Oriental motor

HM-60470-3

Servo Motor

AZX Series / Motorized Actuator equipped with AZX Series

EtherNet/IP™ Compatible Driver

OPERATING MANUAL
Software Edition

Thank you for purchasing an Oriental Motor product.
This Operating Manual describes product handling procedures and safety precautions.

- Please read it thoroughly to ensure safe operation.
- Always keep the manual where it is readily available.

1 Introduction

2 Before starting operation

3 Operation

4 I/O signals

5 Control via EtherNet/IP

6 Parameter list

7 Troubleshooting

8 Extended function

9 Appendix

1 Introduction

This part explains the product overview and safety precautions in addition to the types and descriptions about operating manuals.

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1 Introduction

1-1 Before using the product

Only qualified personnel of electrical and mechanical engineering should work with the product.
Use the product correctly after thoroughly reading the section "3 Safety precautions" on p.11. In addition, be sure to observe the contents described in warning, caution, and note in this manual.
The product described in this manual is designed and manufactured to be incorporated in general industrial equipment. Do not use for any other purpose. Oriental Motor Co., Ltd. is not responsible for any compensation for damage caused through failure to observe this warning.

1-2 Related operating manuals

For operating manuals, download from Oriental Motor Website Download Page or contact your nearest Oriental Motor sales office.

- **AZX** Series / Motorized Actuator equipped with **AZX** Series EtherNet/IP™ Compatible Driver OPERATING MANUAL Hardware Edition
- **AZX** Series / Motorized Actuator equipped with **AZX** Series EtherNet/IP™ Compatible Driver OPERATING MANUAL Software Edition (this document)

Read the following operating manuals for motors and motorized actuators.

- OPERATING MANUAL Motor Edition
- OPERATING MANUAL Actuator Edition
- Motorized Actuator Function Setting Edition

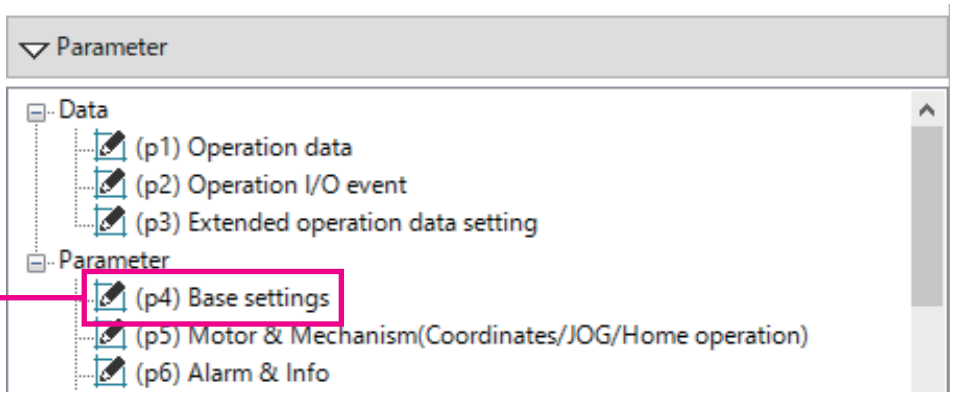
1-3 How to use operating manuals

To use the product, read both the Hardware Edition and the Software Edition (this document) of the **AZX** Series operating manuals.
The Hardware Edition describes installation, connection, and others.
The Software Edition describes operating methods, control methods via EtherNet/IP, parameter list, troubleshooting, and others.

1-4 Screen display of MEXE02 software

When the screen display of the **MEXE02** software is described, it may be indicated using a number such as "(p4)" described in front of the parameter type.

Example of description



MEXE02 code	Name	Description	Setting range	Initial value
p4	Starting speed	Sets the starting speed for stored data operation or continuous macro operation.	0 to 4,000,000 Hz	500

8-1 (p4) Base setting parameters

Parameter ID		Name	Description	Setting range	Initial value	Update
Dec	Hex					
272	0110h	Direct data operation zero speed command action	Sets the command when 0 is written to the “Speed” for direct data operation.	0: Deceleration stop command 1: Speed zero command	0	B

2 Overview of the product

■ Control methods

Operation is performed via Implicit communication (periodic communication) of EtherNet/IP.

■ Setting methods of operation data and parameters

Operation data and parameters can be set via EtherNet/IP or using the support software **MEXE02**.

■ Equipped with direct data operation function

Direct data operation is a function to start operation at the same time as rewriting of the data. It is suitable for applications that change the setting of the operation data frequently, such as changing the speed or travel amount according to a load.

■ Equipped with power removal function

The power removal function is a function that stops supplying the power to the motor by the hardware. The power removal function is assumed to be used to prevent unexpected starting of the moving parts of equipment when an operator works inside the operating range of the moving parts.

■ Providing the EDS File

The EDS file (Electronic Data Sheets file) is a file that describes the specific information of the EtherNet/IP compatible products. Importing the EDS file to the setting tool of the scanner can perform the settings of EtherNet/IP before the driver is delivered to you.
For details, contact your nearest Oriental Motor sales office.

3 Safety precautions

The precautions described below are intended to ensure the safe and correct use of the product, and to prevent the user and other personnel from exposure to the risk of injury. Use the product only after carefully reading and fully understanding these instructions.

⚠WARNING	Handling the product without observing the instructions that accompany a "WARNING" symbol may result in serious injury or death.
⚠CAUTION	Handling the product without observing the instructions that accompany a "CAUTION" symbol may result in injury or property damage.
Note	The items under this heading contain important handling instructions that the user should observe to ensure safe use of the product.
memo	The items under this heading contain related information and contents to gain a further understanding of the text in this manual.

⚠WARNING

General

- Do not use the product in explosive or corrosive environments, in the presence of flammable gases, in places subjected to splashing water, or near combustibles. Doing so may result in fire, electric shock, or injury.
- Assign qualified personnel to the task of installing, wiring, operating/controlling, inspecting and troubleshooting the product. Handling by unqualified personnel may result in fire, electric shock, injury, or damage to equipment.
- Do not transport, install, connect, or inspect the product while the power is supplied. Doing so may result in electric shock.
- Do not touch the driver while the power is supplied. Doing so may result in fire or electric shock.
- Do not touch the terminals indicated ⚠ ⚠ signs on the driver's front panel while the power is supplied because high voltage is applied. Doing so may result in fire or electric shock.
- Take measures to hold the moving part in position if the product is used in vertical drive such as elevating equipment. Failure to do so may result in injury or damage to equipment.
- When an alarm of the driver is generated (any of the driver's protective functions is triggered), remove the cause before resetting the alarm (protective function). Continuing the operation without removing the cause of the problem may result in malfunction of the motor and the driver, leading to injury or damage to equipment.

Installation

- Install the driver in an enclosure. Failure to do so may result in electric shock or injury.
- Be sure to ground the driver as it is Class I equipment. Failure to do so may result in electric shock.

Connection

- Keep the input power voltage of the driver within the specified range. Failure to do so may result in fire or electric shock.
- Connect the product securely according to the connection diagram. Failure to do so may result in fire or electric shock.
- Do not forcibly bend, pull, or pinch the cable. Doing so may result in fire or electric shock.

Operation

- Turn off the main power supply and the control power supply in the event of a power failure. Failure to do so may result in injury or damage to equipment.
- Take safety measures in the event of a momentary voltage drop. This may cause the motor to stop or reduce the holding force or rotational torque, resulting in injury or damage to equipment.
- Do not remove the motor excitation during operation. Doing so may cause the motor to stop and lose the holding force, resulting in injury or damage to equipment.

Repair, disassembly, and modification

- Do not disassemble or modify the driver. Doing so may result in injury or damage to equipment.

Maintenance and inspection

- Do not touch the connection terminals of the driver immediately after turning off the main power supply and the control power supply. Before performing connection or inspection, turn off the main power supply and the control power supply, and check the CHARGE LED has been turned off. Residual voltage may cause electric shock.

⚠CAUTION

General

- Do not use the driver beyond the specifications. Doing so may result in electric shock, injury, or damage to equipment.
- Keep your fingers and objects out of the openings in the driver. Failure to do so may result in fire, electric shock, or injury.
- Do not touch the driver during operation or immediately after stopping. The surface is hot, and this may cause a skin burn(s).
- Do not forcibly bend or pull the cable that is connected to the driver. Doing so may cause damage to the product.

Installation

- Keep the area around the driver free of combustible materials. Failure to do so may result in fire or a skin burn(s).
- Do not leave anything around the driver that would obstruct ventilation. Doing so may result in damage to equipment.

Operation

- Use a motor and a driver only in the specified combination. An incorrect combination may cause a fire.
- For the control power supply, use a DC power supply with reinforced insulation on its primary and secondary sides. Failure to do so may result in electric shock.
- Provide an emergency-stop device or emergency-stop circuit external to equipment so that the entire equipment will operate safely in the event of a system failure or malfunction. Failure to do so may result in injury.
- Before turning on the main power supply and the control power supply, turn all input signals to the driver OFF. Failure to do so may result in injury or damage to equipment.
- When moving the moving part manually, put the motor into a non-excitation state. Continuing the work while the motor is in an excitation state may result in injury.
- When an abnormal condition has occurred, immediately stop operation to turn off the main power supply and the control power supply. Failure to do so may result in fire, electric shock, or injury.
- Take measures against static electricity when operating the switches of the driver. Failure to do so may result in the driver malfunction or damage to equipment.

Inspection and maintenance

- Do not touch the terminals while conducting the insulation resistance measurement or the dielectric strength test. Accidental contact may result in electric shock.

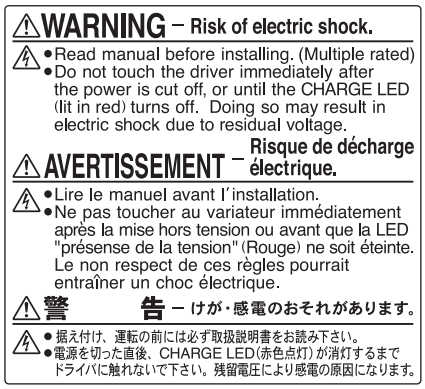
3-1 Graphical symbols on the driver's front panel

	⚠WARNING	This is the protective earth terminal. Be sure to ground because improper grounding may result in electric shock.
	⚠WARNING	A high voltage is applied to the motor connector (CN3) and the main power supply input terminal (CN4). Do not touch them while the power is supplied. Doing so may result in fire or electric shock.

3-2 Description of warning

A warning about handling precautions is described on the driver. Be sure to observe the description contents when handling the product.

Electrical hazard warning label



Material: PET

4 Precautions for use

This chapter explains restrictions and requirements the user should consider when using the product.

- **Always use Oriental Motor cables to connect a motor and a driver.**

  Check on the Oriental Motor Website for the model of cables.

- **When conducting the insulation resistance measurement or the dielectric strength test, be sure to separate the connection between the motor and the driver.**

  Conducting the insulation resistance measurement or the dielectric strength test with the motor and driver connected may result in damage to the product.

- **Preventing leakage current**

  Stray capacitance exists between the driver's current-carrying line and other current-carrying lines, the earth and the motor, respectively. A high-frequency current may leak out through such capacitance, having a detrimental effect on the surrounding equipment. The actual leakage current depends on the driver's switching frequency, the length of wiring between the driver and motor, and so on. When installing an earth leakage breaker, use a product offering resistance against high frequency current such as the one specified below.
  Mitsubishi Electric Corporation: NV series

- **If vertical drive (gravitational operation) such as elevating applications is performed or if sudden start-stop operation of a large inertia is repeated frequently, connect the Oriental Motor's regeneration resistor RGB200.**

  The setting to use the built-in regeneration resistor is applied at the time of shipment. Using the built-in regeneration resistor, however, continuous regeneration operation, vertical drive (gravitational operation) such as elevating applications, or sudden start-stop operation of a large inertia cannot be performed. When performing such operation, use the Oriental Motor's regeneration resistor **RGB200**. Refer to the OPERATING MANUAL Hardware Edition for the connection method.

- **Precaution when connecting a main power supply and a control power supply in a state of grounding the positive side**

  The USB connector, CN5, CN6, and CN7 connectors on the driver are not electrically insulated. When grounding the positive terminal of the power supply, do not connect any equipment (PC, etc.) whose negative terminal is grounded. Doing so may cause the driver and this equipment to short, damaging both. When connecting, do not ground equipment.

- **Saving data to the non-volatile memory**

  Do not turn off the control power supply while writing the data to the non-volatile memory, and also do not turn off for five seconds after the completion of writing the data. Doing so may abort writing the data and cause an alarm of EEPROM error to generate. The non-volatile memory can be rewritten approximately 100,000 times.

- **Noise elimination measures**

  Refer to the OPERATING MANUAL Hardware Edition for noise elimination measures.

2 Before starting operation

This part explains contents to be performed before starting operation.

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1 Operation preparation flow

Use the **MEXE02** software to prepare for operation.
The procedures for a motor and a motorized actuator are different. Prepare for operation according to a product used.

Motors (Standard type / Geared type)	Motorized actuators
Setting of resolution ⇨ **p.18** The resolution can be set using "System of Units Customize Wizard" of the **MEXE02** software.	**Copying the setting value of the ABZO sensor to a driver** ⇨ **p.17** Use the **MEXE02** software to match the ABZO information (fixed value) of the ABZO sensor and the setting value of the driver parameters.
↓	
Home setting ⇨ **p.20**	
↓	↓
Backup of data ⇨ **p.21** Backup the contents having set.	

2 Copy the ABZO information (fixed value) to the driver

For parameters of a motorized actuator, the different values have been stored in the ABZO sensor and the driver, respectively.
The values based on the product specifications such as the recommended macro operation or coordinate information are stored in the ABZO sensor of a motorized actuator. The values stored in the ABZO sensor cannot be changed because of the fixed value.
Meantime, the values for the standard type (motor only) are stored in the driver parameters.

In a state of the factory shipment, the parameter information (fixed value) stored in the ABZO sensor is used preferentially. However, if a parameter is changed with the **MEXE02** soft ware or others, all parameters including the changed parameter will be changed to the values set in the driver. Therefore, an unexpected movement may cause when operation is executed. In order to prevent such problems, copy the ABZO information (fixed value) to the driver, and match the data in the driver parameter with the fixed value in the ABZO sensor.

Note Before copying the ABZO information (fixed value) of the product to the driver,once the parameter (such as electronic gear) is changed to "Manual setting" using the **MEXE02** software and written to the driver, the parameter having changed will not return to the fixed value even if the ABZO information (fixed value) is copied.

■ Procedure

Using the **MEXE02** software, copy the ABZO information (fixed value) of the ABZO sensor to the driver.

1. Turn on the control power supply of the driver.
2. Click [Copy the ABZO (fixed) information to the driver in a lump] under the [Communication] menu.
   The ABZO information (fixed value) is copied to the driver.
3. Turn on the control power supply of the driver again.
4. Check whether the copied data is updated on the unit information monitor window.
   The contents of each item are shown in the table.

Item	Description
Active	Indicates the parameter values presently used.
Driver parameter	Indicates the parameter values set in the driver with the **MEXE02** software or via EtherNet/IP.
ABZO (fixed)	Indicates the parameter values stored in the ABZO sensor. They cannot be changed because of the fixed value.

3 Setting of resolution

Set the resolution when using in combination with a mechanism, such as a geared motor or a motorized actuator.
If the "Electronic gear A" and "Electronic gear B" parameters are set, the resolution per revolution of the motor output shaft can be set.
Note that the calculated value must fall within the setting range specified below.

Setting range of resolution: 100 to 10,000 P/R (Initial value: 1,000 P/R)

$$\text{Resolution (P/R)} = 1{,}000 \times \frac{\text{Electronic gear B}}{\text{Electronic gear A}}$$

Related parameters

MEXE02 code	Name	Description	Setting range	Initial value
p5	Mechanism settings	To change the mechanism settings parameter, select "1: Manual setting."	0: Prioritize ABZO setting 1: Manual setting	0
	Electronic gear A	Sets the denominator of the electronic gear.	1 to 65,535	1
	Electronic gear B	Sets the numerator of the electronic gear.		

Note

- When the "Mechanism settings" parameter is changed, turn off the control power supply of the driver and on again.
- If a resolution out of the setting range is set, information of Electronic gear setting error will be generated. If the control power supply is turned on again or Configuration is executed in a state where information of Electronic gear setting error is generated, an alarm of Electronic gear setting error will be generated.
- If the resolution was changed after preset was executed in a state where the "Preset position" parameter is set to other than "0," execute preset once again. If the "Preset position" parameter is set to "0," the present position is automatically recalculated even if the resolution is changed.

memo The initial value of the resolution may vary depending on the product connected.

■ Calculation method of electronic gears A and B

This section explains how to calculate the electronic gears A and B with examples of a ball screw and rotary table.

● Calculation example 1: Ball screw

- When a ball screw with a lead of 12 mm should be moved 0.01 mm per step.
- Gear ratio: 1 (No speed reduction mechanism between the motor and ball screw.)

$$\text{Resolution on mechanism} = 1{,}000 \times \frac{\text{Electronic gear B}}{\text{Electronic gear A}} = \frac{\text{Ball screw lead}}{\text{Minimum travel amount}}$$

$$\text{In this example:}\quad 1{,}000 \times \frac{\text{Electronic gear B}}{\text{Electronic gear A}} = \frac{12\text{ mm}}{0.01\text{ mm}}$$

$$\text{By calculation:}\quad \frac{\text{Electronic gear B}}{\text{Electronic gear A}} = \frac{12}{10}$$

Therefore, the electronic gear A is 10 and the electronic gear B is 12, and the resolution is 1,200 P/R.

● **Calculation example 2: Rotary table**

- When a rotary table that moves by 360° per revolution should be moved by 0.01° per step.
- Gear ratio: 10 (A geared motor with a gear ratio of 10 is used)

$$\text{Resolution on mechanism} = 1{,}000 \times \frac{\text{Electronic gear B}}{\text{Electronic gear A}} = \frac{\text{Travel amount per revolution}}{\text{Minimum travel amount}} \times \frac{1}{\text{Gear ratio}}$$

$$\text{In this example:} \quad 1{,}000 \times \frac{\text{Electronic gear B}}{\text{Electronic gear A}} = \frac{360°}{0.01°} \times \frac{1}{10}$$

$$\text{By calculation:} \quad \frac{\text{Electronic gear B}}{\text{Electronic gear A}} = \frac{36}{10}$$

Therefore, the electronic gear A is 10 and the electronic gear B is 36, and the resolution is 3,600 P/R.

■ Resolution for phase A (ASG) output and phase B (BSG) output

The phase A output and phase B output are pulse signals output from the ABZO sensor. Since pulses are output from the phase A and phase B outputs in response to the motor operation, the motor position can be monitored by counting the number of pulses.
The resolution for the phase A and phase B outputs is the same as the motor resolution when the control power supply is turned on. If the motor resolution is changed, the resolution for the phase A and phase B outputs is also changed.

