a. Setting item

Activating timing: Real-time

Setting unit: μs

Setting range: -999 to 999

Initial value: 0

b. Function

Set the time constant of speed loop derivative compensation.

The larger the setting, the faster the response, but vibration is likely to occur.

If "0" is set, derivative compensation is not performed.

If a negative value is set, the time constant will be a first-order delay time constant.

P307: Gain No. 3 Speed loop proportional gain distribution factor

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: -100.0 to 100.0

Initial value: 0.0

b. Function

Set the proportional compensation gain distribution factor of the two-degree-of-freedom PID speed control system.

The larger the setting, the faster the decrease in position deviation upon completion of positioning.

If it is too large, it will cause over-shoot.

P308: Gain No. 3 Speed loop derivative gain distribution factor

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: -100.0 to 100.0

Initial value: 0.0

b. Function

Set the derivative compensation gain distribution factor of the two-degree-of-freedom PID speed control system.

This is effective if a positive value is set in [P306: Speed loop derivative time constant]. The smaller the setting, the faster the decrease in position deviation upon completion of positioning.

If it is too small, it will cause over-shoot.

P309: Gain No. 3 Low speed loop proportional gain

a. Setting item

Activating timing: Real-time

Setting range: 0 to 99999

Initial value: 25

b. Function

Set the speed loop gain in the low speed gain range.

The larger the setting, the faster the response, but vibration is likely to occur.

If "0" is set, the motor is in the torque 0 status.

P310: Gain No. 3 Low speed loop integral time constant

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0.0 to 9999.9

Initial value: 20.0

b. Function

Set the time constant of speed loop integral compensation in the low speed gain range.

The smaller the setting, the faster the response, but if it is too small, vibration will occur.

If "0" is set, integral compensation is ineffective.

P311: Gain No. 3 Low speed loop derivative time constant

a. Setting item

Activating timing: Real-time

Setting unit: μs

Setting range: -999 to 999

Initial value: 0

b. Function

Set the time constant of speed loop derivative compensation in the low speed gain range.

The larger the setting, the faster the response, but vibration is likely to occur.

If "0" is set, derivative compensation is not performed.

If a negative value is set, the time constant will be a first-order delay time constant.

P312: Gain No. 3 Low speed loop proportional gain distribution factor

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: -100.0 to 100.0

Initial value: 0.0

b. Function

Set the proportional compensation gain distribution factor o of the two-degree-of freedom PID speed control system in the low speed gain range.

The larger the setting, the faster the decrease in position deviation upon completion of positioning.

If it is too large, it will cause over-shoot.

P313: Gain No. 3 Low speed loop derivative gain distribution factor

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: -100.0 to 100.0

Initial value: 0.0

b. Function

Set the derivative compensation gain distribution factor of the two-degree-of freedom PID speed control system in the low speed gain range.

This is effective if a positive value is set in [P311: Low speed loop derivative time constant].

The smaller the setting, the faster the decrease in position deviation upon completion of positioning.

If it is too small, it will cause over-shoot.

P314: Gain No. 3 Speed loop integral torque limit value

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: 0 to 799 (0 means no limit.)

Initial value: 0

b. Function

Set the output torque limit value of speed loop integral compensation.

For a setting that exceeds the Peak torque of the motor, the output torque is clamped to the Peak torque.

If "0" is set, the torque is limited with the torque limit value during operation.

P315: Gain No. 3 Position loop gain

a. Setting item

Activating timing: Real-time

Setting unit: s^{-1}

Setting range: 0.0 to 9999.9

Initial value: 20.0

b. Function

Set the position loop gain.

The larger the setting, the faster the response, but vibration is likely to occur.

If "0" is set, the following applies.

- Position loop control is not performed, but operation is performed with the speed command of [P319 Speed feed forward].
- Position deviation is fixed to "0".

P316: Gain No. 3 Low speed position loop gain

a. Setting item

Activating timing: Real-time

Setting unit: s^{-1}

Setting range: 0.0 to 9999.9

Initial value: 20.0

b. Function

Set the position loop gain in the low speed gain range.

The larger the setting, the faster the response, but vibration is likely to occur.

If "0" is set, normal positioning operation cannot be performed.

P317[4th - 1st digits]: Gain No. 3 Position loop derivative time constant

a. Setting item

Activating timing: Real-time

Setting unit: μs

Setting range: 0 to 9999

Initial value: 0

b. Function

Set the derivative compensation time constant of the position loop.

The larger the setting, the faster the response, but if the setting is too large, vibration is likely to occur.

If "0" is set, derivative compensation is not performed.

P317[8th - 5th digits]: Gain No. 3 Low speed position loop derivative time constant

a. Setting item

Activating timing: Real-time

Setting unit: μs

Setting range: 0 to 9999

Initial value: 0

b. Function

Set the position loop derivative time constant in the low speed gain range.

P318[4th - 1st digits]: Reserved

a. Setting item

b. Function

Reserved area. Set the initial value.

P318[6th & 5th digits]: Gain No. 3 Positioning command delay time

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0.0 to 1.0

Initial value: 0.0

b. Function

Set the delay time after which to output the position command.

P319[4th - 1st digits]: Gain No. 3 Speed feed forward ratio

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: 0.0 to 120.0

Initial value: 80.0

b. Function

Set the speed feed forward ratio.

The larger the setting, the higher the compliance, but over-shoot is likely to occur.

If this occurs, reduce the setting a little to allow for a slight deviation, thereby stabilizing operation.

If "0" is set, feed forward control is ineffective.

P319[8th - 5th digits]: Gain No. 3 Speed feed forward shift ratio

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: 0.0 to 100.0

Initial value: 0.0

b. Function

Reduce the feed forward speed.

If the sign of the feed forward speed in the formula below changes, the feed forward speed is "0".

Feed forward speed

= Speed based on P319 speed feed forward ratio - (Use maximum speed x Setting [%])

P320: Gain No. 3 Speed feed forward filter time constant

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: -100.0 to 100.0

Initial value: 0.2

b. Function

Set the low pass filter time constant for the speed feed forward command.

- Positive value: The larger the setting, the smoother the speed feed forward command, but over-shoot is more likely to occur.
- Negative value: It will be the derivative control time constant for the speed feed forward command.

P321: Gain No. 3 Inertia

a. Setting item

Activating timing: Real-time

Setting unit: P160 range kgm^2

Setting range: 0 to 999999999

Initial value: 0

b. Function

Set the inertia of the control system.

With [P160: Inertia and viscous friction range selection], a range can be set.

Usually, it is set with auto tuning.

P322: Gain No. 3 Viscous friction

a. Setting item

Activating timing: Real-time
Setting unit: P160 range Nm/(rad/s)
Setting range: 0 to 999999999
Initial value: 0

b. Function

Set the viscous friction of the control system.
With [P160: Inertia and viscous friction range selection], a range can be set.
Usually, it is set with auto tuning.

P323[4th - 1st digits]: Gain No. 3 Inertia feed forward ratio

a. Setting item

Activating timing: Real-time
Setting unit: %
Setting range: 0.0 to 200.0
Initial value: 0.0

b. Function

Set the feed forward ratio for [P321: Inertia].
If "100%" is set, the compliance increases, but vibration may occur depending on the mismatch with the machine system.
If the load inertia fluctuates, usually set "0".
If the load inertia does not fluctuate, set "100%" after servo adjustment.
If "0" is set, this feed forward control is not performed.

P323[8th - 5th digits]: Gain No. 3 Viscous friction feed forward ratio

a. Setting item

Activating timing: Real-time
Setting unit: %
Setting range: 0.0 to 200.0
Initial value: 0.0

b. Function

Set the feed forward ratio for [P322: Viscous friction].
If "100%" is set, the compliance increases, but vibration may occur depending on the mismatch with the machine system.
If "0" is set, this feed forward control is not performed.

P324: Gain No. 3 Torque feed forward filter time constant

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: -100.0 to 100.0

Initial value: 0.1

b. Function

Set the low pass filter time constant for the torque feed forward command.

This torque feed forward command is the torque command output for load inertia and load viscous friction. Depending on the sign of the setting, the specification differs.

- Positive value: The larger the setting, the smoother the torque feed forward command, but over-shoot is more likely to occur.
- Negative value: It will be the derivative control time constant for the torque feed forward command.

P325[3rd - 1st digits]: Gain No. 3 Filter derivative coefficient while stopping

a. Setting item

Activating timing: Real-time

Setting range: 0.0 to 99.9

Initial value: 1.0

b. Function

Set the derivative coefficient for vibration while stopping.

Depending on the condition, make an adjustment as described below.

- If the load inertia is large and the friction is large, so the vibration while stopping cannot be suppressed even if the stopped filter time constant is adjusted, the vibration can be suppressed by setting in the range of 1.0 to 20.0.
- If there is hardly any friction and some sound is heard while stopping, decrease the setting.

P325[6th - 4th digits]: Gain No. 3 Filter time constant while stopping

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0.0 to 99.9

Initial value: 0.2

b. Function

Set the filter time constant for vibration while stopping.

Depending on the condition, make an adjustment as described below.

- If the load inertia is large and vibration occurs while stopping, the vibration can be suppressed by setting in the range of 0.3 to 9.0.
- If the load inertia is small and the static friction of the motor is large, set in the range of 0.0 to 0.3.

P326[4th - 1st digits]: Gain No. 3 Notch filter center frequency

a. Setting item

Activating timing: Real-time

Setting unit: Hz

Setting range: 0 to 9999

Initial value: 0

b. Function

Set the center frequency of the notch filter.

If resonance occurs depending on the combination with the machine system, set the resonance frequency, thereby preventing the resonance. Set the notch filter with a combination of notch filter center frequency, notch filter band width, and notch filter depth.

If "0" is set, the filter is ineffective.

P326[7th - 5th digits]: Gain No. 3 Notch filter band width ratio

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: 0 to 200

Initial value: 0

b. Function

Set the band width of notch filter.

Set it with a ratio to the notch filter center frequency.

If "0" is set, the filter is ineffective.

Example) Center frequency x This setting = Band width

1000 Hz×20%(0.20) ＝ 200 Hz

P326[9th & 8th digits]: Gain No. 3 Notch filter depth

a. Setting item

Activating timing: Real-time

Setting unit: -dB

Setting range: 0 to 99

Initial value: 0

b. Function

Set the depth of the notch filter.

If "0" is set, the notch depth is "- ∞ ".

Usually, set the initial value.

The maximum depth is limited by the operation accuracy of the device.

P330[1st digit]: Torque command filter order selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 1

Initial value: 0

b. Function

Select the torque command filter order.

c. Setting selection

0: Primary

1: Secondary

P330[5th - 2nd digits]: Torque command filter frequency

a. Setting item

Activating timing: Real-time

Setting unit: Hz

Setting range: 0 to 9999

Initial value: 0

b. Function

Set the filter (low pass) frequency of the torque command.

If resonance occurs depending on the combination with the machine system, insert a torque command filter to fix it.

If "0" is set, the filter is ineffective.

P331[4th - 1st digits]: Notch filter center frequency 1

a. Setting item

Activating timing: Real-time

Setting unit: Hz

Setting range: 0 to 9999

Initial value: 0

b. Function

Set the center frequency of the notch filter.

If resonance occurs depending on the combination with the machine system, set the resonance frequency, thereby preventing the resonance. Set the notch filter with a combination of notch filter center frequency, notch filter band width, and notch filter depth.

If "0" is set, the filter is ineffective.

P331[7th - 5th digits]: Notch filter band width ratio 1

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: 0 to 200

Initial value: 0

b. Function

Set the band width of the notch filter.

Set it with a ratio to the notch filter center frequency.

If "0" is set, the filter is ineffective.

Example) Center frequency x This setting = Band width

1000 Hz×20%(0.20) ＝ 200 Hz

P331[9th & 8th digits]: Notch filter depth 1

a. Setting item

Activating timing: Real-time

Setting unit: -dB

Setting range: 0 to 99

Initial value: 0

b. Function

Set the depth of the notch filter.

If "0" is set, the notch depth is "- ∞ ".

Usually, set the initial value.

The maximum depth is limited by the operation accuracy of the device.

P332[4th - 1st digits]: Notch filter center frequency 2

a. Setting item

Activating timing: Real-time

Setting unit: Hz

Setting range: 0 to 9999

Initial value: 0

Initial value: 0

b. Function

Set the center frequency of the notch filter.

If resonance occurs depending on the combination with the machine system, set the resonance frequency, thereby preventing the resonance. Set the notch filter with a combination of notch filter center frequency, notch filter band width, and notch filter depth.

If "0" is set, the filter is ineffective.

P332[7th - 5th digits]: Notch filter band width ratio 2

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: 0 to 200

Initial value: 0

b. Function

Set the band width of the notch filter.

Set it with a ratio to the notch filter center frequency.

If "0" is set, the filter is ineffective.

Example) Center frequency x This setting = Band width

1000 Hz×20%(0.20) ＝ 200 Hz

P332[9th & 8th digits]: Notch filter depth 2

a. Setting item

Activating timing: Real-time

Setting unit: -dB

Setting range: 0 to 99

Initial value: 0

b. Function

Set the depth of the notch filter.

If "0" is set, the notch depth is "- ∞ ".

Usually, set the initial value.

The maximum depth is limited by the operation accuracy of the device.

P333[4th - 1st digits]: Notch filter center frequency 3

a. Setting item

Activating timing: Real-time

Setting unit: Hz

Setting range: 0 to 9999

Initial value: 0

b. Function

Set the center frequency of the notch filter.

If resonance occurs depending on the combination with the machine system, set the resonance frequency, thereby preventing the resonance. Set the notch filter with a combination of notch filter center frequency, notch filter band width, and notch filter depth.

If "0" is set, the filter is ineffective.

P333[7th - 5th digits]: Notch filter band width ratio 3

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: 0 to 200

Initial value: 0

b. Function

Set the band width of the notch filter.

Set it with a ratio to the notch filter center frequency.

If "0" is set, the filter is ineffective.

Example) Center frequency x This setting = Band width

1000 Hz×20%(0.20) ＝ 200 Hz

P333[9th & 8th digits]: Notch filter depth 3

a. Setting item

Activating timing: Real-time

Setting unit: -dB

Setting range: 0 to 99

Initial value: 0

b. Function

Set the depth of the notch filter.

If "0" is set, the notch depth is "- ∞ ".

Usually, set the initial value.

The maximum depth is limited by the operation accuracy of the device.

P334[4th - 1st digits]: Notch filter center frequency 4

a. Setting item

Activating timing: Real-time

Setting unit: Hz

Setting range: 0 to 9999

Initial value: 0

b. Function

Set the center frequency of the notch filter.

If resonance occurs depending on the combination with the machine system, set the resonance frequency, thereby preventing the resonance. Set the notch filter with a combination of notch filter center frequency, notch filter band width, and notch filter depth.

If "0" is set, the filter is ineffective.

P334[7th - 5th digits]: Notch filter band width ratio 4

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: 0 to 200

Initial value: 0

b. Function

Set the band width of the notch filter.

Set it with a ratio to the notch filter center frequency.

If "0" is set, the filter is ineffective.

Example) Center frequency x This setting = Band width

1000 Hz×20%(0.20) ＝ 200 Hz

P334[9th & 8th digits]: Notch filter depth 4

a. Setting item

Activating timing: Real-time

Setting unit: -dB

Setting range: 0 to 99

Initial value: 0

b. Function

Set the depth of the notch filter.

If "0" is set, the notch depth is "- ∞ ".

Usually, set the initial value.

The maximum depth is limited by the operation accuracy of the device.

P340: Vibration control filter ineffective speed range

a. Setting item

Activating timing: Real-time

Setting unit: rpm

Setting range: 0.000 to 99999.999

Initial value: 0.000

b. Function

Set the ineffective speed range of the vibration control filter.

If the speed is equal to or less than this setting, the vibration control filter is ineffective.

If "0" is set, the vibration control filter is ineffective.

P341[4th - 1st digits]: Vibration control filter center frequency

a. Setting item

Activating timing: Real-time

Setting unit: Hz

Setting range: 0 to 9999

Initial value: 0

b. Function

Set the center frequency of the vibration control filter.

If the rigidity is low depending on the combination with the machine system, and low-frequency vibration occurs, set the resonance frequency to prevent the resonance.

If "0" is set, the filter is ineffective.

P341[7th - 5th digits]: Vibration control filter band width ratio

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: 0 to 200

Initial value: 0

b. Function

Set the band width of the vibration control filter.

P341[9th & 8th digits]: Vibration control filter depth

a. Setting item

Activating timing: Real-time

Setting unit: -dB

Setting range: 0 to 99

Initial value: 0

b. Function

Set the depth of the vibration control filter.

If "0" is set, the notch depth is "- ∞ ".

Usually, set the initial value.

The maximum depth is limited by the operation accuracy of the device.

P342[1st digit]: Feedback filter order selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 1

Initial value: 0

b. Function

Select the order of the speed feedback filter.

c. Setting selection

0: Primary

1: Secondary

P342[5th - 2nd digits]: Feedback filter frequency

a. Setting item

Activating timing: Real-time

Setting unit: Hz

Setting range: 0 to 9999

Initial value: 1000

b. Function

Set the speed feedback filter frequency.

P348[3rd - 1st digits]: Vibration control model gain

a. Setting item

Activating timing: Real-time

Setting range: 0 to 300

Initial value: 0

b. Function

Set the vibration control model gain.

To perform vibration control, usually set "100".

If the setting is "0", vibration control is ineffective.

P348[6th - 4th digits]: Vibration control damping gain

a. Setting item

Activating timing: Real-time

Setting range: 0 to 100

Initial value: 0

b. Function

Set the vibration control gain for vibration control.

If the setting is small, the vibration control force is weak. If the setting is large, the vibration control force is strong.

If the setting is too large, the servo response performance worsens.

If the setting is "0", vibration control is ineffective.

c. Vibration control setting

This function can suppress vibration at about 5 to 100 Hz.

- Conditions for performing vibration control
  - [P100: Carrier frequency setting] is 18 kHz to 11 kHz or 9 kHz or less.
  - [P348 (3rd - 1st digits): Vibration control model gain] is other than "0".
  - [P348 (6th - 4th digits): Vibration control damping gain] is other than "0".
  - The inertia of the gain number to operate is other than "0".
- Notes on performing vibration control
  - Set [P349: Vibration control lower limit frequency] and [P349: Vibration control higher limit frequency].
  - The viscous friction to set must be about ten times the inertia.

P349[1st digit]: Vibration control order selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 1

Initial value: 0

b. Function

Select the order of the characteristics of the frequency range from the lower limit frequency to the upper limit frequency in which to suppress vibration with vibration control. Usually, set "0: Secondary".

c. Setting selection

0: 2nd

1: 4th

P349[5th - 2nd digits]: Vibration control lower limit frequency

a. Setting item

Activating timing: Real-time

Setting unit: Hz

Setting range: 0 to 9999

Initial value: 0

b. Function

Set the lower limit frequency at which to suppress vibration with vibration control.

Vibration is suppressed at the frequency equal to or greater than this setting.

If either the lower limit frequency or the upper limit frequency is "0", vibration is suppressed with vibration control in the entire frequency range.

P349[9th - 6th digits]: Vibration control higher limit frequency

a. Setting item

Activating timing: Real-time

Setting unit: Hz

Setting range: 0 to 9999

Initial value: 0

b. Function

Set the upper limit frequency at which to suppress vibration with vibration control.

If either the lower limit frequency or the upper limit frequency is "0", vibration is suppressed with vibration control in the entire frequency range.

P380: Magnetic pole detection torque limit value

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: 0 to 799

Initial value: 200

b. Function

Set the torque limit value during automatic magnetic pole detection.

The same limit value is used for both forward direction and reverse direction.

P381: Magnetic pole detection gain 1

a. Setting item

Activating timing: Real-time

Setting range: 0 to 9999

Initial value: 80

b. Function

Set the proportional compensation gain during automatic magnetic pole detection.

The larger the setting, the faster the response, but vibration may occur depending on the rigidity of the machine system.

If "0" is set, automatic magnetic pole detection does not operate normally.

P382: Magnetic pole detection integration time constant

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0.1 to 9999.9

Initial value: 200.0

b. Function

Set the integral compensation time constant during automatic magnetic pole detection.

The smaller the setting, the faster the response, but vibration is likely to occur.

P383: Magnetic pole detection gain 2

a. Setting item

Activating timing: Real-time

Setting unit: s^{-1}

Setting range: 0 to 9999

Initial value: 20

b. Function

Set the position loop gain during automatic magnetic pole detection.

The larger the setting, the faster the response, but vibration is likely to occur.

If "0" is set, the position loop is open, so that automatic magnetic pole detection cannot be performed.

P384: Magnetic pole detection complete range

a. Setting item

Activating timing: Real-time

Setting unit: deg

Setting range: 0.0 to 30.0

Initial value: 5.0

b. Function

Set the automatic magnetic pole detection completion range.

The wider the range, the easier the completion of automatic magnetic pole detection, but the larger the magnetic pole position error.

If the range is made narrow, it may not be possible to complete automatic magnetic pole detection.

P385[1st digit]: Magnetic pole detection filter order selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 1

Initial value: 0

b. Function

Select the automatic magnetic pole detection filter order.

c. Setting selection

0: Primary

1: Secondary

P385[5th - 2nd digits]: Magnetic pole detection filter frequency

a. Setting item

Activating timing: Real-time

Setting unit: Hz

Setting range: 0 to 9999

Initial value: 2000

b. Function

Set the filter during automatic magnetic pole detection.

If resonance occurs depending on the combination with the machine system, insert a low pass filter to fix it.

If "0" is set, the filter is ineffective.

P386[3rd - 1st digits]: Landing torque

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: 0 to 799

Initial value: 0

b. Function

Set the landing torque during automatic magnetic pole detection.

The same limit value is used for both forward direction and reverse direction.

If "0" is set, the landing torque is ineffective.

P386[7th - 4th digits]: Landing torque holding time

a. Setting item

Activating timing: Real-time

Setting unit: s

Setting range: 0.00 to 99.99

Initial value: 0.00

b. Function

Set the landing torque holding time during automatic magnetic pole detection.

If "0" is set, the landing torque is ineffective.

P387[3rd - 1st digits]: Magnetic pole detection torque minimum value

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: 0 to 799

Initial value: 0

b. Function

Set the minimum value of automatic magnetic pole detection torque for the second and subsequent sessions.

P387[4th digit]: Magnetic pole detection torque attenuation pattern selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 1

Initial value: 0

b. Function

Select the pattern during automatic magnetic pole detection torque attenuation.

c. Setting selection

0: Soft damping

1: Rapid damping

9-4-4 Command-related parameters (groups 4 and 5)

P404: Speed command acceleration standard time

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: 0 to 300000000

Initial value: 0

b. Function

Set the standard speed in speed command acceleration.

If "0" is set, the maximum speed is set.

P405: Speed command deceleration standard speed

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: 0 to 300000000

Initial value: 0

b. Function

Set the standard speed in speed command deceleration.

If "0" is set, the maximum speed is set.

P408: Internal speed command acceleration standard time

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0.0 to 99999.9

Initial value: 500.0

b. Function

Set the acceleration time for the internal speed command.

This setting is the time required to reach the speed that is set in [P404] from the motor stop status.

P409: Internal speed command deceleration standard time

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0.0 to 99999.9

Initial value: 500.0

b. Function

Set the deceleration time for the internal speed command.

This setting is the time required to reach the speed that is set in [P405] from the motor stop status.

P410[1st digit]: SPD SEL 0 Speed command spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Select the speed command value specification in speed command mode.

c. Setting selection

0: Speed command value/Setting value of command number 0

1: Reserved

2: Speed command value/indirect data assignment

Speed data stored with the specified indirect data number

P410[2nd digit]: SPD SEL 0 Gain No. selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 0

b. Function

Select the gain number in speed command mode.

c. Setting selection

0: Gain No. 0

1: Gain No. 1

2: Gain No. 2

3: Gain No. 3

P410[3rd digit]: SPD SEL 0 Overtravel spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 3

b. Function

Select the overtravel specification in speed command mode.

c. Setting selection

0: Auto release alarm

With the overtravel ON, the overtravel auto release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

With the overtravel OFF, the overtravel auto release alarm is released.

1: Reset release alarm 1

With the overtravel ON, the overtravel reset release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is not possible.

Switch OFF the overtravel direction command, and switch ON the reset signal (RST).

The overtravel auto release alarm is displayed, and movement in the overtravel release direction is possible.

2: Warning

With the overtravel ON, the overtravel warning occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

With the overtravel OFF, the overtravel warning is released.

3: Reset release alarm 2

With the overtravel ON, the overtravel reset release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

Switch OFF the overtravel direction command, and release overtravel by switching ON the reset signal (RST).

At this time, the alarm display is released even in the overtravel state.

P411: SPD SEL 0 Speed command value

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: -300000000 to 300000000

Indirect data number: -990000000 to -100000000

Initial value: 0

b. Function

Set the internal speed command value.

For indirect data assignment, the following applies.

- For [P410 (1st digit)], set "2: Speed command value/indirect data assignment".
- To specify indirect data, set a negative value.
- If a value outside the indirect data number range, the speed command will be "0".
- Set the indirect data number in the integer digits.

Example) To specify the indirect data IX15 when [P161 (3rd digit)] is set to "2: 0.01", set "-15.00".

P412: SPD SEL 0 Torque limit value

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: -9.9 to 799.9

Initial value: 300.0

b. Function

Set the motor output torque limit value in speed command mode.

If a value exceeding the Peak torque of the motor is set, the output torque is clamped to the Peak torque.

If "0" is set, no torque is generated.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P413[1st digit]: SPD SEL 1 Speed command value spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Select the speed command value specification in speed command mode.

c. Setting selection

0: Speed command value/Setting value of command number 1

1: Reserved

2: Speed command value/indirect data assignment
Speed data stored with the specified indirect data number

P413[2nd digit]: SPD SEL 1 Gain No. selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 0

b. Function

Select the gain number in speed command mode.

c. Setting selection

0: Gain No. 0

1: Gain No. 1

2: Gain No. 2

3: Gain No. 3

P413[3rd digit]: SPD SEL 1 Overtravel spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 3

b. Function

Select the overtravel specification in speed command mode.

c. Setting selection

0: Auto release alarm

With the overtravel ON, the overtravel auto release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

With the overtravel OFF, the overtravel auto release alarm is released.

1: Reset release alarm 1

With the overtravel ON, the overtravel reset release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is not possible.

Switch OFF the overtravel direction command, and switch ON the reset signal (RST).

The overtravel auto release alarm is displayed, and movement in the overtravel release direction is possible.

2: Warning

With the overtravel ON, the overtravel warning occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

With the overtravel OFF, the overtravel warning is released.

3: Reset release alarm 2

With the overtravel ON, the overtravel reset release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

Switch OFF the overtravel direction command, and release overtravel by switching ON the reset signal (RST).

At this time, the alarm display is released even in the overtravel state.

P414: SPD SEL 1 Speed command value

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: -300000000 to 300000000

Indirect data number: -990000000 to -100000000

Initial value: 0

b. Function

Set the internal speed command value.

For indirect data assignment, the following applies.

- For [P413 (1st digit)], set "2: Speed command value/indirect data assignment".
- To specify indirect data, set a negative value.
- If a value outside the indirect data number range, the speed command will be "0".
- Set the indirect data number in the integer digits.

Example) To specify the indirect data IX15 when [P161 (3rd digit)] is set to "2: 0.01", set "-15.00".

P415: SPD SEL 1 Torque limit value

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: -9.9 to 799.9

Initial value: 300.0

b. Function

Set the motor output torque limit value in speed command mode.

If a value exceeding the Peak torque of the motor is set, the output torque is clamped to the Peak torque.

If "0" is set, no torque is generated.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P416[1st digit]: SPD SEL 2 Speed command value spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Select the speed command value specification in speed command mode.

c. Setting selection

0: Speed command value/Setting value of command number 2

1: Reserved

2: Speed command value/indirect data assignment
Speed data stored with the specified indirect data number

P416[2nd digit]: SPD SEL 2 Gain No. selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 0

b. Function

Select the gain number in speed command mode.

c. Setting selection

0: Gain No. 0

1: Gain No. 1

2: Gain No. 2

3: Gain No. 3

P416[3rd digit]: SPD SEL 2 Overtravel spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 3

b. Function

Select the overtravel specification in speed command mode.

c. Setting selection

0: Auto release alarm

With the overtravel ON, the overtravel auto release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

With the overtravel OFF, the overtravel auto release alarm is released.

1: Reset release alarm 1

With the overtravel ON, the overtravel reset release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is not possible.

Switch OFF the overtravel direction command, and switch ON the reset signal (RST).

The overtravel auto release alarm is displayed, and movement in the overtravel release direction is possible.

2: Warning

With the overtravel ON, the overtravel warning occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

With the overtravel OFF, the overtravel warning is released.

3: Reset release alarm 2

With the overtravel ON, the overtravel reset release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

Switch OFF the overtravel direction command, and release overtravel by switching ON the reset signal (RST).

At this time, the alarm display is released even in the overtravel state.

P417: SPD SEL 2 Speed command value

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: -300000000 to 300000000

Indirect data number: -990000000 to -100000000

Initial value: 0

b. Function

Set the internal speed command value.

For indirect data assignment, the following applies.

- For [P416 (1st digit)], set "2: Speed command value/indirect data assignment".
- To specify indirect data, set a negative value.
- If a value outside the indirect data number range, the speed command will be "0".
- Set the indirect data number in the integer digits.

Example) To specify the indirect data IX15 when [P161 (3rd digit)] is set to "2: 0.01", set "-15.00".

P418: SPD SEL 2 Torque limit value

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: -9.9 to 799.9

Initial value: 300.0

b. Function

Set the motor output torque limit value in speed command mode.

If a value exceeding the Peak torque of the motor is set, the output torque is clamped to the Peak torque.

If "0" is set, no torque is generated.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P419[1st digit]: SPD SEL 3 Speed command value spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Select the speed command value specification in speed command mode.

c. Setting selection

0: Speed command value/Setting value of command number 3

1: Reserved

2: Speed command value/indirect data assignment
Speed data stored with the specified indirect data number

P419[2nd digit]: SPD SEL 3 Gain No. selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 0

b. Function

Select the gain number in speed command mode.

c. Setting selection

0: Gain No. 0

1: Gain No. 1

2: Gain No. 2

3: Gain No. 3

P419[3rd digit]: SPD SEL 3 Overtravel spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 3

b. Function

Select the overtravel specification in speed command mode.

c. Setting selection

0: Auto release alarm

With the overtravel ON, the overtravel auto release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

With the overtravel OFF, the overtravel auto release alarm is released.

1: Reset release alarm 1

With the overtravel ON, the overtravel reset release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is not possible.

Switch OFF the overtravel direction command, and switch ON the reset signal (RST).

The overtravel auto release alarm is displayed, and movement in the overtravel release direction is possible.

2: Warning

With the overtravel ON, the overtravel warning occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

With the overtravel OFF, the overtravel warning is released.

3: Reset release alarm 2

With the overtravel ON, the overtravel reset release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

Switch OFF the overtravel direction command, and release overtravel by switching ON the reset signal (RST).

At this time, the alarm display is released even in the overtravel state.

P420: SPD SEL 3 Speed command value

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: -300000000 to 300000000

Indirect data number: -990000000 to -100000000

Initial value: 0

b. Function

Set the internal speed command value.

For indirect data assignment, the following applies.

- For [P419 (1st digit)], set "2: Speed command value/indirect data assignment".
- To specify indirect data, set a negative value.
- If a value outside the indirect data number range, the speed command will be "0".
- Set the indirect data number in the integer digits.

Example) To specify the indirect data IX15 when [P161 (3rd digit)] is set to "2: 0.01", set "-15.00".

P421: SPD SEL 3 Torque limit value

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: -9.9 to 799.9

Initial value: 300.0

b. Function

Set the motor output torque limit value in speed command mode.

If a value exceeding the Peak torque of the motor is set, the output torque is clamped to the Peak torque.

If "0" is set, no torque is generated.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P422[1st digit]: SPD SEL 4 Speed command value spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Select the speed command value specification in speed command mode.

c. Setting selection

0: Speed command value/Setting value of command number 4

1: Reserved

2: Speed command value/indirect data assignment
Speed data stored with the specified indirect data number

P422[2nd digit]: SPD SEL 4 Gain No. selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 0

b. Function

Select the gain number in speed command mode.

c. Setting selection

0: Gain No. 0

1: Gain No. 1

2: Gain No. 2

3: Gain No. 3

P422[3rd digit]: SPD SEL 4 Overtravel spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 3

b. Function

Select the overtravel specification in speed command mode.

c. Setting selection

0: Auto release alarm

With the overtravel ON, the overtravel auto release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

With the overtravel OFF, the overtravel auto release alarm is released.

1: Reset release alarm 1

With the overtravel ON, the overtravel reset release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is not possible.

Switch OFF the overtravel direction command, and switch ON the reset signal (RST).

The overtravel auto release alarm is displayed, and movement in the overtravel release direction is possible.

2: Warning

With the overtravel ON, the overtravel warning occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

With the overtravel OFF, the overtravel warning is released.

3: Reset release alarm 2

With the overtravel ON, the overtravel reset release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

Switch OFF the overtravel direction command, and release overtravel by switching ON the reset signal (RST).

At this time, the alarm display is released even in the overtravel state.

P423: SPD SEL 4 Speed command value

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: -300000000 to 300000000

Indirect data number: -990000000 to -100000000

Initial value: 0

b. Function

Set the internal speed command value.

For indirect data assignment, the following applies.

- For [P422 (1st digit)], set "2: Speed command value/indirect data assignment".
- To specify indirect data, set a negative value.
- If a value outside the indirect data number range, the speed command will be "0".
- Set the indirect data number in the integer digits.

Example) To specify the indirect data IX15 when [P161 (3rd digit)] is set to "2: 0.01", set "-15.00".

P424: SPD SEL 4 Torque limit value

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: -9.9 to 799.9

Initial value: 300.0

b. Function

Set the motor output torque limit value in speed command mode.

If a value exceeding the Peak torque of the motor is set, the output torque is clamped to the Peak torque.

If "0" is set, no torque is generated.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P425[1st digit]: SPD SEL 5 Speed command value spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Select the speed command value specification in speed command mode.

c. Setting selection

0: Speed command value/Setting value of command number 5

1: Reserved

2: Speed command value/indirect data assignment
Speed data stored with the specified indirect data number

P425[2nd digit]: SPD SEL 5 Gain No. selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 0

b. Function

Select the gain number in speed command mode.

c. Setting selection

0: Gain No. 0

1: Gain No. 1

2: Gain No. 2

3: Gain No. 3

P425[3rd digit]: SPD SEL 5 Overtravel spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 3

b. Function

Select the overtravel specification in speed command mode.

c. Setting selection

0: Auto release alarm

With the overtravel ON, the overtravel auto release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

With the overtravel OFF, the overtravel auto release alarm is released.

1: Reset release alarm 1

With the overtravel ON, the overtravel reset release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is not possible.

Switch OFF the overtravel direction command, and switch ON the reset signal (RST).

The overtravel auto release alarm is displayed, and movement in the overtravel release direction is possible.

2: Warning

With the overtravel ON, the overtravel warning occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

With the overtravel OFF, the overtravel warning is released.

3: Reset release alarm 2

With the overtravel ON, the overtravel reset release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

Switch OFF the overtravel direction command, and release overtravel by switching ON the reset signal (RST).

At this time, the alarm display is released even in the overtravel state.

P426: SPD SEL 5 Speed command value

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: -300000000 to 300000000

Indirect data number: -990000000 to -100000000

Initial value: 0

b. Function

Set the internal speed command value.

For indirect data assignment, the following applies.

- For [P425 (1st digit)], set "2: Speed command value/indirect data assignment".
- To specify indirect data, set a negative value.
- If a value outside the indirect data number range, the speed command will be "0".
- Set the indirect data number in the integer digits.

Example) To specify the indirect data IX15 when [P161 (3rd digit)] is set to "2: 0.01", set "-15.00".

P427: SPD SEL 5 Torque limit value

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: -9.9 to 799.9

Initial value: 300.0

b. Function

Set the motor output torque limit value in speed command mode.

If a value exceeding the Peak torque of the motor is set, the output torque is clamped to the Peak torque.

If "0" is set, no torque is generated.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P428[1st digit]: SPD SEL 6 Speed command value spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Select the speed command value specification in speed command mode.

c. Setting selection

0: Speed command value/Setting value of command number 6

1: Reserved

2: Speed command value/indirect data assignment
Speed data stored with the specified indirect data number

P428[2nd digit]: SPD SEL 6 Gain No. selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 0

b. Function

Select the gain number in speed command mode.

c. Setting selection

0: Gain No. 0

1: Gain No. 1

2: Gain No. 2

3: Gain No. 3

P428[3rd digit]: SPD SEL 6 Overtravel spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 3

b. Function

Select the overtravel specification in speed command mode.

c. Setting selection

0: Auto release alarm

With the overtravel ON, the overtravel auto release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

With the overtravel OFF, the overtravel auto release alarm is released.