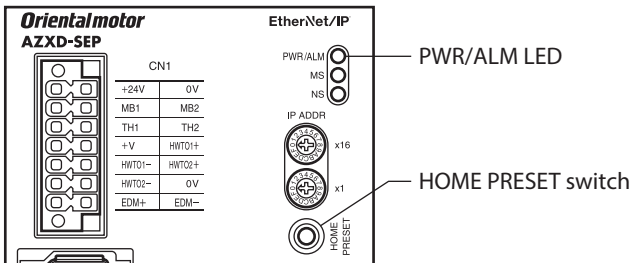
4 Home setting

The home has not set at the time of shipment. Before starting operation, be sure to set the home.
Perform the home setting only once initially. Once the home is fixed, the home information is retained even if the power supply is shut off.

memo The home is written to the non-volatile memory. The non-volatile memory can be rewritten approximately 100,000 times.

■ Home setting method

Use the HOME PRESET switch to set the home.



1. Move the output shaft to the position that is desired to set as the home.
2. Check the control power supply has been turned on, and press and hold the HOME PRESET switch for one second. The PWR/ALM LED blinks in red and green at the same time. (Red and green colors may overlap and it may be visible to orange.)
3. Release a hand off within three seconds after the PWR/ALM LED started blinking, and press the HOME PRESET switch again within three seconds after releasing the hand off.
   The PWR/ALM LED is lit in red and green at the same time, and then it is lit in green only.
4. The home is set.

memo For the operation of the step 3, be sure to release a hand off after the PWR/ALM LED started blinking and perform within three seconds. If three seconds elapsed in either of the two processes, the PWR/ALM LED is returned to the state of being lit in green. In this case, perform from the procedure 2 again.

5 Backup of data

There are two methods to backup the contents set in the **MEXE02** software as shown below.

■ Create to save the data file

The data edited in the **MEXE02** software or the data read from the driver is saved as a file.
Click [Save As] under the [File] menu.

■ Save in the backup area of the driver

Save the data opened in the **MEXE02** software to the backup area of the driver.

● When saving with the MEXE02 software

1. Click [Backup] under the [Communication] menu.
2. Input the Access key and the Write key.
3. Click [Backup].

memo Data saved by backup can be read by clicking [Restore] under the [Communication] menu.

● When saving via EtherNet/IP

Set the key code using the "Backup DATA access key" parameter and "Backup DATA write key" parameter before executing the "Write to backup" command of the maintenance command.

Related parameters

Parameter ID		Name	Description	Key code	Initial value
Dec	Hex				
32	0020h	Backup DATA access key	Inputs the key code to access the backup area. Data can be written and read.	20519253 (01391955h)	0
33	0021h	Backup DATA write key	Inputs the key code to write the data to the backup area.	1977326743 (75DB9C97h)	0
203	00CBh	Read from backup	Reads all the data from the backup area.	–	–
204	00CCh	Write to backup	Writes all the data to the backup area.	–	–

memo When reading the data saved by the backup function, set the key code using the "Backup DATA access key" parameter before executing the "Read from backup" command of the maintenance command.

3 Operation

This part explains the operation functions and the parameters.

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1 Flow of settings necessary for operation

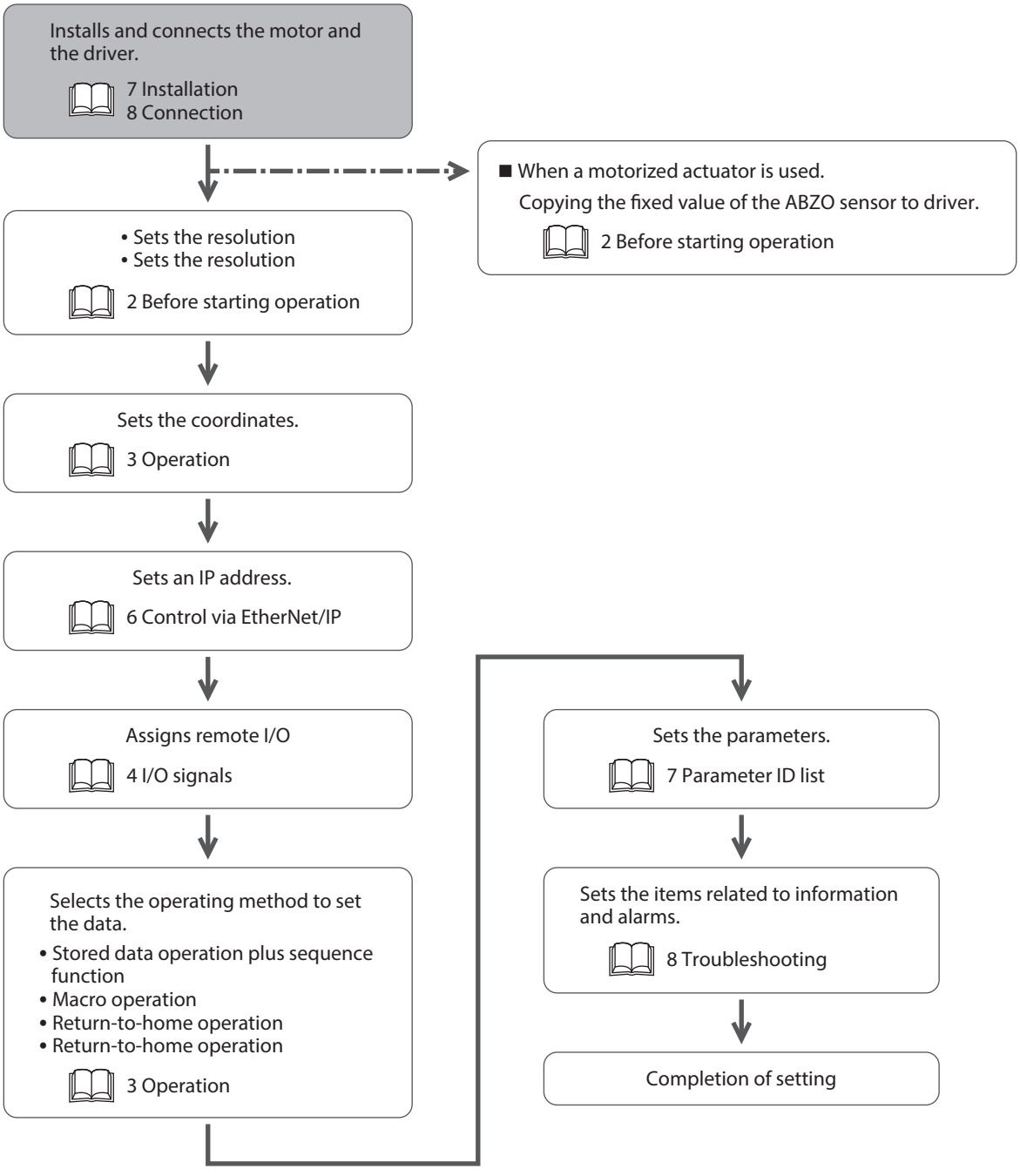
Before performing operation, read this section to understand the operation flow.

: Describes in this manual.

: Refer to **AZX** Series OPERATING MANUAL Hardware Edition.

: The title of the reference description.

memo Note that the title number in the reference destination may be changed. Use the title name when checking the reference destination.

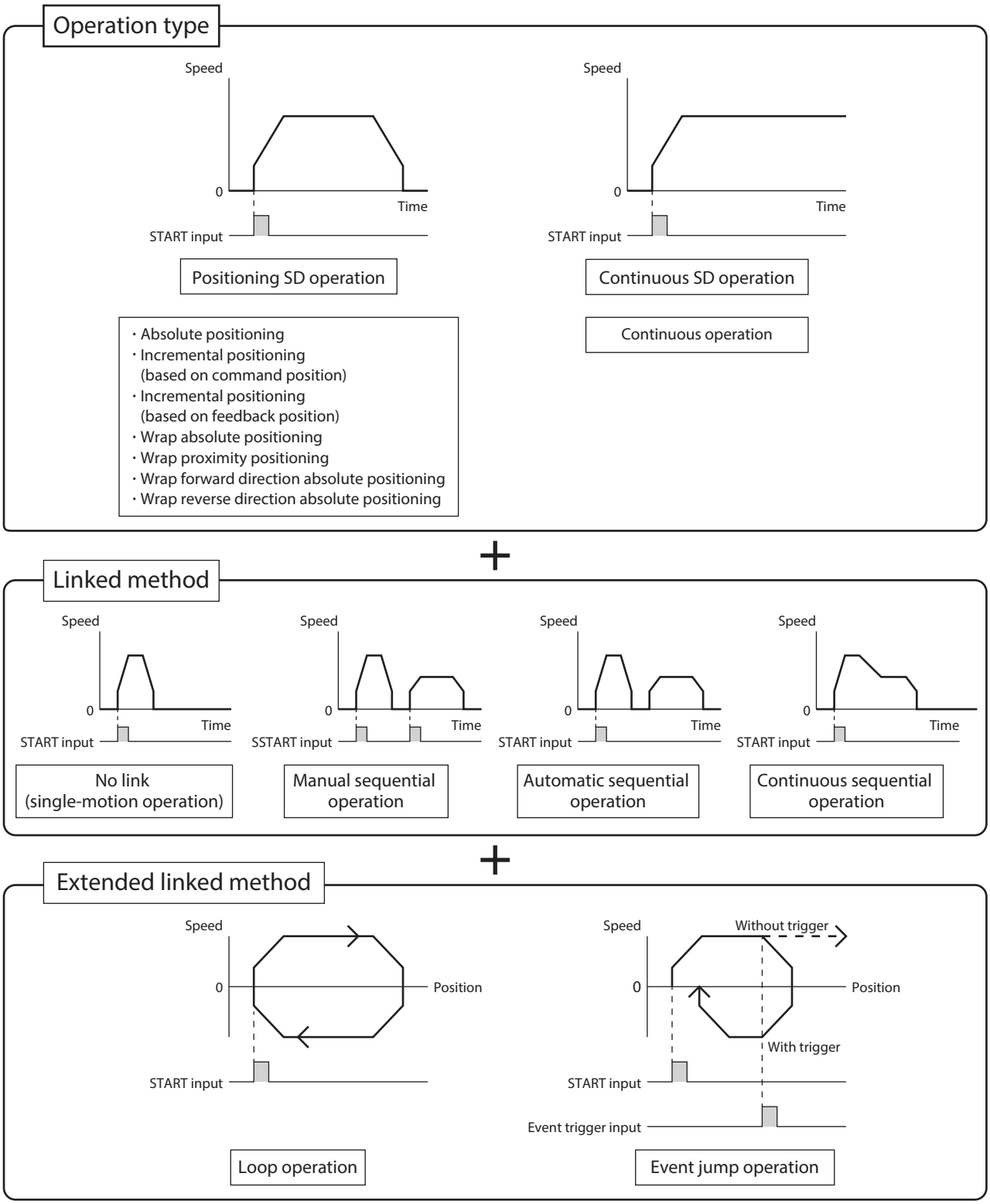


2 Stored data (SD) operation

Stored data operation is operation that sets the operation data such as the motor operating speed and position (travel amount) and executes.

***Before starting operation, be sure to set the home.**

2-1 Types of stored data (SD) operation



■ Method of operation

● Positioning stored data (SD) operation

Setting the motor operating speed and position (travel amount), and other items as operation data can perform trapezoidal drive from the present position toward the target position. The motor starts rotating at the starting speed and accelerates until it reaches the operating speed. Once the motor reaches the operating speed, it keeps the speed constant. Then, it decelerates when approaching the stop position, and finally comes to a stop.

Setting method of target position	Operation type	Description
Absolute positioning	Absolute positioning	Positioning operation is performed from the present position to the set target position.
Incremental positioning	Incremental positioning (based on command position)	Positioning operation with the set travel amount is performed from the present command position.
	Incremental positioning (based on feedback position)	Positioning operation with the set travel amount is performed from the present feedback position.
Wrap absolute positioning	Wrap absolute positioning	Positioning operation is performed to the target position within the wrap range.
	Wrap proximity positioning	Positioning operation in the shortest distance is performed to the target position within the wrap range.
	Wrap forward direction absolute positioning	Positioning operation in the forward direction is performed to the target position within the wrap range.
	Wrap reverse direction absolute positioning	Positioning operation in the reverse direction is performed to the target position within the wrap range.

● Continuous stored data (SD) operation

The motor continues operating according to the set operating speed.

Operation type	Description
Continuous operation	The motor starts rotating at the starting speed and accelerates until it reaches the operating speed. Once the motor reaches the operating speed, it continues operation with the speed maintained. In the case of the position control mode, operation is performed while the position deviation is monitored.

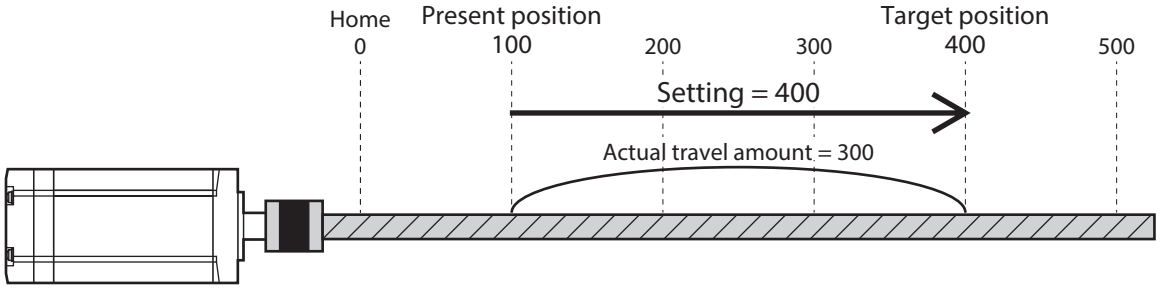
■ Setting method of target position

There are three methods to set the target position as shown below.

- **Absolute positioning**

  Set the target position on coordinates with the home as a reference.

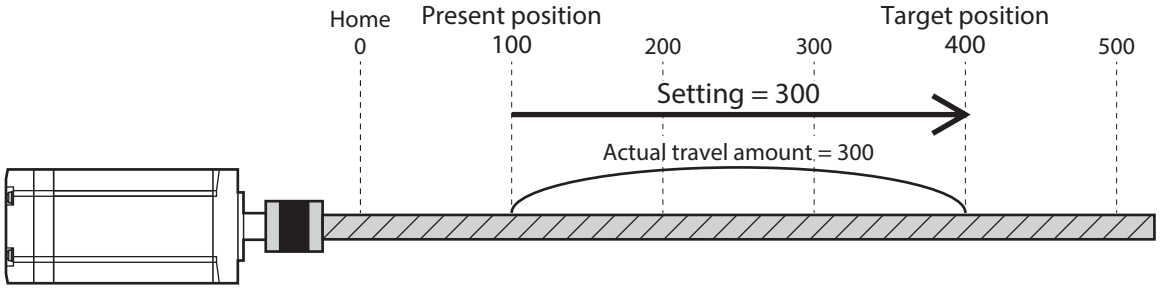
  Example: Setting when moving from the present position "100" to the target position "400"



- **Incremental positioning**

  Set the target position by using the position to which the motor has moved as a starting point of the next movement. This is suitable when the same travel amount is repeatedly operated.

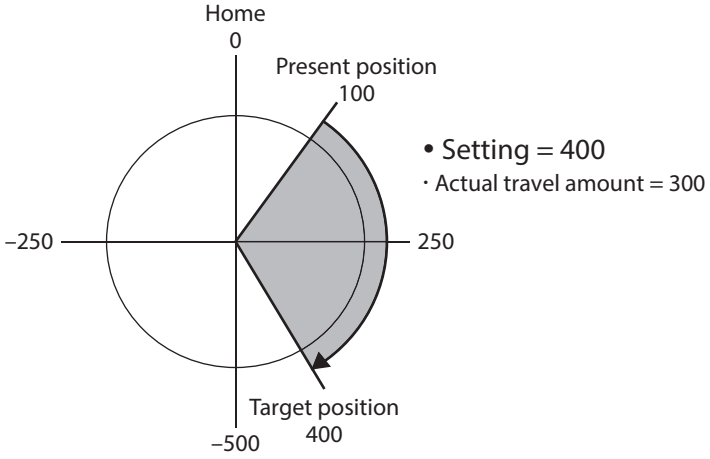
  Example: Setting when moving from the present position "100" to the target position "400"



- **Wrap absolute positioning**

  Set the "Wrap setting" parameter to "1: Enable" to use. Set the target position within the wrap range.

  Example: Setting when moving from the present position "100" to the target position "400"



2-2 Setting the data

There are three methods of settings for stored data operation as shown below.

- **Operation data**

  The operation type, the target position, the operating speed, the acceleration/deceleration rate, the torque limiting value, etc. necessary for stored data operation are set.

- **Operation I/O event**

  The condition to generate an event necessary for the event jump function, the next data number and linked method of the operation when an event is generated, etc. are set. Use when the event jump function is used.

- **Extended operation data setting**

  The loop start position, the loop end position, the number of loop times necessary for the extended loop function are set.
  Use when loop operation for the number of times that cannot be set in the operation data (256 times or more) is executed.

■ Operation data

The following operation data is necessary for stored data operation. Up to 256 operation data (No. 0 to No. 255) can be set.

MEXE02 code	Name	Description	Setting range*1	Initial value
p1	Operation type	Selects the operation type.	1: Absolute positioning 2: Incremental positioning (based on command position) 3: Incremental positioning (based on feedback position) 7: Continuous operation 8: Wrap absolute positioning 9: Wrap proximity positioning 10: Wrap forward direction absolute positioning 11: Wrap reverse direction absolute positioning	2
	Position	Sets the target position (travel amount). It is not used for continuous SD operation.	–2,147,483,648 to 2,147,483,647 steps	0
	Speed	Sets the operating speed. Positioning operation is performed at an absolute operating speed. For continuous operation, setting a positive value rotates the motor in the forward direction, and setting a negative value rotates it in the reverse direction.	–4,000,000 to 4,000,000 Hz	1,000
	Starting/changing rate	Sets the acceleration/deceleration rate or the acceleration/deceleration time when staring or changing the speed.	1 to 1,000,000,000 (1 = 0.001)*2	1,000,000
	Stopping deceleration	Sets the deceleration rate or the deceleration time when stopping.		1,000,000
	Torque limiting value	Sets the torque limiting value.	0 to 10,000 (1 = 0.1 %)	1,000
	Drive-complete delay time	Sets the waiting time generated after operation is completed.	0 to 65,535 (1 = 0.001 s)	0
	Link	Sets the mode for link operation.	0: No link 1: Manual sequential 2: Automatic sequential 3: Continuous sequential operation	0

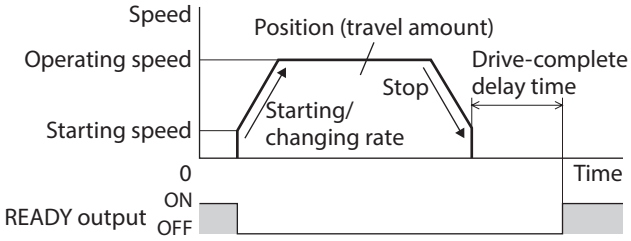
MEXE02 code	Name	Description	Setting range*1	Initial value
p1	Next data number	Sets the next data number.	–256: No link [Stop] –2: Operation data number after next one [↓↓(+2)] –1: Next operation data number [↓(+1)] 0 to 255: Operation data number	–1
	Area offset	Sets the distance from the center position of the range in which the MAREA output is turned ON to the target position of positioning operation. Sets the distance to the operation starting position in the case of continuous operation.	–2,147,483,648 to 2,147,483,647 steps	0
	Area width	Sets the range in which the MAREA output is turned ON.	–1: Disable 0 to 4,194,303 steps	–1
	Loop count	Sets the number of loop times.	0: No loop [–] 2 to 255: Number of loop times [loop 2{ to loop 255{]	0
	Loop offset	Offsets the position (travel amount) every time loop is executed.	–4,194,304 to 4,194,303 steps	0
	Loop end number	Sets to the operation data number in which loop is completed.	0: Not the loop end point [–] 1: Loop end point [}L-End]	0
	(Low) I/O event number	Sets the number of the operation I/O event to generate a low event. The condition to generate the event is set in the operation I/O event.	–1: Disable [–] 0 to 31: Operation I/O event number	–1
	(High) I/O event number	Sets the number of the operation I/O event to generate a high event. If a low event and a high event are generated at the same time, the high event is prioritized. The condition to generate the event is set in the operation I/O event.		

*1 A value in the brackets [ ] is shown on the screen of the **MEXE02** software.
*2 The setting unit is followed the "Acceleration/deceleration unit" parameter.

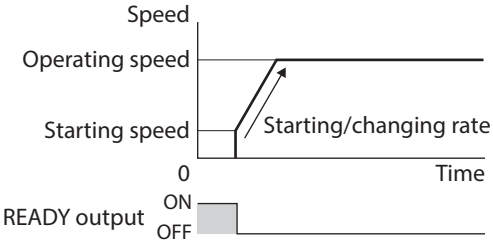
- **Position, Speed, Starting/changing rate, Stopping deceleration, Drive-complete delay time**

  The target position, the operating speed, and the acceleration/deceleration rate (acceleration/deceleration time) necessary for stored data operation are set.

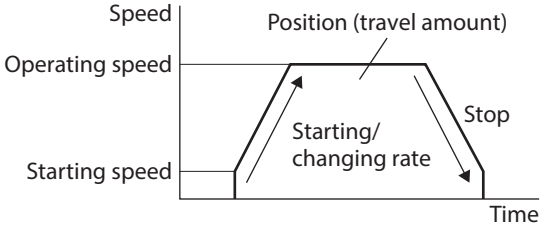
  • Positioning operation



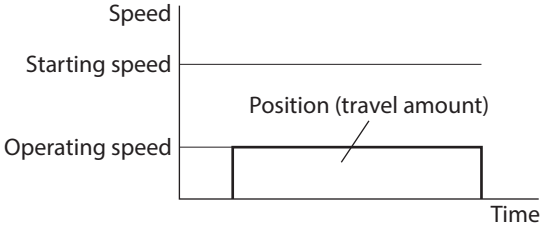
  • Continuous operation



  • When the operating speed is higher than the starting speed



  • When the starting speed is equal to or higher than the operating speed



- **Link, Next data number**

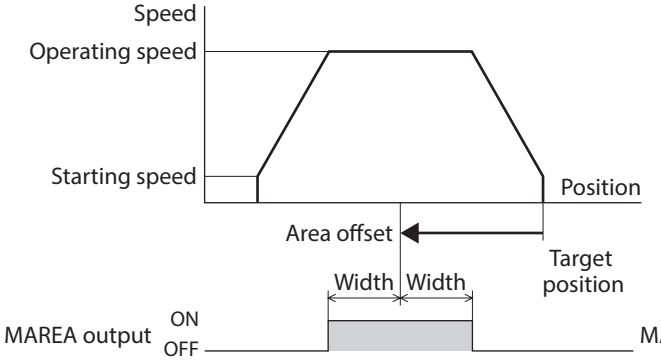
Type	Description
No link	Operation is executed once with a single operation data number. (Single-motion operation)
Manual sequential	Operation based on the operation data number set in the "Next data number" is executed whenever the SSTART input is turned ON. The SSTART input is enabled when the READY output is being ON.
Automatic sequential	Operation based on the operation data number set in the "Next data number" is automatically started after stop for the time set in the "Drive-complete delay time."
Continuous sequential operation	Operation based on the operation data number set in the "Next data number" is executed without stopping the motor.

- **Area offset, Area width**

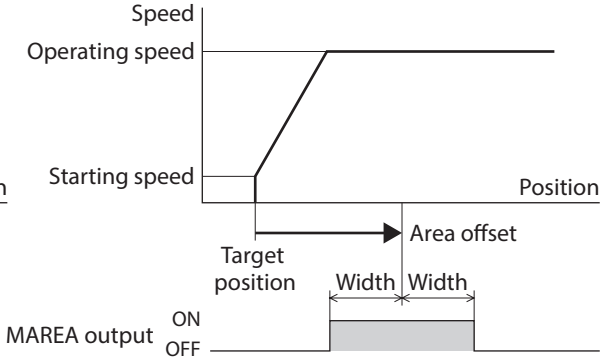
  Setting the area offset or the area width can set the range of the MAREA output for each operation data.

  When the operating direction is the forward direction

  • Positioning operation



  • Continuous operation



- **Loop count, Loop offset, Loop end number**

  If the loop count, the loop offset, and the loop end number are set, the loop function is enabled.
  (⇨"Loop function" on p.55)

- **(Low) I/O event number, (High) I/O event number**

  If the (Low) I/O event number and the (High) I/O event number are set, the event jump function is enabled. If a low event and a high event are generated at the same time, the high event is prioritized.
  (⇨"Event jump function" on p.59)

■ Operation I/O event

This is the operation I/O event necessary for setting the (Low) I/O event number and the (High) I/O event number.

MEXE02 code	Name	Description	Setting range*	Initial value
p2	Link	Sets the mode for link operation after detecting the event trigger.	0: No link 1: Manual sequential 2: Automatic sequential 3: Continuous sequential operation	0
	Next data number	Sets the next data number.	−256: No link [Stop] −2: Operation data number after next one [↓↓(+2)] −1: Next operation data number [↓(+1)] 0 to 255: Operation data number	−256
	Dwell	Sets the waiting time generated after detecting the event trigger.	0 to 65,535 (1 = 0.001 s)	0
	Event trigger I/O	Sets I/O to be used as an event trigger.	Output signals list⇨p.240	0: No function
	Event trigger type	Sets the timing to detect the event trigger. Refer to p.60 for details.	0: No setting [non] 1: ON (calculated cumulative msec) 2: ON (msec) 3: OFF (calculated cumulative msec) 4: OFF (msec) 5: ON edge 6: OFF edge 7: ON (cumulative msec) 8: OFF (cumulative msec)	0
	Event trigger count	Sets the judgment time to detect the event trigger or the number of times of detection.	0 to 65,535 (1 = 1 ms or 1 = once)	0

* A value in the brackets [ ] is shown on the screen of the **MEXE02** software.

- **Link, Next data number**

  Set the mode for link operation and the next data number when the event trigger is detected. There are four types for link as shown below.

Type	Description
No link	Ignores the event.
Manual sequential	Decelerates to stop the present operation. After that, when the time set in "Dwell" has passed, the READY output is turned ON. If the SSTART input is turned ON, the operation based on the operation data number set in the "Next data number" is executed.
Automatic sequential	Decelerates to stop the present operation. After that, when the time set in "Dwell" has passed, the operation based on the operation data number set in the "Next data number" is automatically started.
Continuous sequential operation	Starts operation of the operation data number set in "Next data number" without stopping the operation.

■ Operation data number selection

There are two methods to select the operation data number to be started as shown below.

- Direct selection (D-SEL0 to D-SEL7)
- Selection by M0 to M7 inputs

The priority is in order of the direct selection, and the M0 to M7 inputs.

● Direct selection

The direct selection is a method in which the operation data number is set with parameters and selected with D-SEL0 to D-SEL7 inputs.
If all D-SEL0 to D-SEL7 inputs are turned OFF or two or more inputs are turned ON, the direct selection is disabled and the selection by the M0 to M7 inputs is enabled.

Related parameters

MEXE02 code	Name	Description	Setting range	Initial value
p7	D-SEL drive start function	Sets how to start operation when the D-SEL input is turned ON.	0: Only operation data number selection 1: Operation data number selection with START function	1
	D-SEL0 operation number selection	Sets the operation data number corresponding to the D-SEL input.	0 to 255: Operation data number	0
	D-SEL1 operation number selection			1
	D-SEL2 operation number selection			2
	D-SEL3 operation number selection			3
	D-SEL4 operation number selection			4
	D-SEL5 operation number selection			5
	D-SEL6 operation number selection			6
	D-SEL7 operation number selection			7

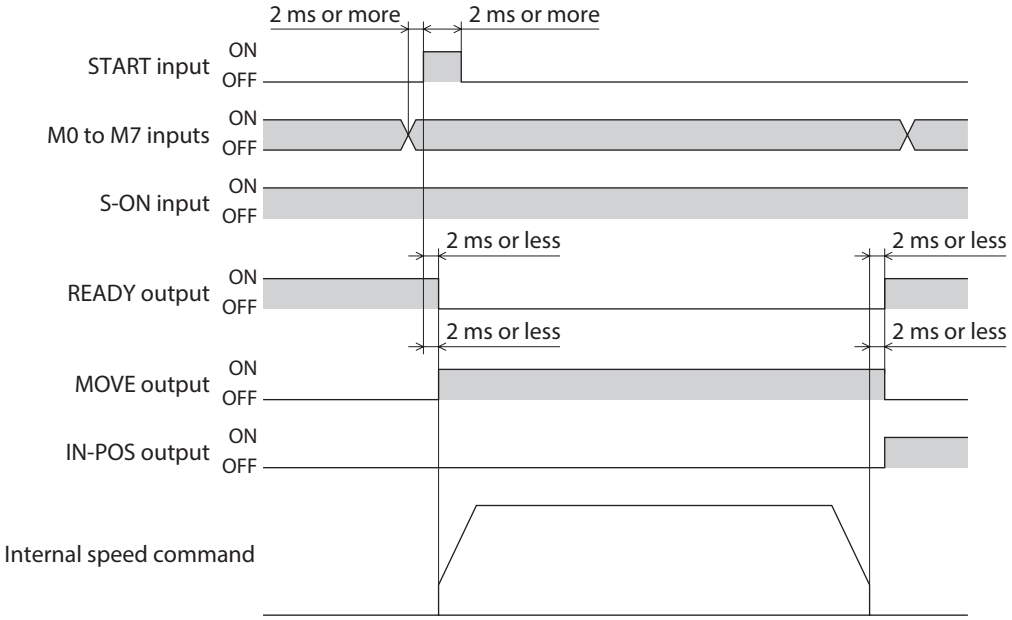
● Selection by M0 to M7 inputs

This is a method in which a desired operation data number is selected by a combination of ON-OFF status of the M0 to M7 inputs.

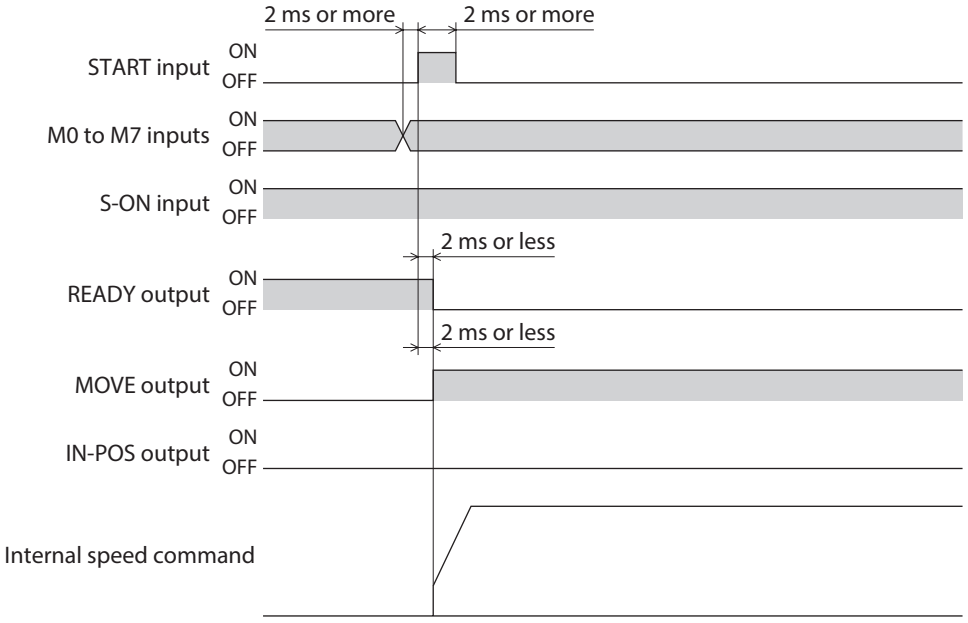
Operation data number	M7	M6	M5	M4	M3	M2	M1	M0
0	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
1	OFF	OFF	OFF	OFF	OFF	OFF	OFF	**ON**
2	OFF	OFF	OFF	OFF	OFF	OFF	**ON**	OFF
3	OFF	OFF	OFF	OFF	OFF	OFF	**ON**	**ON**
• • •	• • •	• • •	• • •	• • •	• • •	• • •	• • •	• • •
253	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	OFF	**ON**
254	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	OFF
255	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**

■ Timing chart

● Positioning operation



● Continuous operation

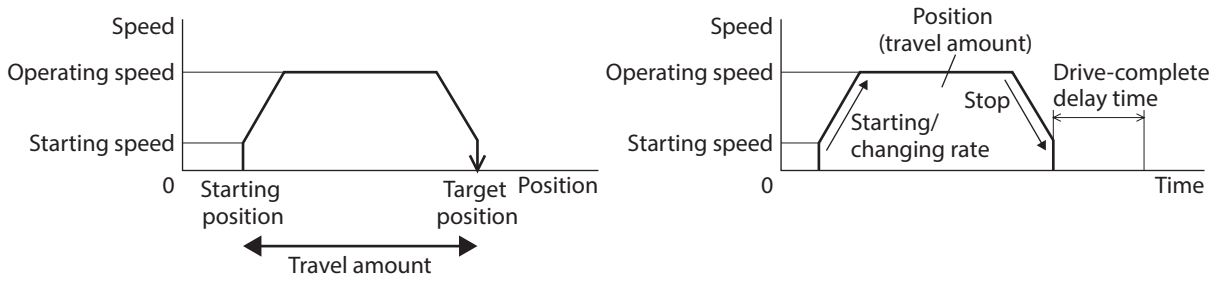


2-3 Positioning SD operation

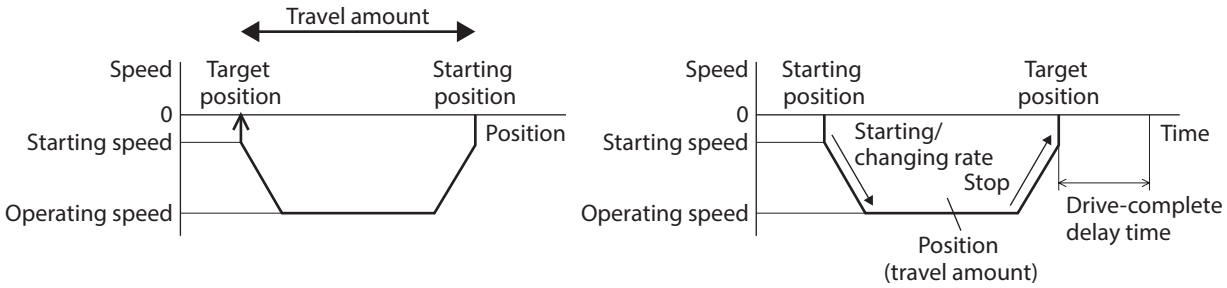
Positioning SD operation is operation that is executed with setting the motor operating speed, the position (travel amount), and other items to the operation data. When positioning SD operation is executed, the motor starts rotating at the starting speed and accelerates until it reaches the operating speed. Once the motor reaches the operating speed, it keeps the speed constant. Then, it decelerates when approaching the target position, and finally comes to a stop.

- **Operation**

When a value of the starting position is lower than that of the target position (operation in forward direction)



When a value of the starting position is higher than that of the target position (operation in reverse direction)



Note The maximum travel amount of positioning SD operation is 2,147,483,647 steps. If the travel amount of the motor exceeds the maximum travel amount, an alarm of Operation data error is generated.

memo
- The rotation direction (forward/reverse) of positioning SD operation is determined based on the setting of "Position" of the operation data.
  Setting a positive value rotates the motor in the forward direction, and setting a negative value rotates it in the reverse direction.
- When a negative value is set to "Speed" of the operation data, the motor is operated as a speed of absolute value.

■ Absolute positioning

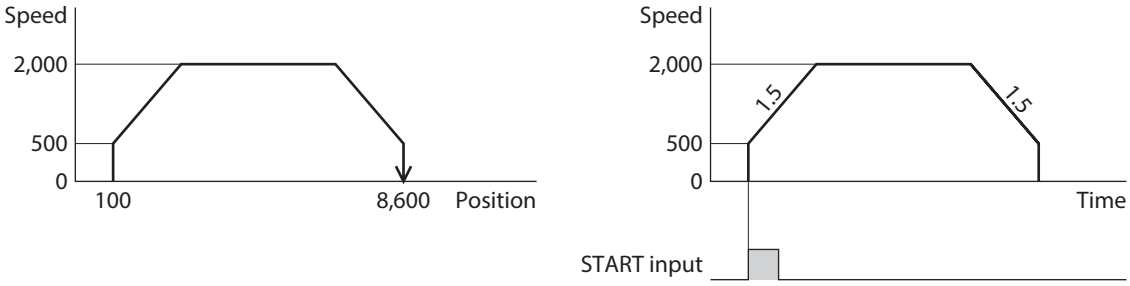
Set the target position on coordinates with the home as a reference.