1: Reset release alarm 1

With the overtravel ON, the overtravel reset release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is not possible.

Switch OFF the overtravel direction command, and switch ON the reset signal (RST).

The overtravel auto release alarm is displayed, and movement in the overtravel release direction is possible.

2: Warning

With the overtravel ON, the overtravel warning occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

With the overtravel OFF, the overtravel warning is released.

3: Reset release alarm 2

With the overtravel ON, the overtravel reset release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

Switch OFF the overtravel direction command, and release overtravel by switching ON the reset signal (RST).

At this time, the alarm display is released even in the overtravel state.

P429: SPD SEL 6 Speed command value

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: -300000000 to 300000000

Indirect data number: -990000000 to -100000000

Initial value: 0

b. Function

Set the internal speed command value.

For indirect data assignment, the following applies.

- For [P428 (1st digit)], set "2: Speed command value/indirect data assignment".
- To specify indirect data, set a negative value.
- If a value outside the indirect data number range, the speed command will be "0".
- Set the indirect data number in the integer digits.

Example) To specify the indirect data IX15 when [P161 (3rd digit)] is set to "2: 0.01", set "-15.00".

P430: SPD SEL 6 Torque limit value

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: -9.9 to 799.9

Initial value: 300.0

b. Function

Set the motor output torque limit value in speed command mode.

If a value exceeding the Peak torque of the motor is set, the output torque is clamped to the Peak torque.

If "0" is set, no torque is generated.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P431[1st digit]: SPD SEL 7 Speed command value spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Select the speed command value specification in speed command mode.

c. Setting selection

0: Speed command value/Setting value of command number 7

1: Reserved

2: Speed command value/indirect data assignment
Speed data stored with the specified indirect data number

P431[2nd digit]: SPD SEL 7 Gain No. selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 0

b. Function

Select the gain number in speed command mode.

c. Setting selection

0: Gain No. 0

1: Gain No. 1

2: Gain No. 2

3: Gain No. 3

P431[3rd digit]: SPD SEL 7 Overtravel spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 3

b. Function

Select the overtravel specification in speed command mode.

c. Setting selection

0: Auto release alarm

With the overtravel ON, the overtravel auto release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

With the overtravel OFF, the overtravel auto release alarm is released.

1: Reset release alarm 1

With the overtravel ON, the overtravel reset release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is not possible.

Switch OFF the overtravel direction command, and switch ON the reset signal (RST).

The overtravel auto release alarm is displayed, and movement in the overtravel release direction is possible.

2: Warning

With the overtravel ON, the overtravel warning occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

With the overtravel OFF, the overtravel warning is released.

3: Reset release alarm 2

With the overtravel ON, the overtravel reset release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

Switch OFF the overtravel direction command, and release overtravel by switching ON the reset signal (RST).

At this time, the alarm display is released even in the overtravel state.

P432: SPD SEL 7 Speed command value

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: -300000000 to 300000000

Indirect data number: -990000000 to -100000000

Initial value: 0

b. Function

Set the internal speed command value.

For indirect data assignment, the following applies.

- For [P431(1st digit)], set "2: Speed command value/indirect data assignment".
- To specify indirect data, set a negative value.
- If a value outside the indirect data number range, the speed command will be "0".
- Set the indirect data number in the integer digits.

Example) To specify the indirect data IX15 when [P161 (3rd digit)] is set to "2: 0.01", set "-15.00".

P433: SPD SEL 7 Torque limit value

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: -9.9 to 799.9

Initial value: 300.0

b. Function

Set the motor output torque limit value in speed command mode.

If a value exceeding the Peak torque of the motor is set, the output torque is clamped to the Peak torque.

If "0" is set, no torque is generated.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P439: Internal torque command Increase/Decrease change time

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0.0 to 9999.9

Initial value: 0.0

b. Function

Set the increase/decrease change time of the internal torque command.

This setting is the time required to reach the rated torque.

P440: Speed limit value at torque command mode

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: 0 to 300000000

Initial value: 0

b. Function

Set the motor operation speed limit value in torque command mode.

If "0" is set, the limit is imposed with 120% of the maximum speed.

P441[1st digit]: TRQ SEL 0 Torque command value spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Select the torque command value specification in torque command mode.

c. Setting selection

0: Torque command value/Setting value of command number 0

1: Reserved

2: Torque command value/indirect data assignment

Torque value stored with the specified indirect data number

P441[2nd digit]: TRQ SEL 0 Gain No. selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 0

b. Function

Select the gain number in torque command mode.

c. Setting selection

0: Gain No. 0

1: Gain No. 1

2: Gain No. 2

3: Gain No. 3

P441[3rd digit]: TRQ SEL 0 Overtravel spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 3

b. Function

Select the overtravel specification in torque command mode.

c. Setting selection

0: Auto release alarm

With the overtravel ON, the overtravel auto release alarm occurs, and the torque becomes zero. In this state, movement in the overtravel release direction is possible.
With the overtravel OFF, the overtravel auto release alarm is released.

1: Reset release alarm 1

With the overtravel ON, the overtravel reset release alarm occurs, and the torque becomes zero. In this state, movement in the overtravel release direction is not possible.
Switch OFF the overtravel direction command, and switch ON the reset signal (RST).
The overtravel auto release alarm is displayed, and movement in the overtravel release direction is possible.

2: Warning

With the overtravel ON, the overtravel warning occurs, and the torque becomes zero. In this state, movement in the overtravel release direction is possible.
With the overtravel OFF, the overtravel warning is released.

3: Reset release alarm 2

With the overtravel ON, the overtravel reset release alarm occurs, and the torque becomes zero. In this state, movement in the overtravel release direction is possible.
Switch OFF the overtravel direction command, and release overtravel by switching ON the reset signal (RST).
At this time, the alarm display is released even in the overtravel state.

P442: TRQ SEL 0 Torque command value

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: -799.9 to 799.9

Indirect data number: -9.9 to -0.1

Initial value: 0.0

b. Function

Set the internal torque command value and the command direction in torque command mode.

For indirect data assignment, the following applies.

- For [P441 (1st digit)], set "2: Torque command value/indirect data assignment".
- To specify indirect data, set a negative value.
- If a value outside the indirect data number range, the torque command will be "0".
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P443: TRQ SEL 0 Speed limit value

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: -990000000 to 300000000

Initial value: 0

b. Function

Set the motor operation speed limit value in torque command mode.

If "0" is set, the limit is imposed with 120% of the maximum speed.

c. Setting selection

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the integer digits.

Example) To specify the indirect data IX15 when [P161 (3rd digit)] is set to "2: 0.01", set "-15.00".

P444[1st digit]: TRQ SEL 1 Torque command value spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Select the torque command value specification in torque command mode.

c. Setting selection

0: Torque command value/Setting value of command number 1

1: Reserved

2: Torque command value/indirect data assignment

Torque value stored with the specified indirect data number

P444[2nd digit]: TRQ SEL 1 Gain No. selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 0

b. Function

Select the gain number in torque command mode.

c. Setting selection

0: Gain No. 0

1: Gain No. 1

2: Gain No. 2

3: Gain No. 3

P444[3rd digit]: TRQ SEL 1 Overtravel spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 3

b. Function

Select the overtravel specification in torque command mode.

c. Setting selection

0: Auto release alarm

With the overtravel ON, the overtravel auto release alarm occurs, and the torque becomes zero. In this state, movement in the overtravel release direction is possible.
With the overtravel OFF, the overtravel auto release alarm is released.

1: Reset release alarm 1

With the overtravel ON, the overtravel reset release alarm occurs, and the torque becomes zero. In this state, movement in the overtravel release direction is not possible.
Switch OFF the overtravel direction command, and switch ON the reset signal (RST).
The overtravel auto release alarm is displayed, and movement in the overtravel release direction is possible.

2: Warning

With the overtravel ON, the overtravel warning occurs, and the torque becomes zero. In this state, movement in the overtravel release direction is possible.
With the overtravel OFF, the overtravel warning is released.

3: Reset release alarm 2

With the overtravel ON, the overtravel reset release alarm occurs, and the torque becomes zero. In this state, movement in the overtravel release direction is possible.
Switch OFF the overtravel direction command, and release overtravel by switching ON the reset signal (RST).
At this time, the alarm display is released even in the overtravel state.

P445: TRQ SEL 1 Torque command value

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: -799.9 to 799.9

Indirect data number: -9.9 to -0.1

Initial value: 0.0

b. Function

Set the internal torque command value and the command direction in torque command mode.

For indirect data assignment, the following applies.

- For [P444 (1st digit)], set "2: Torque command value/indirect data assignment".
- To specify indirect data, set a negative value.
- If a value outside the indirect data number range, the torque command will be "0".
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P446: TRQ SEL 1 Speed limit value

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: -990000000 to 300000000

Initial value: 0

b. Function

Set the motor operation speed limit value in torque command mode.

If "0" is set, the limit is imposed with 120% of the maximum speed.

c. Setting selection

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the integer digits.

Example) To specify the indirect data IX15 when [P161 (3rd digit)] is set to "2: 0.01", set "-15.00".

P447[1st digit]: TRQ SEL 2 Torque command value spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Select the torque command value specification in torque command mode.

c. Setting selection

0: Torque command value/Setting value of command number 2

1: Reserved

2: Torque command value/indirect data assignment

Torque value stored with the specified indirect data number

P447[2nd digit]: TRQ SEL 2 Gain No. selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 0

b. Function

Select the gain number in torque command mode.

c. Setting selection

0: Gain No. 0

1: Gain No. 1

2: Gain No. 2

3: Gain No. 3

P447[3rd digit]: TRQ SEL 2 Overtravel spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 3

b. Function

Select the overtravel specification in torque command mode.

c. Setting selection

0: Auto release alarm

With the overtravel ON, the overtravel auto release alarm occurs, and the torque becomes zero. In this state, movement in the overtravel release direction is possible.
With the overtravel OFF, the overtravel auto release alarm is released.

1: Reset release alarm 1

With the overtravel ON, the overtravel reset release alarm occurs, and the torque becomes zero. In this state, movement in the overtravel release direction is not possible.
Switch OFF the overtravel direction command, and switch ON the reset signal (RST).
The overtravel auto release alarm is displayed, and movement in the overtravel release direction is possible.

2: Warning

With the overtravel ON, the overtravel warning occurs, and the torque becomes zero. In this state, movement in the overtravel release direction is possible.
With the overtravel OFF, the overtravel warning is released.

3: Reset release alarm 2

With the overtravel ON, the overtravel reset release alarm occurs, and the torque becomes zero. In this state, movement in the overtravel release direction is possible.
Switch OFF the overtravel direction command, and release overtravel by switching ON the reset signal (RST).
At this time, the alarm display is released even in the overtravel state.

P448: TRQ SEL 2 Torque command value

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: -799.9 to 799.9

Indirect data number: -9.9 to -0.1

Initial value: 0.0

b. Function

Set the internal torque command value and the command direction in torque command mode.

For indirect data assignment, the following applies.

- For [P447 (1st digit)], set "2: Torque command value/indirect data assignment".
- To specify indirect data, set a negative value.
- If a value outside the indirect data number range, the torque command will be "0".
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P449: TRQ SEL 2 Speed limit value

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: -990000000 to 300000000

Initial value: 0

b. Function

Set the motor operation speed limit value in torque command mode.

If "0" is set, the limit is imposed with 120% of the maximum speed.

c. Setting selection

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the integer digits.

Example) To specify the indirect data IX15 when [P161 (3rd digit)] is set to "2: 0.01", set "-15.00".

P450[1st digit]: TRQ SEL 3 Torque command value spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Select the torque command value specification in torque command mode.

c. Setting selection

0: Torque command value/Setting value of command number 3

1: Reserved

2: Torque command value/indirect data assignment

Torque value stored with the specified indirect data number

P450[2nd digit]: TRQ SEL 3 Gain No. selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 0

b. Function

Select the gain number in torque command mode.

c. Setting selection

0: Gain No. 0

1: Gain No. 1

2: Gain No. 2

3: Gain No. 3

P450[3rd digit]: TRQ SEL 3 Overtravel spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 3

b. Function

Select the overtravel specification in torque command mode.

c. Setting selection

0: Auto release alarm

With the overtravel ON, the overtravel auto release alarm occurs, and the torque becomes zero. In this state, movement in the overtravel release direction is possible.
With the overtravel OFF, the overtravel auto release alarm is released.

1: Reset release alarm 1

With the overtravel ON, the overtravel reset release alarm occurs, and the torque becomes zero. In this state, movement in the overtravel release direction is not possible.
Switch OFF the overtravel direction command, and switch ON the reset signal (RST).
The overtravel auto release alarm is displayed, and movement in the overtravel release direction is possible.

2: Warning

With the overtravel ON, the overtravel warning occurs, and the torque becomes zero. In this state, movement in the overtravel release direction is possible.
With the overtravel OFF, the overtravel warning is released.

3: Reset release alarm 2

With the overtravel ON, the overtravel reset release alarm occurs, and the torque becomes zero. In this state, movement in the overtravel release direction is possible.
Switch OFF the overtravel direction command, and release overtravel by switching ON the reset signal (RST).
At this time, the alarm display is released even in the overtravel state.

P451: TRQ SEL 3 Torque command value

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: -799.9 to 799.9

Indirect data number: -9.9 to -0.1

Initial value: 0.0

b. Function

Set the internal torque command value and the command direction in torque command mode.

For indirect data assignment, the following applies.

- For [P450 (1st digit)], set "2: Torque command value/indirect data assignment".
- To specify indirect data, set a negative value.
- If a value outside the indirect data number range, the torque command will be "0".
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P452: TRQ SEL 3 Speed limit value

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: -990000000 to 300000000

Initial value: 0

b. Function

Set the internal torque command value and the command direction in torque command mode.

If "0" is set, the limit is imposed with 120% of the maximum speed.

c. Setting selection

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the integer digits.

Example) To specify the indirect data IX15 when [P161 (3rd digit)] is set to "2: 0.01", set "-15.00".

P453[1st digit]: TRQ SEL 4 Torque command value spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Select the torque command value specification in torque command mode.

c. Setting selection

0: Torque command value/Setting value of command number 4

1: Reserved

2: Torque command value/indirect data assignment

Torque value stored with the specified indirect data number

P453[2nd digit]: TRQ SEL 4 Gain No. selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 0

b. Function

Select the gain number in torque command mode.

c. Setting selection

0: Gain No. 0

1: Gain No. 1

2: Gain No. 2

3: Gain No. 3

P453[3rd digit]: TRQ SEL 4 Overtravel spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 3

b. Function

Select the overtravel specification in torque command mode.

c. Setting selection

0: Auto release alarm

With the overtravel ON, the overtravel auto release alarm occurs, and the torque becomes zero. In this state, movement in the overtravel release direction is possible.
With the overtravel OFF, the overtravel auto release alarm is released.

1: Reset release alarm 1

With the overtravel ON, the overtravel reset release alarm occurs, and the torque becomes zero. In this state, movement in the overtravel release direction is not possible.
Switch OFF the overtravel direction command, and switch ON the reset signal (RST).
The overtravel auto release alarm is displayed, and movement in the overtravel release direction is possible.

2: Warning

With the overtravel ON, the overtravel warning occurs, and the torque becomes zero. In this state, movement in the overtravel release direction is possible.
With the overtravel OFF, the overtravel warning is released.

3: Reset release alarm 2

With the overtravel ON, the overtravel reset release alarm occurs, and the torque becomes zero. In this state, movement in the overtravel release direction is possible.
Switch OFF the overtravel direction command, and release overtravel by switching ON the reset signal (RST).
At this time, the alarm display is released even in the overtravel state.

P454: TRQ SEL 4 Torque command value

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: -799.9 to 799.9

Indirect data number: -9.9 to -0.1

Initial value: 0.0

b. Function

Set the internal torque command value and the command direction in torque command mode.

For indirect data assignment, the following applies.

- For [P453 (1st digit)], set "2: Torque command value/indirect data assignment".
- To specify indirect data, set a negative value.
- If a value outside the indirect data number range, the torque command will be "0".
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P455: TRQ SEL 4 Speed limit value

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: -990000000 to 300000000

Initial value: 0

b. Function

Set the motor operation speed limit value in torque command mode.

If "0" is set, the limit is imposed with 120% of the maximum speed.

c. Setting selection

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the integer digits.

Example) To specify the indirect data IX15 when [P161 (3rd digit)] is set to "2: 0.01", set "-15.00".

P456[1st digit]: TRQ SEL 5 Torque command value spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Select the torque command value specification in torque command mode.

c. Setting selection

0: Torque command value/Setting value of command number 5

1: Reserved

2: Torque command value/indirect data assignment

Torque value stored with the specified indirect data number

P456[2nd digit]: TRQ SEL 5 Gain No. selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 0

b. Function

Select the gain number in torque command mode.

c. Setting selection

0: Gain No. 0

1: Gain No. 1

2: Gain No. 2

3: Gain No. 3

P456[3rd digit]: TRQ SEL 5 Overtravel spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 3

b. Function

Select the overtravel specification in torque command mode.

c. Setting selection

0: Auto release alarm

With the overtravel ON, the overtravel auto release alarm occurs, and the torque becomes zero. In this state, movement in the overtravel release direction is possible.
With the overtravel OFF, the overtravel auto release alarm is released.

1: Reset release alarm 1

With the overtravel ON, the overtravel reset release alarm occurs, and the torque becomes zero. In this state, movement in the overtravel release direction is not possible.
Switch OFF the overtravel direction command, and switch ON the reset signal (RST).
The overtravel auto release alarm is displayed, and movement in the overtravel release direction is possible.

2: Warning

With the overtravel ON, the overtravel warning occurs, and the torque becomes zero. In this state, movement in the overtravel release direction is possible.
With the overtravel OFF, the overtravel warning is released.

3: Reset release alarm 2

With the overtravel ON, the overtravel reset release alarm occurs, and the torque becomes zero. In this state, movement in the overtravel release direction is possible.
Switch OFF the overtravel direction command, and release overtravel by switching ON the reset signal (RST).
At this time, the alarm display is released even in the overtravel state.

P457: TRQ SEL 5 Torque command value

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: -799.9 to 799.9

Indirect data number: -9.9 to -0.1

Initial value: 0.0

b. Function

Set the internal torque command value and the command direction in torque command mode.

For indirect data assignment, the following applies.

- For [P456 (1st digit)], set "2: Torque command value/indirect data assignment".
- To specify indirect data, set a negative value.
- If a value outside the indirect data number range, the torque command will be "0".
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P458: TRQ SEL 5 Speed limit value

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: -990000000 to 300000000

Initial value: 0

b. Function

Set the motor operation speed limit value in torque command mode.

If "0" is set, the limit is imposed with 120% of the maximum speed.

c. Setting selection

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the integer digits.

Example) To specify the indirect data IX15 when [P161 (3rd digit)] is set to "2: 0.01", set "-15.00".

P459[1st digit]: TRQ SEL 6 Torque command value spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Select the torque command value specification in torque command mode.

c. Setting selection

0: Torque command value/Setting value of command number 6

1: Reserved

2: Torque command value/indirect data assignment

Torque value stored with the specified indirect data number

P459[2nd digit]: TRQ SEL 6 Gain No. selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 0

b. Function

Select the gain number in torque command mode.

c. Setting selection

0: Gain No. 0

1: Gain No. 1

2: Gain No. 2

3: Gain No. 3

P459[3rd digit]: TRQ SEL 6 Overtravel spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 3

b. Function

Select the overtravel specification in torque command mode.

c. Setting selection

0: Auto release alarm

With the overtravel ON, the overtravel auto release alarm occurs, and the torque becomes zero. In this state, movement in the overtravel release direction is possible.
With the overtravel OFF, the overtravel auto release alarm is released.

1: Reset release alarm 1

With the overtravel ON, the overtravel reset release alarm occurs, and the torque becomes zero. In this state, movement in the overtravel release direction is not possible.
Switch OFF the overtravel direction command, and switch ON the reset signal (RST).
The overtravel auto release alarm is displayed, and movement in the overtravel release direction is possible.

2: Warning

With the overtravel ON, the overtravel warning occurs, and the torque becomes zero. In this state, movement in the overtravel release direction is possible.
With the overtravel OFF, the overtravel warning is released.

3: Reset release alarm 2

With the overtravel ON, the overtravel reset release alarm occurs, and the torque becomes zero. In this state, movement in the overtravel release direction is possible.
Switch OFF the overtravel direction command, and release overtravel by switching ON the reset signal (RST).
At this time, the alarm display is released even in the overtravel state.

P460: TRQ SEL 6 Torque command value

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: -799.9 to 799.9

Indirect data number: -9.9 to -0.1

Initial value: 0.0

b. Function

Set the internal torque command value and the command direction in torque command mode.

For indirect data assignment, the following applies.

- For [P459 (1st digit)], set "2: Torque command value/indirect data assignment".
- To specify indirect data, set a negative value.
- If a value outside the indirect data number range, the torque command will be "0".
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P461: TRQ SEL 6 Speed limit value

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: -990000000 to 300000000

Initial value: 0

b. Function

Set the motor operation speed limit value in torque command mode.

If "0" is set, the limit is imposed with 120% of the maximum speed.

c. Setting selection

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the integer digits.

Example) To specify the indirect data IX15 when [P161 (3rd digit)] is set to "2: 0.01", set "-15.00".

P462[1st digit]: TRQ SEL 7 Torque command value spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Select the torque command value specification in torque command mode.

c. Setting selection

0: Torque command value/Setting value of command number 7

1: Reserved

2: Torque command value/indirect data assignment

Torque value stored with the specified indirect data number

P462[2nd digit]: TRQ SEL 7 Gain No. selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 0

b. Function

Select the gain number in torque command mode.

c. Setting selection

0: Gain No. 0

1: Gain No. 1

2: Gain No. 2

3: Gain No. 3

P462[3rd digit]: TRQ SEL 7 Overtravel spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 3

b. Function

Select the overtravel specification in torque command mode.

c. Setting selection

0: Auto release alarm

With the overtravel ON, the overtravel auto release alarm occurs, and the torque becomes zero. In this state, movement in the overtravel release direction is possible.
With the overtravel OFF, the overtravel auto release alarm is released.

1: Reset release alarm 1

With the overtravel ON, the overtravel reset release alarm occurs, and the torque becomes zero. In this state, movement in the overtravel release direction is not possible.
Switch OFF the overtravel direction command, and switch ON the reset signal (RST).
The overtravel auto release alarm is displayed, and movement in the overtravel release direction is possible.

2: Warning

With the overtravel ON, the overtravel warning occurs, and the torque becomes zero. In this state, movement in the overtravel release direction is possible.
With the overtravel OFF, the overtravel warning is released.

3: Reset release alarm 2

With the overtravel ON, the overtravel reset release alarm occurs, and the torque becomes zero. In this state, movement in the overtravel release direction is possible.
Switch OFF the overtravel direction command, and release overtravel by switching ON the reset signal (RST).
At this time, the alarm display is released even in the overtravel state.

P463: TRQ SEL 7 Torque command value

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: -799.9 to 799.9

Indirect data number: -9.9 to -0.1

Initial value: 0.0

b. Function

Set the internal torque command value and the command direction in torque command mode.

For indirect data assignment, the following applies.

- For [P462 (1st digit)], set "2: Torque command value/indirect data assignment".
- To specify indirect data, set a negative value.
- If a value outside the indirect data number range, the torque command will be "0".
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P464: TRQ SEL 7 Speed limit value

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: -990000000 to 300000000

Initial value: 0

b. Function

Set the motor operation speed limit value in torque command mode.

If "0" is set, the limit is imposed with 120% of the maximum speed.

c. Setting selection

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the integer digits.

Example) To specify the indirect data IX15 when [P161 (3rd digit)] is set to "2: 0.01", set "-15.00".

P516[1st digit]: Positioning approval selection when homing is not completed

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Select the positioning approval specification when homing is not completed.

c. Setting selection

0: INC positioning permitted

1: ABS/INC positioning permitted

2: Positioning not allowed

P517[1st digit]: SEL 0 Homing complete signal selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 1

Initial value: 0

b. Function

Select the positioning completion signal in built-in command mode.

c. Setting selection

0: PN1

1: PN2

P517[2nd digit]: SEL 0 Gain No. selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 0

b. Function

Select the gain number in built-in command mode.

c. Setting selection

0: Gain No. 0

1: Gain No. 1

2: Gain No. 2

3: Gain No. 3

P517[3rd digit]: SEL 0 Overtravel spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 3

b. Function

Select the overtravel specification in built-in command mode.

For the software overtravel state, however, the specification is fixed to "reset release alarm".

c. Setting selection

0: Auto release alarm

With the overtravel ON, the overtravel auto release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

With the overtravel OFF, the overtravel auto release alarm is released.

1: Reset release alarm 1

With the overtravel ON, the overtravel reset release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is not possible.

With the reset ON, the overtravel auto release alarm is displayed, and movement in the overtravel release direction is possible.

2: Warning

With the overtravel ON, the overtravel warning occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

With the overtravel OFF, the overtravel warning is released.

3: Reset release alarm 2

With the overtravel ON, the overtravel reset release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

With a reset, the overtravel reset release alarm display is released.

At this time, the alarm display is released even in the overtravel state.

P518: SEL 0 Acceleration standard speed

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: -990000000 to 300000000

Initial value: 0

b. Function

Set the acceleration standard speed in built-in command mode.

If "0" is set, the acceleration standard speed is the maximum speed.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the integer digits.

Example) To specify the indirect data IX15 when [P161 (3rd digit)] is set to "2: 0.01", set "-15.00".

P519: SEL 0 Deceleration standard speed

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: -990000000 to 300000000

Initial value: 0

b. Function

Set the deceleration standard speed in built-in command mode.

If "0" is set, the deceleration standard speed is the maximum speed.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the integer digits.

Example) To specify the indirect data IX15 when [P161 (3rd digit)] is set to "2: 0.01", set "-15.00".

P520: SEL 0 Acceleration time

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: -9.9 to 99999.9

Initial value: 500.0

b. Function

Set the acceleration time in built-in command mode.

This setting is the time required to reach the acceleration standard speed from the motor stop status.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P521: SEL 0 Deceleration time

a. Setting item
Activating timing: Real-time
Setting unit: ms
Setting range: -9.9 to 99999.9
Initial value: 500.0

b. Function
Set the deceleration time in built-in command mode.
This setting is the time required to reach the deceleration standard speed from the motor stop status.
For indirect data assignment, the following applies.
• To specify indirect data, set a negative value.
• Set the indirect data number in the lower two digits, regardless of the decimal point.
Example) To specify the indirect data IX15, set "-1.5".

P522: SEL 0 S-curve time 1

a. Setting item
Activating timing: Real-time
Setting unit: ms
Setting range: -9.9 to 1000.0
Initial value: 10.0

b. Function
Set the S-curve acceleration/deceleration time in built-in command mode.
For indirect data assignment, the following applies.
• To specify indirect data, set a negative value.
• Set the indirect data number in the lower two digits, regardless of the decimal point.
Example) To specify the indirect data IX15, set "-1.5".

P523: SEL 0 Torque limit value

a. Setting item
Activating timing: Real-time
Setting unit: %
Setting range: -9.9 to 799.9
Initial value: 300.0

b. Function
Set the torque limit value in built-in command mode.
If a value exceeding the Peak torque of the motor is set, the output torque is clamped to the Peak torque.
For indirect data assignment, the following applies.
• To specify indirect data, set a negative value.
• Set the indirect data number in the lower two digits, regardless of the decimal point.
Example) To specify the indirect data IX15, set "-1.5".

P524[1st digit]: SEL 1 Homing complete signal selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 1

Initial value: 0

b. Function

Select the positioning completion signal in built-in command mode.

c. Setting selection

0: PN1

1: PN2

P524[2nd digit]: SEL 1 Gain No. selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 0

b. Function

Select the gain number in built-in command mode.

c. Setting selection

0: Gain No. 0

1: Gain No. 1

2: Gain No. 2

3: Gain No. 3

P524[3rd digit]: SEL 1 Overtravel spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 3

b. Function

Select the overtravel specification in built-in command mode.

For the software overtravel state, however, the specification is fixed to "reset release alarm".

c. Setting selection

0: Auto release alarm

With the overtravel ON, the overtravel auto release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

With the overtravel OFF, the overtravel auto release alarm is released.

1: Reset release alarm 1

With the overtravel ON, the overtravel reset release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is not possible.

With the reset ON, the overtravel auto release alarm is displayed, and movement in the overtravel release direction is possible.

2: Warning

With the overtravel ON, the overtravel warning occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

With the overtravel OFF, the overtravel warning is released.

3: Reset release alarm 2

With the overtravel ON, the overtravel reset release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

With a reset, the overtravel reset release alarm display is released.

At this time, the alarm display is released even in the overtravel state.

P525: SEL 1 Acceleration standard speed

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: -990000000 to 300000000

Initial value: 0

b. Function

Set the acceleration standard speed in built-in command mode.

If "0" is set, the acceleration standard speed is the maximum speed.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the integer digits.

Example) To specify the indirect data IX15 when [P161 (3rd digit)] is set to "2: 0.01", set "-15.00".

P526: SEL 1 Deceleration standard speed

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: -990000000 to 300000000

Initial value: 0

b. Function

Set the deceleration standard speed in built-in command mode.

If "0" is set, the deceleration standard speed is the maximum speed.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the integer digits.

Example) To specify the indirect data IX15 when [P161 (3rd digit)] is set to "2: 0.01", set "-15.00".

P527: SEL 1 Acceleration time

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: -9.9 to 99999.9

Initial value: 500.0

b. Function

Set the acceleration time in built-in command mode.

This setting is the time required to reach the acceleration standard speed from the motor stop status.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P528: SEL 1 Deceleration time

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: -9.9 to 99999.9

Initial value: 500.0

b. Function

Set the deceleration time in built-in command mode.

This setting is the time required to reach the deceleration standard speed from the motor stop status.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P529: SEL 1 S-curve time 1

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: -9.9 to 1000.0

Initial value: 10.0

b. Function

Set the S-curve acceleration/deceleration time in built-in command mode.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P530: SEL 1 Torque limit value

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: -9.9 to 799.9

Initial value: 300.0

b. Function

Set the torque limit value in built-in command mode.

If a value exceeding the Peak torque of the motor is set, the output torque is clamped to the Peak torque.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P531[1st digit]: SEL 2 Homing complete signal selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 1

Initial value: 0

b. Function

Select the positioning completion signal in built-in command mode.

c. Setting selection

0: PN1

1: PN2

P531[2nd digit]: SEL 2 Gain No. selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 0

b. Function

Select the gain number in built-in command mode.

c. Setting selection

0: Gain No. 0

1: Gain No. 1

2: Gain No. 2

3: Gain No. 3

P531[3rd digit]: SEL 2 Overtravel spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 3

b. Function

Select the overtravel specification in built-in command mode.

For the software overtravel state, however, the specification is fixed to "reset release alarm".

c. Setting selection

0: Auto release alarm

With the overtravel ON, the overtravel auto release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

With the overtravel OFF, the overtravel auto release alarm is released.

1: Reset release alarm 1

With the overtravel ON, the overtravel reset release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is not possible.

With the reset ON, the overtravel auto release alarm is displayed, and movement in the overtravel release direction is possible.

2: Warning

With the overtravel ON, the overtravel warning occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

With the overtravel OFF, the overtravel warning is released.

3: Reset release alarm 2

With the overtravel ON, the overtravel reset release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

With a reset, the overtravel reset release alarm display is released.

At this time, the alarm display is released even in the overtravel state.

P532: SEL 2 Acceleration standard speed

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: -990000000 to 300000000

Initial value: 0

b. Function

Set the acceleration standard speed in built-in command mode.

If "0" is set, the acceleration standard speed is the maximum speed.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the integer digits.

Example) To specify the indirect data IX15 when [P161 (3rd digit)] is set to "2: 0.01", set "-15.00".

P533: SEL 2 Deceleration standard speed

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: -990000000 to 300000000

Initial value: 0

b. Function

Set the deceleration standard speed in built-in command mode.

If "0" is set, the deceleration standard speed is the maximum speed.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the integer digits.

Example) To specify the indirect data IX15 when [P161 (3rd digit)] is set to "2: 0.01", set "-15.00".

P534: SEL 2 Acceleration time

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: -9.9 to 99999.9

Initial value: 500.0

b. Function

Set the acceleration time in built-in command mode.

This setting is the time required to reach the acceleration standard speed from the motor stop status.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P535: SEL 2 Deceleration time

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: -9.9 to 99999.9

Initial value: 500.0

b. Function

Set the deceleration time in built-in command mode.

This setting is the time required to reach the deceleration standard speed from the motor stop status.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P536: SEL 2 S-curve time 1

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: -9.9 to 1000.0

Initial value: 10.0

b. Function

Set the S-curve acceleration/deceleration time in built-in command mode.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P537: SEL 2 Torque limit value

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: -9.9 to 799.9

Initial value: 300.0

b. Function

Set the torque limit value in built-in command mode.

If a value exceeding the Peak torque of the motor is set, the output torque is clamped to the Peak torque.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P538[1st digit]: SEL 3 Homing complete signal selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 1

Initial value: 0

b. Function

Select the positioning completion signal in built-in command mode.

c. Setting selection

0: PN1

1: PN2

P538[2nd digit]: SEL 3 Gain No. selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 0

b. Function

Select the gain number in built-in command mode.

c. Setting selection

0: Gain No. 0

1: Gain No. 1

2: Gain No. 2

3: Gain No. 3

P538[3rd digit]: SEL 3 Overtravel spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 3

b. Function

Select the overtravel specification in built-in command mode.

For the software overtravel state, however, the specification is fixed to "reset release alarm".

c. Setting selection

0: Auto release alarm

With the overtravel ON, the overtravel auto release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

With the overtravel OFF, the overtravel auto release alarm is released.

1: Reset release alarm 1

With the overtravel ON, the overtravel reset release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is not possible.

With the reset ON, the overtravel auto release alarm is displayed, and movement in the overtravel release direction is possible.

2: Warning

With the overtravel ON, the overtravel warning occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

With the overtravel OFF, the overtravel warning is released.

3: Reset release alarm 2

With the overtravel ON, the overtravel reset release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

With a reset, the overtravel reset release alarm display is released.

At this time, the alarm display is released even in the overtravel state.

P539: SEL 3 Acceleration standard speed

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: -990000000 to 300000000

Initial value: 0

b. Function

Set the acceleration standard speed in built-in command mode.

If "0" is set, the acceleration standard speed is the maximum speed.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the integer digits.

Example) To specify the indirect data IX15 when [P161 (3rd digit)] is set to "2: 0.01", set "-15.00".

P540: SEL 3 Deceleration standard speed

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: -990000000 to 300000000

Initial value: 0

b. Function

Set the deceleration standard speed in built-in command mode.

If "0" is set, the deceleration standard speed is the maximum speed.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the integer digits.

Example) To specify the indirect data IX15 when [P161 (3rd digit)] is set to "2: 0.01", set "-15.00".

P541: SEL 3 Acceleration time

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: -9.9 to 99999.9

Initial value: 500.0

b. Function

Set the acceleration time in built-in command mode.

This setting is the time required to reach the acceleration standard speed from the motor stop status.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P542: SEL 3 Deceleration time

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: -9.9 to 99999.9

Initial value: 500.0

b. Function

Set the deceleration time in built-in command mode.

This setting is the time required to reach the deceleration standard speed from the motor stop status.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P543: SEL 3 S-curve time 1

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: -9.9 to 1000.0

Initial value: 10.0

b. Function

Set the S-curve acceleration/deceleration time in built-in command mode.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P544: SEL 3 Torque limit value

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: -9.9 to 799.9

Initial value: 300.0

b. Function

Set the torque limit value in built-in command mode.

If a value exceeding the Peak torque of the motor is set, the output torque is clamped to the Peak torque.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P545[1st digit]: SEL 4 Homing complete signal selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 1

Initial value: 0

b. Function

Select the positioning completion signal in built-in command mode.

c. Setting selection

0: PN1

1: PN2

P545[2nd digit]: SEL 4 Gain No. selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 0

b. Function

Select the gain number in built-in command mode.

c. Setting selection

0: Gain No. 0

1: Gain No. 1

2: Gain No. 2

3: Gain No. 3

P545[3rd digit]: SEL 4 Overtravel spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 3

b. Function

Select the overtravel specification in built-in command mode.

For the software overtravel state, however, the specification is fixed to "reset release alarm".

c. Setting selection

0: Auto release alarm

With the overtravel ON, the overtravel auto release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

With the overtravel OFF, the overtravel auto release alarm is released.

1: Reset release alarm 1

With the overtravel ON, the overtravel reset release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is not possible.

With the reset ON, the overtravel auto release alarm is displayed, and movement in the overtravel release direction is possible.

2: Warning

With the overtravel ON, the overtravel warning occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

With the overtravel OFF, the overtravel warning is released.

3: Reset release alarm 2

With the overtravel ON, the overtravel reset release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

With a reset, the overtravel reset release alarm display is released.

At this time, the alarm display is released even in the overtravel state.

P546: SEL 4 Acceleration standard speed

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: -990000000 to 300000000

Initial value: 0

b. Function

Set the acceleration standard speed in built-in command mode.

If "0" is set, the acceleration standard speed is the maximum speed.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the integer digits.

Example) To specify the indirect data IX15 when [P161 (3rd digit)] is set to "2: 0.01", set "-15.00".

P547: SEL 4 Deceleration standard speed

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: -990000000 to 300000000

Initial value: 0

b. Function

Set the deceleration standard speed in built-in command mode.

If "0" is set, the deceleration standard speed is the maximum speed.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the integer digits.

Example) To specify the indirect data IX15 when [P161 (3rd digit)] is set to "2: 0.01", set "-15.00".

P548: SEL 4 Acceleration time

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: -9.9 to 99999.9

Initial value: 500.0

b. Function

Set the acceleration time in built-in command mode.

This setting is the time required to reach the acceleration standard speed from the motor stop status.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P549: SEL 4 Deceleration time

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: -9.9 to 99999.9

Initial value: 500.0

b. Function

Set the deceleration time in built-in command mode.

This setting is the time required to reach the deceleration standard speed from the motor stop status.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P550: SEL 4 S-curve time 1

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: -9.9 to 1000.0

Initial value: 10.0

b. Function

Set the S-curve acceleration/deceleration time in built-in command mode.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P551: SEL 4 Torque limit value

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: -9.9 to 799.9

Initial value: 300.0

b. Function

Set the torque limit value in built-in command mode.

If a value exceeding the Peak torque of the motor is set, the output torque is clamped to the Peak torque.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P552[1st digit]: SEL 5 Homing complete signal selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 1

Initial value: 0

b. Function

Select the positioning completion signal in built-in command mode.

c. Setting selection

0: PN1

1: PN2

P552[2nd digit]: SEL 5 Gain No. selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 0

b. Function

Select the gain number in built-in command mode.

c. Setting selection

0: Gain No. 0

1: Gain No. 1

2: Gain No. 2

3: Gain No. 3

P552[3rd digit]: SEL 5 Overtravel spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 3

b. Function

Select the overtravel specification in built-in command mode.

For the software overtravel state, however, the specification is fixed to "reset release alarm".

c. Setting selection

0: Auto release alarm

With the overtravel ON, the overtravel auto release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

With the overtravel OFF, the overtravel auto release alarm is released.

1: Reset release alarm 1

With the overtravel ON, the overtravel reset release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is not possible.

With the reset ON, the overtravel auto release alarm is displayed, and movement in the overtravel release direction is possible.

2: Warning

With the overtravel ON, the overtravel warning occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

With the overtravel OFF, the overtravel warning is released.

3: Reset release alarm 2

With the overtravel ON, the overtravel reset release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

With a reset, the overtravel reset release alarm display is released.

At this time, the alarm display is released even in the overtravel state.

P553: SEL 5 Acceleration standard speed

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: -990000000 to 300000000

Initial value: 0

b. Function

Set the acceleration standard speed in built-in command mode.

If "0" is set, the acceleration standard speed is the maximum speed.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the integer digits.

Example) To specify the indirect data IX15 when [P161 (3rd digit)] is set to "2: 0.01", set "-15.00".

P554: SEL 5 Deceleration standard speed

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: -990000000 to 300000000

Initial value: 0

b. Function

Set the deceleration standard speed in built-in command mode.

If "0" is set, the deceleration standard speed is the maximum speed.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the integer digits.

Example) To specify the indirect data IX15 when [P161 (3rd digit)] is set to "2: 0.01", set "-15.00".

P555: SEL 5 Acceleration time

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: -9.9 to 99999.9

Initial value: 500.0

b. Function

Set the acceleration time in built-in command mode.

This setting is the time required to reach the acceleration standard speed from the motor stop status.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P556: SEL 5 Deceleration time

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: -9.9 to 99999.9

Initial value: 500.0

b. Function

Set the deceleration time in built-in command mode.

This setting is the time required to reach the deceleration standard speed from the motor stop status.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P557: SEL 5 S-curve time 1

a. Setting item
Activating timing: Real-time
Setting unit: ms
Setting range: -9.9 to 1000.0
Initial value: 10.0

b. Function
Set the S-curve acceleration/deceleration time in built-in command mode.
For indirect data assignment, the following applies.
• To specify indirect data, set a negative value.
• Set the indirect data number in the lower two digits, regardless of the decimal point.
Example) To specify the indirect data IX15, set "-1.5".

P558: SEL 5 Torque limit value

a. Setting item
Activating timing: Real-time
Setting unit: %
Setting range: -9.9 to 799.9
Initial value: 300.0

b. Function
Set the torque limit value in built-in command mode.
If a value exceeding the Peak torque of the motor is set, the output torque is clamped to the Peak torque.
For indirect data assignment, the following applies.
• To specify indirect data, set a negative value.
• Set the indirect data number in the lower two digits, regardless of the decimal point.
Example) To specify the indirect data IX15, set "-1.5".

P559[1st digit]: SEL 6 Homing complete signal selection

a. Setting item
Activating timing: Real-time
Setting range: 0 to 1
Initial value: 0

b. Function
Select the positioning completion signal in built-in command mode.

c. Setting selection
0: PN1
1: PN2

P559[2nd digit]: SEL 6 Gain No. selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 0

b. Function

Select the gain number in built-in command mode.

c. Setting selection

0: Gain No. 0

1: Gain No. 1

2: Gain No. 2

3: Gain No. 3

P559[3rd digit]: SEL 6 Overtravel spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 3

b. Function

Select the overtravel specification in built-in command mode.

For the software overtravel state, however, the specification is fixed to "reset release alarm".

c. Setting selection

0: Auto release alarm

With the overtravel ON, the overtravel auto release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

With the overtravel OFF, the overtravel auto release alarm is released.

1: Reset release alarm 1

With the overtravel ON, the overtravel reset release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is not possible.

With the reset ON, the overtravel auto release alarm is displayed, and movement in the overtravel release direction is possible.

2: Warning

With the overtravel ON, the overtravel warning occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

With the overtravel OFF, the overtravel warning is released.

3: Reset release alarm 2

With the overtravel ON, the overtravel reset release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

With a reset, the overtravel reset release alarm display is released.

At this time, the alarm display is released even in the overtravel state.

P560: SEL 6 Acceleration standard speed

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: -990000000 to 300000000

Initial value: 0

b. Function

Set the acceleration standard speed in built-in command mode.

If "0" is set, the acceleration standard speed is the maximum speed.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the integer digits.

Example) To specify the indirect data IX15 when [P161 (3rd digit)] is set to "2: 0.01", set "-15.00".

P561: SEL 6 Deceleration standard speed

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: -990000000 to 300000000

Initial value: 0

b. Function

Set the deceleration standard speed in built-in command mode.

If "0" is set, the deceleration standard speed is the maximum speed.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the integer digits.

Example) To specify the indirect data IX15 when [P161 (3rd digit)] is set to "2: 0.01", set "-15.00".

P562: SEL 6 Acceleration time

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: -9.9 to 99999.9

Initial value: 500.0

b. Function

Set the acceleration time in built-in command mode.

This setting is the time required to reach the acceleration standard speed from the motor stop status.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P563: SEL 6 Deceleration time

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: -9.9 to 99999.9

Initial value: 500.0

b. Function

Set the deceleration time in built-in command mode.

This setting is the time required to reach the deceleration standard speed from the motor stop status.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P564: SEL 6 S-curve time 1

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: -9.9 to 1000.0

Initial value: 10.0

b. Function

Set the S-curve acceleration/deceleration time in built-in command mode.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P565: SEL 6 Torque limit value

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: -9.9 to 799.9

Initial value: 300.0

b. Function

Set the torque limit value in built-in command mode.

If a value exceeding the Peak torque of the motor is set, the output torque is clamped to the Peak torque.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P566[1st digit]: SEL 7 Homing complete signal selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 1

Initial value: 0

b. Function

Select the positioning completion signal in built-in command mode.

c. Setting selection

0: PN1

1: PN2

P566[2nd digit]: SEL 7 Gain No. selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 0

b. Function

Select the gain number in built-in command mode.

c. Setting selection

0: Gain No. 0

1: Gain No. 1

2: Gain No. 2

3: Gain No. 3

P566[3rd digit]: SEL 7 Overtravel spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 3

b. Function

Select the overtravel specification in built-in command mode.

For the software overtravel state, however, the specification is fixed to "reset release alarm".

c. Setting selection

0: Auto release alarm

With the overtravel ON, the overtravel auto release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

With the overtravel OFF, the overtravel auto release alarm is released.

1: Reset release alarm 1

With the overtravel ON, the overtravel reset release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is not possible.

With the reset ON, the overtravel auto release alarm is displayed, and movement in the overtravel release direction is possible.

2: Warning

With the overtravel ON, the overtravel warning occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

With the overtravel OFF, the overtravel warning is released.

3: Reset release alarm 2

With the overtravel ON, the overtravel reset release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.

With a reset, the overtravel reset release alarm display is released.

At this time, the alarm display is released even in the overtravel state.

P567: SEL 7 Acceleration standard speed

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: -990000000 to 300000000

Initial value: 0

b. Function

Set the acceleration standard speed in built-in command mode.

If "0" is set, the acceleration standard speed is the maximum speed.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the integer digits.

Example) To specify the indirect data IX15 when [P161 (3rd digit)] is set to "2: 0.01", set "-15.00".

P568: SEL 7 Deceleration standard speed

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: -990000000 to 300000000

Initial value: 0

b. Function

Set the deceleration standard speed in built-in command mode.

If "0" is set, the deceleration standard speed is the maximum speed.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the integer digits.

Example) To specify the indirect data IX15 when [P161 (3rd digit)] is set to "2: 0.01", set "-15.00".

P569: SEL 7 Acceleration time

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: -9.9 to 99999.9

Initial value: 500.0

b. Function

Set the acceleration time in built-in command mode.

This setting is the time required to reach the acceleration standard speed from the motor stop status.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P570: SEL 7 Deceleration time

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: -9.9 to 99999.9

Initial value: 500.0

b. Function

Set the deceleration time in built-in command mode.

This setting is the time required to reach the deceleration standard speed from the motor stop status.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P571: SEL 7 S-curve time 1

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: -9.9 to 1000.0

Initial value: 10.0

b. Function

Set the S-curve acceleration/deceleration time in built-in command mode.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P572: SEL 7 Torque limit value

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: -9.9 to 799.9

Initial value: 300.0

b. Function

Set the torque limit value in built-in command mode.

If a value exceeding the Peak torque of the motor is set, the output torque is clamped to the Peak torque.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P573: Jog speed 0

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: -99 to 300000000

Initial value: 10000 (when P161 is the initial state, 10000 pulse/s)

b. Function

Set the speed for jog operation.

The acceleration/deceleration time and so on follow the setting value of SEL0.

To select jog speeds 0 to 7, use the command selection 1 to 3 signals (SS1 to SS3).

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the integer digits.

Example) To specify the indirect data IX15 when [P161 (3rd digit)] is set to "2: 0.01", set "-15.00".

P574: Jog speed 1

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: -99 to 300000000

Initial value: 10000 (when P161 is the initial state, 10000 pulse/s)

b. Function

Set the speed for jog operation.

The acceleration/deceleration time and so on follow the setting value of SEL0.

To select jog speeds 0 to 7, use the command selection 1 to 3 signals (SS1 to SS3).

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the integer digits.

Example) To specify the indirect data IX15 when [P161 (3rd digit)] is set to "2: 0.01", set "-15.00".

P575: Jog speed 2

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: -99 to 300000000

Initial value: 10000 (when P161 is the initial state, 10000 pulse/s)

b. Function

Set the speed for jog operation.

The acceleration/deceleration time and so on follow the setting value of SEL0.

To select jog speeds 0 to 7, use the command selection 1 to 3 signals (SS1 to SS3).

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the integer digits.

Example) To specify the indirect data IX15 when [P161 (3rd digit)] is set to "2: 0.01", set "-15.00".

P576: Jog speed 3

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: -99 to 300000000

Initial value: 10000 (when P161 is the initial state, 10000 pulse/s)

b. Function

Set the speed for jog operation.

The acceleration/deceleration time and so on follow the setting value of SEL0.

To select jog speeds 0 to 7, use the command selection 1 to 3 signals (SS1 to SS3).

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the integer digits.

Example) To specify the indirect data IX15 when [P161 (3rd digit)] is set to "2: 0.01", set "-15.00".

P577: Jog speed 4

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: -99 to 300000000

Initial value: 10000 (when P161 is the initial state, 10000 pulse/s)

b. Function

Set the speed for jog operation.

The acceleration/deceleration time and so on follow the setting value of SEL0.

To select jog speeds 0 to 7, use the command selection 1 to 3 signals (SS1 to SS3).

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the integer digits.

Example) To specify the indirect data IX15 when [P161 (3rd digit)] is set to "2: 0.01", set "-15.00".

P578: Jog speed 5

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: -99 to 300000000

Initial value: 10000 (when P161 is the initial state, 10000 pulse/s)

b. Function

Set the speed for jog operation.

The acceleration/deceleration time and so on follow the setting value of SEL0.

To select jog speeds 0 to 7, use the command selection 1 to 3 signals (SS1 to SS3).

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the integer digits.

Example) To specify the indirect data IX15 when [P161 (3rd digit)] is set to "2: 0.01", set "-15.00".

P579: Jog speed 6

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: -99 to 300000000

Initial value: 10000 (when P161 is the initial state, 10000 pulse/s)

b. Function

Set the speed for jog operation.

The acceleration/deceleration time and so on follow the setting value of SEL0.

To select jog speeds 0 to 7, use the command selection 1 to 3 signals (SS1 to SS3).

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the integer digits.

Example) To specify the indirect data IX15 when [P161 (3rd digit)] is set to "2: 0.01", set "-15.00".

P580: Jog speed 7

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: -99 to 300000000

Initial value: 10000 (when P161 is the initial state, 10000 pulse/s)

b. Function

Set the speed for jog operation.

The acceleration/deceleration time and so on follow the setting value of SEL0.

To select jog speeds 0 to 7, use the command selection 1 to 3 signals (SS1 to SS3).

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the integer digits.

Example) To specify the indirect data IX15 when [P161 (3rd digit)] is set to "2: 0.01", set "-15.00".

P581[1st digit]: Zero point marker selection for homing

a. Setting item

Activating timing: Command execution or power re-input

Setting range: 0 to 1

Initial value: 0

b. Function

Select the signal to use as a zero point marker.

c. Setting selection

0: Feedback marker

1: External marker

P581[2nd digit]: Homing acceleration/deceleration control in reverse direction

a. Setting item

Activating timing: Real-time

Setting range: 0 to 1

Initial value: 0

b. Function

Select the specification of homing acceleration/deceleration in reverse direction.

c. Setting selection

0: Acc./Dec. (SEL acceleration/deceleration setting)

1: Quick Acc./Dec.

P581[3rd digit]: Zero point return set distance operation selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 1

Initial value: 0

b. Function

Select the operation direction for [P584: Zero point return set distance].

c. Setting selection

0: Coordinate direction

When a positive value is set, operation is performed in the forward direction.

When a negative value is set, operation is performed in the reverse direction.

1: Operation direction

When a positive value is set, operation is performed in the zero point return operation direction.

When a negative value is set, operation is performed in the opposite direction of zero point return operation.

P582: Zero point return creep speed

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: 1 to 300000000

Initial value: 10000 (when P161 is the initial state, 10000 pulse/s)

Common parameter: 85h

b. Function

Set the creep operation speed after zero point deceleration detection in zero point return operation.

Usually, set a value equal to or less than 1/100 of the motor rated speed.

P583: Zero point position constant

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit

Setting range: 0 to 2147483647

Initial value: 0

b. Function

Set the distance after which to start marker signal detection after zero point deceleration detection in zero point return operation. Set a value equal to or greater than the distance enabling deceleration from the zero point return speed to the homing creep speed.

⚠Caution

If the zero point return speed is high, sudden deceleration and sudden stopping may occur if this setting is small.

Set a value sufficient for deceleration to the creep speed.

P584: Zero point return set distance

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit

Setting range: -2147483648 to 2147483647

Initial value: 0

Common parameter: 86h

b. Function

Set the +? travel distance from the marker signal detection point in zero point return operation.

This is used for fine adjustment of the marker signal position and the machine zero point position.

Positioning is performed in accordance with the operation direction that is set in [P581 (3rd digit)].

If "0" is set, zero point return is completed at the time of marker signal detection.

If the setting is equal to or less than the deceleration distance to stop the motor from the homing creep speed, over-shoot occurs upon completion of zero point return.

P585: Position data standard point

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit

Setting range: -2147483648 to 2147483647

Initial value: 0

b. Function

Set the standard position of the absolute position data as the distance from the machine zero point.

The setting is made upon completion of zero point return.

If positioning operation is performed without performing zero point return after the power supply is turned on, the position at which the power supply is turned on becomes the standard position of absolute position data.

Soft OT limit values of parameters [P171] and [P172] are based on this position data standard point.

P586: OT deceleration time at OT HOME

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0.0 to 99999.9

Initial value: 0.0

b. Function

Set the deceleration time for the motor to stop from the rated speed.

This setting is valid only in OT reverse operation of OT-return zero point return.

9-4-5 Self-diagnosis- and input and output-related parameters (group 6)

P600[3rd - 1st digits]: Status display C000 display item selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 999

Initial value: 0

b. Function

Select the item to display in status display C000.

If "0" is set, the display item is "C111".

- 0 - 999: C000 - C999

P600[4th digit]: Reserved

a. Setting item

b. Function

Reserved area. Set the initial value.

P600[5th digit]: Status display C000 display multiplier factor selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 6

Initial value: 0

b. Function

Select the display multiplier of status display C000.

The unit is [P161 (2nd digit)].

0: 1

1: 1/10

2: 1/100

3: 1/1000

4: 1/10000

5: 1/100000

6: 1/1000000

P600[6th digit]: STO operation status indication selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Select the display status of the data display LED panel during STO operation.

c. Setting selection

0: Display

STO is displayed in the STO status.

1: Hide

Not displayed even in the STO status.

2: Display 2

Displayed only if [C109: Network connection state] is "Connecting".

P601[1st digit]: Auto tuning moving direction

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Select the direction in which to run the motor during the execution of the auto tuning function.

c. Setting selection

0: Both

1: Forward

2: Reverse

P601[4th - 2nd digits]: Auto tuning test operation ratio

a. Setting item

Activating timing: Real-time

Setting range: 0.01 to 1.00

Initial value: 0.30

b. Function

Set the motor operation speed during the execution of the auto tuning function.

Specify this setting as a ratio to the maximum speed.

If "1.00" is set, the maximum speed is assumed.

P601[7th - 5th digits]: Max torque at auto tuning

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: 0 to 300

Initial value: 100

b. Function

Set the maximum torque during auto tuning.

P601[8th digit]: Auto tuning inertia multiplying selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the magnitude of the load inertia for the inertia moment of the motor.

c. Setting selection

0: 150 or less times

1: 150 to 300 times

2: More than 300 times

P604[1st digit]: Test run starting position assignment

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Select the position assignment method for the start of test run.

Set the moving amount with [P605: Test run starting position].

ABS: Moves to the position indicated by [C020: Current position].

INC: Moves from the current position by the specified amount.

c. Setting selection

0: INVALID

1: ABS

2: INC

P604[2nd digit]: Test run traveling direction

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Select the motor command direction for test run.

c. Setting selection

0: Both

1: Forward

2: Reverse

P604[3rd digit]: Test run SEL selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 7

Initial value: 0

b. Function

Select the SEL number used for test run.

0 to 7: SEL.0 to 7

P604[9th - 4th digits]: Test run stopping time

a. Setting item

Activating timing: Real-time

Setting unit: s

Setting range: 0.000 to 999.999

Initial value: 1.000

b. Function

Set the stopping time for test run.

P605: Test run starting position

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit

Setting range: -2147483648 to 2147483647

Initial value: 0

b. Function

Set the run starting position for test run.

This is the position indicated by [C020: Current position] with ABS in [P604[1st digit]: Test run starting position assignment] or the specified amount by which to move with INC from the current position to the starting position.

P606: Test run positioning amount

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit

Setting range: 0 to 2147483647

Initial value: 0

b. Function

Set the repetition positioning amount for test run.

P607: Test run positioning speed

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: 0 to 300000000

Initial value: 10000 (when P161 is the initial state, 10000 pulse/s)

b. Function

Set the positioning operation speed for test run.

P608: Test run starting position movement speed

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: 0 to 300000000

Initial value: 10000 (when P161 is the initial state, 10000 pulse/s)

b. Function

Set the speed at which the motor moves to the starting position for the start of test run.
This is the speed at which it moves from the current position to [P604[1st digit]: Test run starting position assignment].

P620[2nd & 1st digits]: Control input signal allocation 1 (DI1)

a. Setting item

Activating timing: Real-time

Setting range: 00 to 99

Initial value: 53

b. Function

Set the allocation of control input signal DI1.
If "00" is set, the input signal is ineffective.

c. Reference

For the allocation number of each signal, refer to "Table 9-1　Control input signal allocation number table".

P620[4th & 3rd digits]: Control input signal allocation 1 (DI2)

a. Setting item

Activating timing: Real-time

Setting range: 00 to 99

Initial value: 59

b. Function

Set the allocation of control input signal DI2.

If "00" is set, the input signal is ineffective.

c. Reference

For the allocation number of each signal, refer to "Table 9-1 Control input signal allocation number table".

P620[6th & 5th digits]: Control input signal allocation 1 (DI3)

a. Setting item

Activating timing: Real-time

Setting range: 00 to 99

Initial value: 60

b. Function

Set the allocation of control input signal DI3.

If "00" is set, the input signal is ineffective.

c. Reference

For the allocation number of each signal, refer to "Table 9-1 Control input signal allocation number table".

P620[8th & 7th digits]: Control input signal allocation 1(DI4)

a. Setting item

Activating timing: Real-time

Setting range: 00 to 99

Initial value: 26

b. Function

Set the allocation of control input signal DI4.

If "00" is set, the input signal is ineffective.

c. Reference

For the allocation number of each signal, refer to "Table 9-1 Control input signal allocation number table".

P621[2nd & 1st digits]: Control input signal allocation 2 (DI5)

a. Setting item

Activating timing: Real-time

Setting range: 00 to 99

Initial value: 41

b. Function

Set the allocation of control input signal DI5.

If "00" is set, the input signal is ineffective.

c. Reference

For the allocation number of each signal, refer to "Table 9-1 Control input signal allocation number table".

Table 9-1 Control input signal allocation number table

Allocation No.		Signal code	Signal name	Allocation No.		Signal code	Signal name
Positive logic	Negative logic			Positive logic	Negative logic		
1	51	RST	Reset	26	76	ZLS	Zero point deceleration
2	52	ARST	Alarm reset	27	77	ZMK	External zero point marker
3	53	EMG	Emergency stop	28	78	TRG	External trigger
4	54	SON	Servo on	29	79	CMDZ	Command zero
5	55	DR	Drive	30	80	ZCAN	Positioning cancel
6	56	CLR	Deviation clear	31	81	FJOG	Forward direction jog
7	57			32	82	RJOG	Reverse direction jog
8	58	TL	Torque limit	33	83		
9	59	FOT	Forward direction overtravel	34	84		
10	60	ROT	Reverse direction overtravel	35	85		
11	61	MD1	Mode select 1	36	86		
12	62	MD2	Mode select 2	37	87	MTOH	Motor overheat
13	63	GSL1	Gain select 1	38	88		
14	64	GSL2	Gain select 2	39	89		
15	65			40	90		
16	66	RVS	Command direction inversion	41	91	EXT1	1st external latch input
17	67	SS1	Command selection 1	42	92	EXT2	2nd external latch input
18	68	SS2	Command selection 2	43	93	EXT3	3rd external latch input
19	69	SS3	Command selection 3	44	94		
20	70	SS4	Command selection 4	45	95		
21	71	SS5	Command selection 5	46	96		
22	72	SS6	Command selection 6	47	97		
23	73	SS7	Command selection 7	48	98		
24	74	SS8	Command selection 8	49	99		
25	75	ZST	Positioning drive				

P622[2nd & 1st digits]: Control output signal allocation 1 (DO1)

a. Setting item

Activating timing: Real-time

Setting range: 00 to 99

Initial value: 17

b. Function

Set the allocation of control output signal DO1.

If "00" is set, the output signal is ineffective.

c. Reference

For the allocation number of each signal, refer to "Table 9-2 Control output signal allocation number table".

P622[4th & 3rd digits]: Control output signal allocation 1 (DO2)

a. Setting item

Activating timing: Real-time

Setting range: 00 to 99

Initial value: 51

b. Function

Set the allocation of control output signal DO2.

If "00" is set, the output signal is ineffective.

c. Reference

For the allocation number of each signal, refer to "Table 9-2 Control output signal allocation number table".

P622[6th & 5th digits]: Control input signal allocation 1 (DO3)

a. Setting item

Activating timing: Real-time

Setting range: 00 to 99

Initial value: 07

b. Function

Set the allocation of control output signal DO3.

If "00" is set, the output signal is ineffective.

c. Reference

For the allocation number of each signal, refer to "Table 9-2 Control output signal allocation number table".

Table 9-2 Control output signal allocation number table

Allocation No.		Signal code	Signal name	Allocation No.		Signal code	Signal name
Positive logic	Negative logic			Positive logic	Negative logic		
1	51	ALM	Alarm	26	76	TMOD	Torque command mode in-process
2	52	WNG	Warning	27	77	PMOD	Position control mode in-process

Allocation No.		Signal code	Signal name	Allocation No.		Signal code	Signal name
Positive logic	Negative logic			Positive logic	Negative logic		
3	53	RDY	Servo ready	28	78	NMOD	Built-in command mode in-process
4	54	SZ	Speed Zero	29	79		
5	55	PE1	Position deviation range 1	30	80		
6	56	PE2	Position deviation range 2	31	81		
7	57	PN1	Positioning complete 1	32	82		
8	58	PN2	Positioning complete 2	33	83	OUT1	Common output 1
9	59	PZ1	Positioning complete response 1	34	84	OUT2	Common output 2
10	60	PZ2	Positioning complete response 2	35	85	OUT3	Common output 3
11	61	ZN	Command complete	36	86	OUT4	Common output 4
12	62	ZZ	Command complete response	37	87	OUT5	Common output 5
13	63	ZRDY	Command drive ready	38	88	OUT6	Common output 6
14	64	PRF	Rough match	39	89	OUT7	Common output 7
15	65	VCP	Speed attainment	40	90	OUT8	Common output 8
16	66			41	91		
17	67	BRK	Brake release	42	92		
18	68	LIM	Limit in-Process	43	93		
19	69	EMGO	Emergency stop	44	94		
20	70	HCP	Zero point return complete	45	95		
21	71	HLDZ	Command zero in-process	46	96		
22	72	OTO	Overtravel in-process	47	97		
23	73	MTON	Motor electrification in-process	48	98		
24	74			49	99	OCEM	Marker output*
25	75	SMOD	Speed command mode in-process				

* Only positive logic OCEM output is effective. Even if it is set as negative logic with the parameter, it is output as positive logic.

P623[1st digit]: Control input signal condition setting 1 (RST)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P623[2nd digit]: Control input signal condition setting 1 (ARST)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P623[3rd digit]: Control input signal condition setting 1 (EMG)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

<In communication mode>

The emergency stop signal (EMG) of control input signal (CN1) follows this setting.

<In maintenance mode>

Only the emergency stop signal (EMG) with the switch box of VPH DES operates regardless of this setting.

The emergency stop signal (EMG) of control input signal (CN1) follows this setting.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P623[4th digit]: Control input signal condition setting 1 (SON)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P623[5th digit]: Control input signal condition setting 1 (DR)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P623[6th digit]: Control input signal condition setting 1 (CLR)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P623[7th digit]: Control input signal condition setting 1 (Reserved)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P623[8th digit]: Control input signal condition setting 1 (TL)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P624[1st digit]: Control input signal condition setting 2 (FOT)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P624[2nd digit]: Control input signal condition setting 2 (ROT)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P624[3rd digit]: Control input signal condition setting 2 (MD1)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P624[4th digit]: Control input signal condition setting 2 (MD2)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P624[5th digit]: Control input signal condition setting 2 (GSL1)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P624[6th digit]: Control input signal condition setting 2 (GSL2)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P624[7th digit]: Control input signal condition setting 2 (Reserved)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P624[8th digit]: Control input signal condition setting 2 (RVS)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P625[1st digit]: Control input signal condition setting 3 (SS1)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P625[2nd digit]: Control input signal condition setting 3 (SS2)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P625[3rd digit]: Control input signal condition setting 3 (SS3)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P625[4th digit]: Control input signal condition setting 3 (SS4)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P625[5th digit]: Control input signal condition setting 3 (SS5)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P625[6th digit]: Control input signal condition setting 3 (SS6)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P625[7th digit]: Control input signal condition setting 3 (SS7)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P625[8th digit]: Control input signal condition setting 3 (SS8)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P626[1st digit]: Control input signal condition setting 4 (ZST)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P626[2nd digit]: Control input signal condition setting 4(ZLS)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P626[3rd digit]: Control input signal condition setting 4 (ZMK)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P626[4th digit]: Control input signal condition setting 4 (TRG)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P626[5th digit]: Control input signal condition setting 4 (CMDZ)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P626[6th digit]: Control input signal condition setting 4 (ZCAN)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P626[7th digit]: Control input signal condition setting 4 (FJOG)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P626[8th digit]: Control input signal condition setting 4 (RJOG)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P627[1st digit]: Control input signal condition setting 5 (Reserved)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P627[2nd digit]: Control input signal condition setting 5 (Reserved)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P627[3rd digit]: Control input signal condition setting 5 (Reserved)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P627[4th digit]: Control input signal condition setting 5 (Reserved)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P627[5th digit]: Control input signal condition setting 5 (MTOH)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P627[6th digit]: Control input signal condition setting 5 (Reserved)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P627[7th digit]: Control input signal condition setting 5 (Reserved)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P627[8th digit]: Control input signal condition setting 5 (Reserved)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P628[1st digit]: Control input signal condition setting 6 (EXT1)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P628[2nd digit]: Control input signal condition setting 6 (EXT2)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P628[3rd digit]: Control input signal condition setting 6 (EXT3)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P628[4th digit]: Control input signal condition setting 6 (Reserved)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P628[5th digit]: Control input signal condition setting 6 (Reserved)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P628[6th digit]: Control input signal condition setting 6 (Reserved)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P628[7th digit]: Control input signal condition setting 6 (Reserved)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P628[8th digit]: Control input signal condition setting 6 (Reserved)

a. Setting item

Activating timing: Real-time

Setting range: 0 to 2

Initial value: 0

b. Function

Set the control input signal conditions.

c. Setting selection

0: ON/OFF effective

1: OFF fixed

2: ON fixed

P631[1st digit]: Deviation clear selection when SON signal is OFF

a. Setting item

Activating timing: Real-time

Setting range: 0 to 1

Initial value: 0

b. Function

Select the deviation clear setting when the servo on signal (SON) is turned OFF.

If deviation clear is made ineffective, error detection is performed with the value of [P175].

c. Setting selection

0: Deviation clear effective

1: Deviation clear ineffective

P633[1st digit]: Stopping selection when EMG signal is ON

a. Setting item

Activating timing: Real-time

Setting range: 0 to 1

Initial value: 0

b. Function

Select the stopping method when the emergency stop signal (EMG) is ON.

c. Setting selection

0: Servo OFF after braking stop

1: Servo OFF

P633[5th - 2nd digits]: Deceleration time after EMG signal braking stoppage

a. Setting item

Activating timing: Real-time

Setting unit: s

Setting range: 0.00 to 99.99

Initial value: 0.00

b. Function

Set the deceleration time of braking stoppage by turning ON the emergency stop signal (EMG).

The setting is the deceleration time required for stoppage from the motor maximum speed.

P633[8th - 6th digits]: Servo OFF delay time after EMG braking stoppage

a. Setting item

Activating timing: Real-time

Setting unit: s

Setting range: 0.00 to 9.99

Initial value: 0.50

b. Function

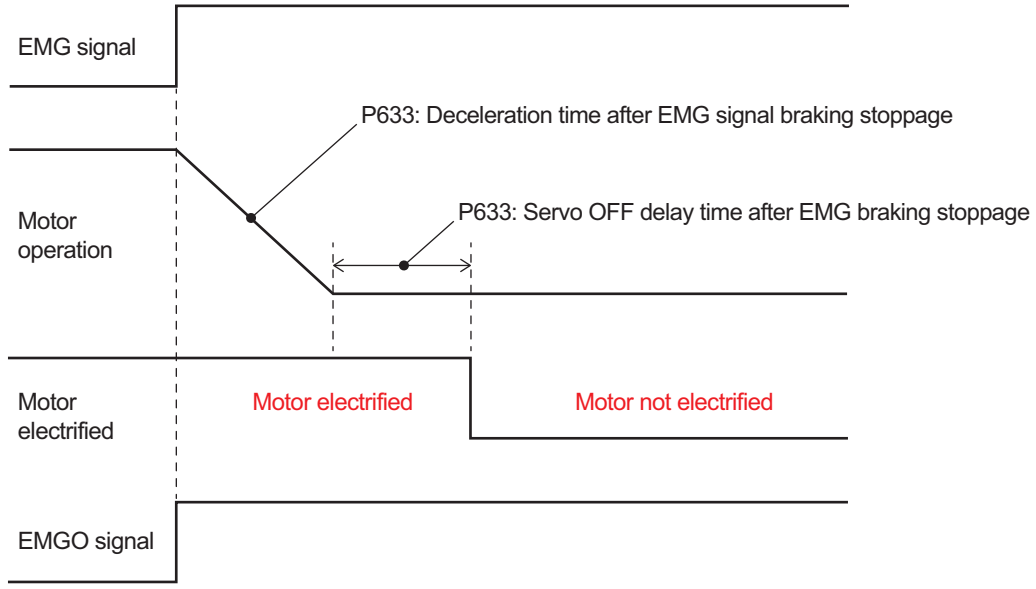
Set the delay time from the braking stoppage by turning ON the emergency stop signal (EMG) until the motor electrification in-process signal (MTON) turns OFF.

As soon as the emergency stop signal (EMG) is turned ON, the motor performs braking stoppage.

After the elapse of the time that is set in [P633 (5th - 2nd digits)], the motor un-electrified status is assumed, and the motor electrification in-process signal (MTON) turns OFF.

For a torque command, the torque command becomes zero without braking stoppage.

If the motor is operating due to external force, etc., the motor un-electrified status is not assumed.



P634[1st digit]: Reserved

a. Setting item

b. Function

Reserved area. Set the initial value.

P634[5th - 2nd digits]: Deceleration time after OT signal braking stoppage

a. Setting item

Activating timing: Real-time

Setting unit: s

Setting range: 0.00 to 99.99

Initial value: 0.00

b. Function

Set the deceleration time of braking stoppage due to OT detection.

The setting is the deceleration time required for stoppage from the motor maximum speed.

For a torque command, the torque becomes zero without braking stoppage.

P634[8th - 6th digits]: OT condition holding time

a. Setting item

Activating timing: Real-time

Setting unit: s

Setting range: 0.00 to 9.99

Initial value: 2.00

b. Function

Set the time for which to hold the OT condition after an OT is detected and the OT is released.

P635[1st digit]: Reserved

a. Setting item

b. Function

Reserved area. Set the initial value.

P635[5th - 2nd digits]: Soft OT braking stoppage deceleration time

a. Setting item

Activating timing: Real-time

Setting unit: s

Setting range: 0.00 to 99.99

Initial value: 0.00

b. Function

Set the deceleration time of braking stoppage due to soft OT detection.

The setting is the deceleration time required for stoppage from the motor maximum speed.

For a torque command, the torque becomes zero without braking stoppage.

P635[8th - 6th digits]: Soft OT condition holding time

a. Setting item

Activating timing: Real-time

Setting unit: s

Setting range: 0.00 to 9.99

Initial value: 2.00

b. Function

Set the time for which to hold the OT condition after a soft OT is detected and the OT is released.

P636: TL signal torque limit value +

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: -9.9 to 799.9

Initial value: 100.0

Common parameter: 8Ch

Initial value: 100.0

b. Function

Set the forward direction torque limit value when the torque limit signal (TL) is ON.

The torque is limited with whichever is lower of this setting and [P080].

For indirect data assignment, the following applies.

- A negative value results in indirect data assignment.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P637: TL signal torque limit value -

a. Setting item

Activating timing: Real-time

Setting unit: %

Setting range: -9.9 to 799.9

Initial value: 100.0

Common parameter: 8Dh

b. Function

Set the reverse direction torque limit value when the torque limit signal (TL) is ON.

The torque is limited with whichever is lower of this setting and [P081].

For indirect data assignment, the following applies.

- A negative value results in indirect data assignment.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P638[3rd - 1st digits]: MD signal delay time

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0 to 999

Initial value: 0

b. Function

Set the delay time from the time the mode selection signal (MD1 or MD2) is changed until the run mode is switched.

The actual run mode switching time is this setting plus 0.02 sec.