- **Example:**
  When the motor is operated from the command position 100 to the target position 8,600

Setting the operation data

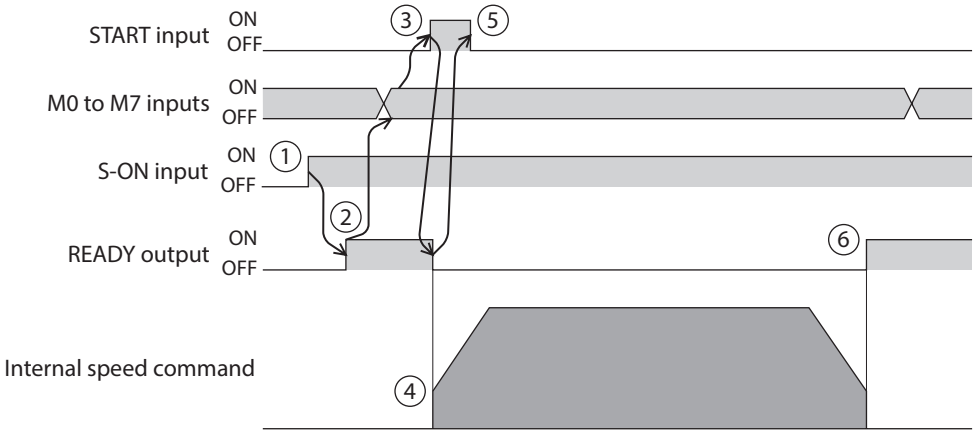
Operation type	Position [step]	Speed [Hz]	Starting/changing rate [kHz/s]	Stopping deceleration [kHz/s]
Absolute positioning	8,600	2,000	1.500	1.500

Operation example



Operating method

1. Turn the S-ON input ON.
2. Check the READY output is being ON.
3. Select the operation data number using the M0 to M7 inputs, and turn the START input ON.
4. The READY output is turned OFF, and the motor starts operation.
5. Check the READY output has been turned OFF and turn the START input OFF.
6. When the operation is completed, the READY output is turned ON.



■ Incremental positioning (based on command position)

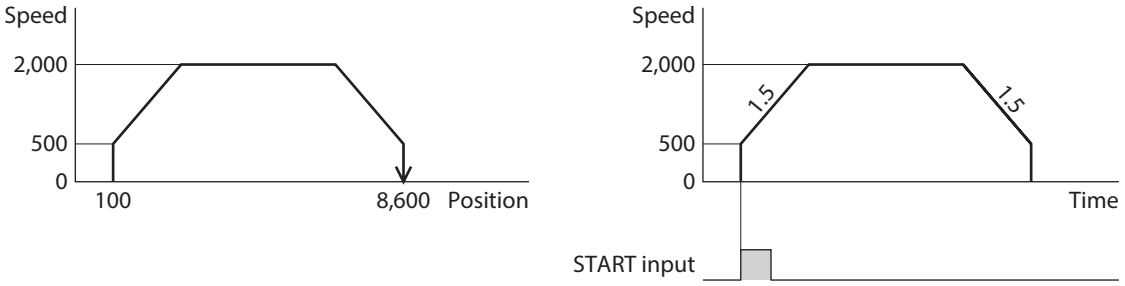
Set the travel amount from the present command position to the target position.

- **Example:**
  When the motor is operated from the command position 100 to the target position 8,600

Setting the operation data

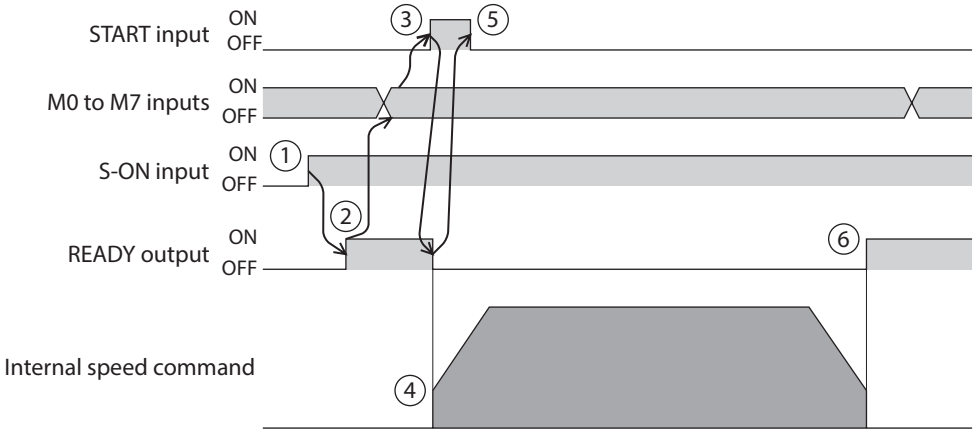
Operation type	Position [step]	Speed [Hz]	Starting/changing rate [kHz/s]	Stopping deceleration [kHz/s]
Incremental positioning (based on command position)	8,500	2,000	1.500	1.500

Operation example



Operating method

1. Turn the S-ON input ON.
2. Check the READY output is being ON.
3. Select the operation data number using the M0 to M7 inputs, and turn the START input ON.
4. The READY output is turned OFF, and the motor starts operation.
5. Check the READY output has been turned OFF and turn the START input OFF.
6. When the operation is completed, the READY output is turned ON.



■ Incremental positioning (based on feedback position)

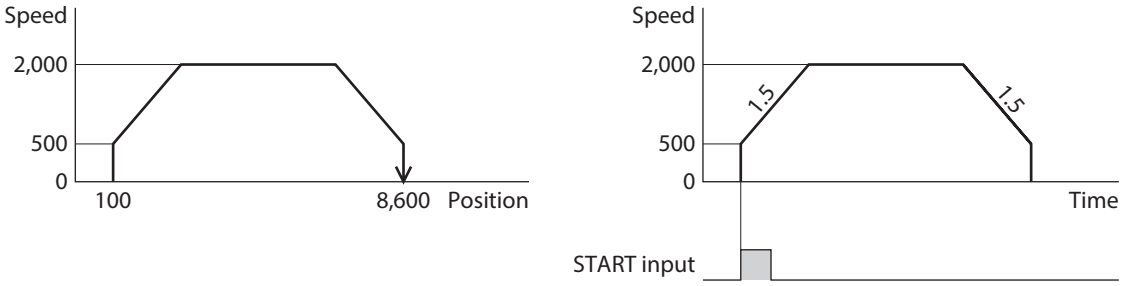
Set the travel amount from the present feedback position to the target position.

- **Example:**
  When the motor is operated from the feedback position 100 to the target position 8,600

Setting the operation data

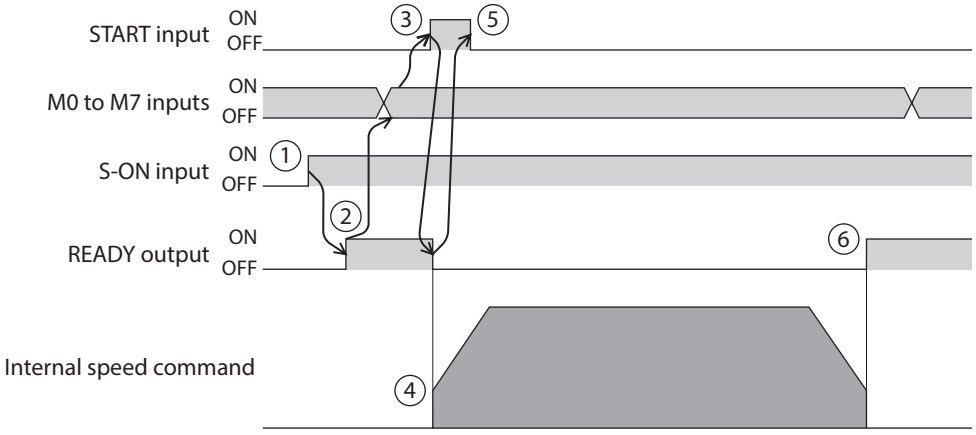
Operation type	Position [step]	Speed [Hz]	Starting/changing rate [kHz/s]	Stopping deceleration [kHz/s]
Incremental positioning (based on feedback position)	8,500	2,000	1.500	1.500

Operation example



Operating method

1. Turn the S-ON input ON.
2. Check the READY output is being ON.
3. Select the operation data number using the M0 to M7 inputs, and turn the START input ON.
4. The READY output is turned OFF, and the motor starts operation.
5. Check the READY output has been turned OFF and turn the START input OFF.
6. When the operation is completed, the READY output is turned ON.



memo The reference position of the operation based on the feedback position varies depending on a load. This is a convenient method to start the next operation from the status in which the command position and the feedback position are different.

■ Wrap absolute positioning

Set the target position within the wrap range to the operation data.

- **Example:**
  When the motor is operated from the command position 100 to the target position 8,600 (Wrap setting range 18 revolutions, wrap offset ratio 50 %)

Setting the wrap function

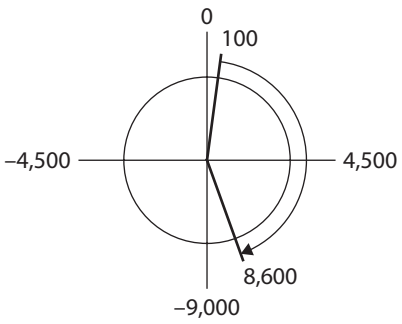
Refer to "Wrap function" on p.104 for details about the wrap function.

MEXE02 code	Name	Setting value
p5	Initial coordinate generation & wrap coordinate setting	Manual setting
	Initial coordinate generation & wrap setting range	18 rev
	Initial coordinate generation & wrap range offset ratio	50 %
	Wrap setting	Enable

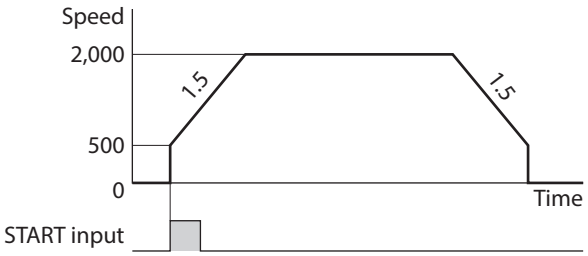
Setting the operation data

Operation type	Position [step]	Speed [Hz]	Starting/changing rate [kHz/s]	Stopping deceleration [kHz/s]
Wrap absolute positioning	8,600	2,000	1.500	1.500

Coordinates example

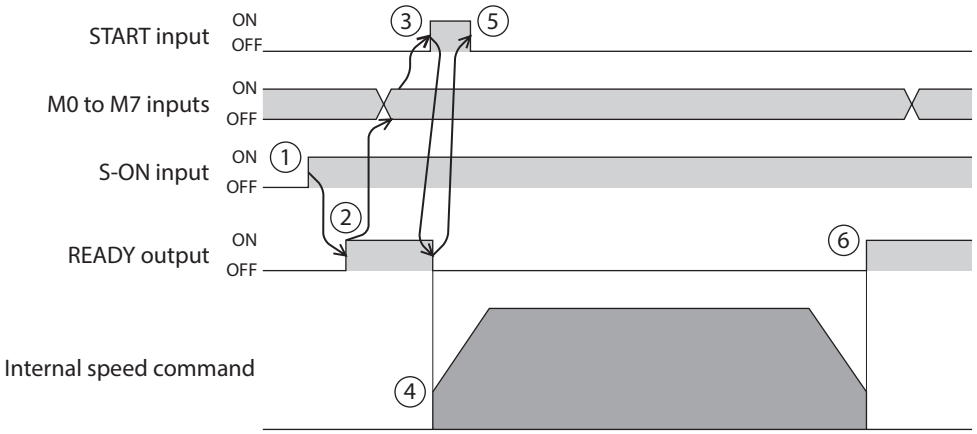


Operation example



Operating method

1. Turn the S-ON input ON.
2. Check the READY output is being ON.
3. Select the operation data number using the M0 to M7 inputs, and turn the START input ON.
4. The READY output is turned OFF, and the motor starts operation.
5. Check the READY output has been turned OFF and turn the START input OFF.
6. When the operation is completed, the READY output is turned ON.



■ Wrap proximity positioning

Set the target position within the wrap range. Positioning SD operation is executed in the rotation direction near to the target position.

- **Example:**
  When the motor is operated from the command position 100 to the target position 8,600 (Wrap setting range 18 revolutions, wrap offset ratio 50 %)

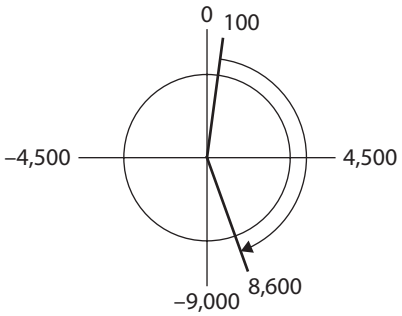
Setting of wrap function

MEXE02 code	Name	Setting value
p5	Initial coordinate generation & wrap coordinate setting	Manual setting
	Initial coordinate generation & wrap setting range	18 rev
	Initial coordinate generation & wrap range offset ratio	50 %
	Wrap setting	Enable

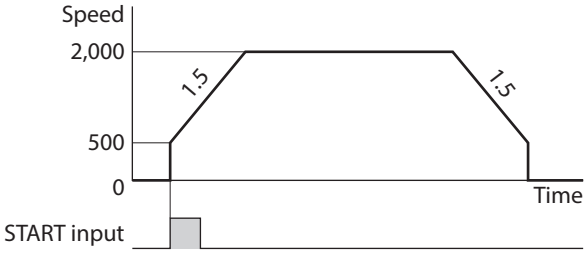
Setting the operation data

Operation type	Position [step]	Speed [Hz]	Starting/changing rate [kHz/s]	Stopping deceleration [kHz/s]
Wrap proximity positioning	8,600	2,000	1.500	1.500

Coordinates example

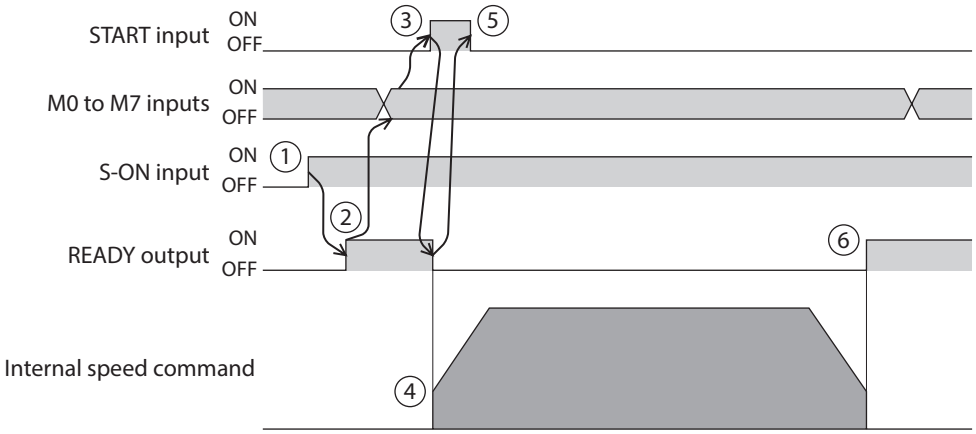


Operation example



Operating method

1. Turn the S-ON input ON.
2. Check the READY output is being ON.
3. Select the operation data number using the M0 to M7 inputs, and turn the START input ON.
4. The READY output is turned OFF, and the motor starts operation.
5. Check the READY output has been turned OFF and turn the START input OFF.
6. When the operation is completed, the READY output is turned ON.



■ Wrap forward direction absolute positioning

Set the target position within the wrap range to the operation data. Positioning SD operation is always executed in the forward direction regardless the target position.

- **Example:**
  When the motor is operated from the command position 100 to the target position 8,600 (Wrap setting range 18 revolutions, wrap offset ratio 50 %)

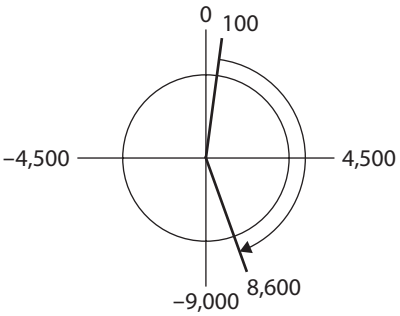
Setting of wrap function

MEXE02 code	Name	Setting value
p5	Initial coordinate generation & wrap coordinate setting	Manual setting
	Initial coordinate generation & wrap setting range	18 rev
	Initial coordinate generation & wrap range offset ratio	50 %
	Wrap setting	Enable

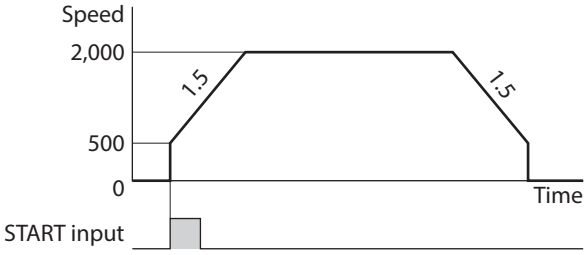
Setting the operation data

Operation type	Position [step]	Speed [Hz]	Starting/changing rate [kHz/s]	Stopping deceleration [kHz/s]
Wrap forward direction absolute positioning	8,600	2,000	1.500	1.500

Coordinates example

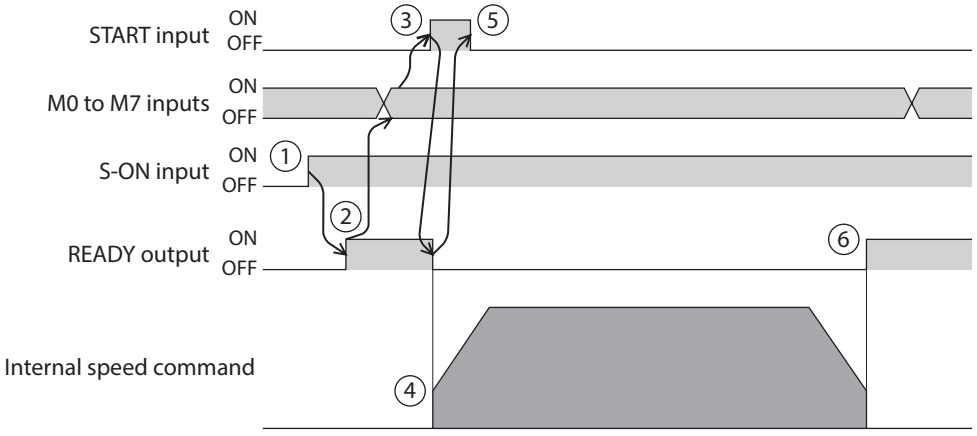


Operation example



Operating method

1. Turn the S-ON input ON.
2. Check the READY output is being ON.
3. Select the operation data number using the M0 to M7 inputs, and turn the START input ON.
4. The READY output is turned OFF, and the motor starts operation.
5. Check the READY output has been turned OFF and turn the START input OFF.
6. When the operation is completed, the READY output is turned ON.