P638[6th - 4th digits]: SS signal delay time

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0 to 999

Initial value: 0

b. Function

Set the delay time from the time the command selection signal (SS1 to SS8) is changed until the command is switched.

P638[9th - 7th digits]: ZST signal delay time

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0 to 999

Initial value: 0

b. Function

Set the delay time from the time the positioning start signal (ZST) is changed until positioning starts.

P650[1st digit]: RDY signal specifications Selection of OT ALM signal is ON

a. Setting item

Activating timing: Reset or power ON

Setting range: 0 to 1

Initial value: 0

b. Function

Select the servo ready signal (RDY) condition when the alarm signal (ALM) is turned ON due to OT detection.

c. Setting selection

0: RDY signal OFF

1: RDY signal ON

P650[2nd digit]: RDY signal specifications Selection of motor electrification ALM signal other than OT is ON

a. Setting item

Activating timing: Reset or power ON

Setting range: 0 to 1

Initial value: 0

b. Function

Select the servo ready signal (RDY) condition when the alarm signal (ALM) is turned ON if a non-OT alarm that does not cause servo off occurs.

c. Setting selection

0: RDY signal OFF

1: RDY signal ON

P651: SZ signal speed range

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: 0 to 300000000

Initial value: 10000 (when P161 is the initial state, 10000 pulse/s)

Common parameter: 8Eh

b. Function

Set the speed zero signal (SZ) output range.

If the motor speed is within this setting, the speed zero signal (SZ) is switched ON.

P652: VCP signal speed deviation range

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: 0 to 300000000

Initial value: 10000 (when P161 is the initial state, 10000 pulse/s)

Common parameter: 8Fh

b. Function

Set the speed attainment signal (VCP) output range.

If the difference between the speed command and the motor speed is within this setting, the speed attainment signal (VCP) is switched ON.

P653: PE1 signal deviation range

a. Setting item

Activating timing: Real-time

Setting unit: FB pulse

Setting range: 0 to 99999999

Initial value: 10

Common parameter: 66h

b. Function

Set the position deviation range 1 signal (PE1) and positioning complete 1 signal (PN1) output deviation range.

P654: PE1 signal delay time

a. Setting item

Activating timing: Real-time

Setting unit: s

Setting range: 0.000 to 9.999

Initial value: 0.000

b. Function

Set the delay time from the time the deviation becomes equal to or less than the [P653] setting until the position deviation range 1 signal (PE1) and the positioning complete 1 signal (PN1) turn ON.

P655: PE2 signal deviation range

a. Setting item

Activating timing: Real-time

Setting unit: FB pulse

Setting range: 0 to 99999999

Initial value: 10

b. Function

Set the position deviation range 2 signal (PE2) and positioning complete 2 signal (PN2) output deviation range.

P656: PE2 signal delay time

a. Setting item

Activating timing: Real-time

Setting unit: s

Setting range: 0.000 to 9.999

Initial value: 0.000

b. Function

Set the delay time from the time the deviation becomes equal to or less than the [P655] setting until the position deviation range 2 signal (PE2) and the positioning complete 2 signal (PN2) turn ON.

P657: PRF signal distance

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit

Setting range: -2147483648 to 2147483647

Initial value: 1000 (when P161 is the initial state, 1000 pulse/s)

Common parameter: 67h

b. Function

Set the rough match signal (PRF) output range.

If the difference between the current position and target position is within this setting, the rough match signal (PRF) is switched ON.

The specifications of the setting are listed below.

- For a positive value, [C020: Current position (Command position)] is used as the current position.
- For a negative value, [C021: Current position (Feedback position)] is used as the current position.

P658[4th - 1st digits]: Brake release delay time

a. Setting item

Activating timing: Real-time

Setting unit: s

Setting range: 0.000 to 9.999

Initial value: 0.000

b. Function

Set the delay time from the time the motor is electrified until the brake is released (BRK signal ON).

P658[8th - 5th digits]: Brake activation delay time

a. Setting item

Activating timing: Real-time

Setting unit: s

Setting range: 0.000 to 9.999

Initial value: 0.000

b. Function

Set the delay time from the time the brake is activated (BRK signal OFF) when an alarm, emergency stop, servo OFF, or reset occurs until the motor un-electrified status (MTON signal OFF) is assumed.

P659: Brake activation effective low speed range

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: 0 to 300000000

Initial value: 0

b. Function

Set the speed range in which to activate the brake.

P660: Brake enforced activation delay time

a. Setting item

Activating timing: Real-time

Setting unit: s

Setting range: 0.000 to 9.999

Initial value: 0.000

b. Function

Set the delay time after which to activate the brake.

9-4-6 Network-related parameters (group 8)

P800[1st digit]: Forward direction overtravel run selection

a. Setting item

Activating timing: Reset or power ON

Setting range: 0 to 1

Initial value: 0

Common parameter: 25h

b. Function

Select the forward direction overtravel detection specification.

c. Setting selection

0: Effective

1: Ineffective

P800[2nd digit]: Reverse direction overtravel run selection

a. Setting item

Activating timing: Reset or power ON

Setting range: 0 to 1

Initial value: 0

Common parameter: 25h

b. Function

Select the reverse direction overtravel detection specification.

c. Setting selection

0: Effective

1: Ineffective

P800[3rd digit]: Forward direction software limit run selection

a. Setting item

Activating timing: Reset or power ON

Setting range: 0 to 1

Initial value: 0

Common parameter: 25h

b. Function

Select the forward direction soft overtravel detection specification.

c. Setting selection

0: Ineffective

1: Effective

P800[4th digit]: Reverse direction software limit run selection

a. Setting item

Activating timing: Reset or power ON

Setting range: 0 to 1

Initial value: 0

Common parameter: 25h

b. Function

Select the reverse direction software overtravel detection specification.

c. Setting selection

0: Ineffective

1: Effective

P801: Torque base unit selection

a. Setting item

Activating timing: Reset or power ON

Setting range: -5 to 0

Initial value: -1

Common parameter: 48h

b. Function

Set the multiplier n for the unit selected with torque unit selection.

With this setting, the unit is multiplied by 10^n.

P803: Zero point return approach speed

a. Setting item

Activating timing: Real-time

Setting unit: P161 setting unit/s

Setting range: 1 to 300000000

Initial value: 20000 (pulse/s)

Common parameter: 84h

b. Function

Set the speed after the deceleration limit switch signal is switched ON in zero point return.

It is effective if [P810] is "0: MIII HOME".

P804: Fixed monitor selection 1

a. Setting item

Activating timing: Real-time

Setting range: 0 to 15

Initial value: 1

Common parameter: 87h

b. Function

Select the response No. 12 to 15 byte monitor data in the standard servo profile command.

c. Reference

For details of the setting, refer to [P804, P805: Monitor select].

P805: Fixed monitor selection 2

a. Setting item

Activating timing: Real-time

Setting range: 0 to 15

Initial value: 0

Common parameter: 88h

b. Function

Select the response No. 16 to 19 byte monitor data in the standard servo profile command.

c. Reference

For details of the setting, refer to "Table 9-3 P804, P805 Fixed monitor selection".

Table 9-3 P804, P805 Fixed monitor selection

Selection code		Monitor Name	Description	Support	Remarks	VPH Status display
Decimal	Hexa decimal					
0	0h	APOS	Feedback position	○	Current position of motor	C021
1	1h	CPOS	Command position	○	Command position after acceleration/deceleration filter	C020
2	2h	PERR	Position deviation	○	Position deviation	C026
3	3h	LPOS1	Latch position 1	○	Motor position at which latching is performed with the latch signal	—
4	4h	LPOS2	Latch position 2	○	Motor position at which latching is performed with the latch signal	—
5	5h	FSPD	Feedback speed	○	Current speed of motor	C001
6	6h	CSPD	Command speed	○	Command speed to motor	—
7	7h	TRQ	Command torque (thrust)	○	Command torque to motor	C005
8	8h	ALARM	Detailed information about the alarm that currently occurs	○	Alarm/warning code that currently occurs	AL.
9	9h	MPOS	Command position	○	Command position after acceleration/deceleration filter	C020
10	Ah	—	Reserved	—	—	—
11	Bh	—	Reserved	—	—	—
12	Ch	CMN1	Common monitor 1	○	Motor No. specified with common parameter No. 89	—
13	Dh	CMN2	Common monitor 2	○	Motor No. specified with common parameter No. 8A	—
14	Eh	OMN1	Option monitor 1	○	Display of the status of VPH selected with P813	C000 -
15	Fh	OMN2	Option monitor 2	○	Display of the status of VPH selected with P814	C000 -

P806: Monitor select for SEL_MON1

a. Setting item

Activating timing: Real-time

Setting range: 0 to 9

Initial value: 0

Common parameter: 89h

b. Function

Select the monitor data for common monitor 1 (CMN1) of MECHATROLINK-III.

c. Reference

For details of the setting, refer to [P806, P807: Monitor select for SEL_MON].

P807: Monitor select for SEL_MON2

a. Setting item

Activating timing: Real-time

Setting range: 0 to 9

Initial value: 1

Common parameter: 8Ah

b. Function

Select the monitor data for common monitor 2 (CMN2) of MECHATROLINK-III.

c. Reference

For details of the setting, refer to "Table 9-4 P806, P807: Monitor select for SEL_MON".

Table 9-4 P806, P807: Monitor select for SEL_MON

Selection code		Monitor Name	Description	Support	VPH Status display
Decimal	Hexa decimal				
0	0h	TPOS	Target position in the command coordinate system	○	—
1	1h	IPOS	Command position in the command coordinate system	○	C020
2	2h	POS_OFSET	Offset value that is set with the coordinate system setting (POS_SET) command	○	—
3	3h	TSPD	Target speed	○	—
4	4h	SPD_LIM	Speed limit value	○	C011
5	5h	TRQ_LIM	Torque limit value	○	C009, C010
6	6h	SV_STAT	1st byte: Current communication phase 2nd byte: Current control mode 4th byte: Extended signal monitor (latch processing and signal status)	○	—
7	7h	Reserved	—	—	—
8	8h	INIT_PGPOS (Low)	64-bit data resulting from converting the initial encode position into a command position	○	—
9	9h	INIT_PGPOS (High)	64-bit data resulting from converting the initial encode position into a command position	○	—

P808: Zero point position detection range

a. Setting item

Activating timing: Real-time

Setting unit: FB position

Setting range: 0 to 99999999

Initial value: 10

Common parameter: 8Bh

b. Function

Set the zero point detection width (ZPOINT) of the servo command input/output signal monitor.

P809: Acceleration basic unit selection

a. Setting item

Activating timing: Reset or power ON

Setting range: 0 to 3

Initial value: 0

Common parameter: 46h

b. Function

Set the multiplier n corresponding to the unit selected with Acceleration unit (common parameter: 45h).

With this setting, the unit is multiplied by 10^n.

c. Setting selection

0: 10^0

1: 10^1

2: 10^2

3: 10^3

P810: Zero point return selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 5

Initial value: 0

b. Function

Select the zero point return method in the communication mode.

c. Setting selection

0: MIII HOME

1: STD HOME

2: LS LESS

3: STOP HOME

4: OT HOME

5: OT LS LESS

For details of zero point return operation, refer to the following.

- For "0: MIII HOME": Separate document "VPH Series HE Type Communications Manual"
- For other than the above: Each operation item of "5-3 Built-in command"

P811: Overtravel spec selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 3

b. Function

Select the overtravel specification in the communication mode.

c. Setting selection

0: Auto release alarmWith the overtravel ON, the overtravel auto release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.With the overtravel OFF, the overtravel auto release alarm is released.

1: Reset release alarm 1With the overtravel ON, the overtravel reset release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is not possible.Switch OFF the overtravel direction command, and switch ON the reset signal (RST).The overtravel auto release alarm is displayed, and movement in the overtravel release direction is possible.

2: WarningWith the overtravel ON, the overtravel warning occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.With the overtravel OFF, the overtravel warning is released.

3: Reset release alarm 2With the overtravel ON, the overtravel reset release alarm occurs, and the motor stops. In this state, movement in the overtravel release direction is possible.Switch OFF the overtravel direction command, and release overtravel by switching ON the reset signal (RST).At this time, the alarm display is released even in the overtravel state.

P814[1st digit]: WDT error detection selection

a. Setting item

Activating timing: Power ON

Setting range: 0 to 1

Initial value: 0

b. Function

In the communication error status (COMM_ALM) of the command status (CMD_STAT), select whether to make the following error detection effective or ineffective

- WDT error (code: C)

c. Setting selection

0: Effective

1: Ineffective

P814[2nd digit]: Communication error detection selection

a. Setting item

Activating timing: Power ON

Setting range: 0 to 1

Initial value: 0

b. Function

In the communication error status (COMM_ALM) of the command status (CMD_STAT), select whether to make the following error detection effective or ineffective.

- FCS error (code: 1/8)
- Command data not received (code: 2/9)
- Synchronization frame un-receiving (code: 3/A)
- Synchronization interval error (code: B)

c. Setting selection

0: Effective

1: Ineffective

P815[1st digit]: Select positioning mode

a. Setting item

Activating timing: Reset or power ON

Setting range: 0 to 1

Initial value: 0

b. Function

Select the positioning mode to use to execute the POSING command.

c. Setting selection

0: Index positioning mode

Index positioning is performed in one direction (unlimited length positioning).

One positioning feed is within the following range.

During forward direction operation: 1 to 2147483647

During reverse direction operation: -1 to -2147483648

1: Round-trip positioning mode

Round-trip positioning is performed in the movement range (limited length positioning).

The positioning movement range is -2147483648 to 2147483647.

P815[2nd digit]: Command abort selection

a. Setting item

Activating timing: Reset or power ON

Setting range: 0 to 1

Initial value: 0

b. Function

Select the command stopping method to use when the VELCTRL (speed control) command and TRQCTRL (torque control) command.

c. Setting selection

0: Command 0

The command is stopped if the VREF (speed command) and TQREF (torque command) are "0".

For the VELCTRL (speed control) command, the command is also stopped if the CMD_CANCEL (move command stop command) is "1".

1: Command stop command

The command is stopped if CMD_CANCEL (move command stop command) is "1".

The command is continued if VREF (speed command) and TQREF (torque command) are "0".

P820[1st digit]: NET SEL 0 Gain No. selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 0

b. Function

Select a gain number to be used in the communication mode.

c. Setting selection

0: Gain No. 0

1: Gain No. 1

2: Gain No. 2

3: Gain No. 3

P823: NET SEL 0 S-curve time 1

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: -9.9 to 1000.0

Initial value: 10.0

Common parameter: 82h

b. Function

Set the S-curve acceleration/deceleration time in the communication mode.

This setting is effective only in the position control mode.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P824[4th - 1st digits]: NET SEL 0 Delay compensation

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0 to 99.99

Initial value: 0.00

b. Function

Set the delay compensation time in the communication mode.

This setting is effective in the position control mode.

P824[8th - 5th digits]: NET SEL 0 Lead compensation

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0 to 99.99

Initial value: 0.00

b. Function

Set the advance compensation time in the communication mode.

This setting is effective in the position control mode.

P830[1st digit]: NET SEL 1 Gain No. selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 1

b. Function

Select a gain number to be used in the communication mode.

c. Setting selection

0: Gain No. 0

1: Gain No. 1

2: Gain No. 2

3: Gain No. 3

P833: NET SEL 1 S-curve time 1

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: -9.9 to 1000.0

Initial value: 10.0

b. Function

Set the S-curve acceleration/deceleration time in the communication mode.

This setting is effective only in the position control mode.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P834[4th - 1st digits]: NET SEL 1 Delay compensation

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0 to 99.99

Initial value: 0.00

b. Function

Set the delay compensation time in the communication mode.

This setting is effective in the position control mode.

P834[8th - 5th digits]: NET SEL 1 Lead compensation

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0 to 99.99

Initial value: 0.00

b. Function

Set the advance compensation time in the communication mode.

This setting is effective in the position control mode.

P840[1st digit]: NET SEL 2 Gain No. selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 2

b. Function

Select a gain number to be used in the communication mode.

c. Setting selection

0: Gain No. 0

1: Gain No. 1

2: Gain No. 2

3: Gain No. 3

P843: NET SEL 2 S-curve time 1

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: -9.9 to 1000.0

Initial value: 10.0

b. Function

Set the S-curve acceleration/deceleration time in the communication mode.

This setting is effective only in the position control mode.

For indirect data assignment, the following applies.

• To specify indirect data, set a negative value.

• Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P844[4th - 1st digits]: NET SEL 2 Delay compensation

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0 to 99.99

Initial value: 0.00

b. Function

Set the delay compensation time in the communication mode.

This setting is effective in the position control mode.

P844[8th - 5th digits]: NET SEL 2 Lead compensation

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0 to 99.99

Initial value: 0.00

b. Function

Set the advance compensation time in the communication mode.

This setting is effective in the position control mode.

P850[1st digit]: NET SEL 3 Gain No. selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 3

b. Function

Select a gain number to be used in the communication mode.

c. Setting selection

0: Gain No. 0

1: Gain No. 1

2: Gain No. 2

3: Gain No. 3

P853: NET SEL 3 S-curve time 1

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: -9.9 to 1000.0

Initial value: 10.0

b. Function

Set the S-curve acceleration/deceleration time in the communication mode.

This setting is effective only in the position control mode.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P854[4th - 1st digits]: NET SEL 3 Delay compensation

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0 to 99.99

Initial value: 0.00

b. Function

Set the delay compensation time in the communication mode.

This setting is effective in the position control mode.

P854[8th - 5th digits]: NET SEL 3 Lead compensation

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0 to 99.99

Initial value: 0.00

b. Function

Set the advance compensation time in the communication mode.

This setting is effective in the position control mode.

P860[1st digit]: NET SEL 4 Gain No. selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 0

b. Function

Select a gain number to be used in the communication mode.

c. Setting selection

0: Gain No. 0

1: Gain No. 1

2: Gain No. 2

3: Gain No. 3

P863: NET SEL 4 S-curve time 1

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: -9.9 to 1000.0

Initial value: 10.0

b. Function

Set the S-curve acceleration/deceleration time in the communication mode.

This setting is effective only in the position control mode.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P864[4th - 1st digits]: NET SEL 4 Delay compensation

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0 to 99.99

Initial value: 0.00

b. Function

Set the delay compensation time in the communication mode.

This setting is effective in the position control mode.

P864[8th - 5th digits]: NET SEL 4 Lead compensation

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0 to 99.99

Initial value: 0.00

b. Function

Set the advance compensation time in the communication mode.

This setting is effective in the position control mode.

P870[1st digit]: NET SEL 5 Gain No. selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 1

b. Function

Select a gain number to be used in the communication mode.

c. Setting selection

0: Gain No. 0

1: Gain No. 1

2: Gain No. 2

3: Gain No. 3

P873: NET SEL 5 S-curve time 1

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: -9.9 to 1000.0

Initial value: 10.0

b. Function

Set the S-curve acceleration/deceleration time in the communication mode.

This setting is effective only in the position control mode.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P874[4th - 1st digits]: NET SEL 5 Delay compensation

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0 to 99.99

Initial value: 0.00

b. Function

Set the delay compensation time in the communication mode.

This setting is effective in the position control mode.

P874[8th - 5th digits]: NET SEL 5 Lead compensation

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0 to 99.99

Initial value: 0.00

b. Function

Set the advance compensation time in the communication mode.

This setting is effective in the position control mode.

P880[1st digit]: NET SEL 6 Gain No. selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 2

b. Function

Select a gain number to be used in the communication mode.

c. Setting selection

0: Gain No. 0

1: Gain No. 1

2: Gain No. 2

3: Gain No. 3

P883: NET SEL 6 S-curve time 1

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: -9.9 to 1000.0

Initial value: 10.0

b. Function

Set the S-curve acceleration/deceleration time in the communication mode.

This setting is effective only in the position control mode.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P884[4th - 1st digits]: NET SEL 6 Delay compensation

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0 to 99.99

Initial value: 0.00

b. Function

Set the delay compensation time in the communication mode.

This setting is effective in the position control mode.

P884[8th - 5th digits]: NET SEL 6 Lead compensation

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0 to 99.99

Initial value: 0.00

b. Function

Set the advance compensation time in the communication mode.

This setting is effective in the position control mode.

P890[1st digit]: NET SEL 7 Gain No. selection

a. Setting item

Activating timing: Real-time

Setting range: 0 to 3

Initial value: 3

b. Function

Select a gain number to be used in the communication mode.

c. Setting selection

0: Gain No. 0

1: Gain No. 1

2: Gain No. 2

3: Gain No. 3

P893: NET SEL 7 S-curve time 1

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: -9.9 to 1000.0

Initial value: 10.0

b. Function

Set the S-curve acceleration/deceleration time in the communication mode.

This setting is effective only in the position control mode.

For indirect data assignment, the following applies.

- To specify indirect data, set a negative value.
- Set the indirect data number in the lower two digits, regardless of the decimal point.

Example) To specify the indirect data IX15, set "-1.5".

P894[4th - 1st digits]: NET SEL 7 Delay compensation

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0 to 99.99

Initial value: 0.00

b. Function

Set the delay compensation time in the communication mode.

This setting is effective in the position control mode.

P894[8th - 5th digits]: NET SEL 7 Lead compensation

a. Setting item

Activating timing: Real-time

Setting unit: ms

Setting range: 0 to 99.99

Initial value: 0.00

b. Function

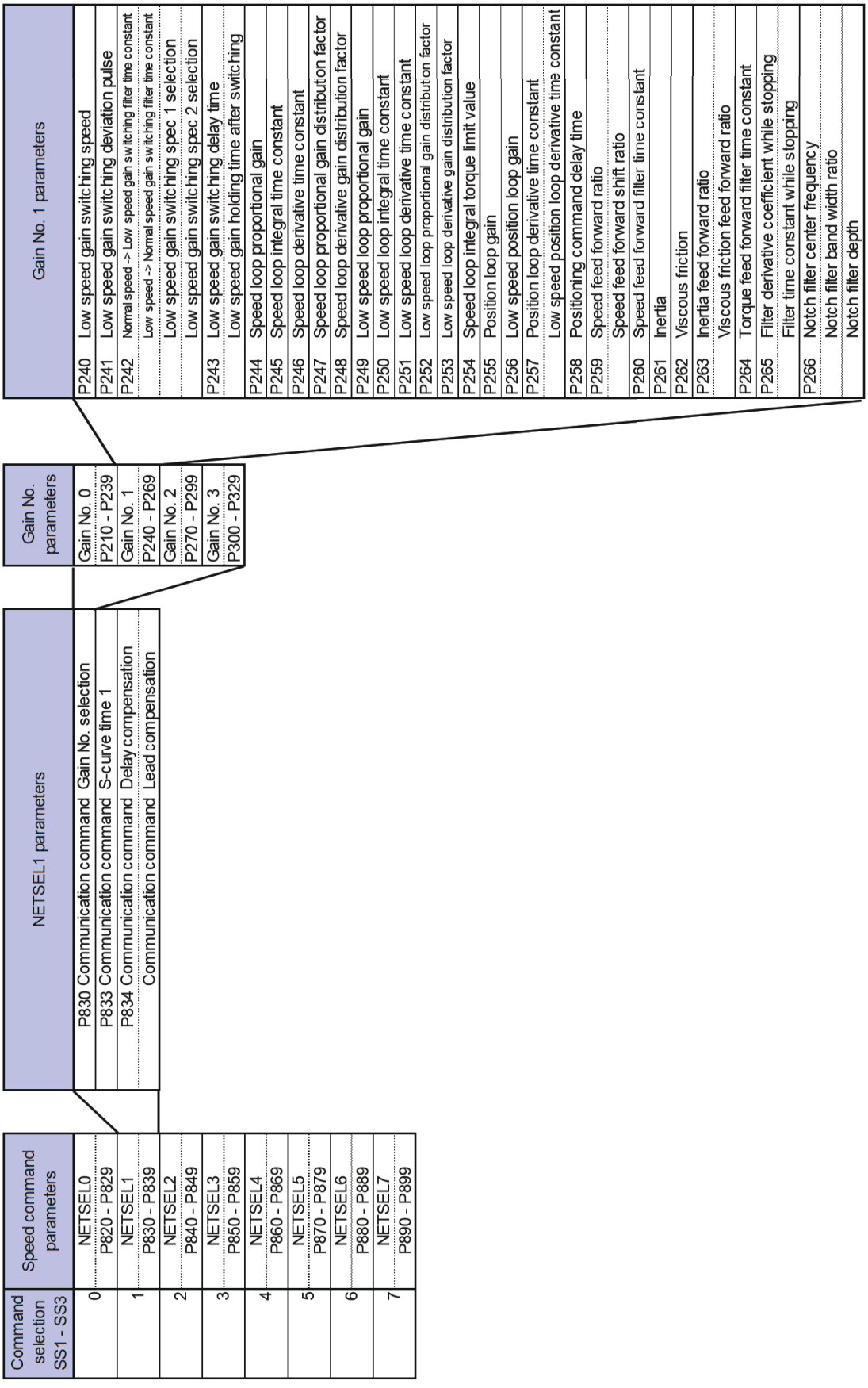
Set the advance compensation time in the communication mode.

This setting is effective in the position control mode.

9-5 Relationships among command selection, SEL numbers, and gain numbers

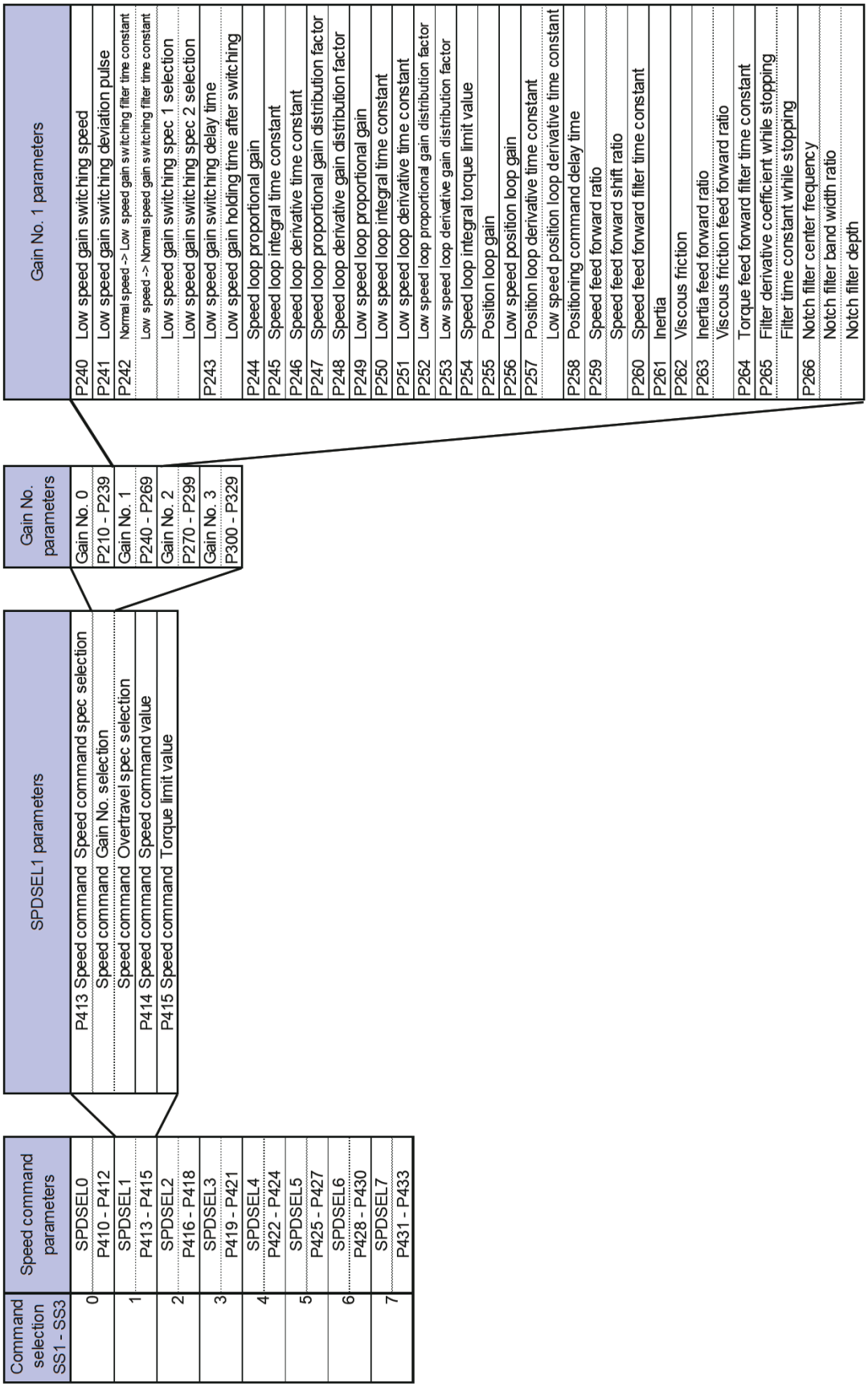
9-5-1 Communication command

Relationships among command selection SS1 to SS3, SEL numbers, and gain numbers in the communication command mode



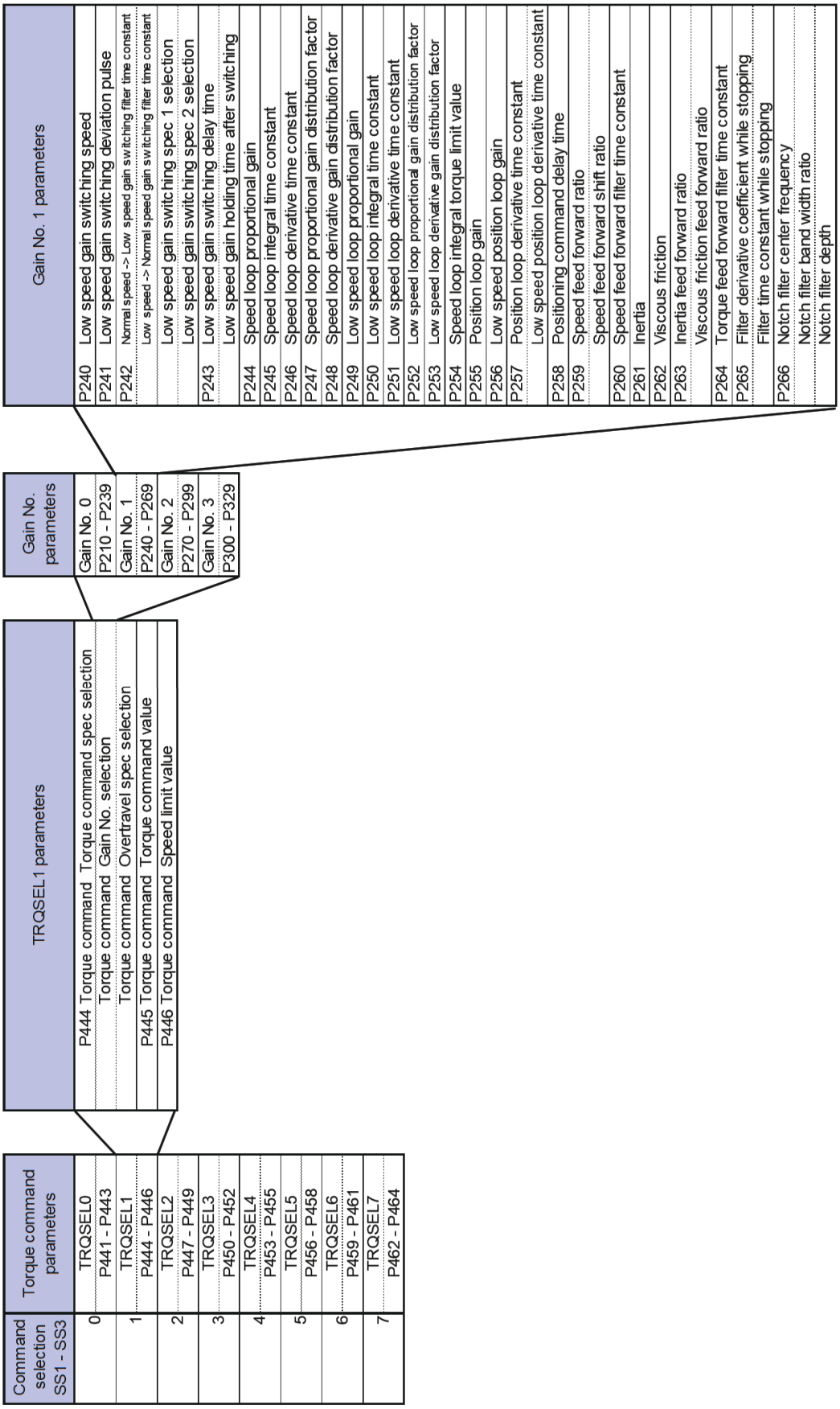
9-5-2 Speed command

Relationships among command selection SS1 to SS3, SEL numbers, and gain numbers in the speed command mode



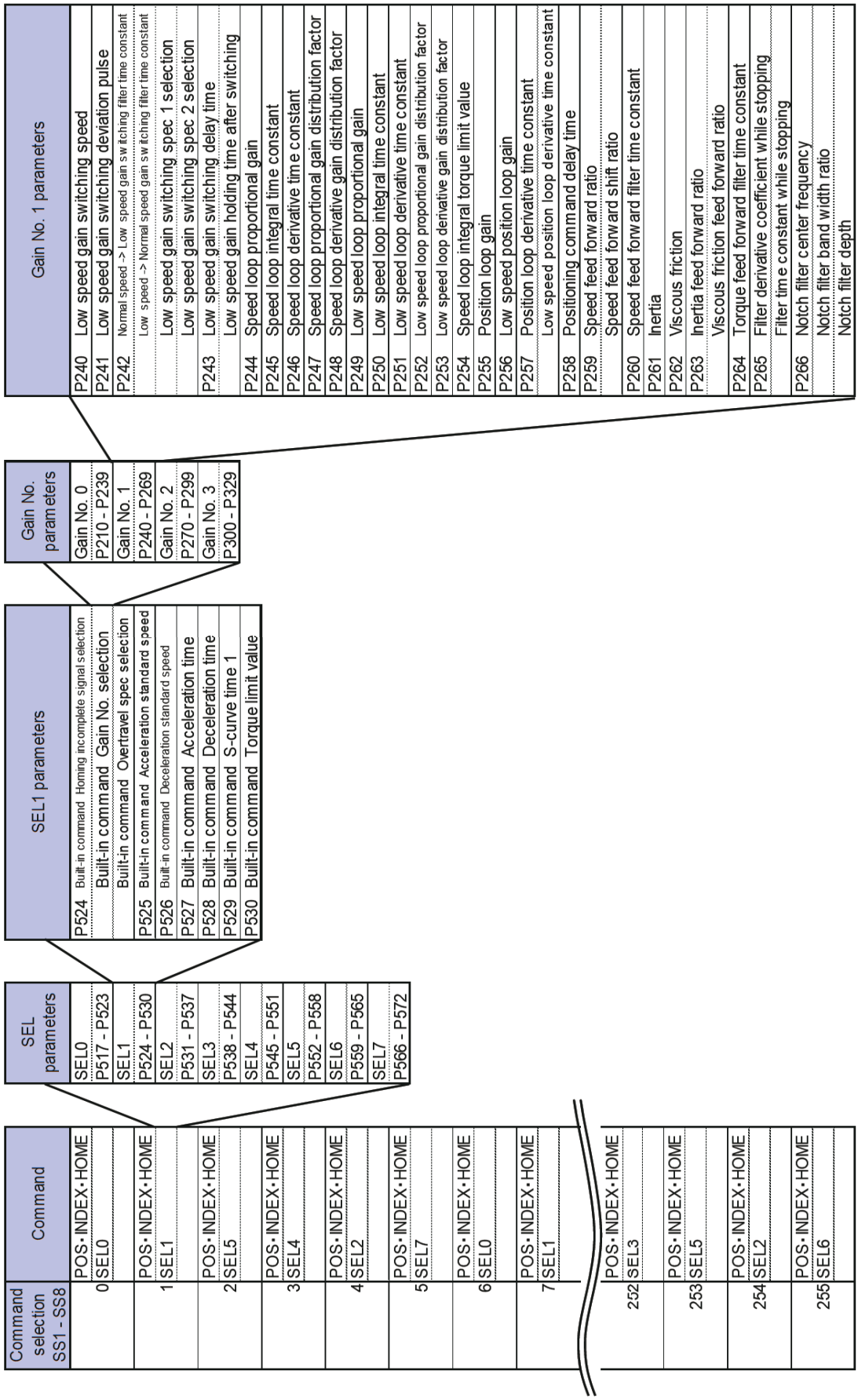
9-5-3 Torque command

Relationships among command selection SS1 to SS3, SEL numbers, and gain numbers in the torque command mode



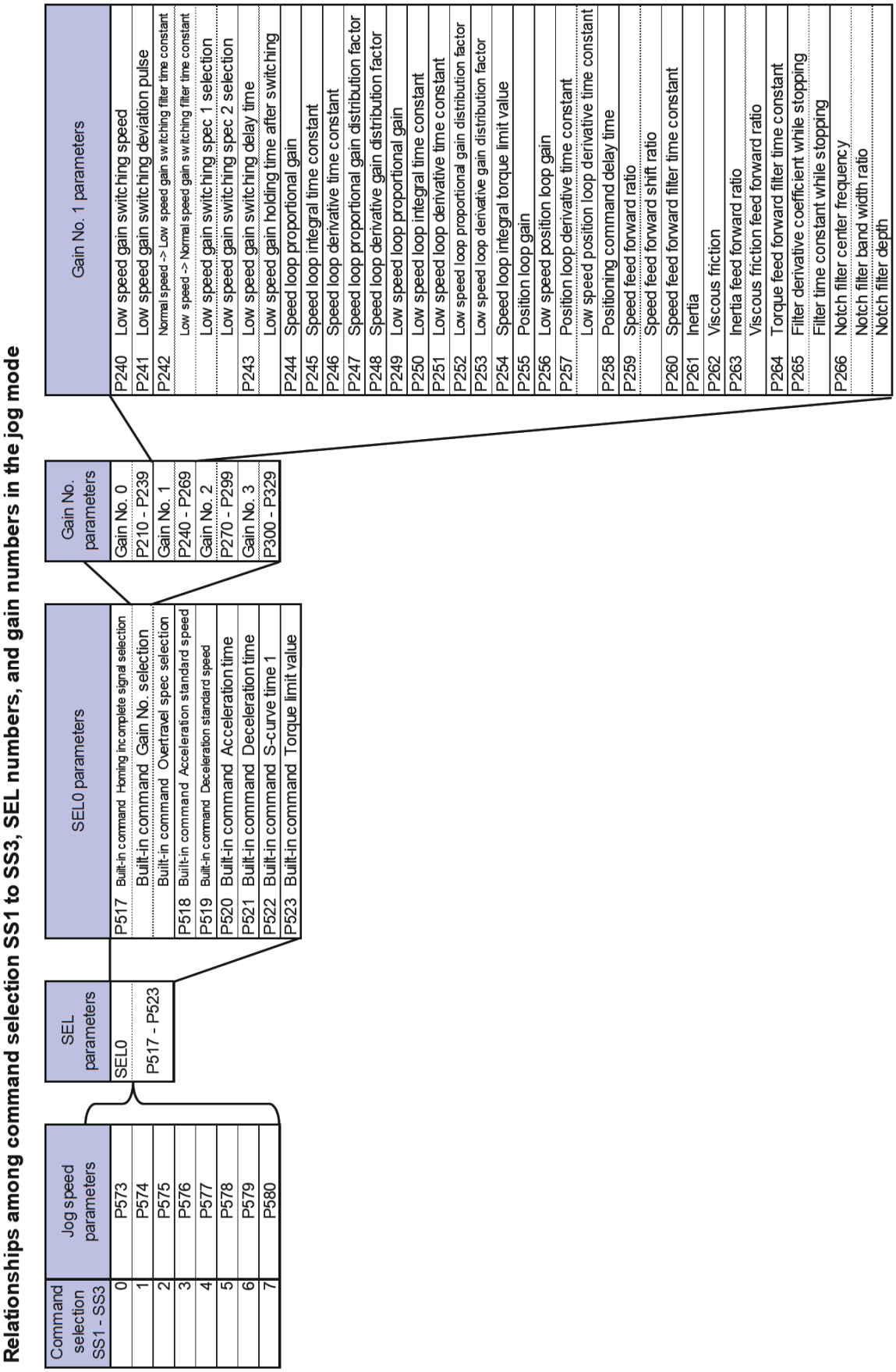
9-5-4 Built-in command (command)

Relationships among command selection SS1 to SS8, SEL numbers, and gain numbers for the POS, INDX, and HOME commands



9-5-5 Built-in command (jog)

Relationships among command selection SS1 to SS3, SEL numbers, and gain numbers in the jog mode



Chapter 10 Status display

10-1 Status display

Under the status display mode, the following modes are offered.