■ Wrap reverse direction absolute positioning

Set the target position within the wrap range. Positioning SD operation is always executed in the reverse direction regardless the target position.

- **Example:**
  When the motor is operated from the command position 100 to the target position 8,600 (Wrap setting range 18 revolutions, wrap offset ratio 50 %)

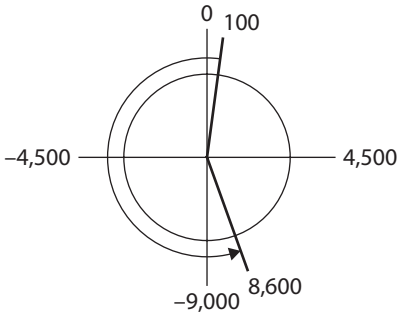
Setting of wrap function

MEXE02 code	Name	Setting value
p5	Initial coordinate generation & wrap coordinate setting	Manual setting
	Initial coordinate generation & wrap setting range	18 rev
	Initial coordinate generation & wrap range offset ratio	50 %
	Wrap setting	Enable

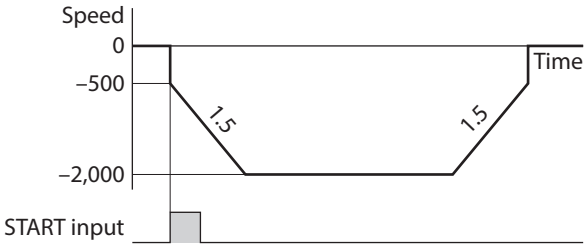
Setting the operation data

Operation type	Position [step]	Speed [Hz]	Starting/changing rate [kHz/s]	Stopping deceleration [kHz/s]
Wrap reverse direction absolute positioning	8,600	2,000	1.500	1.500

Coordinates example

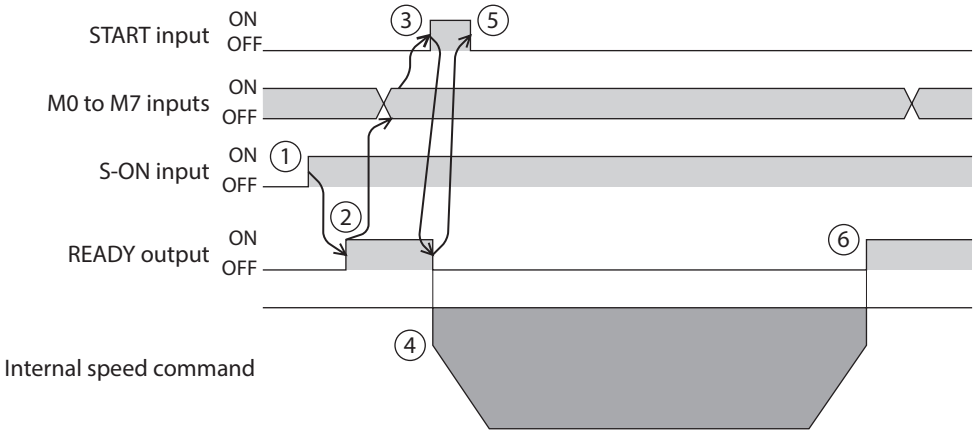


Operation example



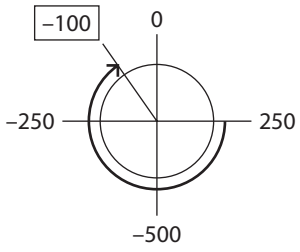
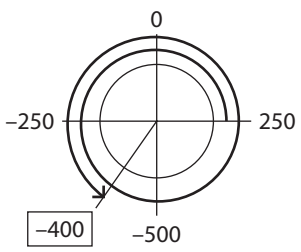
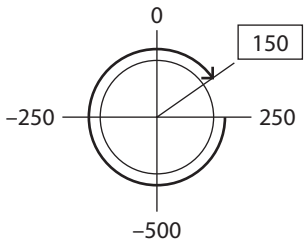
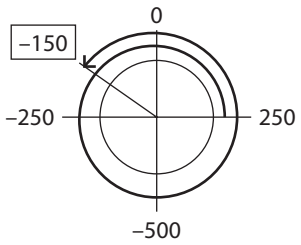
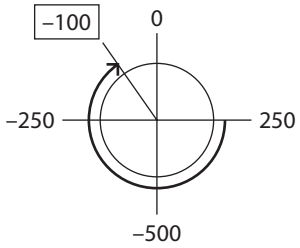
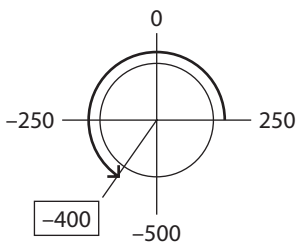
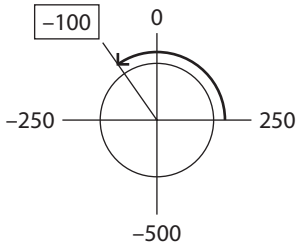
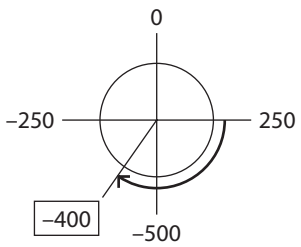
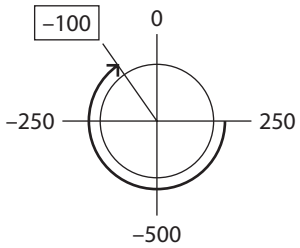
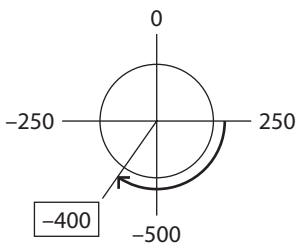
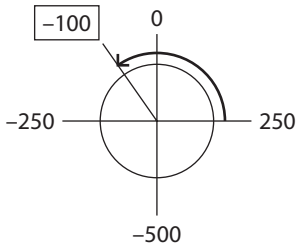
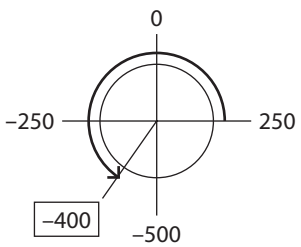
Operating method

1. Turn the S-ON input ON.
2. Check the READY output is being ON.
3. Select the operation data number using the M0 to M7 inputs, and turn the START input ON.
4. The READY output is turned OFF, and the motor starts operation.
5. Check the READY output has been turned OFF and turn the START input OFF.
6. When the operation is completed, the READY output is turned ON.



- **Orbit comparison of positioning SD operation**

  The wrap setting range should be 1 revolution, and the wrap offset ratio should be 50 %.
  (⇨"Wrap function" on p.104)
  The value in the square ☐ represents the coordinate of the position where the motor stopped.

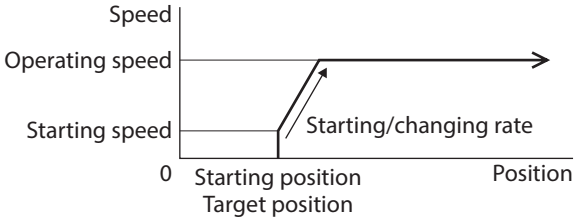
Operation type	Initial value → Value set in "Position" of operation data	
	250 → 900	250 → −1,400
• Absolute positioning Sets coordinates of the target position from the home.		
• Incremental positioning (based on command position) • Incremental positioning (based on feedback position) Sets the travel amount from the command position or the feedback position to the target position.		
• Wrap absolute positioning Sets the target position on coordinates with the home as a reference and operates within the wrap range.		
• Wrap proximity positioning Sets the target position on coordinates with the home as a reference and operates toward the target position within the wrap range in the shortest distance.		
• Wrap forward direction absolute positioning Sets the target position on coordinates with the home as a reference and operates in the forward direction (FWD) toward the target position within the wrap range.		
• Wrap reverse direction absolute positioning Sets the target position on coordinates with the home as a reference and operates in the reverse direction (RVS) toward the target position within the wrap range.		

2-4 Continuous SD operation

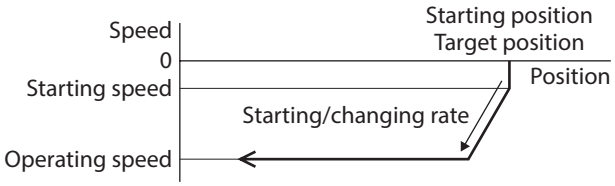
Continuous SD operation is operation that is executed with setting the motor operating speed to the operation data. Setting a positive value to the operating speed continues to operate the motor at a constant speed in the forward direction and setting a negative value continues to operate it at a constant speed in the reverse direction.

- **Operation**

When the operating speed (forward direction) is higher than 0



When the operating speed (reverse direction) is lower than 0



memo The target position for continuous SD operation is the starting position (command position). "Position" of the operation data is not set.

■ Continuous operation

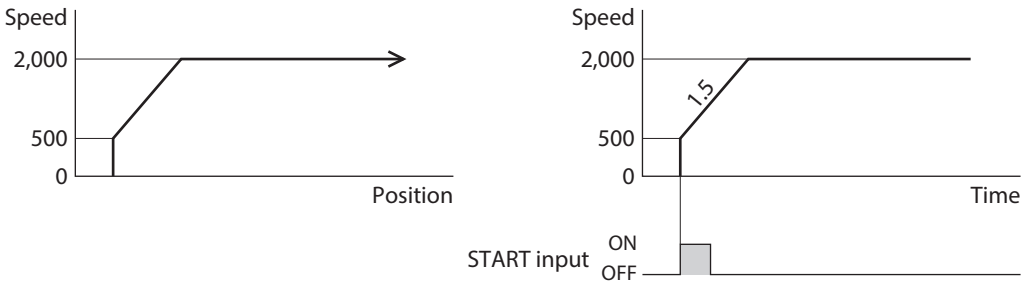
Set the operating speed to the operation data to execute operation. When the operation is executed, the motor starts rotating at the starting speed and accelerates until it reaches the operating speed. Once the motor reaches the operating speed, it continues operation with the speed maintained. In the case of the position control mode, since operation is executed while the position deviation is monitored, an alarm of Overload or Excessive position deviation is generated when a load exceeding the motor torque is applied.

- **Example of use**

Setting the operation data

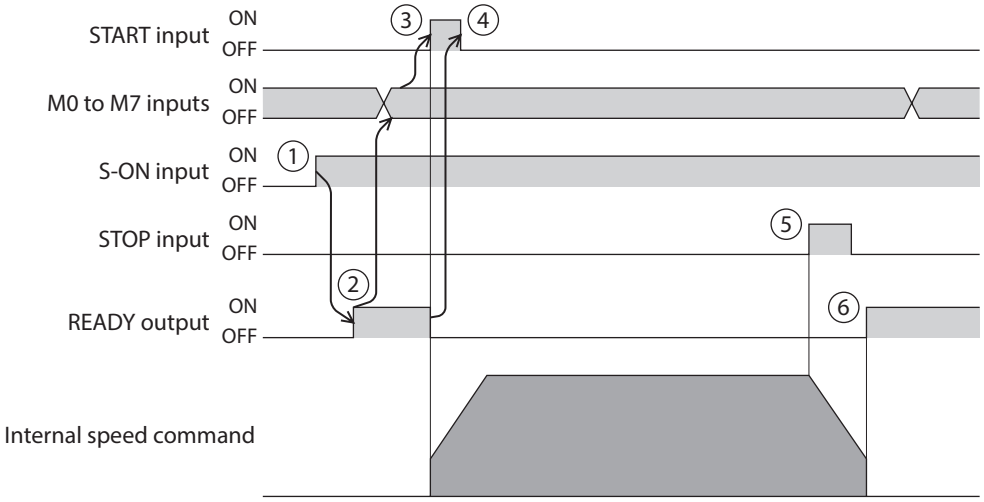
Operation type	Speed [Hz]	Starting/changing rate [kHz/s]	Stopping deceleration [kHz/s]
Continuous operation	2,000	1.500	1.500

Operation example



Operating method

1. Turn the S-ON input ON.
2. Check the READY output is being ON.
3. Select the operation data number using the M0 to M7 inputs, and turn the START input ON.
   The READY output is turned OFF, and the motor starts operation.
4. Check the READY output has been turned OFF and turn the START input OFF.
5. If the STOP input is turned ON, the motor starts deceleration stop.
6. When the motor stops, the READY output is turned ON.



2-5 Link method of operation data

Operations of two or more operation data numbers are linked. If the base point for linked operation is changed using the M0 to M7 inputs or the D-SEL0 to D-SEL7 inputs, linked operation with multiple operation patterns can be set. This can be used when a different operation pattern for each load is set.
The timing to transition to the operation data number of the next data varies depends on the operation method.

- **Positioning SD operation**
  - When the command position reaches the target position
  - When the NEXT input is turned ON.
  - When the event jump function is executed (⇨"Event jump function" on p.59)
- **Continuous SD operation**
  - When the NEXT input is turned ON.
  - When the event jump function is executed (⇨"Event jump function" on p.59)

Related operation data

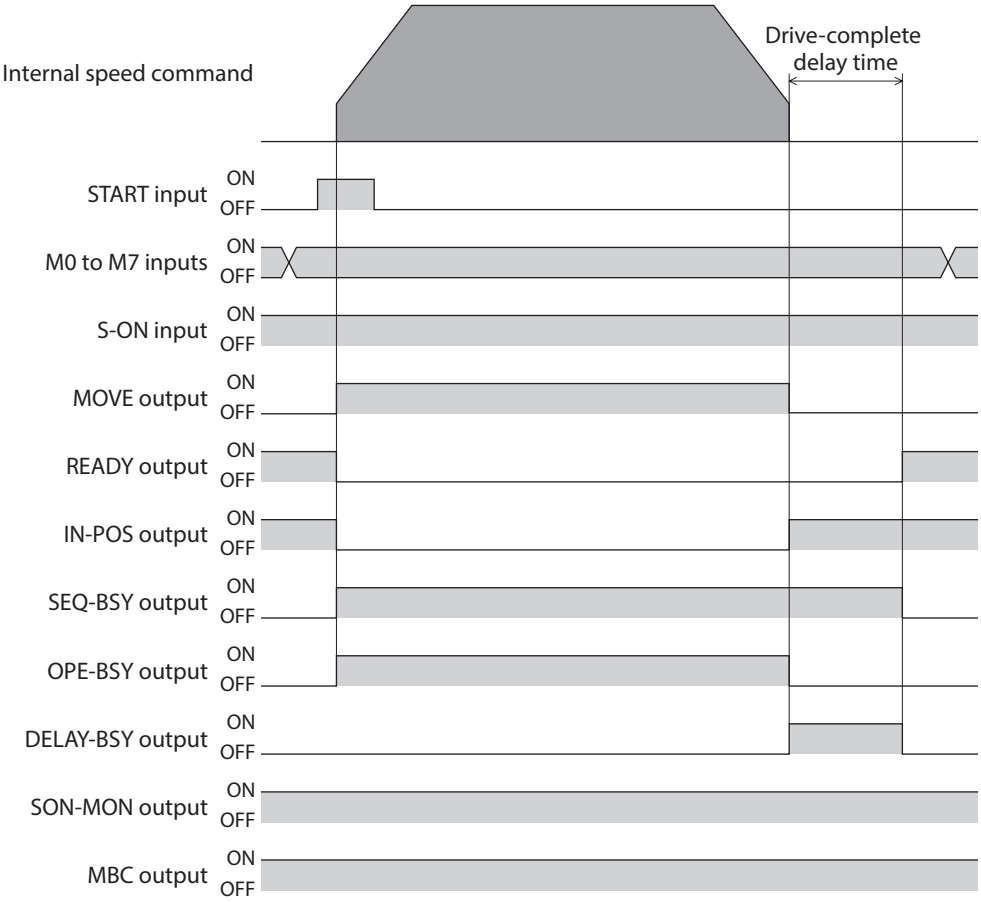
MEXE02 code	Name	Setting range*	Initial value
p1	Link	0: No link 1: Manual sequential 2: Automatic sequential 3: Continuous sequential operation	0
	Next data number	−256: No link [Stop] −2: Operation data number after next one [↓↓(+2)] −1: Next operation data number [↓(+1)] 0 to 255: Operation data number	−1

* A value in the brackets [ ] is shown on the screen of the **MEXE02** software.

■ No link (single-motion operation)

Operation is executed once with a single operation data number.

Related I/O signals



■ Manual sequential operation

Operation based on the operation data number set in the next data number is executed whenever the SSTART input is turned ON. This is a convenient method when multiple positioning operations are performed sequentially because there is no need to repeatedly select each operation data number.

memo

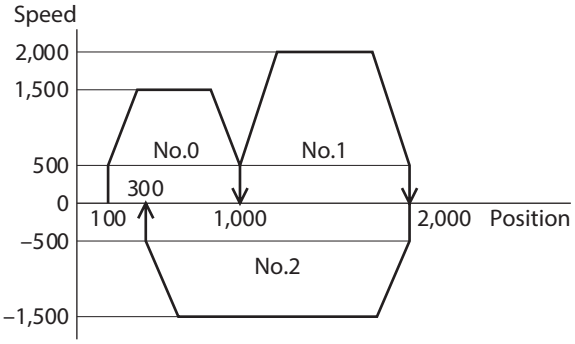
- Even if operation of the operation data number for which the manual sequential operation is set is completed, the SEQ-BSY output is not turned OFF (manual sequential waiting status). If the SSTART input is turned ON in a state where the SEQ-BSY output is ON, the operation data number set in the next data number is executed.
- If the SSTART input is turned ON in a state where the SEQ-BSY output is OFF, the operation data number presently selected is executed.

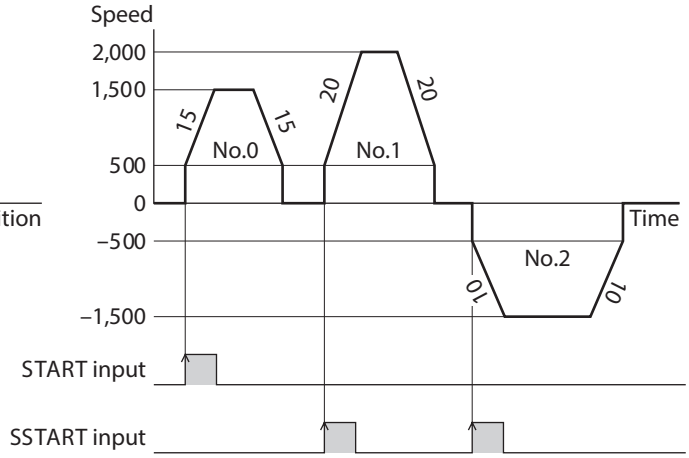
● **Example of use:**
When positioning operation is performed to multiple coordinates at a desired time

Setting the operation data

Data No.	Operation type	Position [step]	Speed [Hz]	Starting/ changing rate [kHz/s]	Stopping deceleration [kHz/s]	Link	Next data number
No. 0	Absolute positioning	1,000	1,500	15.000	15.000	Manual sequential	↓(+1)
No. 1	Absolute positioning	2,000	2,000	20.000	20.000	Manual sequential	↓(+1)
No. 2	Absolute positioning	300	1,500	10.000	10.000	No link	Stop

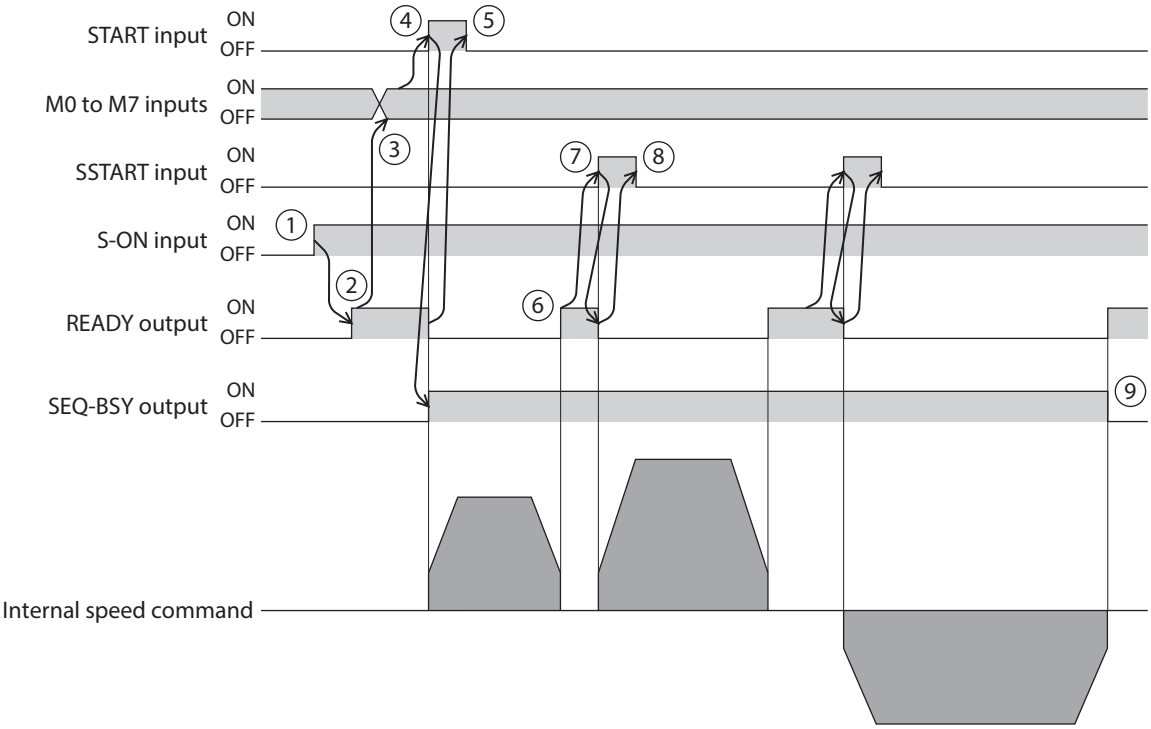
Operation example



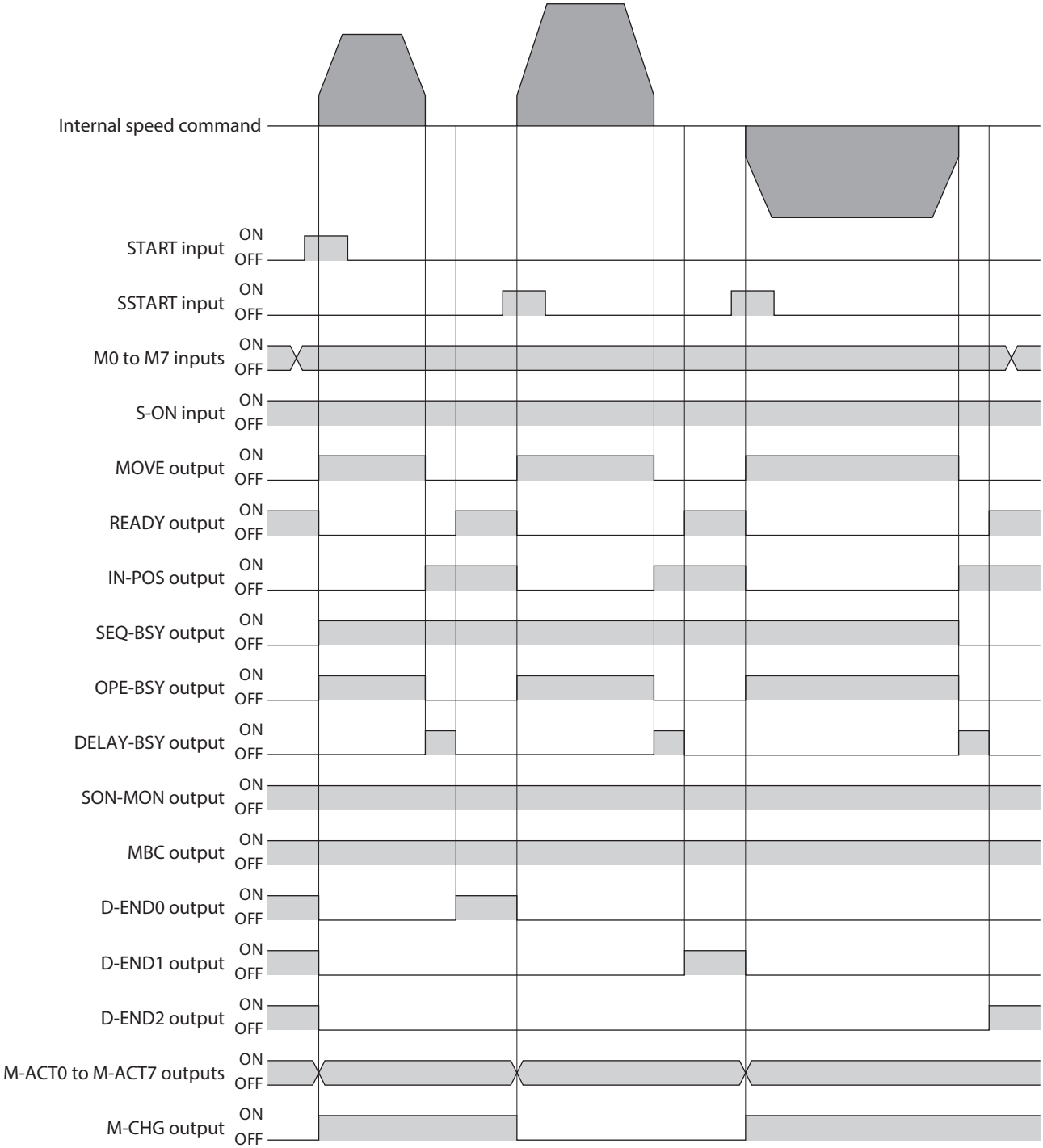


Timing chart

1. Turn the S-ON input ON.
2. Check the READY output is being ON.
3. Select the operation data number using the M0 and M7 inputs.
4. Turn the START input ON.
   The READY output is turned OFF, the SEQ-BSY output is turned ON, and the motor starts operation.
5. Check the READY output has been turned OFF and turn the START input OFF.
6. When the operation is completed, the READY output is turned ON.
7. Check the READY output has been turned ON and turn the SSTART input ON.
   Operation of the operation data number linked by manual sequential is started.
8. Check the READY output has been turned OFF and turn the SSTART input OFF.
9. When all linked operations are completed, the SEQ-BSY output is turned OFF and the READY output is turned ON.



Related I/O signals



■ Automatic sequential operation

Two or more operations are automatically executed in sequence. After one operation is completed, operation of the operation data number set in the "Next data number" is started after stop for the time set in the "Drive-complete delay time." If there is operation data that "0: No link" is set, the motor operates stored data operation sequentially and stops when the operation data of "No link" is completed.

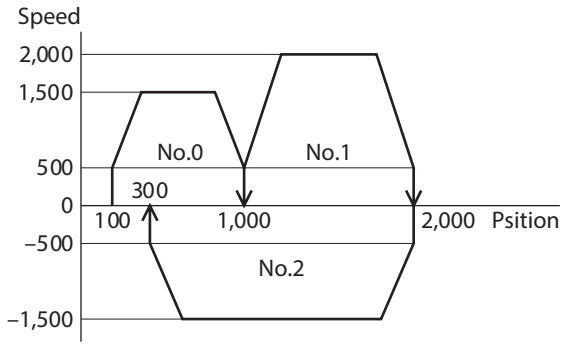
- **Example of use:**
  When positioning operation is automatically performed to multiple coordinates

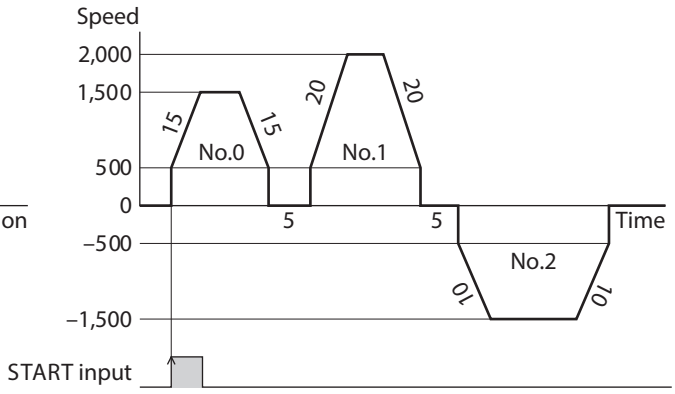
Setting the operation data

Data No.	Operation type	Position [step]	Speed [Hz]	Starting/changing rate [kHz/s]	Stopping deceleration [kHz/s]
No. 0	Absolute positioning	1,000	1,500	15.000	15.000
No. 1	Absolute positioning	2,000	2,000	20.000	20.000
No. 2	Absolute positioning	300	1,500	10.000	10.000

Data No.	Drive-complete delay time [s]	Link	Next data number
No. 0	5.000	Automatic sequential	↓ (+1)
No. 1	5.000	Automatic sequential	↓ (+1)
No. 2	0.000	No link	Stop

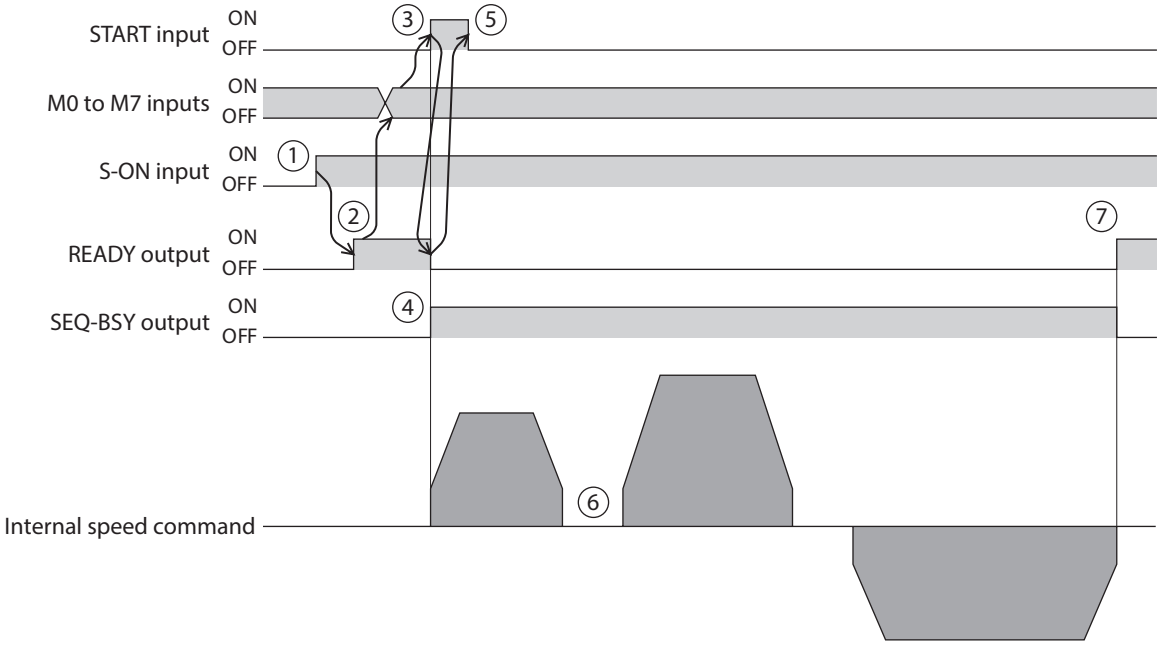
Operation example



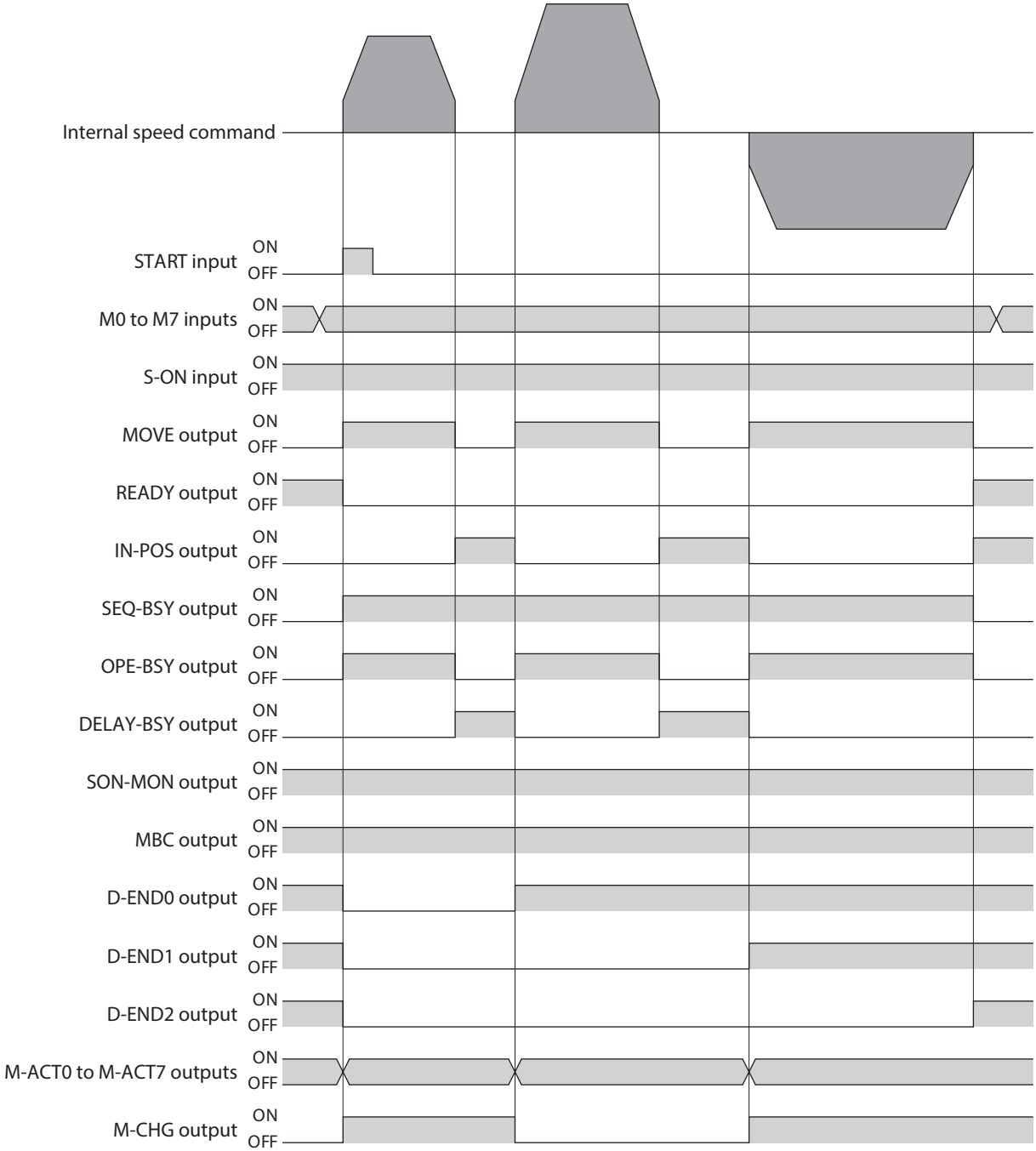


Timing chart

1. Turn the S-ON input ON.
2. Check the READY output is being ON.
3. Select the operation data number using the M0 and M7 inputs.
4. Turn the START input ON.
   The READY output is turned OFF, the SEQ-BSY output is turned ON, and the motor starts operation.
5. Check the READY output has been turned OFF and turn the START input OFF.
6. When the first operation is completed, operation linked in "Automatic sequential" is started after stop for time set in "Drive-complete delay time."
7. When all linked operations are completed, the SEQ-BSY output is turned OFF and the READY output is turned ON.



Related I/O signals



■ Continuous sequential operation

Operation based on the operation data number set in the "Next data number" is executed continuously without stopping the motor. If there is operation data that "0: No link" is set, the motor operates stored data operation sequentially and stops when the operation data of "No link" is completed.

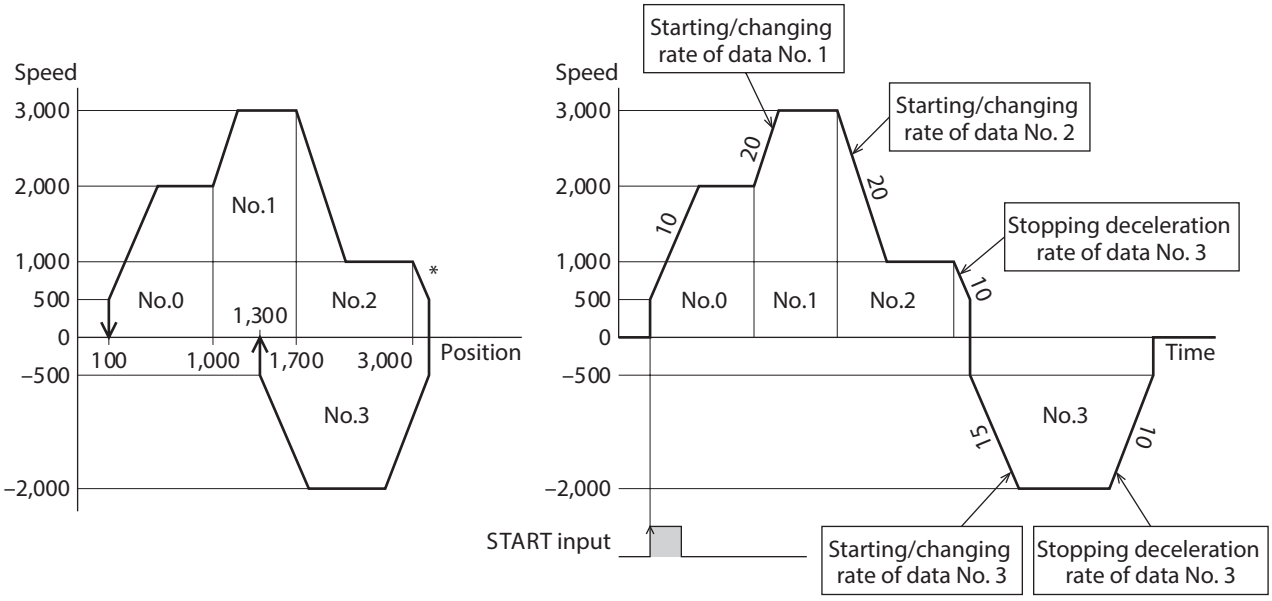
- **Example of use:**
  When the speed is changed at positions specified.