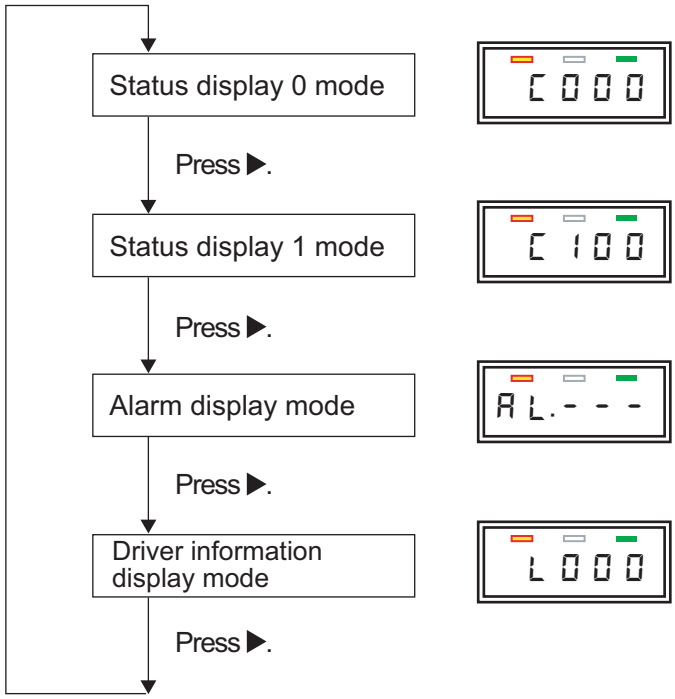


Figure 10-1 Status display mode configuration and transition

Table 10-1 List of display modes in the status display mode

Display mode	Description
Status display 0 mode	Displays servo-related status data. Examples) Motor operation speed, generated torque, and encoder pulse status
Status display 1 mode	Displays data other than servo-related status data. Examples) Input/output signal status and communication indicator
Alarm display mode	Displays information including an alarm which occurs, alarm history, a warning which occurs, and warning history.
Driver information display mode	Displays driver information including the output capacity and driver version.

C000: User desired status display item

Displays a user desired status display item.
When C001 or a subsequent status display number is specified in [P600], the value of the specified item is displayed in C000. The value of this item is displayed immediately after the termination of power on initial display (all LEDs are on). You can specify a frequently used item to check the status more smoothly.
If "0" is set in [P600], the
In the communication mode, the [C111: Station address] value is displayed.
In the maintenance mode, "LOCAL" is displayed.
The data display example indicates -234.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display	22 1	Same as for the item selected in P600	Same as for the item selected in P600

C001: Actual operation speed of motor

Displays the actual motor operation speed.
The data display example indicates -1347.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
-. 0	-. 1347	P161 setting unit/sec	-300000000 to 300000000

C002: Operable max speed

Displays the maximum operable speed.
The data display example indicates -1234.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
-. 0	-. 1234	P161 setting unit/sec	-300000000 to 300000000

C004: Actual motor operating rotational speed

Displays the actual motor rotation speed.
The data display example indicates -550 rpm.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display	-. 550	rpm	-99999 to 99999

C005: Actual torque command value

Displays the actual torque command value.
When the motor rated torque is set, 100% is displayed.
The data display example indicates 200.0%.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display	2000	0.1%	-799.9 to 799.9

C006: Peak torque command value

Displays the peak torque command value.
When the motor rated torque is set, 100% is displayed.
The data display example indicates 250.0%.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display	2500	0.1%	-799.9 to 799.9

Pressing ▲ and ▼ simultaneously for 1.5 seconds in the data display status clears the display data to 0.

C008: Load factor of motor

Displays the motor load ratio (effective value).
When the motor rated load is applied, 100% is displayed.
The data display example indicates 50.0%.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display	500	0.1%	0.0 to 300.0

C009: + Torque limit value

Displays the + torque limit value.
When the motor rated torque is set, 100% is displayed.
The data display example indicates 100.0%.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display	1000	0.1%	0.0 to 799.9

C010: - Torque limit value

Displays the - torque limit value.
When the motor rated torque is set, 100% is displayed.
The data display example indicates 50.0%.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display		0.1%	0.0 to 799.9

C011: Speed limit value

Displays the speed limit value.
The data display example indicates 15000000.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
		P161 setting unit/sec	0 to 300000000

C012: Thermal trip rate of motor

Displays the motor thermal trip rate.
When the display data indicates 100.0 (100%), a "motor overload error" is detected.
The data display example indicates 45.0%.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display		0.1%	0.0 to 100.0

C014: Thermal trip ratio of driver

Displays the device thermal trip rate.
When the display data indicates 100.0 (100%), a "driver overload error" is detected.
The data display example indicates 40.0%.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display		0.1%	0.0 to 100.0

C016: Main power supply DC voltage value

Displays the DC voltage value of the main power supply.
The example indicates 280V.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display	280	V	0 to 999

C017: Peak servo control error ratio

Displays the peak servo control error detection rate.
When the display data indicates 100.0 (100%), a "servo control error" is detected. This error detection rate can be adjusted using "P120: Servo control error detection dead band torque".
The error detection rate is cleared to 0 when:

- The RST signal is switched ON after a servo control error occurs.
- The setting of P120 is changed.

The data display example indicates 30.0%.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display	300	0.1%	0.0 to 300.0

Pressing ▲ and ▼ simultaneously for 1.5 seconds in the data display status clears the display data to 0.

C018: Regenerative overload factor

Displays the regenerative resistor overload rate.
When the display data indicates 100.0 (100%), "regenerative resistor overload error" is detected.
The data display example indicates 30.0%.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display	300	0.1%	0.0 to 100.0

C019: ABS Encoder position

Displays the ABS encoder position.
Reads position data from the encoder.
The data display example indicates 100000 pulses.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
1	00000	Encoder pulse	-2147483648 to 2147483647

C020: Current position(Command position)

Displays the current position (command position).
The data display example indicates position 2112345678.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
21123	45678	P161 setting unit	-2147483648 to 2147483647

C021: Current position(Feedback position)

Displays the current position (feedback position).
The data display example indicates position 2112345680.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
21123	45680	P161 setting unit	-2147483648 to 2147483647

C022: INC position

Displays the incremental position.
The data display example indicates position 654321.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
6	54321	P161 setting unit	-2147483648 to 2147483647

C023: Encoder pulse cumulative quantity

Displays the accumulated number of encoder pulses.
The data display example indicates 2333678 pulses.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
23	33678	Encoder pulse	-2147483648 to 2147483647

Pressing ▲ and ▼ simultaneously for 1.5 seconds in the data display status clears the display data to 0.

C024: Encoder position

Displays the encoder position.
The data display example indicates -803366655 pulses.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
-.8033	66655	Encoder pulse	-2147483648 to 2147483647

C025: 1 rotation position of encoder

Displays the encoder 1-rotation position.
The data display example indicates 113652 pulses.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
0	13652	Encoder pulse	-2147483648 to 2147483647

C026: Position deviation pulse

Displays the position deviation pulses.
The data display example indicates -234 pulses.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
-. 0	-. 234	Encoder pulse	-2147483648 to 2147483647

C027: Communication position command cumulative quantity

Displays the communication position command cumulative quantity.
The data display example indicates -12345678 pulses.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
-. 123	4.5678	Communication position command unit	-2147483648 to 2147483647

Pressing ▲ and ▼ simultaneously for 1.5 seconds in the data display status clears the display data to 0.

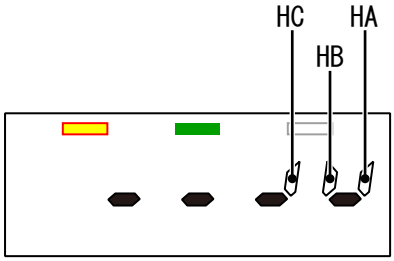
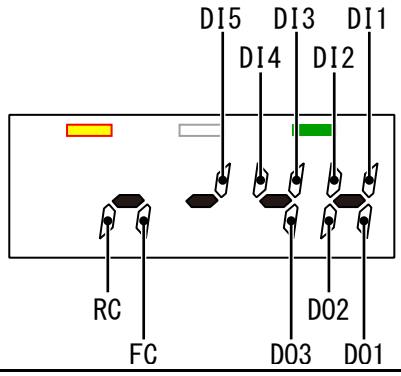
C028: Input frequency of communication position command

Displays the input frequency in the communication position command.
In the least significant digit, 0 is always displayed.
The data display example indicates 11230 pps.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
0	11230	Communication position command unit	-30000000 to 30000000

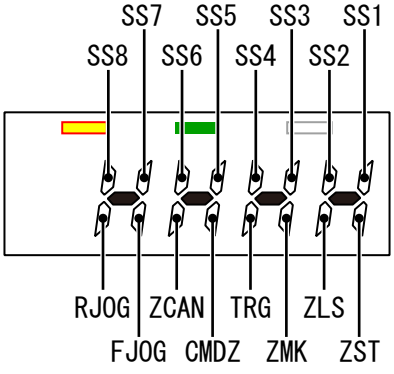
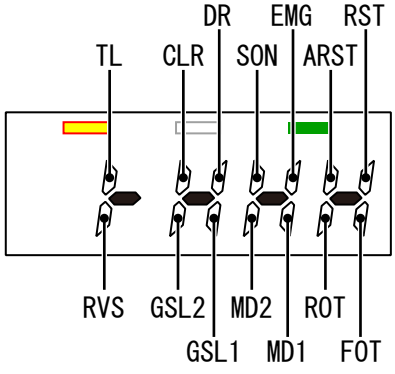
C100: External I/O signal status

Displays the external input/output control signal status.
Description: When a signal is ON, the corresponding LED shown below is on.

Data display		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
		None	None

C101: Internal input signal status 1

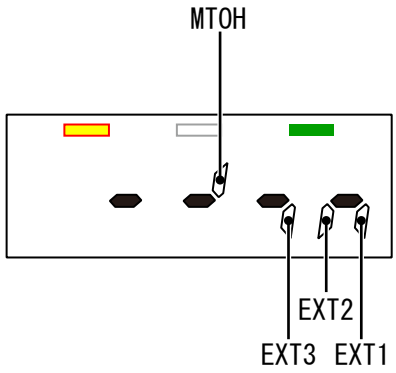
Displays internal input control signal status 1.
Description: When a signal is ON, the corresponding LED shown below is on.

Data display		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
		None	None

C102: Internal input signal status 2

Displays internal input control signal status 2.

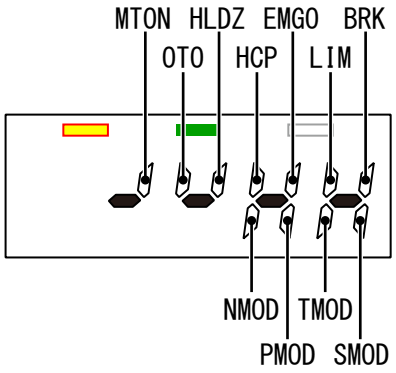
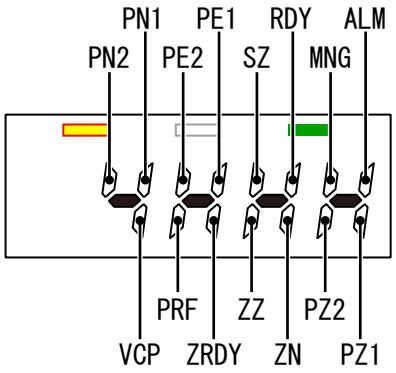
Description: When a signal is ON, the corresponding LED shown below is on.

Data display		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display		None	None

C103: Internal output signal status 1

Displays internal output control signal status 1.

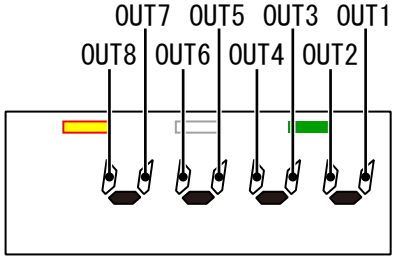
Description: When a signal is ON, the corresponding LED shown below is on.

Data display		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
		None	None

C104: Internal output signal status 2

Displays internal output control signal status 2.

Description: When a signal is ON, the corresponding LED shown below is on.

Data display		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display		None	None

C106: SEL number

Displays the current SEL number.
For each run mode, the following SEL name is assigned.

- SPDSEL: Speed command
- TRQSEL: Torque command
- SEL: Built-in command
- NETSEL: Communication mode command

The data display example indicates SEL number 2.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display	2	None	0 to 7

C107: Gain number

Displays the current gain number.
The data display example indicates gain number 0.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display	0	None	0 to 3

C108: Command address

Displays the address of the command being executed or the address of the command which has been executed. "0" is displayed from power-on until the execution of the first command.
The data display example indicates address 128.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display	128	None	0 to 255

C109: Network connection state

Displays the network connection state.

- 0: No connection
- 1: Getting ready for connection
- 2: Connecting (cyclic communication)
- 3: Connecting (event-driven communication)

The data display example indicates connecting.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display	2	None	0 to 2

C110: Comm phase state

Displays the communication phase state.
The data display example indicate communication phase 4.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display		None	0 to 4

C111: Station address

Displays the MECHATROLINK-III station address that is set for this device.
The data display example indicates address 16.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display		Station address	0 to 255

C112: Function mode

Displays the current function mode.

- 0: Maintenance mode
- 1: Communication mode
- 2: Maintenance mode (VPH DES)

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display		None	0 to 2

C113: Motion mode

Displays the current motion mode.

- 0: Self-diagnosis mode
- 1: Normal operation mode
- 2: Communication operation mode

The data display example indicates the normal operation mode.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display		None	0 to 2

C114: Operation mode

Displays the current operation mode.

- 0: Self-diagnosis in process
- 1: Speed command mode
- 2: Torque command mode
- 3: Position control mode
- 4: Built-in command mode

The data display example indicates the torque command mode.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display		None	0 to 4

C115: Transmission byte

Displays the current function mode.

- 0: 16 bytes
- 1: 32 bytes
- 2: 48 bytes
- 3: 64 bytes

The data display example indicates 32 bytes.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display		None	0 to 2

C116: MECHATROLINK-III transmission cycle

Displays the MECHATROLINK-III transmission cycle.

The data display example indicates 0.250 ms.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display		0.001 ms	0.125 to 4.000

C117: MECHATROLINK-III communication cycle

Displays the MECHATROLINK-III communication cycle.

The data display example indicates 0.500 ms.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display		0.001 ms	0.125 to 4.000

C118: Main command

Displays the main command being executed.

- 0: NOP
- 3: ID_RD
- 4: CONFIG
- 5: ALM_RD
- 6: ALM_CR
- 13: SYNC_SET
- 14: CONNECT
- 15: DISCONNECT
- 29: MEM_RD
- 30: MEM_WR
- 32: POS_SET
- 33: BRK_ON
- 34: BRK_OFF
- 35: SENS_ON
- 36: SENS_OFF
- 48: SMON
- 49: SV_ON
- 50: SV_OFF
- 52: INTERPORATE
- 53: POSING
- 54: FEED
- 55: EX_FEED
- 57: EX_POSING
- 58: ZRET
- 60: VELCTRL
- 61: TRQCTRL
- 64: SVPRM_RD
- 65: SVPRM_WR

The data display example indicates NOP.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display	0	None	0 to 65

C119: Sub command

Displays the sub command being executed.

- 0: NOP
- 5: ALM_RD
- 48: SMON
- 64: SVPRM_RD
- 65: SVPRM_WR

The data display example indicates NOP.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display	0	None	0 to 65

C120: MECHATROLINK-III communication command control

Displays the MECHATROLINK-III communication command control (CMD_CTRL).

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display	8	None	0 to 65535

For details of the command, refer to Separate document "VPH Series HE Type Communications manual".

C121: MECHATROLINK-III communication command status

Displays the MECHATROLINK-III communication command status (CMD_STAT).

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display	4096	None	0 to 65535

For details of the command, refer to Separate document "VPH Series HE Type Communications manual".

C122: MECHATROLINK-III communication sub command control

Displays the MECHATROLINK-III communication sub command control (SUB_CTRL).

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display	256	None	0 to 65535

For details of the command, refer to Separate document "VPH Series HE Type Communications manual".

C123: MECHATROLINK-III communication sub command status

Displays the MECHATROLINK-III communication sub command status (SUB_STAT).

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display	8192	None	0 to 65535

For details of the command, refer to Separate document "VPH Series HE Type Communications manual".

C124: MECHATROLINK-III communication servo command control

Displays the MECHATROLINK-III communication servo command control (SVCMD_CTRL).

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
10	48576	None	-2147483648 to 2147483647

For details of the command, refer to Separate document "VPH Series HE Type Communications manual".

C125: MECHATROLINK-III communication servo command status

Displays the MECHATROLINK-III communication servo command status (SVCMD_STAT).

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
41	94304	None	-2147483648 to 2147483647

For details of the command, refer to Separate document "VPH Series HE Type Communications manual".

C126: MECHATROLINK-III communication servo command output signal

Displays the MECHATROLINK-III communication servo command output signal (SVCMD_IO).

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display	512	None	-2147483648 to 2147483647

For details of the command, refer to Separate document "VPH Series HE Type Communications manual".

C127: MECHATROLINK-III communication servo command input signal

Displays the MECHATROLINK-III communication servo command input signal (SVCMD_IO).

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
5	24288	None	-2147483648 to 2147483647

For details of the command, refer to Separate document "VPH Series HE Type Communications manual".

10-2 Alarm display

In the alarm display mode, an item and its corresponding data are displayed at a time.

AL: Present alarm

Displays the present alarm.
The data example indicates alarm code 005.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display		None	

A0: Latest alarm

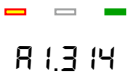
Displays the latest alarm.
The data example indicates alarm code 125.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display		None	A0.000 to A0.899

Pressing ▲ and ▼ simultaneously for 1.5 seconds in the data display status clears all alarm and warning histories to "---".

A1: 1 time previous alarm

Displays the latest alarm but one.
The data example indicates alarm code 314.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display		None	A1.000 to A1.899

Pressing ▲ and ▼ simultaneously for 1.5 seconds in the data display status clears all alarm and warning histories to "---".

A2: 2 times previous alarm

Displays the latest alarm but two.
The data example indicates alarm code 045.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display		None	A2.000 to A2.899

Pressing ▲ and ▼ simultaneously for 1.5 seconds in the data display status clears all alarm and warning histories to "---".

A3: 3 times previous alarm

Displays the latest alarm but three.
The data example indicates alarm code 233.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display	A3.233	None	A3.000 to A3.899

Pressing ▲ and ▼ simultaneously for 1.5 seconds in the data display status clears all alarm and warning histories to "---".

A4: 4 times previous alarm

Displays the latest alarm but four.
The data example indicates alarm code 020.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display	A4.020	None	A4.000 to A4.899

Pressing ▲ and ▼ simultaneously for 1.5 seconds in the data display status clears all alarm and warning histories to "---".

A5: 5 times previous alarm

Displays the latest alarm but five.
The data example indicates no alarm.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display	A5.---	None	A5.000 to A5.899

Pressing ▲ and ▼ simultaneously for 1.5 seconds in the data display status clears all alarm and warning histories to "---".

FL: Present warning

Displays the present warning.
The data example indicates no warning.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display	FL.---	None	FL.000 to FL.999

F0: Latest warning

Displays the latest warning.

The data example indicates warning 914.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display		None	FL.000 to FL.999

Pressing ▲ and ▼ simultaneously for 1.5 seconds in the data display status clears all alarm and warning histories to "---".

10-3 Driver information display

L000: Model number

Displays the model number.
The example indicates model number 200.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display		None	0 to 9999

L001: Driver output capacity

Displays the driver output capacity.
The example indicates 400W.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display		W	50 to 99999

L002: Driver input power supply voltage

Displays the driver input power supply voltage.
The example indicates 200V.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display		V	100 to 400

L003: Hardware version

Displays the hardware version.
The example indicates hardware version 1.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display		None	0 to 9999

L004: Software version

Displays the software version.
The example indicates software version 145.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display	145	None	0 to 9999

L005: Special software code

Displays the special software code.
The example indicates special software code 0.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display	0	None	0 to 9999

L006: Driver serial number (Upper)

Displays the upper digits of the equipment manufacture serial number.
The serial No. is an ASCII code in decimal notation.
[Example]
If the serial number is "AB01", the ASCII code in decimal notation is "65,66,48,49". The serial number "AB01" is displayed as "65664849".
The example indicates the serial number 65666768 (ABCD).

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
656	66768	None	-2147483648 to 2147483647

L007: Driver serial number (Lower)

Displays the lower digits of the equipment manufacture serial number.
The serial No. is an ASCII code in decimal notation.
For an example of conversion from ASCII code to decimal number, refer to [L006].
The example indicates the serial number 48495051 (0123).

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
484	95051	None	-2147483648 to 2147483647

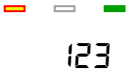
L010: Driver system software number

Displays the driver system software number.
The example indicates driver system software number 4503.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display		None	0 to 9999

L012: Special hardware code

Displays the special hardware code.
The example indicates special hardware code 123.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display		None	0 to 9999

L013: Driver revision number

Displays the driver revision number.
The example indicates driver revision number 13.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display		None	0 to 9999

L021: Absolute position compensation data

Displays data indicating whether ABS position compensation data is valid or invalid.
0: Invalid
1: Valid
The example indicates that ABS position compensation data is valid.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display		None	0 to 1

L040: Encoder type

Displays the encoder type.
The encoder selected with [P060: Encoder type] is assumed.
The data example indicates C-SEN2 (encoder with the marker for the τDISC motor).

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
No display		None	0 to 17

L070 to L077: Motor type (upper to lower 32 characters)

Device No.: D0540 to D0555
Displays the motor type of the connected motor.
The motor type is an ASCII code in decimal notation.
The value is displayed top-aligned (L070), with empty locations replaced by spaces.
The data example indicates the motor type 78684949 48455453 45708332 (ND110-65-FS).
L070: 78684949

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
		None	-2147483648 to 2147483647

L071: 48455453

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
		None	-2147483648 to 2147483647

L072: 45708332

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
		None	-2147483648 to 2147483647

L073 to L077: 32323232

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
		None	-2147483648 to 2147483647

L078 to L085: Motor model (upper to lower 32 characters)

Device No.: D0556 to D0571

Displays the motor model of the connected motor.

The motor model is an ASCII code in decimal notation.

The value is displayed top-aligned (L078), with empty locations replaced by spaces.

The data example indicates the motor type 78778245 83656974 65506545 49514965 (NMR-SAEJA2A-131A).

L078: 78778245

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
787	78245	None	-2147483648 to 2147483647

L079: 83656974

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
836	56974	None	-2147483648 to 2147483647

L080: 65506545

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
655	06545	None	-2147483648 to 2147483647

L081: 49514965

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
495	14965	None	-2147483648 to 2147483647

L082 to 85: 32323232

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
323	23232	None	-2147483648 to 2147483647

L086: Motor serial number (upper)

Device No.: D0572 to D0573
Displays the motor serial number of the connected motor.
The motor serial number is an ASCII code in decimal notation.
The data example indicates the motor serial number 65696548 (AEA0).

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
		None	-2147483648 to 2147483647

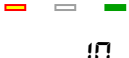
L087: Motor serial number (lower)

Device No.: D0574 to D0575
Displays the motor serial number of the connected motor.
The motor serial number is an ASCII code in decimal notation.
The data example is the motor serial number 49514855 (1307).

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
		None	-2147483648 to 2147483647

L088: Mechanical angle offset

Device No.: D0576 to D0577
Displays the mechanical angle offset of the connected motor.
The data example indicates 10 pulses.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
		Encoder pulse	0 to Number of encoder pulses per rotation

L089: Electric angle offset

Device No.: D0578 to D0579
Displays the electric angle offset of the connected motor.
The data example indicates 10 pulses.

Data display example		Setting unit	Setting range
10 to 6 digits	5 to 1 digits		
		Encoder pulse	0 to Number of encoder pulses per rotation

Chapter 11 Self-diagnosis

11-1 Self-diagnosis mode configuration

This device has a self-diagnosis function for auto-tuning and checking external input/output signals and internal circuit.
The following three types of self-diagnosis modes are available.

1. Self-diagnosis
In this mode, self-diagnosis is executed for auto-tuning, external wiring of the driver, or driver error check.
Execute self-diagnosis using VPH DES.

2. Self-diagnosis for the manufacturer
In this mode, self-diagnosis dedicated to the manufacturer is executed for adjustment at shipment.
Do not execute this mode unless there are such instructions from the manufacturer.

3. Device parameter edit
In this mode, device parameter editing dedicated to the manufacturer is executed for adjustment at shipment.
Do not execute this mode unless there are such instructions from the manufacturer.

⚠Caution		
⃠Prohibition	Do not execute self-diagnosis for the manufacturer or device parameter editing.	If self-diagnosis for the manufacturer or device parameter editing is executed improperly, the motor may run out of control, burn out, or be damaged or the device may burn out or be damaged.

11-2 Input/output signals related to self-diagnosis

The following table indicates whether each signal is valid or invalid during the execution of self-diagnosis.

Table 11-1 List of signals that are valid during self-diagnosis

Control input signal			Control output signal		
Signal name	Signal code		Signal name	Signal code	
Reset	RST	○	Alarm	ALM	○
Alarm reset	ARST	○	Warning	WNG	○
Emergency stop	EMG	○	Servo ready	RDY	○
Servo on	SON	—	Speed Zero	SZ	○
Drive	DR	—	Position deviation range 1, 2	PE1, PE2	○
Deviation clear	CLR	—	Positioning complete 1, 2	PN1, PN2	○
—	—		Positioning complete response 1, 2	PZ1, PZ2	—
Torque limit	TL	○	Command complete	ZN	—
Forward direction overtravel	FOT	○	Command complete response	ZZ	—
Reverse direction overtravel	ROT	○	Command drive ready	ZRDY	—
Mode select 1, 2	MD1, MD2	—	Rough match	PRF	○
Gain select 1, 2	GSL1, GSL2	○	Speed attainment	VCP	○
Command direction inversion	RVS	—	Brake release	BRK	○
Command selection 1 to 3	SS1 - SS3	—	Limit in-Process	LIM	○
Command selection 4 to 8	SS4 - SS8	—	Emergency stop	EMGO	○
Positioning drive	ZST	—	Zero point return complete	HCP	○
Zero point deceleration	ZLS	—	Command zero in-process	HLDZ	—
External zero point marker	ZMK	—	Overtravel in-process	OTO	○
External trigger	TRG	—	Motor electrification in-process	MTON	○
Command zero	CMDZ	—	Speed command mode in-process	SMOD	○
Positioning cancel	ZCAN	—	Torque command mode in-process	TMOD	○
Forward direction jog	FJOG	—	Position control mode in-process	PMOD	○
Reverse direction jog	RJOG	—	Built-in command mode in-process	NMOD	○
—	—	—	Common output 1 - 8	OUT1 - OUT8	—
Motor overheat	MTOH	○	Marker output	OCEM	○

11-3 Diagnosis items

The self-diagnosis items are listed below.
In the self-diagnosis mode, the data display LED panel indicates PCd.

d000: Auto tuning gain number 0

Measures the motor load and sets the position loop gain and speed loop gain for gain No. 0 Parameters.

a. Operation for execution
Item display → Press ENT → run blinking → Press ENT for 1.5 seconds → Motor operation → Result display

b. Operation for forced termination
Press ENT.

c. Result display
run = Measuring/End = Normal completion/Er 1 = Measurement 0/Er2 = Outside integration range/Er3 = Data error/
Er9 = Midway stop (ALM, RST, EMG, OT)

d001: Auto tuning gain number 1

Same as for d000. Sets values for gain No. 1 parameters.

d002: Auto tuning gain number 2

Same as for d000. Sets values for gain No. 2 parameters.

d003: Auto tuning gain number 3

Same as for d000. Sets values for gain No. 3 parameters.

d004: Test run

Repeats positioning by the specified distance.

a. Operation for execution
Item display → Press ENT → run blinking → Press ENT for 1.5 seconds → Motor operation and result display

b. Method of operation for forced termination
Press ENT.

c. Result display
run = Operating/Er9 = Midway stop (ALM, RST, EMG, OT)

d. Operation specification
[P604] - P607]
* The self-diagnosis in which the motor runs stops when an alarm occurs or the RST, EMG, or OT signal is switched ON.

d005: Forced Jog

Performs motor jog operation.

a. Operation for execution

Item display → Press ENT → run blinking → Press ENT for 1.5 seconds → With the pressing of ▲ or ▼ , motor operation or result display

(Pressing of ▲ : Forward direction operation, pressing of ▼ : Reverse direction operation)

b. Result display

-99999 to 99999

rpm speed display operation speed = Normal operation in process/

Erg = Midway stop (ALM, RST, EMG, OT)

c. Operation specification

Jog speed = Command number 0, SEL0 (P573)

* When the operation speed exceeds ±100000, ±99999 is displayed.
* The self-diagnosis in which the motor runs stops when an alarm occurs or the RST, EMG, or OT signal is switched ON.

d007: DC energization

Performs DC energization at 70% of the motor rated current.

a. Operation for execution

Item display → Press ENT → run blinking → Press ENT for 1.5 seconds → Motor operation and result display

b. Method of operation for forced termination

Press ENT.

c. Result display

run = DC energization in process/Erg = Midway stop (ALM, RST, EMG, OT)

* The motor draws in electric angle 0° by DC energization.
* The self-diagnosis in which the motor runs stops when an alarm occurs or the RST, EMG, or OT signal is switched ON.

d012: U phase electric current FB display

Displays U phase current feedback.

a. Operation for execution

Item display → Press ENT → Result display

b. Result display

-32768 to 32767 (Within ±32: Normal)

d013: V phase electric current FB display

Displays V phase current feedback.

a. Operation for execution

Item display → Press ENT → Result display

b. Result display

-32768 to 32767 (Within ±32: Normal)

d014: W phase electric current FB display

Displays W phase current feedback.

a. Operation for execution

Item display → Press ENT → Result display

b. Result display

-32768 to 32767 (Within ±32: Normal)

d015: Absolute position compensation data transmission (VPH → IPU)

Transfers absolute position compensation related data (compensation values and user parameters) stored in the VPH main unit to the IPU.

a. Operation for execution

Item display → Press ENT → run blinking → Press ENT for 1.5 seconds → Result display

b. Result display

run = Measuring/End = Normal completion/Er 1 = Abnormal completion

d020: Auto magnetic pole detection magnetic pole offset setup

Checks the magnetic pole position with auto magnetic pole detection and sets [P087: Magnetic pole position offset special setting].

a. Operation for execution

Item display → Press ENT → run blinking → Press ENT for 1.5 seconds → Result display

b. Result display

run = Measuring/End = Normal completion/Er 1 = Abnormal completion

d021: DC energization magnetic offset setting

Checks the position to which the motor draws in electric angle 0° by DC energization and sets [P087: Magnetic pole position offset special setting].

a. Operation for execution

Item display → Press ENT → run blinking → Press ENT for 1.5 seconds → Result display

b. Result display

run = Measuring/End = Normal completion/Er 1 = Abnormal completion

d022: Current position magnetic pole offset setup

Assumes the electric angle of the spot to be 0° and sets [P087: Magnetic pole position offset special setting].

a. Operation for execution

Item display → Press ENT → run blinking → Press ENT for 1.5 seconds → Result display

b. Result display

run = Measuring/End = Normal completion/Er 1 = Abnormal completion

d100: RAM check

Performs a RAM check.

a. Operation for execution

Item display → Press ENT → Result display

b. Result display

run = Measuring/End = Normal completion/Er 1 to Er3 = RAM error

d101: Control input signal check

Displays the LED corresponding to each of input signals DI1 to 5.

a. Operation for execution

Item display → Press ENT → Result display

b. Result display

Same as the top row of the status display C 100 lower display.

d102: Control output signal check

Forcibly outputs the signal corresponding to the set number.

* For VPH DES, a signal is switched between ON and OFF with the switch for that signal.

a. Operation for execution

Item display → Press ENT → 0 display (rightmost digit display bar blinking) → Select output signal by pressing ▲ or ▼ → Output selected signal in real-time

b. Setting range

0 to 4

0 = DO1 to 3 signal OFF & DBK (dynamic brake) signal OFF

1 to 3 = DO1 to 3 signal ON

4 = DBK signal ON

d104: 90 deg phase difference encoder marker check

Checks the 90 deg phase difference encoder marker.

The displayed value is incremented by one each time the encoder marker signal is input.

When the value exceeds 32767, the counter is set to -32768 and counting continues toward 0.

a. Operation for execution

Item display → Press ENT → Result display

b. Result display

-32768 to 32767 (starting with 0)

H000: Init

Performs the initialization process corresponding to the specified code.

a. Operation for execution

Item display → Press ENT → Setting in the same way as in parameter input

b. Input range

0 to 9999

18 = Data initialization

31 = Absolute position compensation data initialization (0 clear)

⚠Caution
H000: If "18" is executed during initialization, the following storage data is initialized. • Parameters • Program data • Indirect data • Alarm history It is recommended to preserve data before initialization. Data can be saved with VPH DES.

Chapter 12 Operation panel

12-1 Overview of the operation panel

12-1-1 Function of each part of the operation panel

Use the operation panel to display the motor or device status, edit parameters, and execute self-diagnosis.