Setting the operation data

Data No.	Operation type	Position [step]	Speed [Hz]	Starting/changing rate [kHz/s]	Stopping deceleration [kHz/s]
No. 0	Absolute positioning	1,000	2,000	10.000	15.000
No. 1	Absolute positioning	1,700	3,000	20.000	20.000
No. 2	Absolute positioning	3,000	1,000	20.000	20.000
No. 3	Absolute positioning	1,300	2,000	15.000	10.000

Data No.	Link	Next data number
No. 0	Continuous sequential operation	↓ (+1)
No. 1	Continuous sequential operation	↓ (+1)
No. 2	Continuous sequential operation	↓ (+1)
No. 3	No link	Stop

Operation example



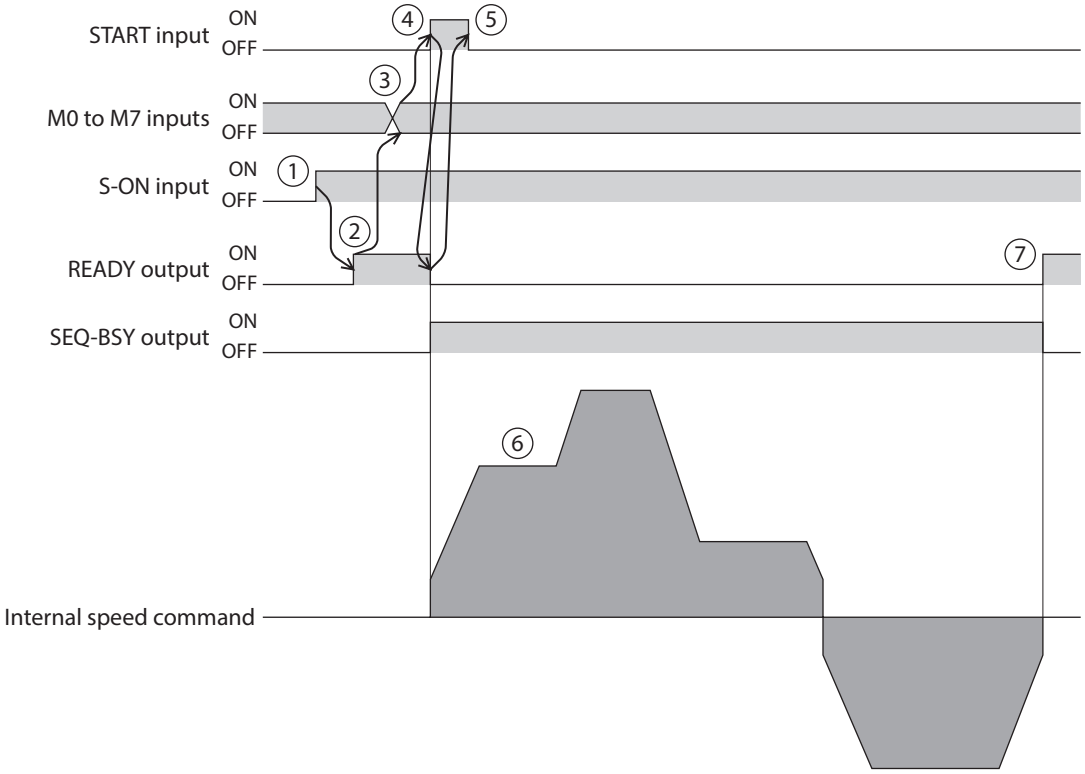
* If the direction of operation is switched to the opposite direction in the middle of operation, the target position will be exceeded.

memo

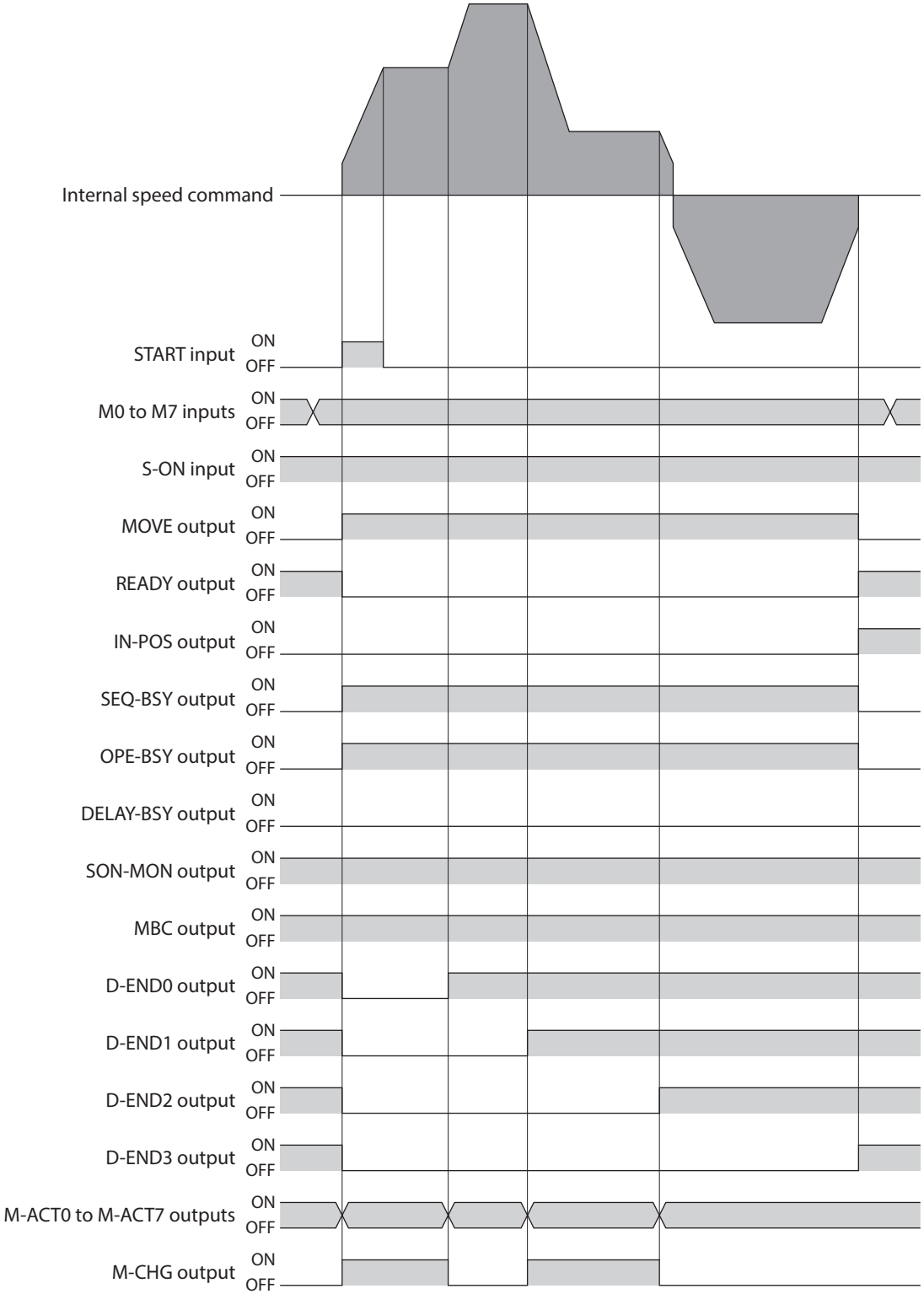
- To link to the next operation data number, the motor accelerates according to the starting/changing rate of the next data number.
- If operation of the next data number was set to the rotation in the opposite direction, the motor decelerates according to the stopping deceleration of the next data number.
- When stopped, the motor decelerates according to the stopping deceleration of the operation data number linked at last.

Timing chart

1. Turn the S-ON input ON.
2. Check the READY output is being ON.
3. Select the operation data number using the M0 and M7 inputs.
4. Turn the START input ON.
   The READY output is turned OFF, the SEQ-BSY output is turned ON, and the motor starts operation.
5. Check the READY output has been turned OFF and turn the START input OFF.
6. When the motor reaches the target position during operation, the operation transitions to the next operation linked, and the motor starts acceleration/deceleration from the present speed to the target speed.
7. When all linked operations are completed, the SEQ-BSY output is turned OFF and the READY output is turned ON.



Related I/O signals



2-6 Sequence function (repetitive operation)

There are three methods to link two or more operation data numbers to perform repetitive operation as shown below. The setting method of operation data varies depending on the number of repetitions.

- **Using the loop function (⇨ next section)**

  Use the loop function when operation is desired to repeat in the range of 2 to 255 times.
  If "Loop offset" is set, the target position for positioning can be shifted by the offset amount while repeating operation. This can be used for palletizing operation, etc.

- **Using the extended loop function (⇨p.62)**

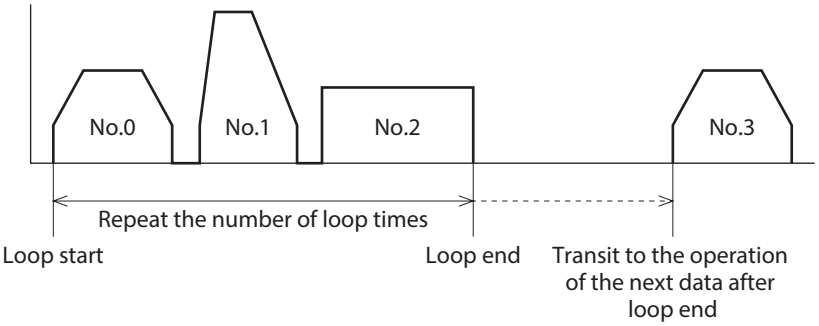
  Use the extended loop function when operation is desired to repeat in the range of 2 to 100,000,000 times.
  This allows repetitive operation for a number of times that cannot be set for the loop function.

- **Using the link function (⇨p.58)**

  Use the link function when operation is desired to repeat infinitely. Position offset cannot be performed.

■ Loop function

The loop function is a function that repeats the operation of the linked operation data numbers for the number of times having set.
From the operation data number having set the "Loop count" until that having set the "Loop end number," operation is repeated for the number of times set in the "Loop count." When operation for the number of times having set is completed, the operation transitions to the operation data number that is set in "Next data number."



Note If "0: No link" is included in "Link" of the operation data number to be looped, the motor will stop when operation of the operation data number that "0: No link" was set is completed. Be sure to link all operation data numbers using "1: Manual sequential," "2: Automatic sequential," or "3: Continuous sequential operation."

Related operation data

MEXE02 code	Name	Description	Setting range*	Initial value
p1	Link	Sets the mode for link operation.	0: No link 1: Manual sequential 2: Automatic sequential 3: Continuous sequential operation	0
	Next data number	Sets the next data number.	–256: No link [Stop] –2: Operation data number after next one [↓↓(+2)] –1: Next operation data number [↓(+1)] 0 to 255: Operation data number	–1
	Loop count	Sets the number of loop times.	0: No loop [–] 2 to 255: Number of loop times [loop 2{ to loop 255{]	0
	Loop offset	Offsets the position (travel amount) every time loop is executed.	–4,194,304 to 4,194,303 steps	0
	Loop end number	Sets to the operation data number in which loop is completed.	0: Not the loop end point [–] 1: Loop end point [}L-End]	0

* A value in the brackets [ ] is shown on the screen of the **MEXE02** software.

- **Example of use:**
  When operation is transitioned to the operation data No. 2 after that from the operation data No. 0 to No. 1 is repeated three times.

Setting the operation data

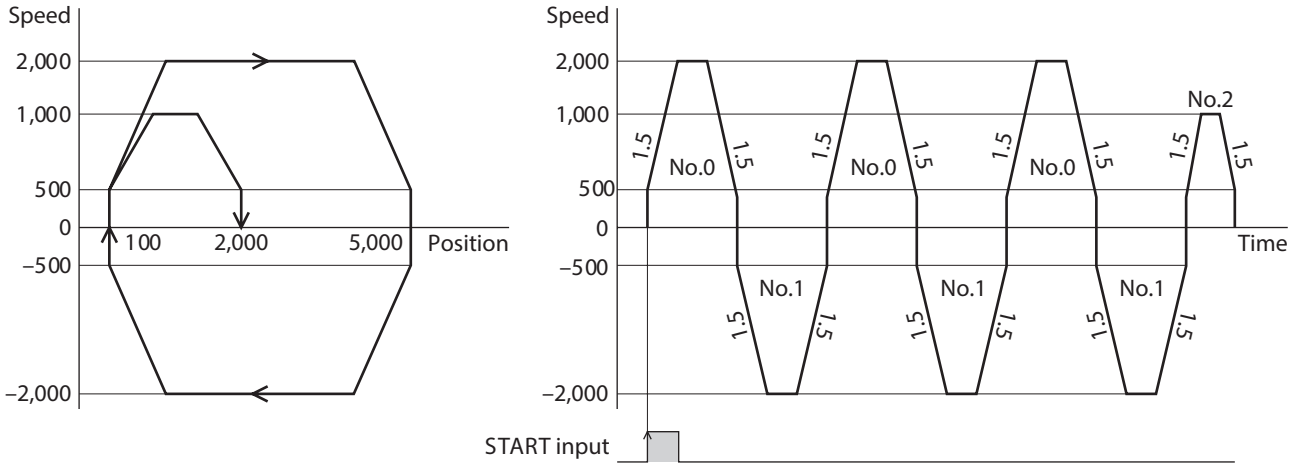
Data No.	Operation type	Position [step]	Speed [Hz]	Starting/changing rate [kHz/s]	Stopping deceleration [kHz/s]
No. 0	Absolute positioning	5,000	2,000	1.500	1.500
No. 1	Absolute positioning	100	2,000	1.500	1.500
No. 2	Absolute positioning	2,000	1,000	1.500	1.500

Data No.	Link	Next data number	Loop count	Loop end number
No. 0	Automatic sequential	↓ (+1)	loop 3{	–
No. 1	Automatic sequential	↓ (+1)	–	}L-End
No. 2	No link	Stop	–	–

Note Set "1: Manual sequential," "2: Automatic sequential," or "3: Continuous sequential operation" to "Link" of the operation data number to be looped. If "0: No link" is set, the operation stops.

memo If operation is not transitioned to the operation data No. 2 after that from the operation data No. 0 to No. 1 is repeated, set the next data number of the operation data No. 1 to "–256: No link [Stop]."

Operation example



- **Offset of loop**

  If an offset is set, the target position for positioning can be shifted by the amount set in the "Loop offset" while repeating the loop. Use for palletizing operation, etc.

  Example of use:
  When operation from the operation data No. 0 to No. 1 is repeated three times.
  (When the target position is increased by 100 steps every time loop is executed)

  Setting the operation data (for absolute positioning)

  The coordinate of the target position is offset.

Data No.	Operation type	Position [step]	Speed [Hz]	Starting/changing rate [kHz/s]	Stopping deceleration [kHz/s]
No. 0	Absolute positioning	1,000	1,200	1.500	1.500
No. 1	Absolute positioning	100	1,200	1.500	1.500

Data No.	Link	Next data number	Loop count	Loop offset	Loop end number
No. 0	Automatic sequential	↓ (+1)	loop 3{	100	–
No. 1	Automatic sequential	Stop	–	0	} L-End

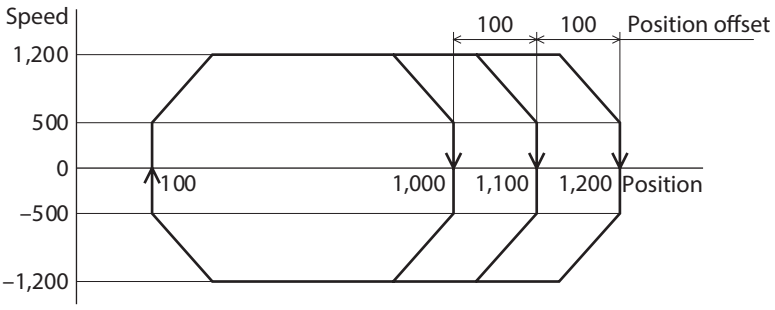
  Setting the operation data (for incremental positioning)

  The travel amount to the target position is offset.

Data No.	Operation type	Position [step]	Speed [Hz]	Starting/changing rate [kHz/s]	Stopping deceleration [kHz/s]
No. 0	Incremental positioning (based on command position)	900	1,200	1.500	1.500
No. 1	Incremental positioning (based on command position)	–900	1,200	1.500	1.500

Data No.	Link	Next data number	Loop count	Loop offset	Loop end number
No. 0	Automatic sequential	↓ (+1)	loop 3{	100	–
No. 1	Automatic sequential	Stop	–	–100	} L-End

  Operation example



■ Link function

To perform repetitive operation infinitely, link from the operation data number where repetitive operation starts until that where it ends. Then, set the next operation data number of the operation data number where repetitive operation ends to that where it starts.

Note

- If "0: No link" is included in "Link" of the operation data number to be linked, the motor will stop operation when operation of the operation data number that "0: No link" was set is completed. Be sure to link all operation data numbers using "1: Manual sequential," "2: Automatic sequential," or "3: Continuous sequential operation."
- The position cannot be offset by "Loop offset" since it is not the loop function.
- To stop repetitive operation, use the STOP input or the event jump function to stop the operation.

Related operation data

MEXE02 code	Name	Description	Setting range*	Initial value
p1	Link	Sets the mode for link operation.	0: No link 1: Manual sequential 2: Automatic sequential 3: Continuous sequential operation	0
	Next data number	Sets the next data number.	−256: No link [Stop] −2: Operation data number after next one [↓↓(+2)] −1: Next operation data number [↓(+1)] 0 to 255: Operation data number	−1

* A value in the brackets [ ] is shown on the screen of the **MEXE02** software.