Configuration of the operation panel

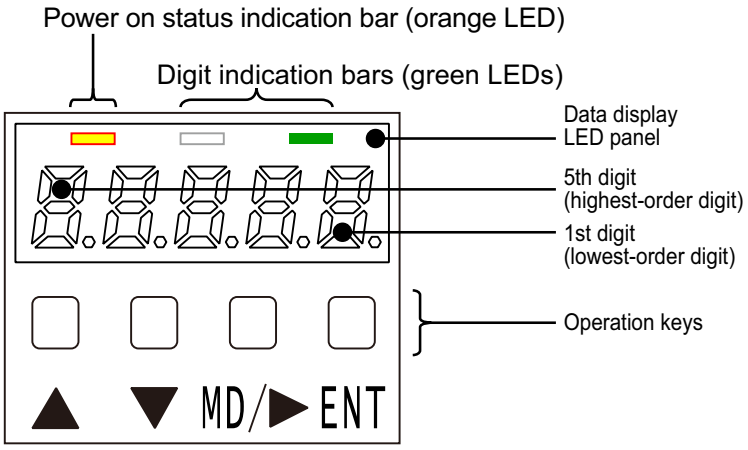


Figure 12-1 Configuration of the operation panel

Data display LED panel

The data display LED panel displays an item and its corresponding data for each operation mode.
On the data display LED panel, the numbers and characters listed below are displayed.

Table 12-1 Numbers and characters displayed on the data display LED panel

Data display LED panel	Number	Data display LED panel	Character	Data display LED panel	Character
0	0	A	A	n	n(N)
1	1	b	b(B)	o	o(O)
2	2	C	C	P	P
3	3	d	d(D)	q	q(Q)
4	4	E	E	r	r(R)
5	5	F	F	t	t(T)
6	6	H	H	U	U
7	7	h	h	u	u
8	8	J	J	-	- (negative sign) *1
9	9	L	L		

*1: When a negative value consisting of up to four digits is displayed, - (negative sign) is displayed in the 5th digit.
At this time, the decimal point at the 5th digit also lights.
When a negative value consisting of five or more digits is displayed, the decimal point at the 5th digit lights instead of - (negative sign).

A character or characters displayed in the one or two high-order digits of the data display LED panel indicate an item as listed below.

Table 12-2 Displayed characters and corresponding items

Displayed character(s)	Corresponding item	Example
C	Status display item	C001
AL.	Code of an alarm being issued	AL.003
A0.	The latest code in the alarms that have occurred is displayed.	A0.003
A*.	Alarm history item	A 1.003
FL.	Code of a warning being issued	FL.903
F0.	The latest code in the warnings that have occurred is displayed.	F0.903
L	Driver information display item	L001
P	Parameter edit item	P002
PP	Auto-Tuning level adjustment item	PP00
d	Self-diagnosis execution item	d004
dd	Execution item of self-diagnosis for the manufacturer	dd04
H	Self-diagnosis edit item	H000
HH	Edit item of self-diagnosis for the manufacturer	HH00
EH	Indirect data edit item	EH
Ad	Command address	Ad000
Cd	Command edit item	Cd00
E	Device parameter edit item	E000
Er	Input error	Er001
hALt	Driver system error	hALt

*: Error or warning history number

Each decimal point on the data display LED panel has a special meaning. The following table lists its meaning.

Table 12-3 Decimal points on the data display LED panel

Decimal point at	Corresponding item
5th digit	Sign indication Off: + data On: - (negative) data
4th digit	Delimiter between the character and number of an alarm or warning item
3rd digit	Always off. On only at power-on.
2nd digit	Always off. On only at power-on.
1st digit	Always off. On only at power-on.

The indication bars at the top of the operation panel have the following meaning.

Table 12-4 Indication bars

Name	Corresponding item	
Power on status indication bar	Leftmost indication bar on the panel. Always on in ▭ (orange) when the power is on.	
Digit indication bar	Center and rightmost indication bars on the panel. Their meanings are listed below.	
	▭ ▬	The 1st to 5th digits or an item is displayed.
	▬ ▭	The 6th to 10th digits are displayed.
	▬ ▬	The data mode selection digit is displayed in the command edit mode. For details, refer to "12-4 Command edit mode".
	▬: On in green, ▭: Off	

Operation keys

Use the operation keys to select a display item in each operation mode and edit parameters and other data.
The following table lists the function of each operation key.

Table 12-5 Operation key function list

Key	Status	Description
▲	Item display	Selects the next item.
	Data setting	Increments the blinking numeric value at the cursor by 1.
	Real time data setting	Increments the entire display data by 1.
	Data display	Changes the displayed data from the 5th to 1st digits to the 10th to 6th digits, data mode selection digit, and the 5th to 1st digits.
▼	Item display	Selects the previous item.
	Data setting	Increments the blinking numeric value at the cursor by -1.
	Real time data setting	Increments the entire display data by -1.
	Data display	Changes the displayed data from the 5th to 1st digits to the data mode selection digit, 10th to 6th digits, and the 5th to 1st digits.
MD/ ▸	Item display	Moves to the next main operation mode.
		Returns to the command address item display status in the command setting data item display status.
	Data setting	Selects a digit to which to set data.
	Real time data setting	Disabled.
	Data display	Moves to the data setting status.
MD/ ▸ when pressed for 1.5 s	Item display	Moves to the next main operation mode. * Automatically restarts the device in the self-diagnosis mode.
	Data setting	Disabled.
	Real time data setting	
	Data display	

Key	Status	Description
ENT	Item display	Moves to the data display status of the current item. Functions in the same way as ▲ in the alarm history display mode.
	Data setting	Cancels data changes and moves to the data display status.
	Real time data setting	
	Data display	Changes the displayed data from the 5th to 1st digits to the selected item, data mode selection digit, 10th to 6th digits, and the 5th to 1st digits.
ENT when pressed for 1.5 s	Item display	Disabled.
	Data setting	Registers the display data (data changes) and moves to the data display status.
	Real time data setting	
	Data display	Moves to the real time data setting status. Real time data setting is available only for servo adjustment parameters and auto-tuning level adjustment data, however.
▲ , ▼ when pressed simultaneously	Item display	Disabled.
	Data setting	Cancels data changes and moves to the data display status.
	Real time data setting	
	Data display	Disabled.
▲ , ▼ when pressed simultaneously for 1.5 s	Item display	Clears all alarm history in the alarm display mode.
	Data setting	Disabled.
	Real time data setting	
	Data display	Clears the display data in the status display mode to 0. Data is cleared only when it can be cleared, however.
▲ ,ENT when pressed simultaneously for 1.5 s	Item display	Moves to the self-diagnosis mode in the status display 0 mode.
	Data setting	Disabled.
	Real time data setting	
	Data display	

12-1-2 Operation mode configuration and transition

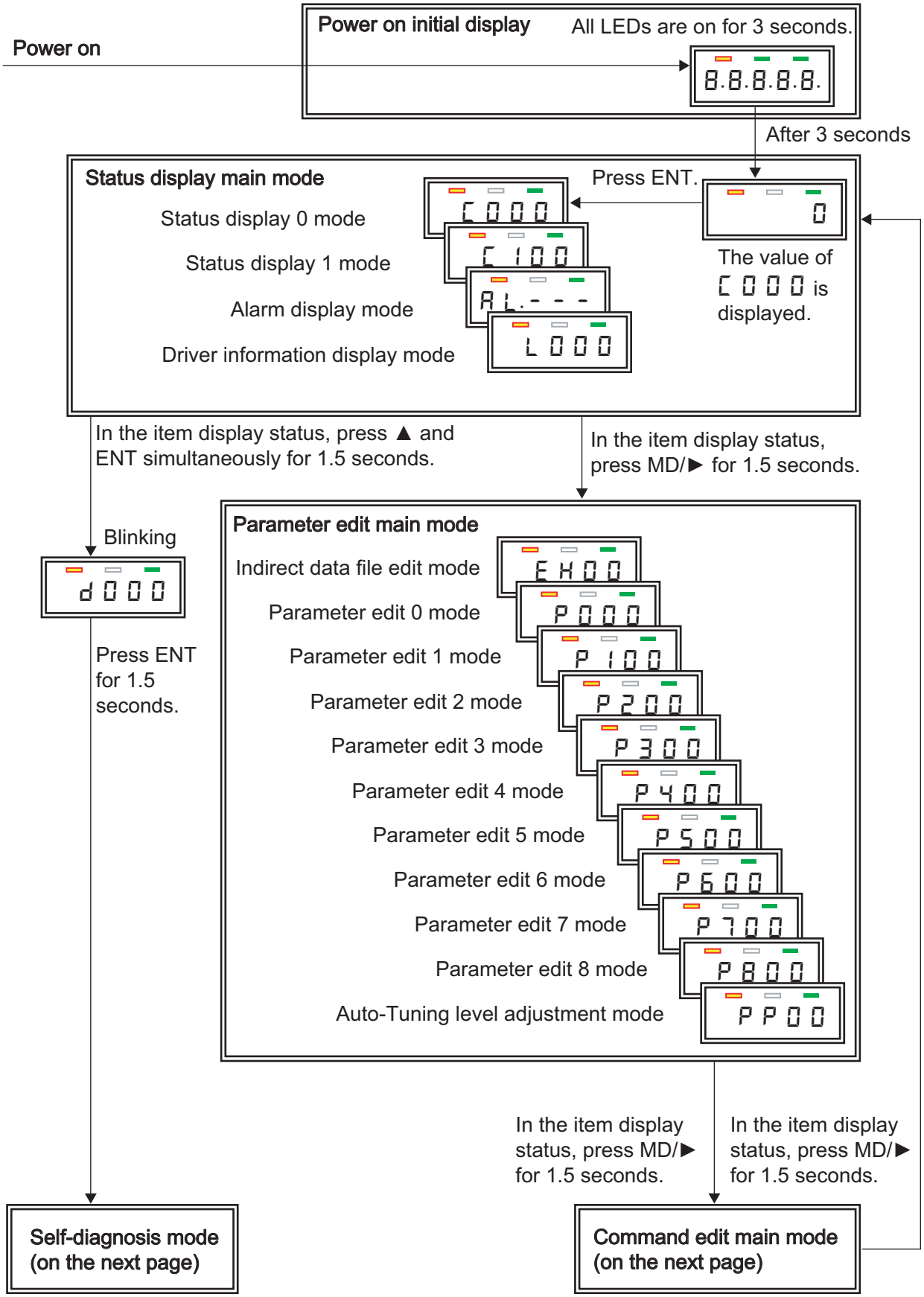


Figure 12-2 Operation mode configuration and transition (1/2)

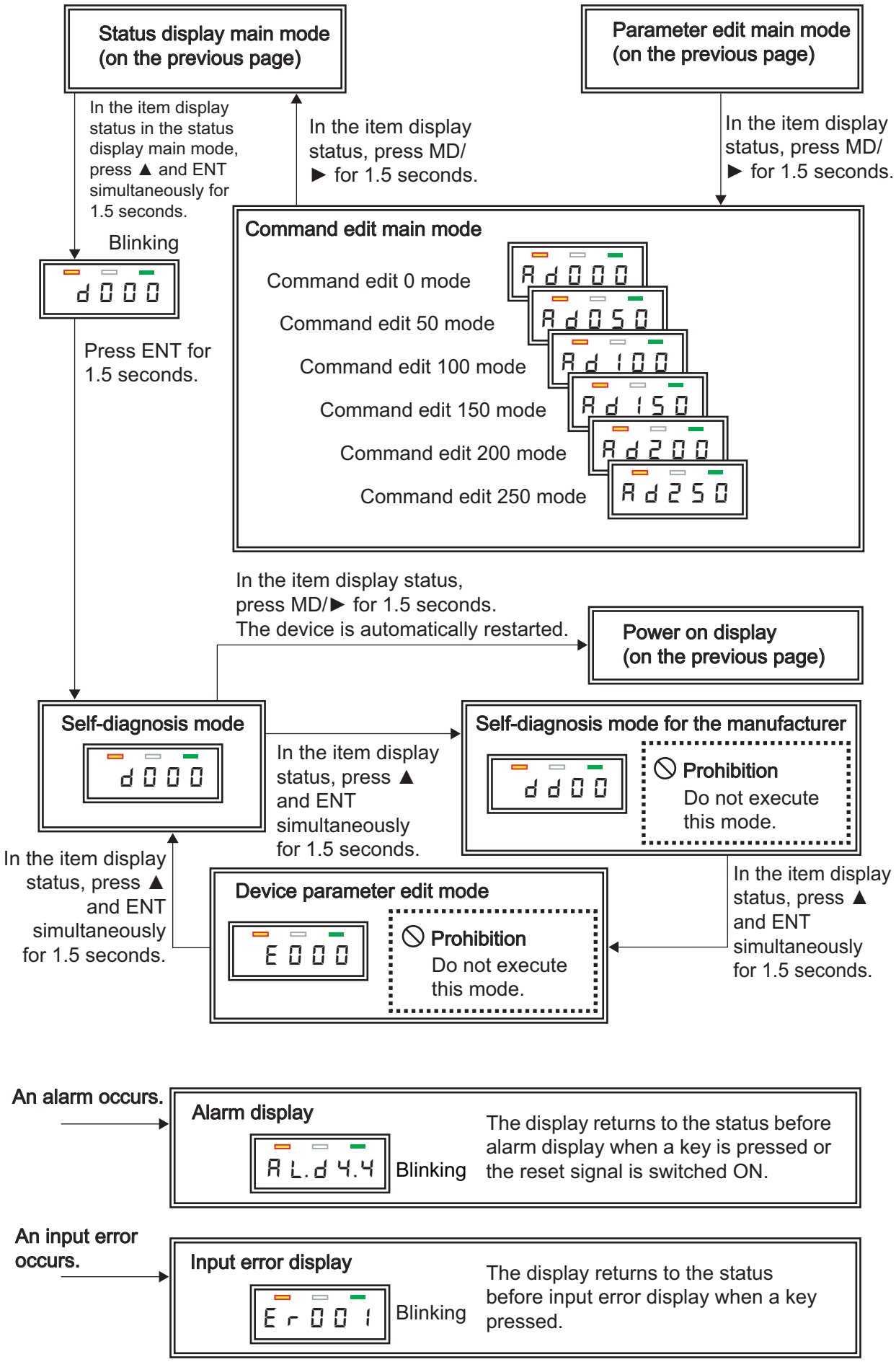


Figure 12-3 Operation mode configuration and transition (2/2)

The following table lists operations available in each operation mode.

Table 12-6 Operation mode list

Operation mode	Item/data	Description
Status display	Item selection	Selects the code of a display item including the operation speed, actual torque, and software version.
	Data display	Displays data corresponding to the selected display item code.
	Alarm display	Displays the code of an alarm which occurs.
	Warning display	Displays the code of a warning which occurs.
Parameter edit	Item selection	Selects the code of a parameter item to be edited.
	Data editing	Sets data for the selected edit item code.
Self-diagnosis	Item selection	Selects an item code for self-diagnosis.
		Self-diagnosis: Self-diagnosis for checking driver errors
		Self-diagnosis dedicated to the manufacturer: Do not execute this mode.
		Device parameter mode: Do not execute this mode.
	Data display/editing	Displays or edits data corresponding to the selected diagnosis item code.
Command edit	Address selection	Selects the address of a command to be edited.
	Command item selection	Selects a command item to be edited.
	Command/data editing	Edits the command code and setting data.

The following input errors may occur.

Table 12-7 Input error list

Error display	Description	Remarks
Er001	The set value is below the setting range.	
Er002	The set value exceeds the setting range.	
Er003	Auto-tuning level adjustment was made when there was no measurement data by auto-tuning.	Execute auto-tuning or set the following parameters, and make auto-tuning level adjustment. Setting parameters: P231,P261,P291,P321

12-2 Parameter edit mode

Under the parameter edit main mode, there are the following modes.

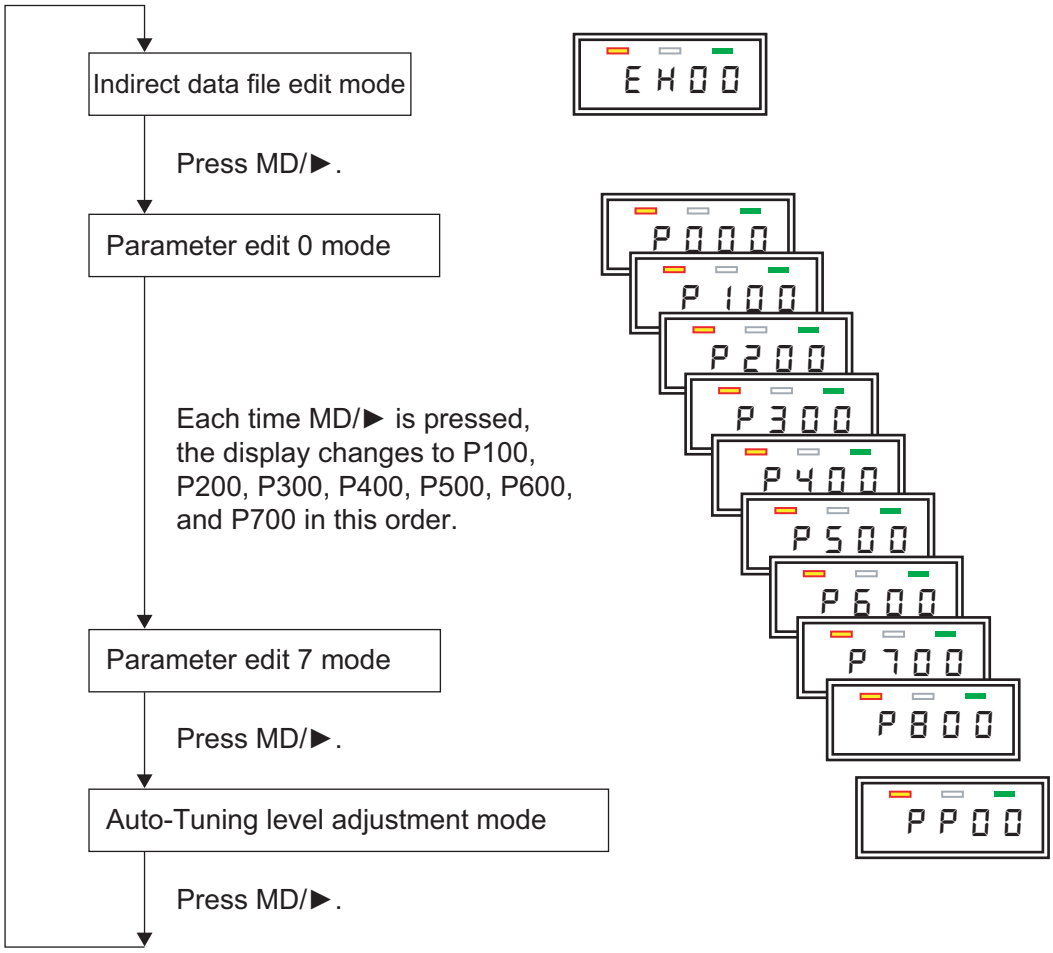


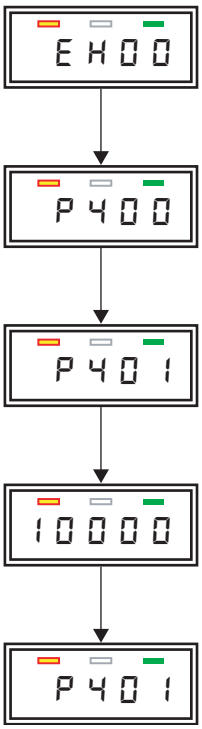
Figure 12-4 Parameter edit mode configuration and transition

Table 12-8 List of display modes in the parameter edit main mode

Display mode	Description
Indirect data file edit mode	Displays and sets indirect data to be used in the command edit mode.
Parameter edit 0 - 7 modes	Displays and sets parameter values. The parameter edit 0 to 7 mode corresponds to parameter group 0 to 7. For details of parameter groups and parameter items, refer to "Chapter 9 Parameters".
Auto-tuning level adjustment mode	Adjusts the servo response level based on the load measured by auto-tuning while setting the speed loop proportional gain, speed loop integral time constant, and position loop gain in appropriate proportion. For details of auto-tuning level adjustment, refer to the separate instruction manual, "VPH Series Servo Adjustment Manual".

12-2-1 Parameter setting

Displaying parameter data consisting of up to 5 digits



The parameter edit main mode is selected.

Press MD/► five times to select the parameter group to be displayed.

The first item of the target parameter group is displayed.

Press ▲ once to display the parameter item to be displayed.

The target parameter item is displayed.

Press ENT once to change to the parameter value display status.

The parameter value is displayed.

Press ENT once to return to the parameter item display status.

The target parameter item is displayed.

Figure 12-5 Example of displaying P401 data

Displaying parameter data consisting of up to 5 digits

The underlined digit in the display blinks.

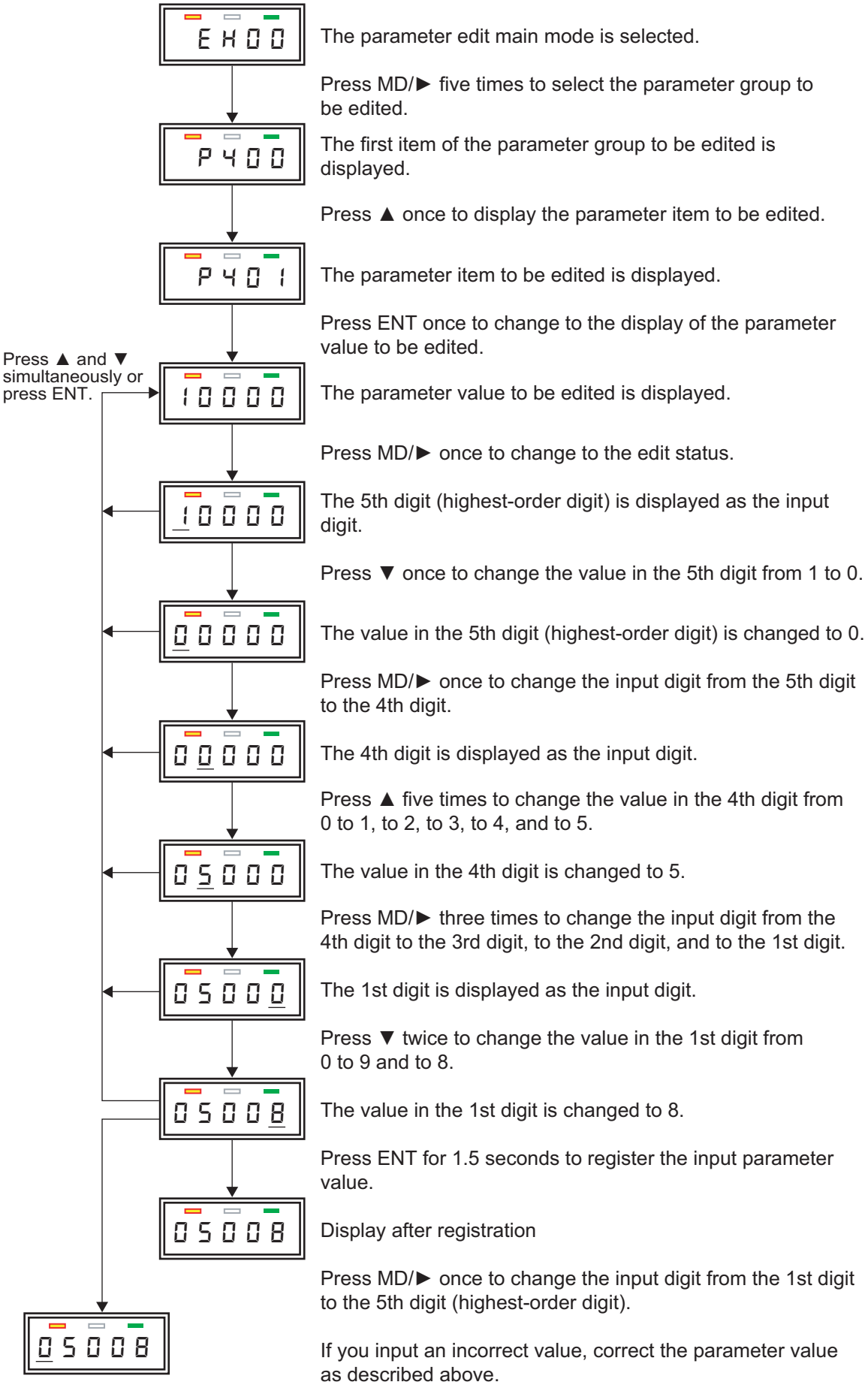


Figure 12-6 Example of changing the P401 parameter value (up to 5 digits) from 10000 to 5008

Editing parameter data consisting of 6 to 10 digits

The underlined digit in the display blinks.

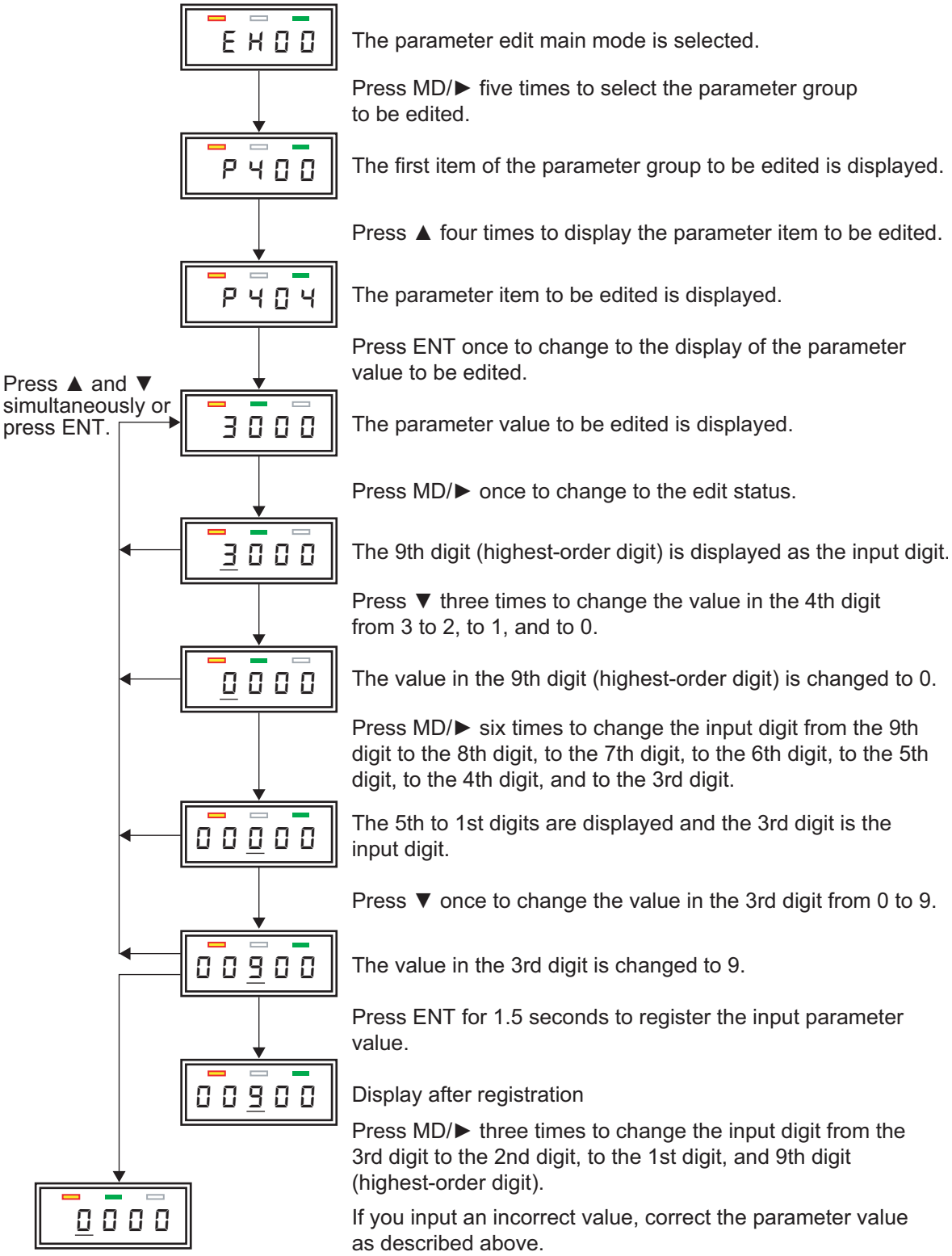


Figure 12-7 Example of changing the P404 parameter value (up to 9 digits) from 300000000 to 900

Editing parameter data in real time

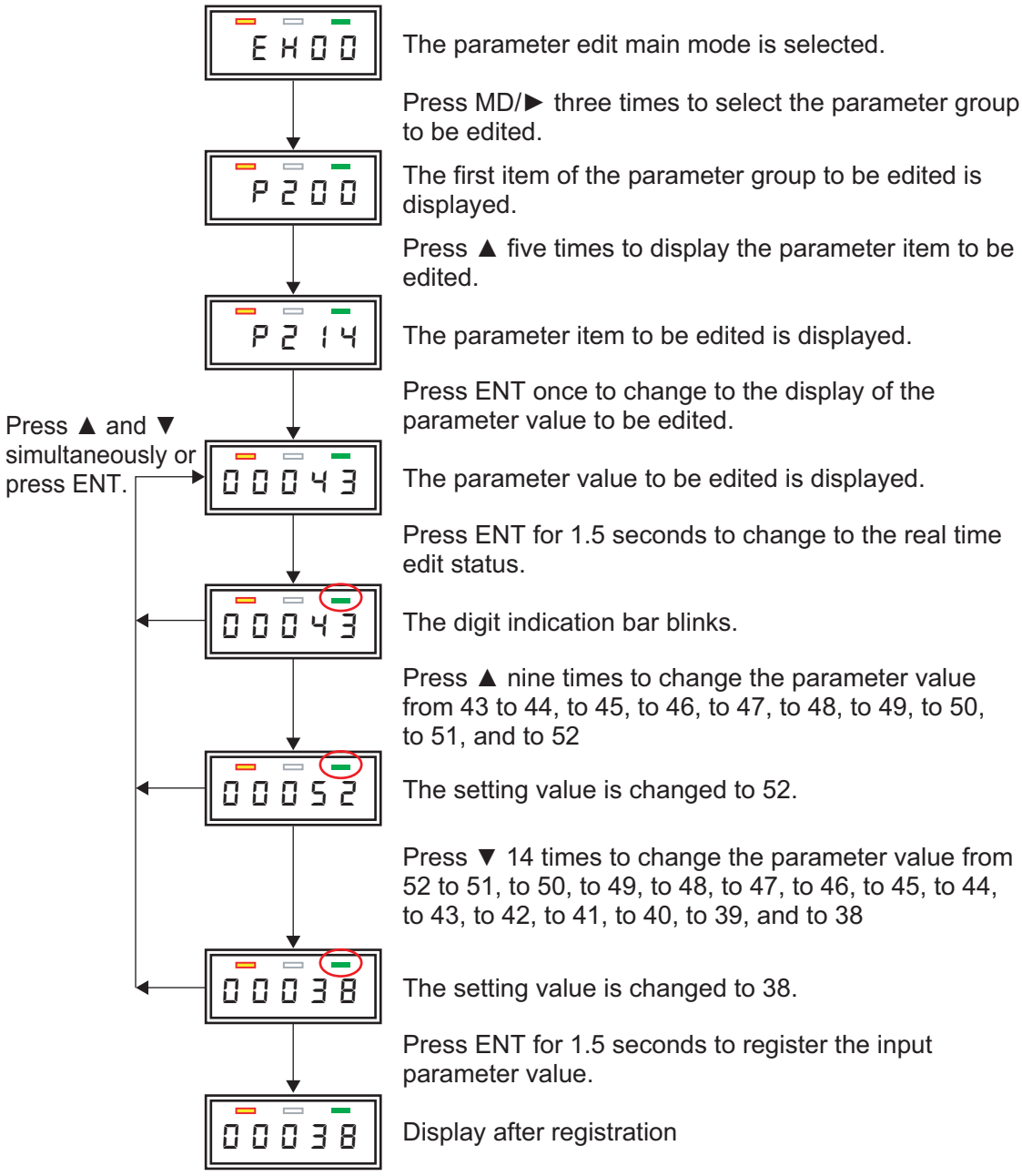
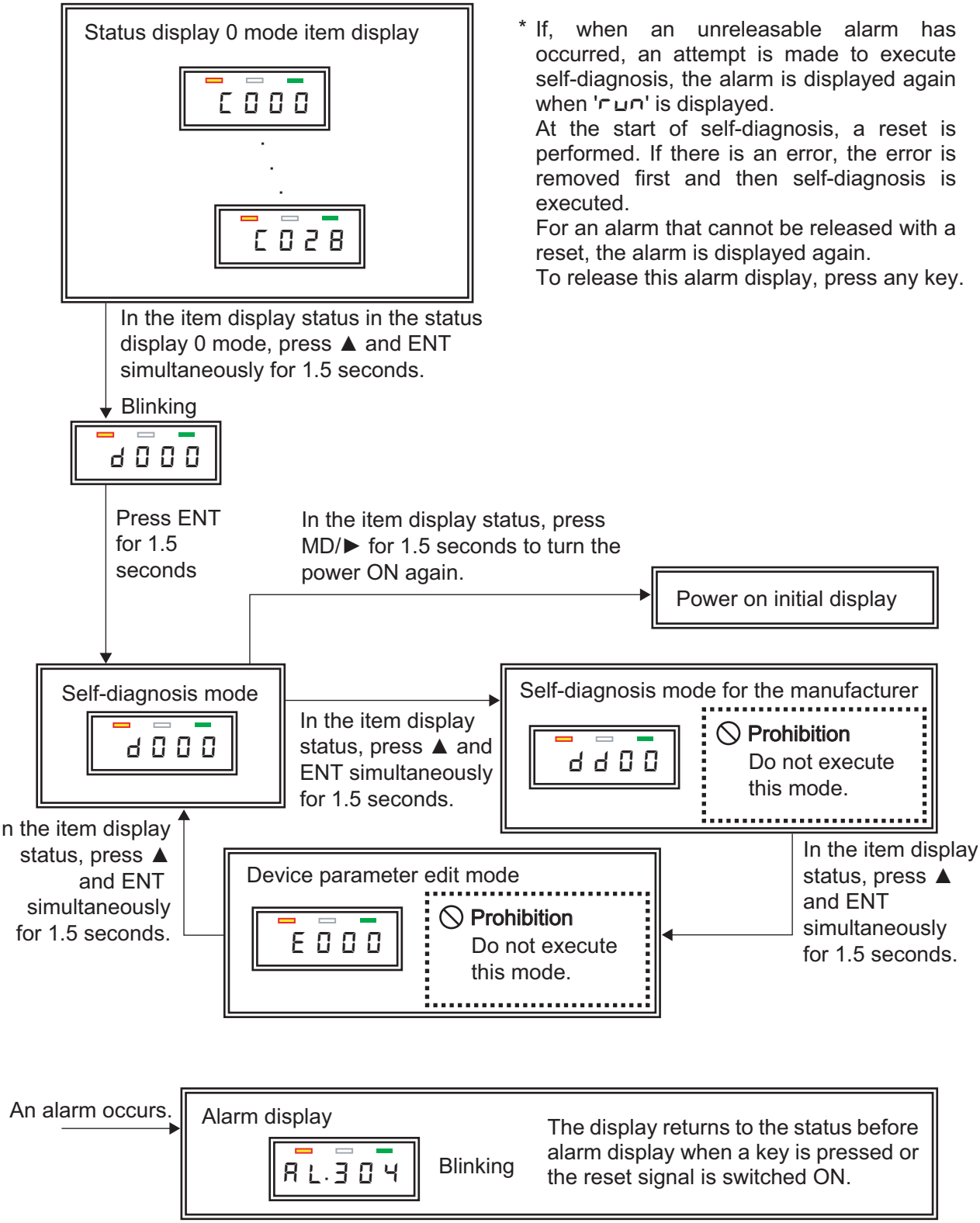


Figure 12-8 Changing P214 parameter value (up to 5 digits) from 00043 to 00052 and to 00038

12-3 Self-diagnosis mode

The following describes the procedure for implementing self-diagnosis mode on the operation panel.
For details of the self-diagnosis mode, refer to "Chapter 11 Self-diagnosis".



* If, when an unreleasable alarm has occurred, an attempt is made to execute self-diagnosis, the alarm is displayed again when 'run' is displayed.
At the start of self-diagnosis, a reset is performed. If there is an error, the error is removed first and then self-diagnosis is executed.
For an alarm that cannot be released with a reset, the alarm is displayed again.
To release this alarm display, press any key.

12-4 Command edit mode

12-4-1 Command edit mode

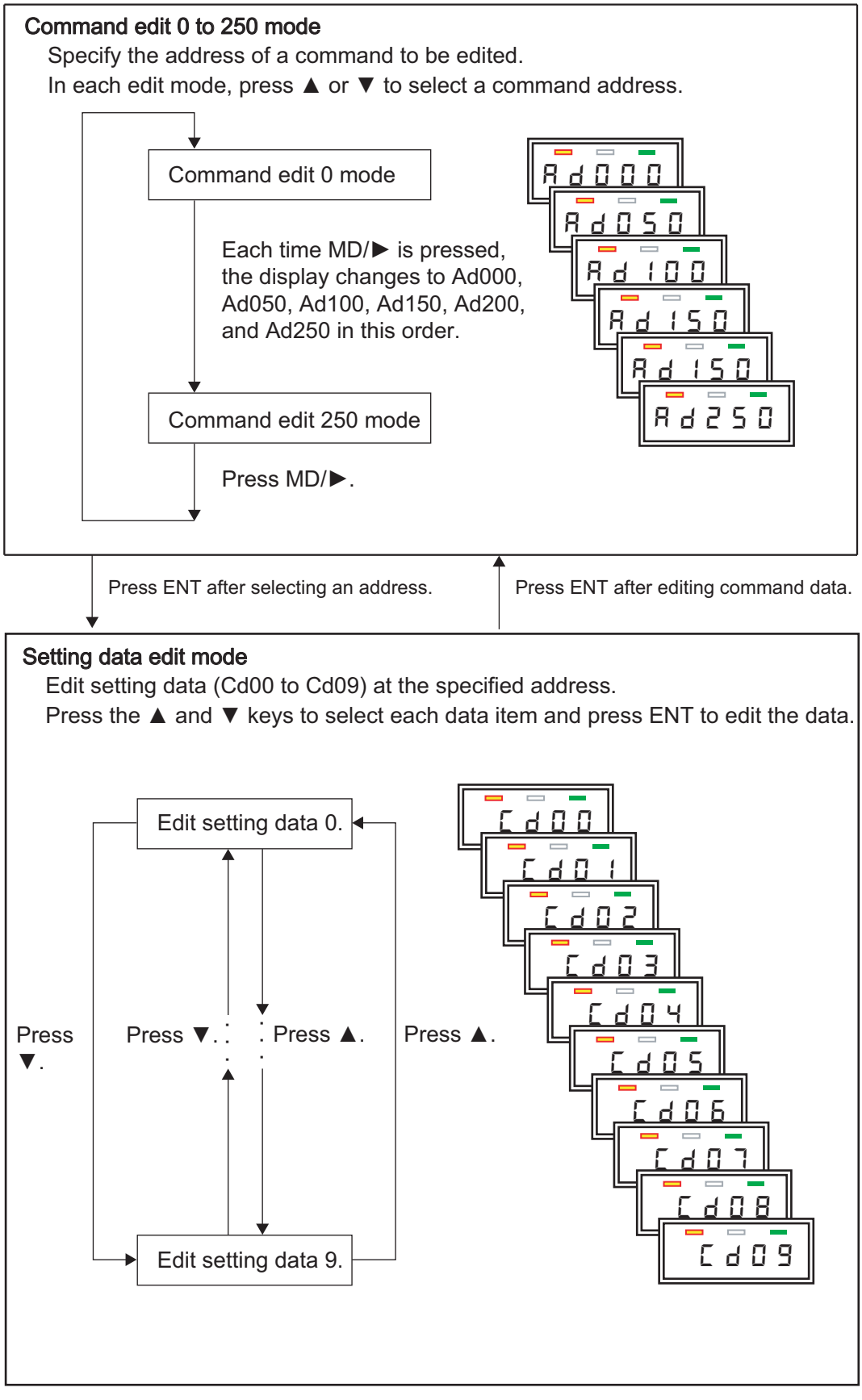


Figure 12-9 Command edit mode configuration and transition

12-4-2 Command edit

Command editing

Set the following index positioning command at Ad.154.

Table 12-9 Sample command to be edited

Setting data number	Cd00	Cd02	Cd04	Cd05	Cd06	Cd08	Cd09
Setting data name	COM	UPDN	OUT Valid/ invalid	POS (0.01 pulse)	F (0.01 pps)	OUT	DIR
Data to be set	INDX	SEL.0 (Initial value)	Invalid (Initial value)	10000.5	Refer to IX50.	0 (Initial value)	SHORT (Initial value)
Data to be displayed	3	0	0	1000050	1000000050	0	0

Set values other than the initial values (Cd00, Cd05, and Cd06) in the above table.

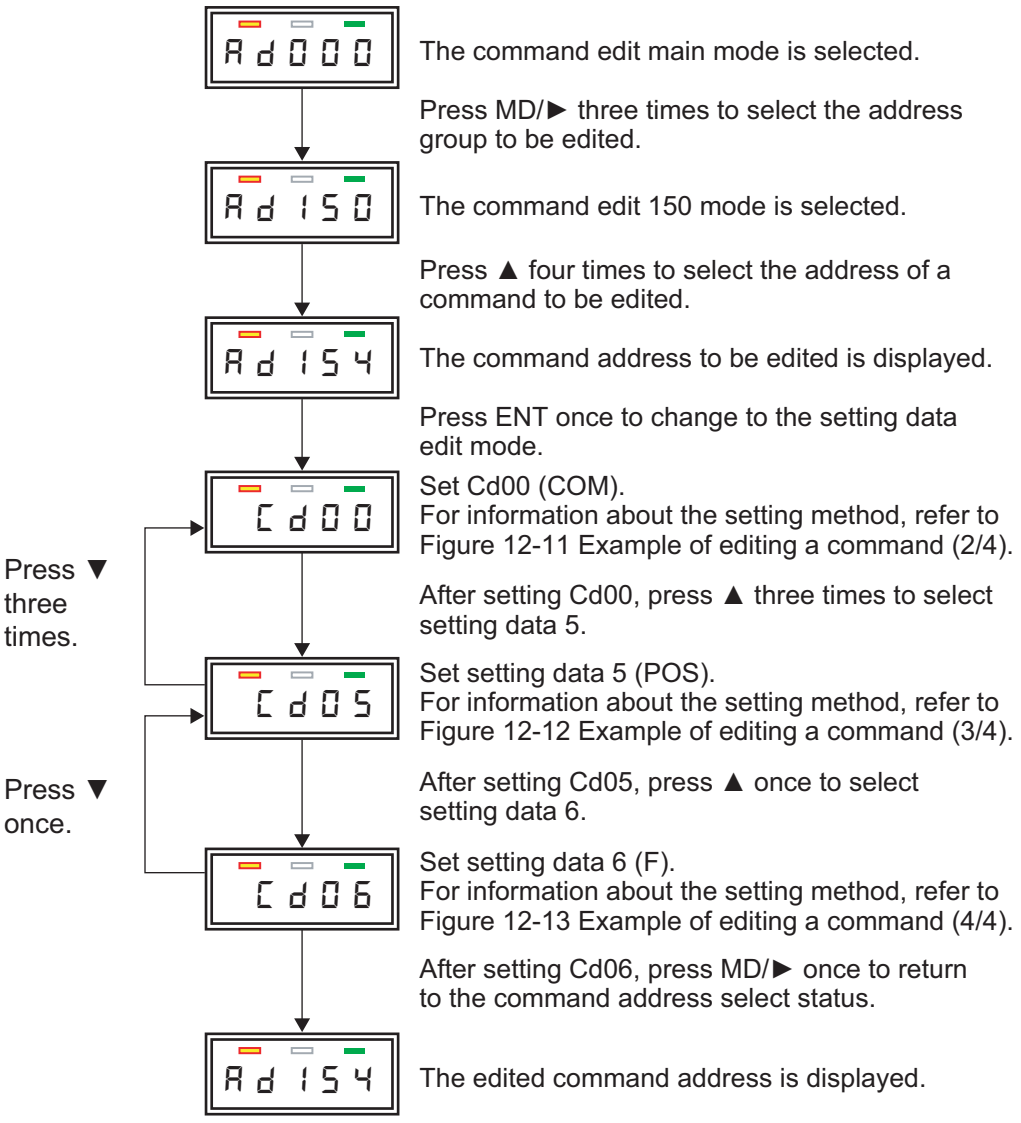
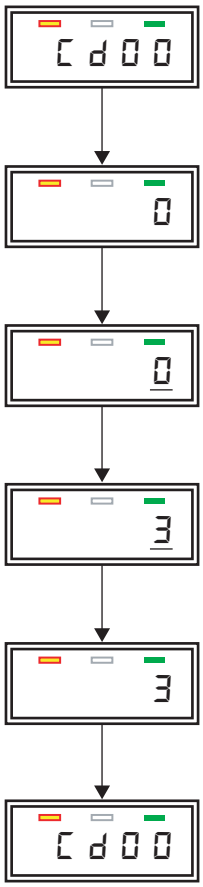


Figure 12-10 Example of editing a command (1/4)

Set Cd00 (COM) = 3 (INDX).

The underlined digit in the display blinks.



The setting data 0 item is displayed.

Press ENT once to display the setting data value to be edited.

The target setting data value is displayed.

Press MD/► once to change to the edit status.

The 1st digit (lowest-order digit) is displayed as the input digit.

Press ▲ or ▼ to change the value in the input digit.

The setting data value is changed to 3 (INDX).

Press ENT for 1.5 seconds to register the input setting data value.

Display after registration

Press ENT once to display the setting data 0 item.

The setting data 0 item is displayed.

Figure 12-11 Example of editing a command (2/4)

Set Cd05 (POS) = 00001000050 (10,000.50).

The underlined digit in the display blinks.

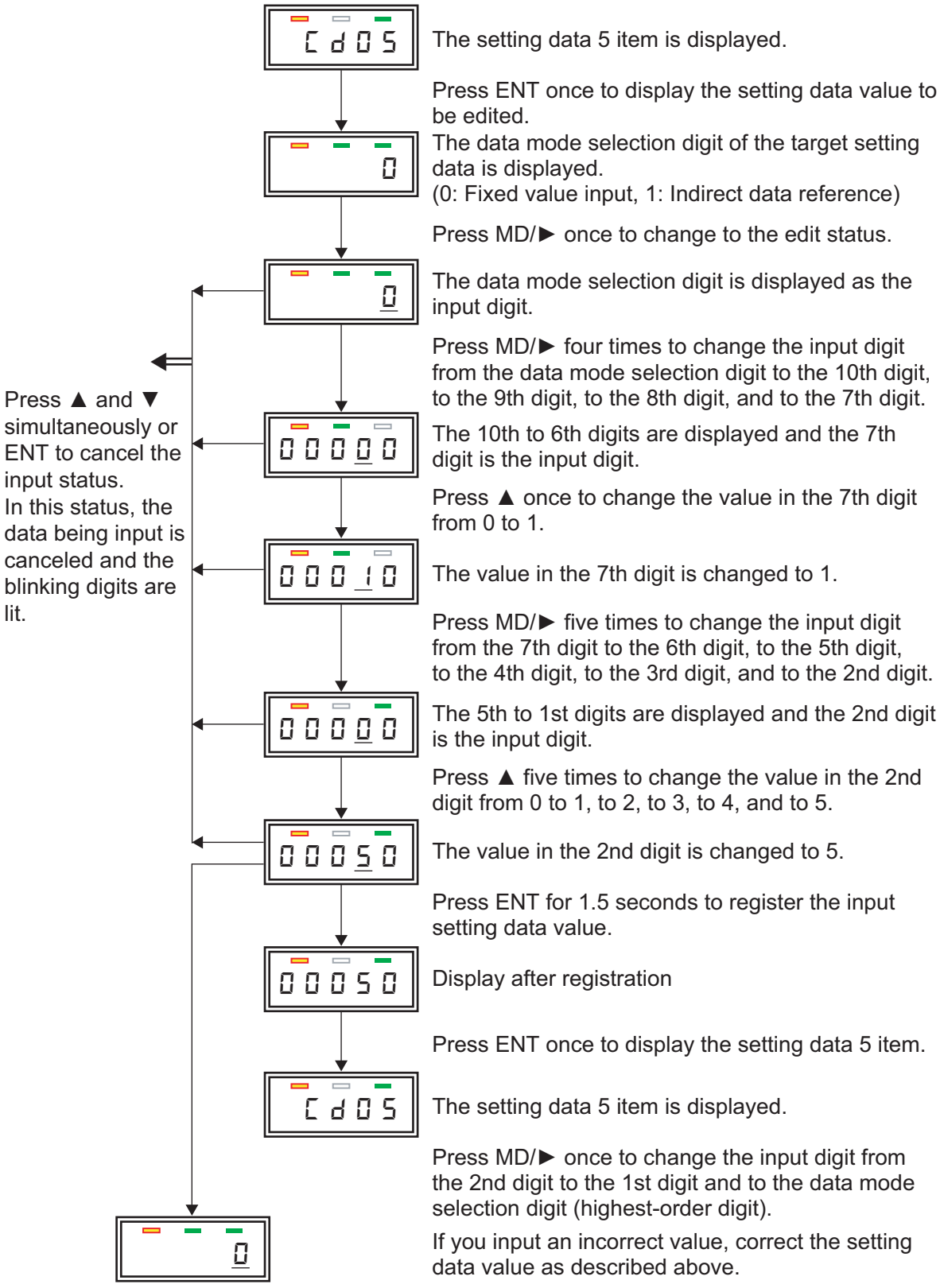


Figure 12-12 Example of editing a command (3/4)

Set Cd06 (F) = 10000000050 (IX50 reference).

The underlined digit in the display blinks.

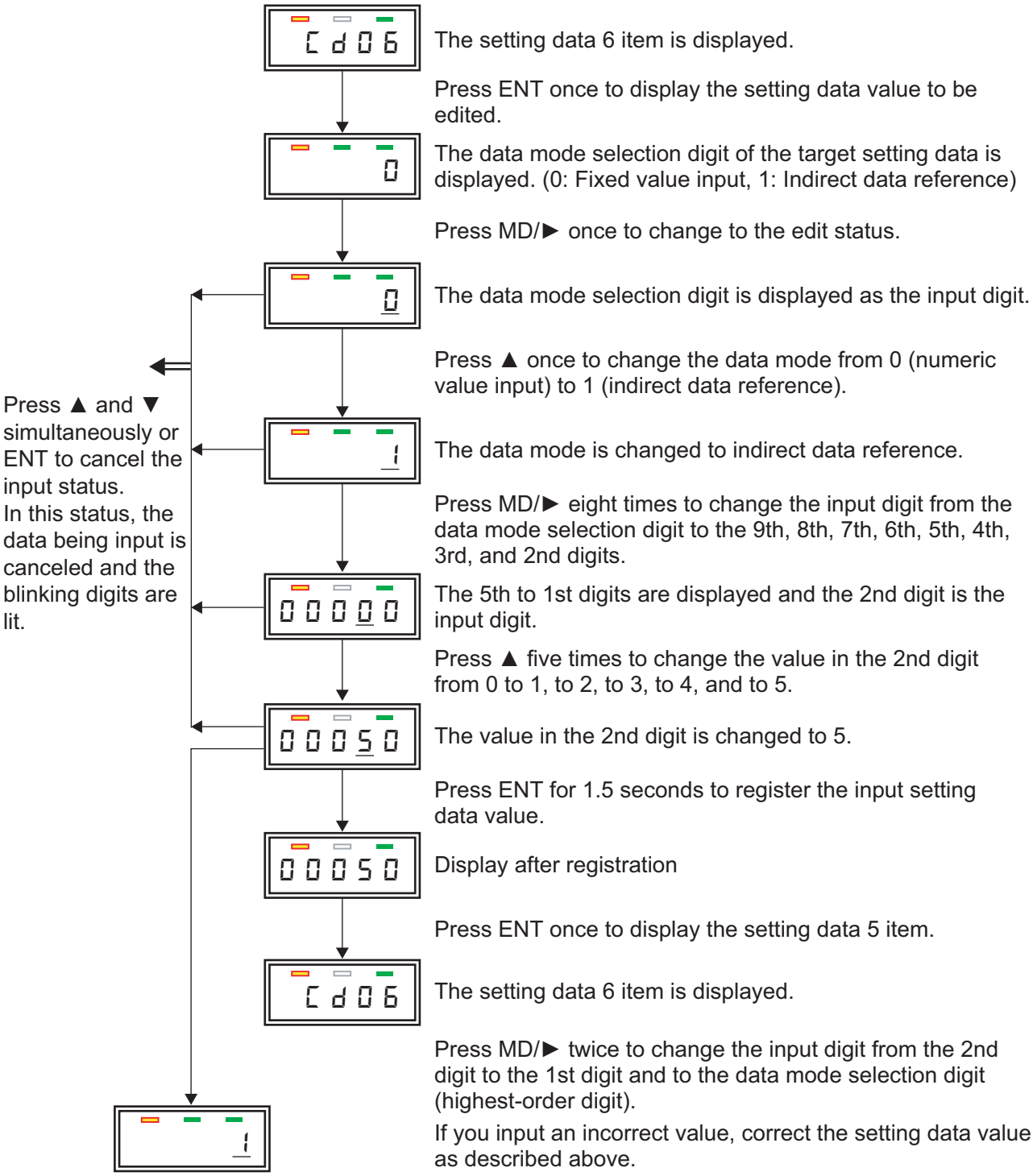


Figure 12-13 Example of editing a command (4/4)

Chapter 13 Specifications

13-1 Device specifications

13-1-1 Model

Model of VPH Series is as follows.

NCR− ① ② ③ ④ ⑤ − ⑥ − ⑦ ⑧ ⑨ − ⑩

Table 13-1 Model display

No.	Item	Display	Description
		NCR	Servo controller series
①	Series name	H	VPH Series
②	Function type	E	MECHATROLINK-III specifications
③	Input power supply specification	1	100 VAC system
		2	200 VAC system
④	Output capacity	Example) 401	40 1 = 40 × 10^1 = 400W Exponent portion of exponentiation of 10 Significant figures
⑤	Hardware specification	A	Standard specification
		B	Coating specification
⑥	Software type	A	τDISC
⑧	Absolute position compensation Option	0	None
		1	Absolute position compensation data incorporation
⑨	STO option	0	None
		1	Yes
⑩	Special specification	None	Standard specification
		S***	Special specification

13-1-2 General specifications

Item		Description
Ambient condition (when used)	Temperature	0 to 55 ℃ (no freezing allowed)
	Humidity	90%RH or less (no condensation allowed)
	Sea level	1000 m or less
	Atmosphere	Avoid any harmful atmosphere including corrosive gas, grinding oil, metal dust, and oil. Indoor place not exposed to direct sunlight
Vibration resistance		Acceleration 5.9 m/s^2 (10 to 55 Hz) No resonance allowed

13-1-3 Functional specifications

Item			Description
Number of control shafts			1 shaft
Control method			Semiclosed loop with feedback
Feedback signal			Serial method: Maximum of 250 M resolution/sec 90 deg phase difference method: Maximum of the frequency of 4-multiplication of 25 Mpps
			Supply voltage: 5.0 VDC±5% Maximum current: 500 mA
Applicable motor			τDISC
Communication mode			
	Run modes		Speed command, torque command, and position control run modes
	Speed command	Command input	Command with MECHATROLINK-III
	Torque command	Command input	Command with MECHATROLINK-III
	Position control	Command input	Command based on MECHATROLINK-III
		S-curve acceleration/ deceleration	8 types (0 to 1.000 sec)
	Servo adjustment item	Gain change	4 types (switching to the gain number specified with network selection, switching with operation conditions)
		Feed forward	Speed feed forward ratio, speed feed forward shift ratio, inertia torque feed forward ratio, viscous friction torque feed forward ratio
		Filter	Feedback filter, torque command filter, five torque command notch filters, speed feed forward filter, torque feed forward filter
	Control input and output signal	Control input signal	5 external input signals. The following signals can be assigned to each signal: **ARST**(alarm reset), **EMG** (emergency stop), **TL** (torque limit), **FOT** (forward direction overtravel), **ROT** (reverse direction overtravel), **GSL1 - GSL2** (gain select), **ZLS** (zero point deceleration), **ZMK** (external marker), **MTOH** (motor overheat), **EXT1 - EXT3** (1st - 3rd external latch input) The ON/OFF status of the control input signal can be fixed. When assigned to an external input signal, signal logic change is possible.
		Control output signal	3 external output signals. The following signals can be assigned to each signal: **ALM** (alarm), **WNG** (warning), **RDY** (servo ready), **SZ** (speed zero), **PE1 - PE2** (position deviation range), **PN1 - PN2** (positioning complete), **ZZ** (command complete response), **ZRDY** (command drive ready), **PRF** (rough match), **VCP** (speed attainment), **BRK** (brake release), **LIM** (limit in-process), **EMGO** (emergency stop in-process), **HCP** (zero point return complete), **OTO** (overtravel in-process), **MTON** (motor electrification in-process), **PMOD** (positioning mode in-process), **OCEM** (marker output) When assigned to an external output signal, signal logic change is possible (except OCEM).

Item			Description
Maintenance mode			
	Run modes		Speed command, torque command, and built-in command run modes
	Speed command	Internal speed command	8 types, selected with the control signal (speed in the setting unit specified)
		Acceleration/ deceleration	A value between 0 to 99.999 sec can be specified for each of acceleration and deceleration.
	Torque command	Internal torque command	8 points, selected with the control signal (setting unit: 0.1%)
		Torque increase/ decrease time	0 to 9.999 sec
	Built-in command	Setting unit	pulse
		Jog	8 speeds
		Command	256 commands, 3 types POS (positioning): ABS/INC INDX (index positioning): Short cut/unidirectional HOME (zero point return): STD HOME, LS LESS, OT HOME, STOP HOME, OT LSLESS, SET ABS, OUT POS
		Acceleration/ deceleration	8 types (A value between 0 to 99.999 sec can be specified for each of acceleration and deceleration.)
		S-curve acceleration/ deceleration	8 types (0 to 1.000 sec)
		Coordinate management	Infinite feed Absolute position management -2147483648 to +2147483647 Load axis 1-rotation position management (Examples: 0 to 359 deg, -179 to 180 deg)
	Servo adjustment item	Gain change	4 gains (changed according to the GSL1 and GSL2 signals and operation conditions)
		Feed forward	Speed feed forward ratio, speed feed forward shift ratio, inertia torque feed forward ratio, viscous friction torque feed forward ratio
		Filter	Feedback filter, torque command filter, five torque command notch filters, speed feed forward filter, torque feed forward filter
	Control input and output signal	Control input signal	5 external input signals. The following signals can be assigned to each signal. **RST** (reset), **ARST** (alarm reset), **EMG** (emergency stop), **SON** (servo on), **DR** (drive), **CLR** (deviation clear), **TL** (torque limit), **FOT** (forward direction overtravel), **ROT**(reverse direction overtravel), **MD1 - MD2** (mode select 1 - 2), **GSL1 - GSL2** (gain select 1 - 2), **RVS** (command direction inversion), **SS1 - SS8** (command selection 1 - 8), **ZST** (positioning drive), **ZLS** (zero point deceleration), **ZMK** (external marker), **TRG** (external trigger), **CMDZ** (command zero), **ZCAN** (positioning cancel), **FJOG** (forward direction jog), **RJOG** (reverse direction jog), **MTOH** (motor overheat) The ON/OFF status of the control input signal can be fixed. When assigned to an external input signal, signal logic change is possible.
		Control output signal	3 external output signals. The following signals can be assigned to each signal. **ALM** (alarm), **WNG** (warning), **RDY** (servo ready), **SZ** (speed zero), **PE1 - PE2** (position deviation range 1 to 2), **PN1 - PN2** (positioning complete 1 to 2), **PZ1 - PZ2** (positioning complete response), **ZN** (command complete), **ZZ** (command complete response), **ZRDY** (command drive ready), **PRF** (rough match), **VCP** (speed attainment), **BRK** (brake release), **LIM** (limit in-process), **EMGO** (emergency stop in-process), **HCP** (zero point return complete), **HLDZ** (command zero in-process), **OTO** (overtravel in-process), **MTON** (motor electrification in-process), **SMOD** (speed command mode in-process), **TMOD** (torque command mode in-process), **NMOD** (built-in command mode), **OUT1 - OUT8** (common output), **OCEM** (marker output) When assigned to an external output signal, signal logic change is possible (except OCEM).

Item	Description
Error detection	Encoder error, over speed error, motor overload error, driver overload error, power supply undervoltage error, excessive voltage error, overcurrent error, servo control error, phase error, magnetic pole error, deviation error, backup data error, CPU error, etc. 5 alarms stored in the history
Holding brake (BRK signal)	BRK (brake release) signal OFF in the motor power off status With control for drop prevention of the vertical axis (Control for drop prevention is disabled when a power error occurs, however.)
Dynamic brake	External dynamic brake unit (which operates in the motor power off status)
Pulse output	• Line driver method: 90 deg phase difference + marker • The marker output signal can be output with the control output signal. Widths of up to 2ms can be set. • Hardware frequency dividing output: Maximum output frequency 25 Mpps (4-multiplication) • Software control output: Maximum output frequency 16.36 Mpps (4-multiplication) • Pulse output frequency division: A/B (A, B: 1 to 99999999) • Current position data pulse output function (outputs as many pulses as indicating the current position.)
Torque limit command	Setting in 0.1% units with a parameter
Compensation function	Absolute position compensation, torque compensation
Display	CHARGE, power LED, front data display 5-digit LED panel
Communication	• MECHATROLINK-III: 2ch • USB2.0 (Full Speed): 1ch For connection between a PC (VPH DES) and device
VPH DES function	• Parameter editing and parameter transmission and reception • Oscilloscope display: Waveform monitor: 3ch, Control signal monitor: 1ch • FFT analyzer: Vibration frequency analysis display and notch filter setting [Valid only in the maintenance mode] • Switch box • Frequency response measurement • Self-diagnosis: Auto-tuning, test run, etc.
SEMI F47 compatible function	Torque limit function when the main circuit voltage drops (The control power must be supplied from a UPS.)

13-1-4 Performance

Item			Description *
Speed control	Speed control range		1:5000
	Speed variation	Load	0 to 100% load: ±0.01% or less (at rated speed)
		Voltage	Rated voltage ±10%: 0% (at rated speed)
		Temperature characteristics	0 to 40 ℃ : ±0.1% or less (at rated speed)
Torque control	Resolution		1:1000 (up to rated torque)
	Reproducibility		±1% (up to rated torque)

* The above performance values apply to the driver alone. Depending on the motor to be combined, the motor may not meet the performance values.

13-1-5 Device electrical specification

Electrical specification of the 100V, single-phase input device

Table 13-2 Electrical specification of the 100V, single-phase input device

Item			NCR-HE1051*-A-***	NCR-HE1101*-A-***	NCR-HE1201*-A-***				
Control power supply	Rated voltage Frequency	[V] [Hz]	100 - 120 AC 1φ 50/60						
	Permissible voltage fluctuation	[V]	85 - 132 AC						
	Input rated current	[Arms]	0.24	0.24	0.24				
	Power consumption	[W]	15	15	15				
	Inrush current	[A]*	17 [5 ms]	17 [5 ms]	17 [5 ms]				
Main power supply	Rated voltage Frequency	[V] [Hz]	100 - 120 AC 1φ 50/60						
	Permissible voltage fluctuation	[V]	85 - 132 AC						
	Input rated current	[Arms]	1.5	3	6				
	Rated capacity	[kVA]	0.15	0.3	0.6				
	Inrush current	[A]*	23 [12 ms]	23 [12 ms]	23 [12 ms]				
Rated output		[W]	50	100	200				
Drive method			3-phase sine wave PWM						
Brake method			Regenerative brake: External regenerative resistor						
Continuous output current		[Arms]	1.1	2.0	3.5				
Instant output current		[Arms]	3.3	6.0	9.9				
Output frequency		[Hz]	0 to 400						
Carrier frequency		[kHz]	8 (parameter selection: Up to 16)	8					
Structure (IP code)			Air cooling (IP20)						
Mounting type			Panel mounting						
Shape			Type1						
Weight		[Kg]	About 1.0						
Accessory			Main power plug terminal × 1 Motor power plug terminal × 1 Control power plug terminal × 1 Open tool × 1						
Option			Regenerative resistor, dynamic brake unit, etc.						

* Value at the rated voltage of 120 VAC. The value in brackets ([]) indicates the time constant for inrush current. For the time after which inrush current is eliminated, use 3 times the value in brackets ([]) as a rough guide.

Electrical specification of the 200V, 3-phase input device

Table 13-3 Electrical specification of the 200 V, 3-phase input device (1/2)

Item			NCR-HE2101*-A-***	NCR-HE2201*-A-***	NCR-HE2401*-A-***	NCR-HE2801*-A-***	NCR-HE2152*-A-***	NCR-HE2222*-A-***	NCR-HE2332*-A-***
Control power supply	Rated voltage Frequency	[V] [Hz]	200 - 240 AC 1φ 50/60 Hz						
	Permissible voltage fluctuation	[V]	170 - 264 AC						
	Input rated current	[Arms]	0.12	0.12	0.12	0.12	0.15	0.15	0.18
	Power consumption	[W]	15	15	15	15	18	18	20
	Inrush current	[A]*	17 [3 ms]	17 [3 ms]	17 [3 ms]	17 [3 ms]	17 [3 ms]	17 [3 ms]	34 [2 ms]
Main power supply	Rated voltage Frequency	[V] [Hz]	200 - 240 AC 1φ, 3φ 50/60 Hz				200 - 240 AC 3φ 50/60 Hz		
	Permissible voltage fluctuation	[V]	170 - 264 AC						
	Input rated current	[Arms]	1.5(1φ) 0.9(3φ)	3.0(1φ) 1.7(3φ)	5.5(1φ) 3.2(3φ)	9.0(1φ) 5.2(3φ)	9.6	13.5	17
	Rated capacity	[kVA]	0.3	0.6	1.1	1.8	3	4.2	5.9
	Inrush current	[A]*1	45 [5 ms]	45 [5 ms]	45 [5 ms]	45 [9 ms]	33 [18 ms]	33 [18 ms]	85 [10 ms]
Rated output		[W]	100	200	400	800	1.5k	2.2k	3.3k
Drive method			3-phase sine wave PWM						
Brake method			Regenerative brake: External regenerative resistor						
Continuous output current		[Arms]	1.1	2	3.5	6.8	10	16	24.0 (25.0) *2
Instant output current		[Arms]	3.3	6	9.9	17	30	35	63
Output frequency		[Hz]	0 to 400						
Carrier frequency		[kHz]	8 (parameter selection: Up to 16)	8					
Structure (IP code)			Air cooling (IP20)			Forced cooling (IP20)			
Mounting type			Panel mounting						
Shape			Type1			Type2	Type3		Type4
Weight		[Kg]	About 1.0			About 1.5	About 2.3		About 3.7
Accessory			Main power plug terminal × 1 Motor power plug terminal × 1 Control power plug terminal × 1 Open tool × 1						
Option			Regenerative resistor, dynamic brake unit, etc.						

*1 Value at the rated voltage of 240 VAC. The value in brackets ([]) indicates the time constant for inrush current. For the time after which inrush current is eliminated, use 3 times the value in brackets ([]) as a rough guide.

*2 If it does not conform to the standard, the rated current is "25.0 A".

Table 13-4 Electrical specification of the 200 V, 3-phase input device (2/2)

Item			NCR-HE2702*-A-***	NCR-HE2153*-A-***					
Control power supply	Rated voltage Frequency	[V] [Hz]	200 - 240 AC 1φ 50/60 Hz						
	Permissible voltage fluctuation	[V]	170 - 264 AC						
	Input rated current	[Arms]	0.4	0.4					
	Power consumption	[W]	45	45					
	Inrush current	[A]*	26 [3 ms]	26 [3 ms]					
Main power supply	Rated voltage Frequency	[V] [Hz]	200 - 240 AC 3φ 50/60 Hz						
	Permissible voltage fluctuation	[V]	170 - 264 AC						
	Input rated current	[Arms]	44	68					
	Rated capacity	[kVA]	16	23.5					
	Inrush current	[A]*	73 [30 ms]	73 [38 ms]					
Rated output		[W]	7k	15k					
Drive method			3-phase sine wave PWM						
Brake method			Regenerative brake: External regenerative resistor						
Continuous output current		[Arms]	48.0	62.6					
Instant output current		[Arms]	96.0	125.2					
Output frequency		[Hz]	0 to 400						
Carrier frequency		[kHz]	8						
Structure (IP code)			Forced cooling (IP00)						
Mounting type			Panel mounting						
Shape			Type5	Type6					
Weight		[Kg]	About 7.5	About 9.5					
Accessory			Control power plug terminal × 1						
Option			Regenerative resistor, etc.						

* Value at the rated voltage of 240 VAC. The value in brackets ([]) indicates the time constant for inrush current. For the time after which inrush current is eliminated, use 3 times the value in brackets ([]) as a rough guide.

13-2 Outline drawings and names of parts

13-2-1 Device with up to 400 W

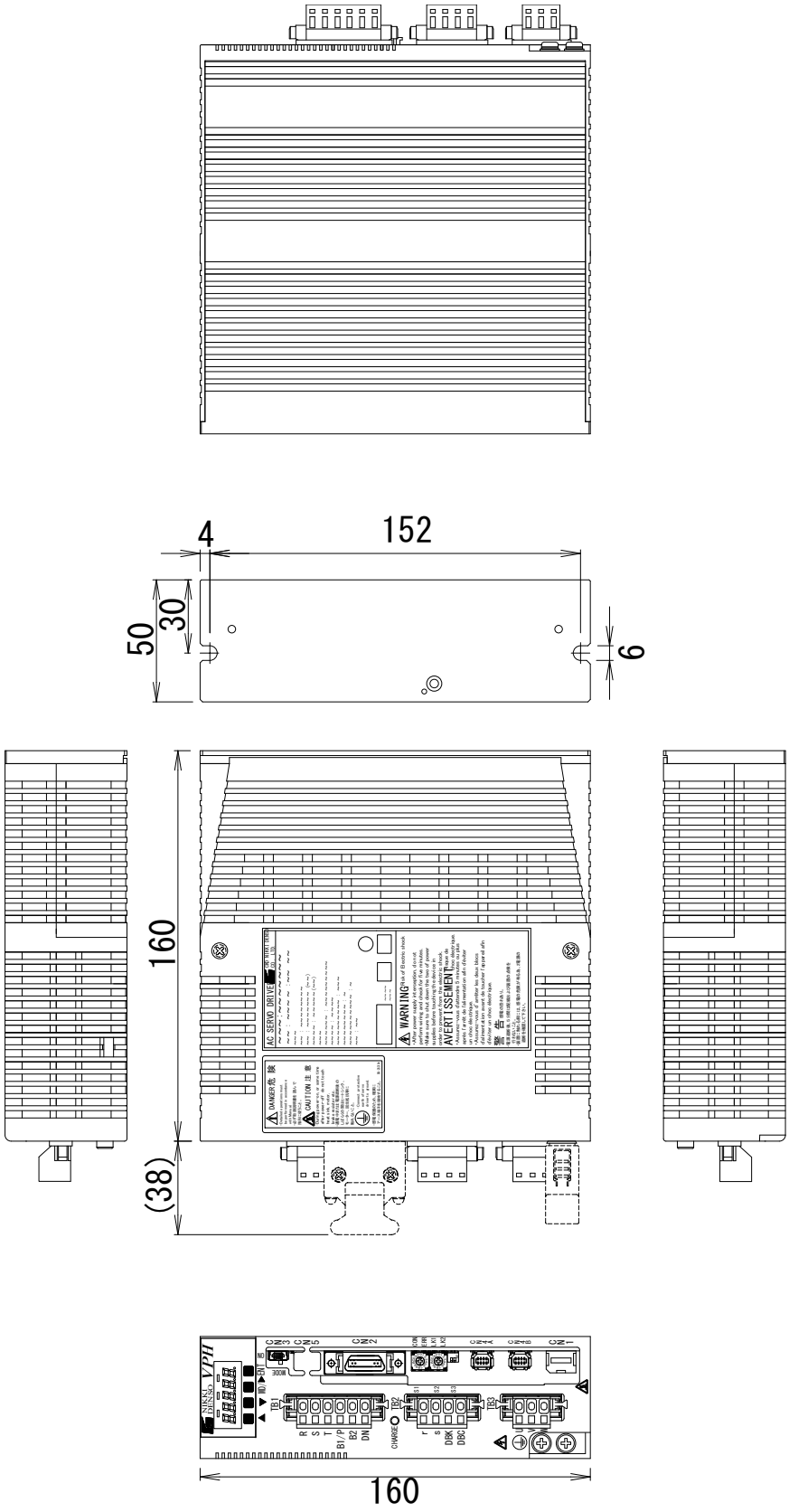


Figure 13-1 Outline drawing of the main unit of the device with up to 400 W (Type 1)

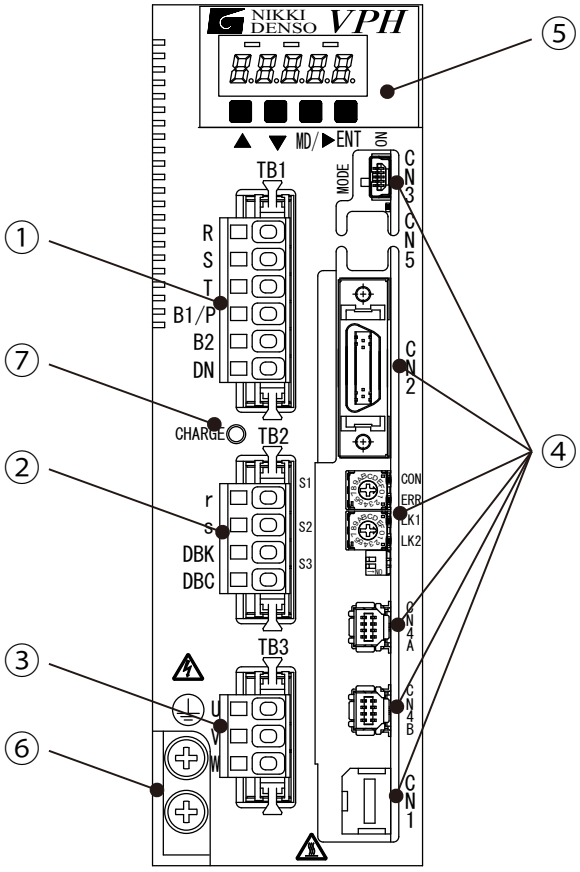


Figure 13-2 Front view of the main unit of the device with up to 400 W (Type 1)

Table 13-5 Name of each part

No.	Name	Function
①	TB1	• Main power supply terminals (R, S, T) • Regenerative resistor connection terminals (B1/P, B2) • Unused (DN)
②	TB2	• Control power supply connection terminals (r, s) • Dynamic brake connection terminals (DBK, DBC)
③	TB3	• Motor connection terminals (U, V, W)
④	S1, S2	• Station address setting switch
	S3	• Transmission byte setting switch
	CN1	• Control input/output signal connector
	CN2	• Encoder connection connector Input the encoder feedback signal from the encoder mounted on the motor.
	CN3	• USB communication connector Used to connect a PC on which VPH DES is installed for USB communication.
	CN4A	• MECHATROLINK-III cable connection connector
	CN4B	• MECHATROLINK-III cable connection connector
⑤	LED1 - 5	• Data display LED panel (5 digits)
	SW	• Operation keys (UP, DOWN, MODE, ENTER)
⑥	E	Terminal for connecting power and motor grounding cables | Size M4
⑦	CHARGE LED	On when high voltage is charged in the main circuit capacitor in the device.

13-2-2 Device with 800 W

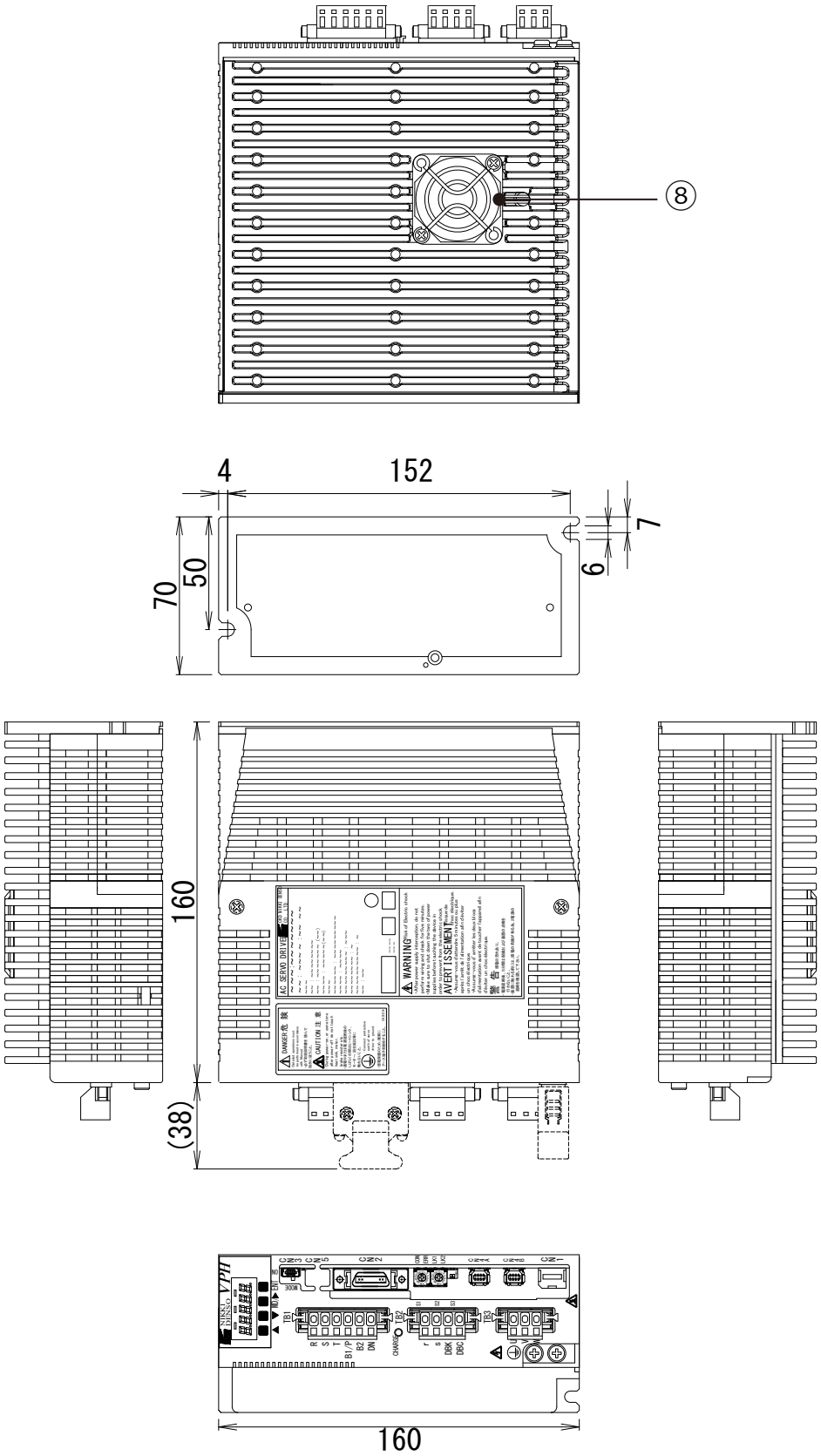


Figure 13-3 Outline drawing of the main unit of the device with 800 W (Type 2)

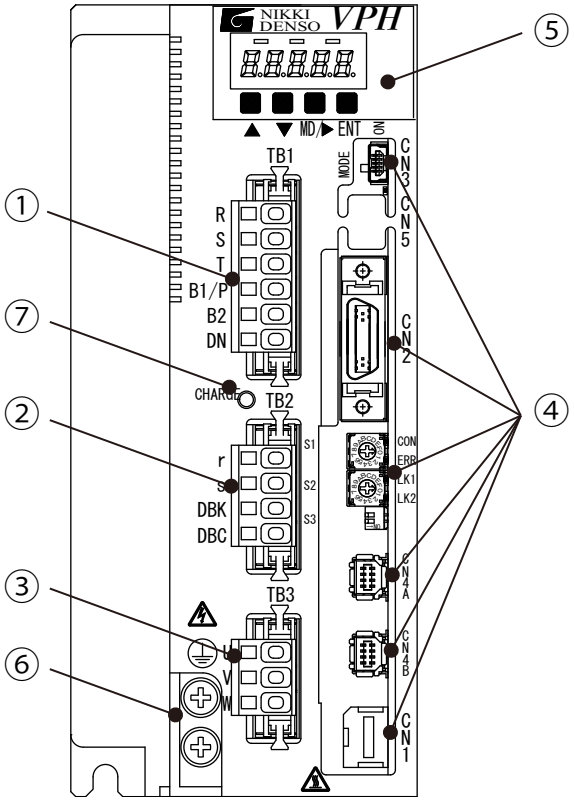


Figure 13-4 Front view of the main unit of the device with 800 W (Type2)

Table 13-6 Name of each part

No.	Name	Function	
①	TB1	• Main power supply terminals (R, S, T) • Regenerative resistor connection terminals (B1/P, B2) • Unused (DN)	
②	TB2	• Control power supply connection terminals (r, s) • Dynamic brake connection terminals (DBK, DBC)	
③	TB3	• Motor connection terminals (U, V, W)	
④	S1, S2	• Station address setting switch	
	S3	• Transmission byte setting switch	
	CN1	• Control input/output signal connector	
	CN2	• Encoder connection connector Input the encoder feedback signal from the encoder mounted on the motor.	
	CN3	• USB communication connector Used to connect a PC on which VPH DES is installed for USB communication.	
	CN4A	• MECHATROLINK-III cable connection connector	
	CN4B	• MECHATROLINK-III cable connection connector	
⑤	LED1 - 5	• Data display LED panel (5 digits)	
	SW	• Operation keys (UP, DOWN, MODE, ENTER)	
⑥	E	Terminal for connecting power and motor grounding cables	Size M4
⑦	CHARGE LED	On when high voltage is charged in the main circuit capacitor in the device.	
⑧	FAN	Cooling fan. Refer to "Figure 13-3 Outline drawing of the main unit of the device with 800 W (Type 2)".	

13-2-3 Device with 1.5 kW or 2.2 kW

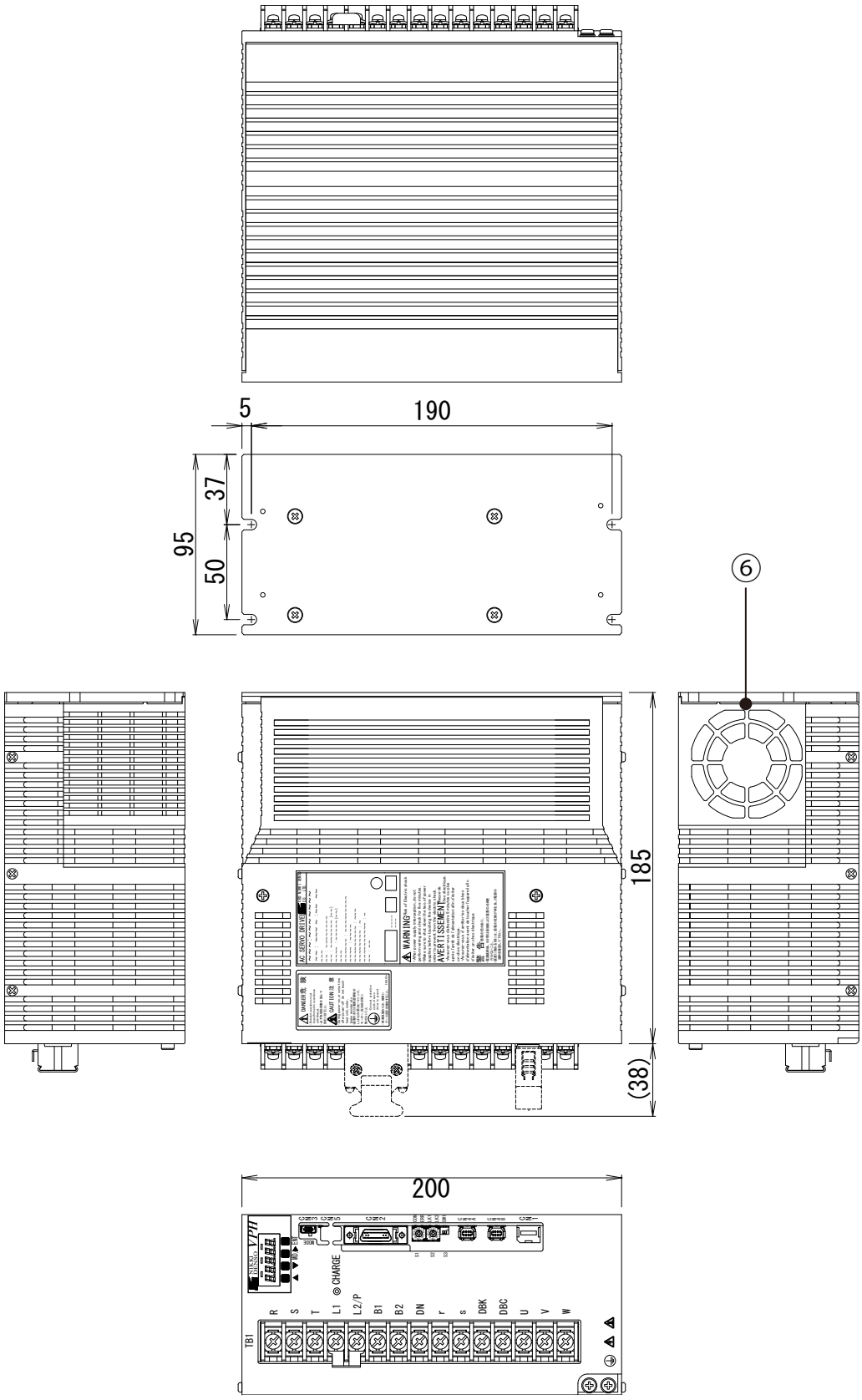


Figure 13-5 Outline drawing of the main unit of the device with 1.5 kW or 2.2 kW (Type 3)

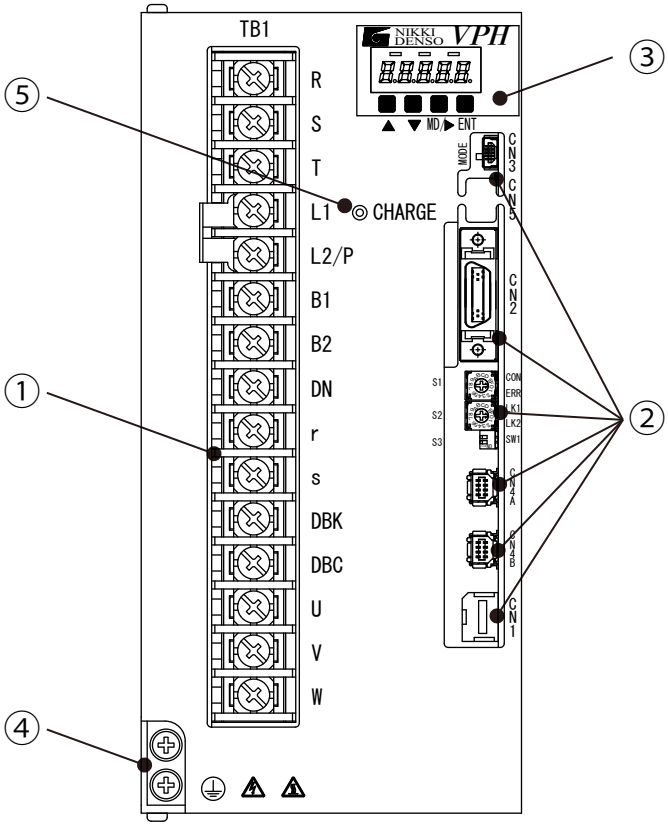


Figure 13-6 Front view of the main unit of the device with 1.5 kW or 2.2 kW (Type 3)

Table 13-7 Name of each part

No.	Name	Function	
①	TB1	• Main power supply terminals (R, S, T) • DC reactor connection terminals (L1, L2/P) • Regenerative resistor connection terminals (B1, B2) • Unused (DN) • Control power supply connection terminals (r, s) • Dynamic brake connection terminals (DBK, DBC) • Motor connection terminals (U, V, W)	Size M4
②	S1, S2	• Station address setting switch	
	S3	• Transmission byte setting switch	
	CN1	• Control input/output signal connector	
	CN2	• Encoder connection connector Input the encoder feedback signal from the encoder mounted on the motor.	
	CN3	• USB communication connector Used to connect a PC on which VPH DES is installed for USB communication.	
	CN4A	• MECHATROLINK-III cable connection connector	
	CN4B	• MECHATROLINK-III cable connection connector	
③	LED1 - 5	• Data display LED panel (5 digits)	
	SW	• Operation keys (UP, DOWN, MODE, ENTER)	
④	E	Terminal for connecting power and motor grounding cables	Size M4
⑤	CHARGE LED	On when high voltage is charged in the main circuit capacitor in the device.	
⑥	FAN	Cooling fan. Refer to "Figure 13-5 Outline drawing of the main unit of the device with 1.5 kW or 2.2 kW (Type 3)".	

13-2-4 3.3 kW device

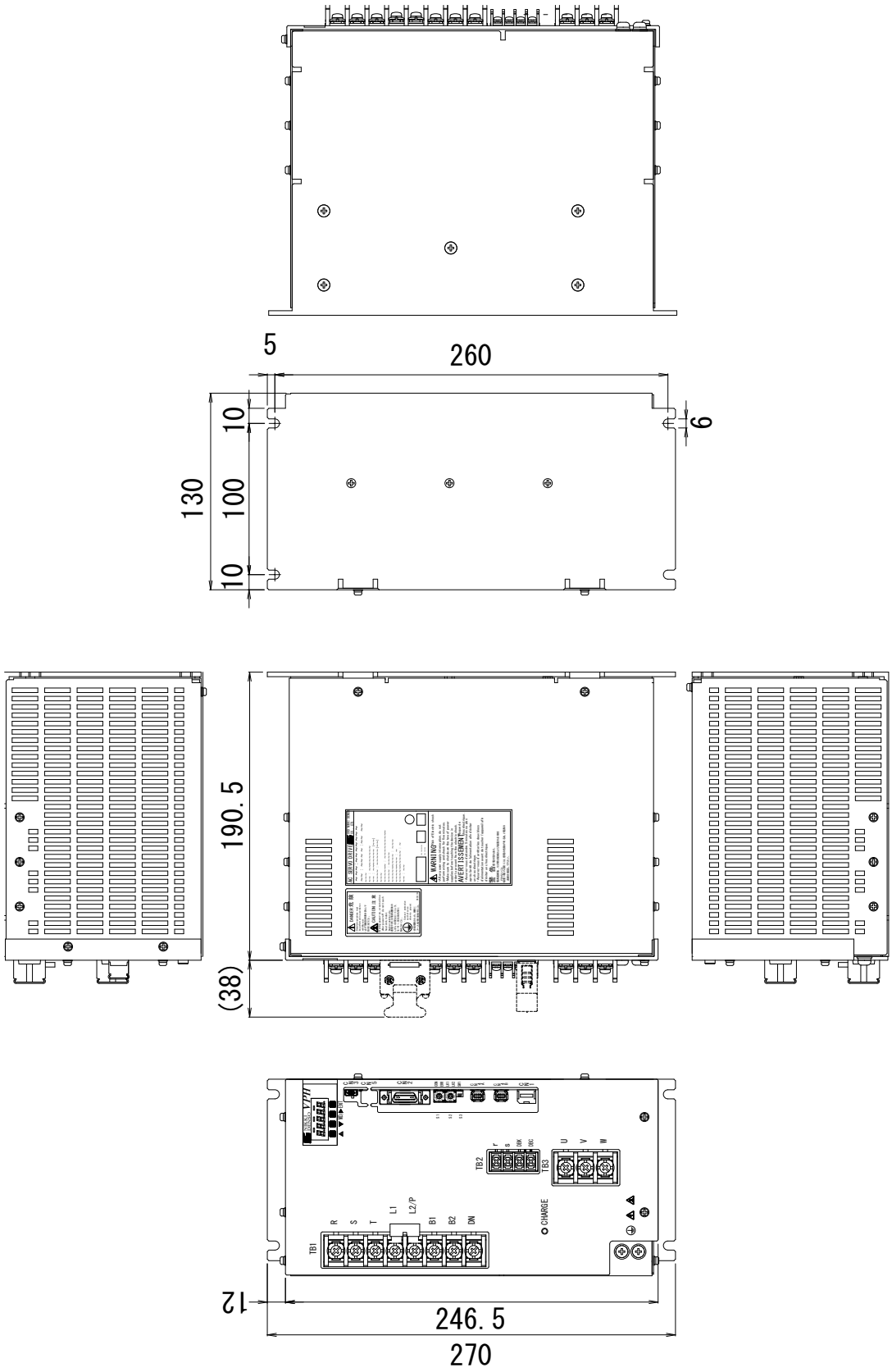


Figure 13-7 Outline drawing of the main unit of the device with 3.3 kW (Type 4)

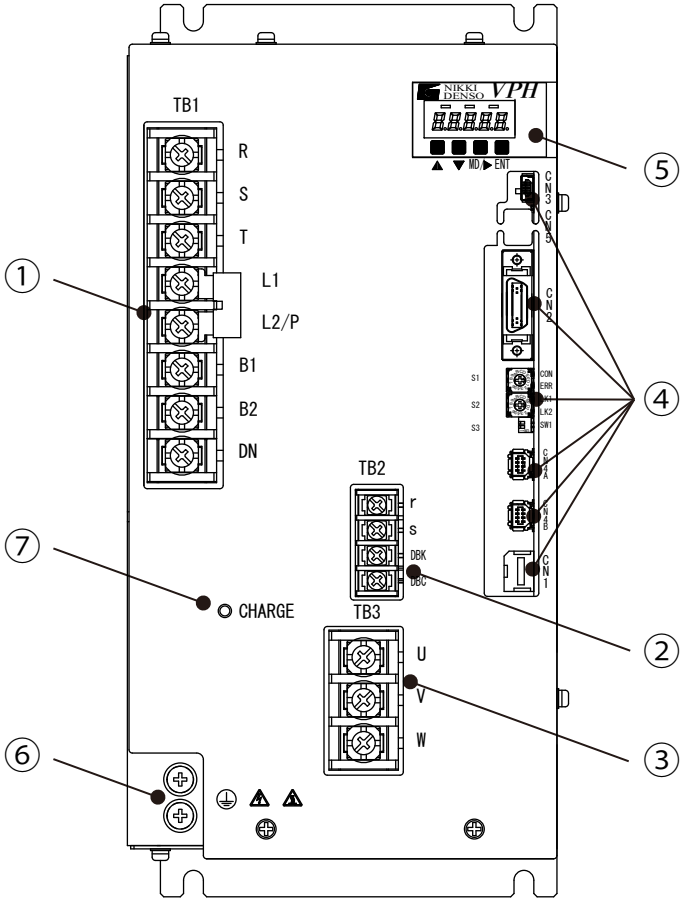


Figure 13-8 Front view of the main unit of the device with 3.3 kW (Type 4)

Table 13-8 Name of each part

No.	Name	Function	
①	TB1	• Main power supply terminals (R, S, T) • Regenerative resistor connection terminals (B1/P, B2) • Unused (DN)	Size M4
②	TB2	• Control power supply connection terminals (r, s) • Dynamic brake connection terminals (DBK, DBC)	Size M3
③	TB3	• Motor connection terminals (U, V, W)	Size M4
④	S1, S2	• Station address setting switch	
	S3	• Transmission byte setting switch	
	CN1	• Control input/output signal connector	
	CN2	• Encoder connection connector Input the encoder feedback signal from the encoder mounted on the motor.	
	CN3	• USB communication connector Used to connect a PC on which VPH DES is installed for USB communication.	
	CN4A	• MECHATROLINK-III cable connection connector	
	CN4B	• MECHATROLINK-III cable connection connector	
⑤	LED1 - 5	• Data display LED panel (5 digits)	
	SW	• Operation keys (UP, DOWN, MODE, ENTER)	
⑥	E	Terminal for connecting power and motor grounding cables	Size M4
⑦	CHARGE LED	On when high voltage is charged in the main circuit capacitor in the device.	

13-2-5 7 kW device

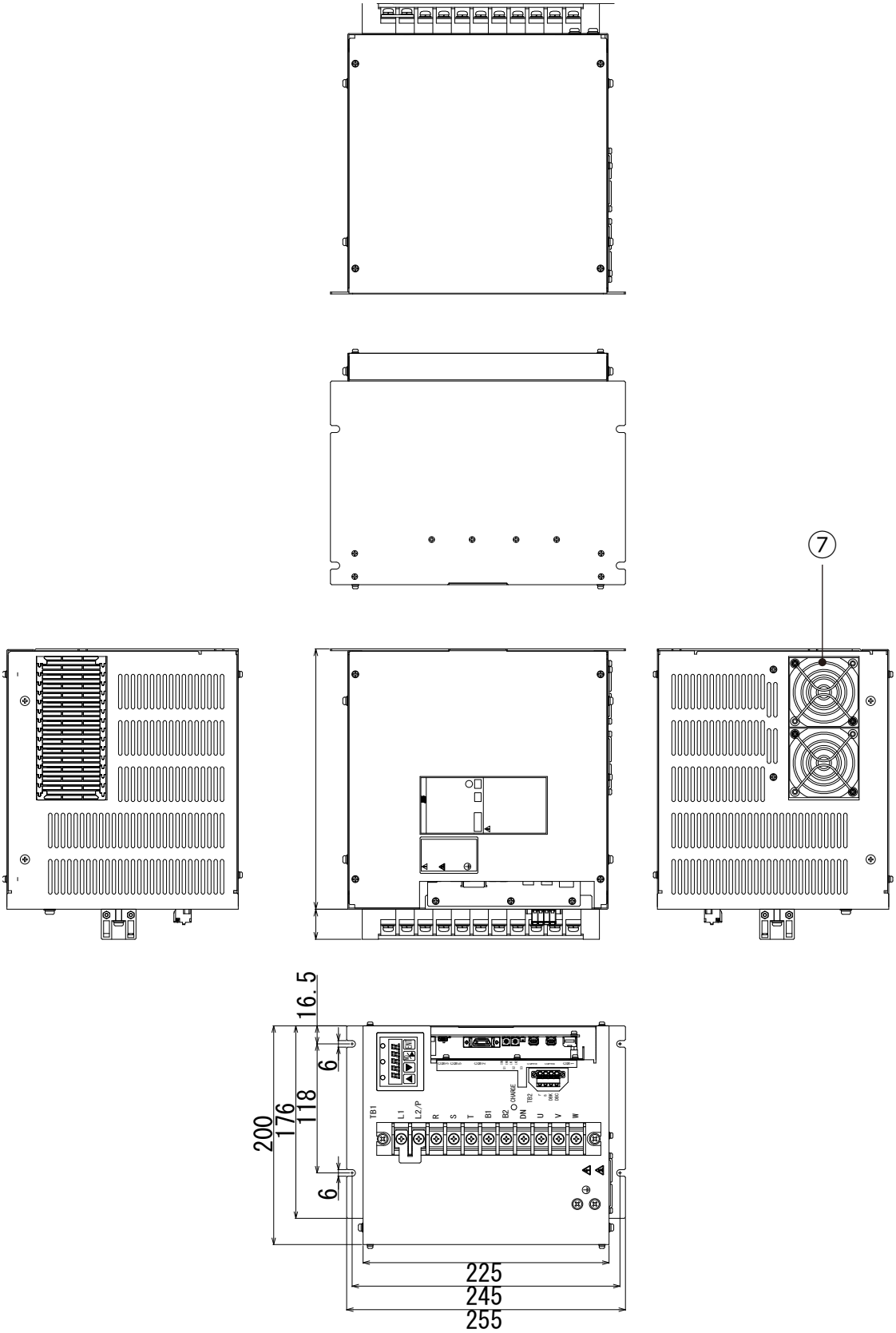


Figure 13-9 Outline drawing of the main unit of the device with 7 kW (Type 5)

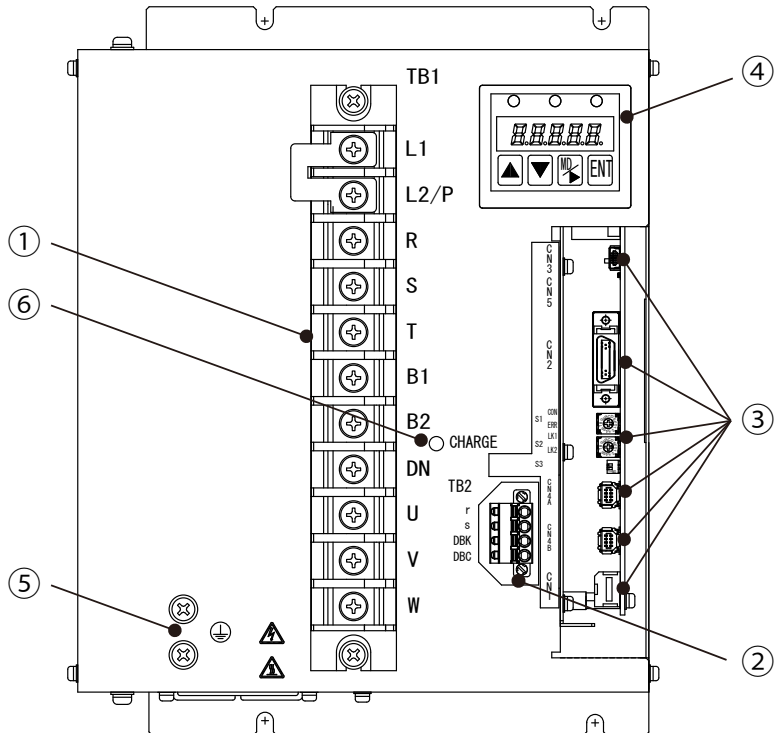


Figure 13-10 Front view of the main unit of the device with 7 kW (Type 5)

Table 13-9 Name of each part

No.	Name	Function	
①	TB1	• Main power supply terminals (R, S, T) • DC reactor connection terminals (L1, L2/P) • Regenerative resistor connection terminals (B1, B2) • Unused (DN) • Motor connection terminals (U, V, W)	Size M5
②	TB2	• Control power supply connection terminals (r, s) • Unused (DBK, DBC)	
③	S1, S2	• Station address setting switch	
	S3	• Transmission byte setting switch	
	CN1	• Control input/output signal connector	
	CN2	• Encoder connection connector Input the encoder feedback signal from the encoder mounted on the motor.	
	CN3	• USB communication connector Used to connect a PC on which VPH DES is installed for USB communication.	
	CN4A	• MECHATROLINK-III cable connection connector	
	CN4B	• MECHATROLINK-III cable connection connector	
④	LED1 - 5	• Data display LED panel (5 digits)	
	SW	• Operation keys (UP, DOWN, MODE, ENTER)	
⑤	E	Terminal for connecting power and motor grounding cables	Size M5
⑥	CHARGE LED	On when high voltage is charged in the main circuit capacitor in the device.	
⑦	FAN	Cooling fan. Refer to "Figure 13-9 Outline drawing of the main unit of the device with 7 kW (Type 5)".	

13-2-6 15 kW device

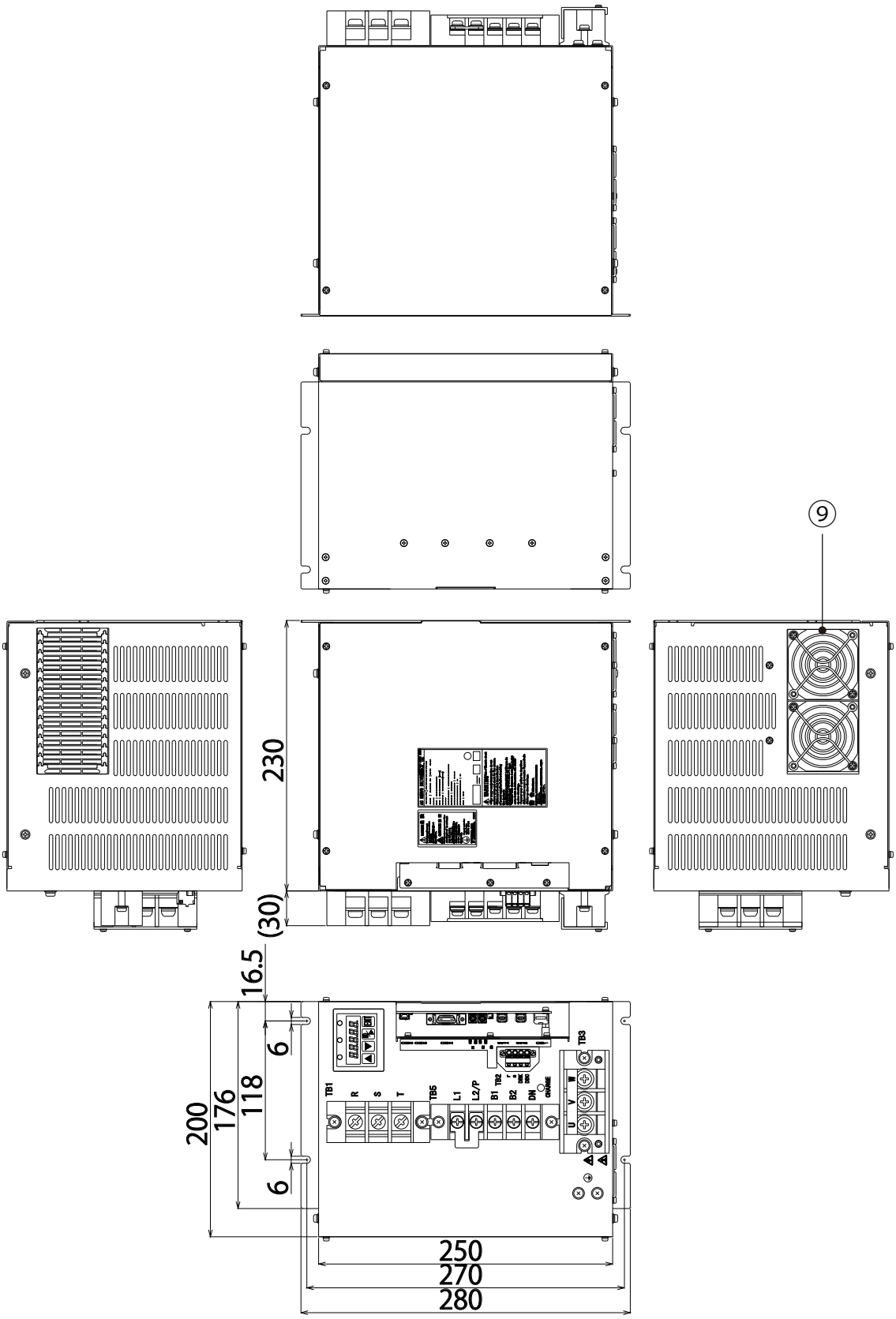


Figure 13-11 Outline drawing of the main unit of the device with 15 kW (Type 6)

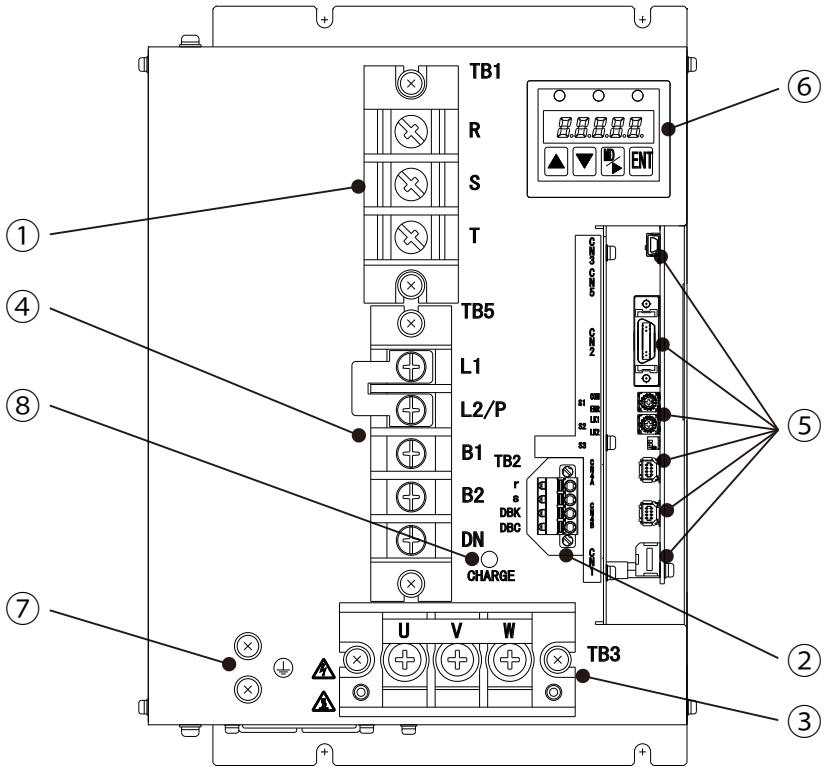


Figure 13-12 Front view of the main unit of the device with 15 kW (Type 6)

Table 13-10 Name of each part

No.	Name	Function	
①	TB1	• Main power supply terminals (R, S, T)	Size M6
②	TB2	• Control power supply connection terminals (r, s) • Unused (DBK, DBC)	
③	TB3	• Motor connection terminals (U, V, W)	Size M6
④	TB5	• DC reactor connection terminals (L1, L2/P) • Regenerative resistor connection terminals (B1, B2) • Unused (DN)	Size M5
⑤	S1, S2	• Station address setting switch	
	S3	• Transmission byte setting switch	
	CN1	• Control input/output signal connector	
	CN2	• Encoder connection connector Input the encoder feedback signal from the encoder mounted on the motor.	
	CN3	• USB communication connector Used to connect a PC on which VPH DES is installed for USB communication.	
	CN4A	• MECHATROLINK-III cable connection connector	
	CN4B	• MECHATROLINK-III cable connection connector	
⑥	LED1 - 5	• Data display LED panel (5 digits)	
	SW	• Operation keys (UP, DOWN, MODE, ENTER)	
⑦	E	Terminal for connecting power and motor grounding cables	Size M5
⑧	CHARGE LED	On when high voltage is charged in the main circuit capacitor in the device.	
⑨	FAN	Cooling fan. Refer to "Figure 13-11 Outline drawing of the main unit of the device with 15 kW (Type 6)".	