- **Example of use:**
  When operations of the operation data No. 0 and No. 1 are infinitely repeated.

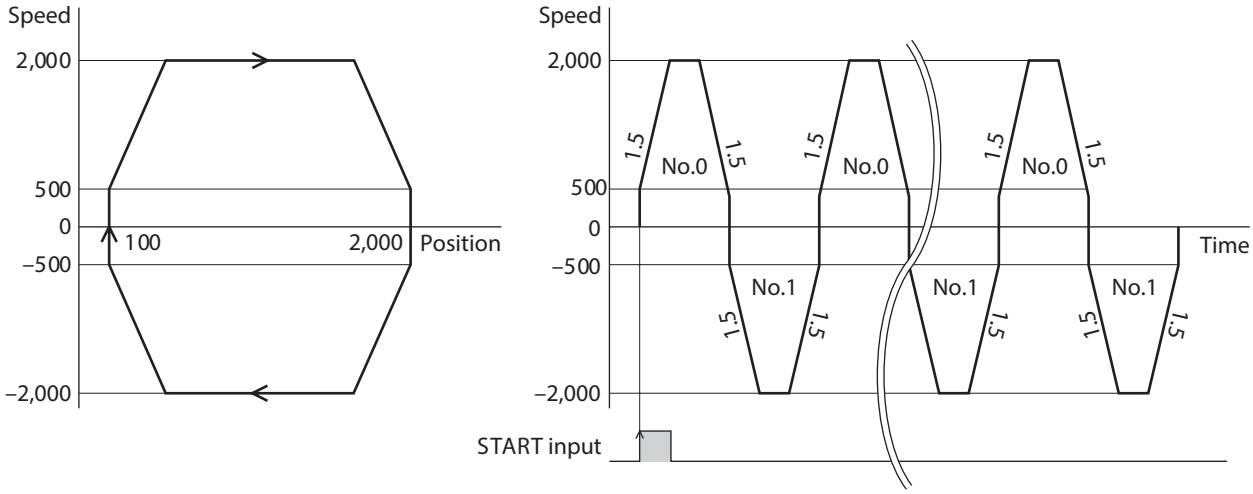
Setting the operation data

Data No.	Operation type	Position [step]	Speed [Hz]	Starting/ changing rate [kHz/s]	Stopping deceleration [kHz/s]	Link	Next data number
No. 0	Absolute positioning	2,000	2,000	1.500	1.500	Automatic sequential	↓(+1)
No. 1	Absolute positioning	100	2,000	1.500	1.500	Automatic sequential	0

Note

Set "1: Manual sequential," "2: Automatic sequential," or "3: Continuous sequential operation" to "Link" of the operation data number to be linked. If "0: No link" is set, the operation stops.

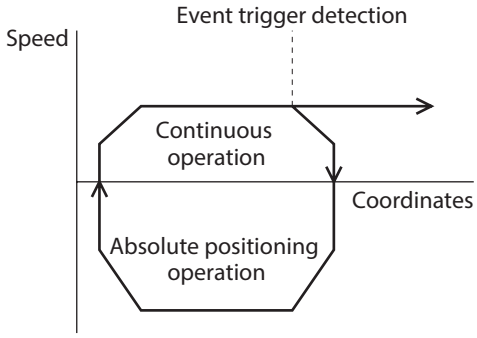
Operation example



2-7 Sequence function (branch of operation)

■ Event jump function

The event jump function is a function that branches the operation by ON-OFF of the signal set in the "Event trigger I/O"of the operation I/O event. The operation transitions to the "Next data number" forcibly when the event trigger I/O is detected during linked operation or loop operation. Two types of "(Low) I/O event number" and "(High) I/O event number" can be set for a single set of operation data. If the event triggers of "(Low) I/O event number" and "(High) I/O event number" are simultaneously detected, "(High) I/O event number" is prioritized.



Related operation data

MEXE02 code	Name	Description	Setting range*	Initial value
p1	(Low) I/O event number	Selects the operation I/O event number.	−1: Disable [−] 0 to 31: Operation I/O event number	−1
	(High) I/O event number			

* A value in the brackets [ ] is shown on the screen of the **MEXE02** software.

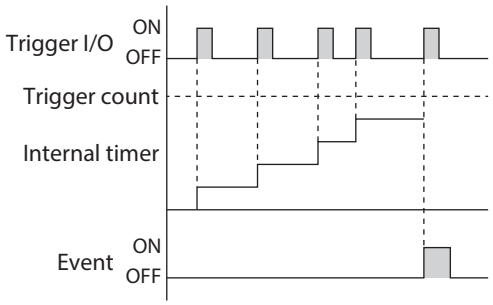
Related I/O event

MEXE02 code	Name	Description	Setting range*	Initial value
p2	Link	Sets the mode for link operation after detecting the event trigger.	0: No link 1: Manual sequential 2: Automatic sequential 3: Continuous sequential operation	0
	Next data number	Sets the next data number.	−256: No link [Stop] −2: Operation data number after next one [↓↓(+2)] −1: Next operation data number [↓(+1)] 0 to 255: Operation data number	−256
	Dwell	Sets the waiting time generated after detecting the event trigger.	0 to 65,535 (1 = 0.001 s)	0
	Event trigger I/O	Sets I/O to be used as an event trigger.	Output signals list⇨p.240	0: No function
	Event trigger type	Sets the timing to detect the event trigger.	0: No setting [non] 1: ON (calculated cumulative msec) 2: ON (msec) 3: OFF (calculated cumulative msec) 4: OFF (msec) 5: ON edge 6: OFF edge 7: ON (cumulative msec) 8: OFF (cumulative msec)	0
	Event trigger counter	Sets the judgment time to detect the event trigger or the number of times of detection.	0 to 65,535 (1 = 1 ms or 1 = once)	0

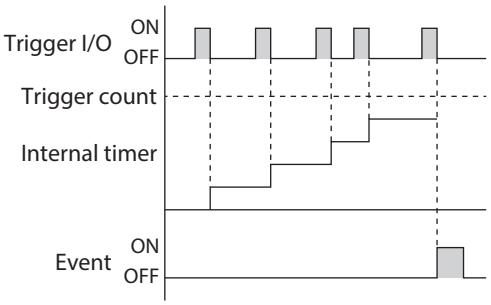
* A value in the brackets [ ] is shown on the screen of the **MEXE02** software.

- **Types of event trigger**

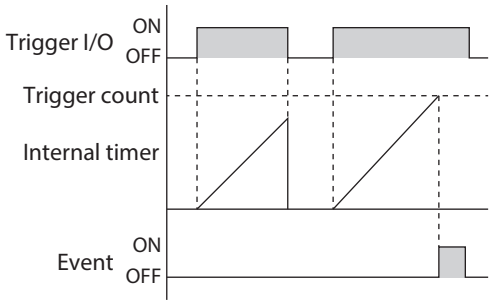
■ ON edge



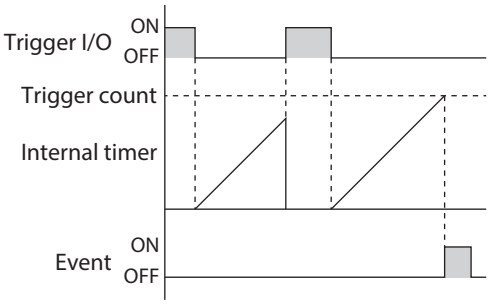
■ OFF edge



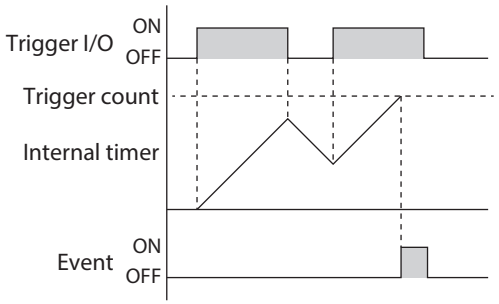
■ ON (msec)



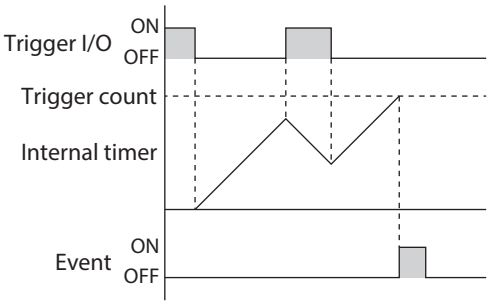
■ OFF (msec)



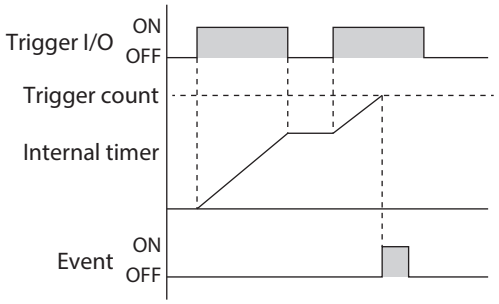
■ ON (calculated cumulative msec)



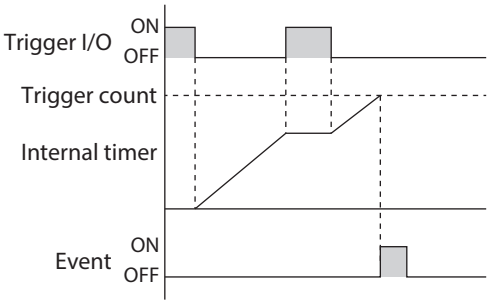
■ OFF (calculated cumulative msec)



■ ON (cumulative msec)



■ OFF (cumulative msec)



- **Example of use:**
  When absolute positioning operation of the operation data No. 0 is executed
  - Without R0 input: After operation of the operation data No. 0 is completed, the operation data No. 1 is started operating. (Event not generated)
  - With R0 input: After the ON edge of the R0_R output is detected, the operation data No.2 is started operating. (Low event generated)

Setting the operation data

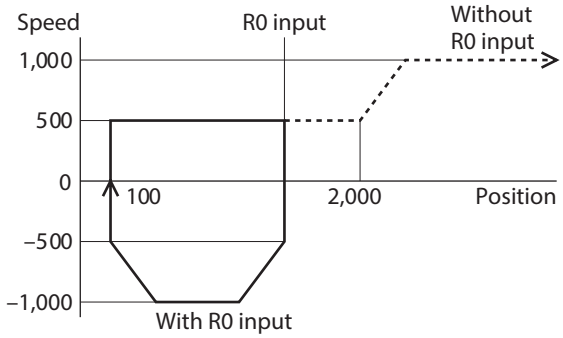
Data No.	Operation type	Position [step]	Speed [Hz]	Starting/changing rate [kHz/s]	Stopping deceleration [kHz/s]
No. 0	Absolute positioning	2,000	500	1,000.000	1,000.000
No. 1	Continuous operation	0	1,000	0.500	0.500
No. 2	Absolute positioning	100	1,000	0.500	0.500

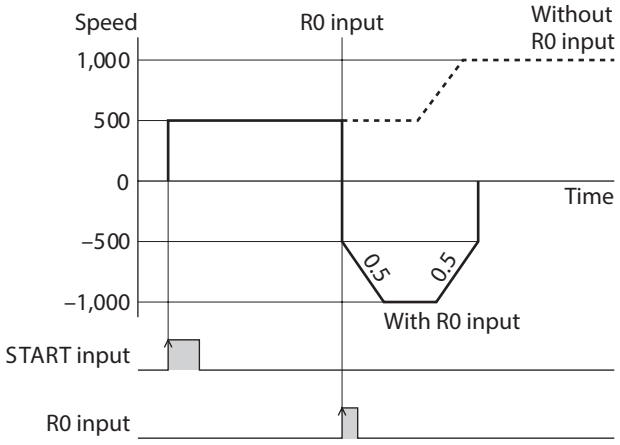
Data No.	Link	(Low) I/O event number
No. 0	Continuous sequential operation	0
No. 1	No link	–
No. 2	No link	–

Setting the operation I/O event

Data No.	Link	Next data number	Event trigger I/O	Event trigger type	Event trigger counter
No. 0	Automatic sequential	2	R0_R	ON edge	1

Operation example





2-8 Extended operation data setting

Specifications of operation data can be extended.

■ Extended loop function

The extended loop function is a function to execute loop operation for the number of times (256 times or more) that cannot be set in the operation data. It can be used to repeat simple operation as in an endurance test.
Operation is repeated the number of times set in "Repeat time" from the operation data number set in "Repeat start operation data number" to that set in "Repeat end operation data number." When operation for the number of times having set is completed, the operation transitions to the operation data number that is set in "Next data number."
When the extended loop function is used, the operation data from "Repeat start operation data number" to "Repeat end operation data number" is fixed to the following values.

MEXE02 code	Name	Fixed value*
p1	Next data number	−1: Next operation data number [↓(+1)]
	Area offset	0
	Area width	−1
	Loop count	• Operation data number set in "Repeat start operation data number" 2 to 255: Number of loop times [loop 2{ to loop 255{] • Other operation data number 0: No loop [−]
	Loop offset	0
	Loop end number	• Operation data number set in "Repeat end operation data number" 1: Loop end point [}L-End] • Other operation data number 0: Not the loop end point [−]
	(Low) I/O event number	−1: Disable [−]
	(High) I/O event number	−1: Disable [−]

* A value in the brackets [ ] is shown on the screen of the **MEXE02** software.

Note If "0: No link" is included in "Link" of the operation data number to be looped, the motor will stop when operation of the operation data number that "0: No link" was set is completed. Be sure to link all operation data numbers using "1: Manual sequential," "2: Automatic sequential," or "3: Continuous sequential operation."

Related operation data

MEXE02 code	Name	Description	Setting range*	Initial value
p1	Link	Sets the mode for link operation.	0: No link 1: Manual sequential 2: Automatic sequential 3: Continuous sequential operation	0
	Next data number	Sets the next data number.	−256: No link [Stop] −2: Operation data number after next one [↓↓(+2)] −1: Next operation data number [↓(+1)] 0 to 255: Operation data number	−1

* A value in the brackets [ ] is shown on the screen of the **MEXE02** software.

Related extended operation data setting

MEXE02 code	Name	Description	Setting range	Initial value
p3	Repeat start operation data number	Sets to the operation data number in which extended loop operation is started.	−1: Disable 0 to 255: Operation data number	−1
	Repeat end operation data number	Sets the operation data number in which extended loop operation is completed.		−1
	Repeat time	Sets the number of repeat times of extended loop operation.	−1: Disable 0 to 100,000,000 times	−1

- **Example of use:**
  When operation is transitioned to the operation data No. 2 after that of the operation data No. 0 and No. 1 is repeated 500 times.

Setting the operation data

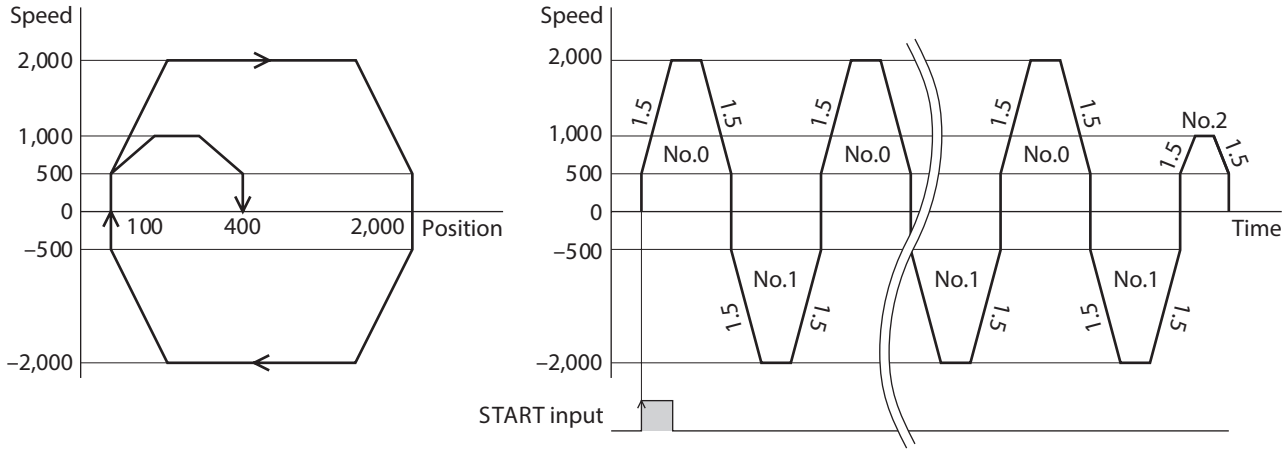
Data No.	Operation type	Position [step]	Speed [Hz]	Starting/ changing rate [kHz/s]	Stopping deceleration [kHz/s]	Link	Next data number
No. 0	Absolute positioning	2,000	2,000	1.500	1.500	Automatic sequential	↓(+1)
No. 1	Absolute positioning	100	2,000	1.500	1.500	Automatic sequential	↓(+1)
No. 2	Absolute positioning	400	1,000	1.500	1.500	No link	Stop

Note Set "1: Manual sequential," "2: Automatic sequential," or "3: Continuous sequential operation" to "Link" of the operation data number to be looped. If "0: No link" is set, the operation stops.

Values in extended operation data setting

Name	Setting value
Repeat start operation data number	0
Repeat end operation data number	1
Repeat time	500

Operation example



■ Common setting and separate setting for acceleration/deceleration

The acceleration/deceleration in stored data operation and continuous macro operation can be set as follows using the "Rate selection" parameter.

- Common setting: The values set in the "Common acceleration rate or time" parameter and the "Common stopping deceleration" parameter are followed.
- Separate setting: The values of "Starting/changing rate" and "Stopping deceleration" set in the operation data number are followed.

Related extended operation data setting

MEXE02 code	Name	Description	Setting range	Initial value
p3	Common acceleration rate or time	Sets the starting/changing rate or the starting/changing time in common setting.	1 to 1,000,000,000 (1 = 0.001)*	1,000,000
	Common stopping deceleration	Sets the stopping deceleration or the stop time in common setting.		1,000,000
	Rate selection	Sets whether to use the common acceleration/deceleration or the acceleration/deceleration specified in the operation data.	0: The common rate is used (common setting) 1: The rate of each operation data is used (separate setting)	1

* The setting unit is followed the "Acceleration/deceleration unit" parameter.

2-9 Stopping movement

■ Operation stop input

Inputing the operation stop signal during motor operation causes the motor to stop.

Related parameters

MEXE02 code	Name	Description	Setting range	Initial value
p7	STOP/STOP-SOFF input action	Sets how to stop the motor when the STOP input or the STOP-SOFF input is turned ON.	0: Immediate stop for both STOP and STOP-SOFF inputs 1: Deceleration stop for STOP input, immediate stop for STOP-SOFF input 2: Immediate stop for STOP input, deceleration stop for STOP-SOFF input 3: Deceleration stop for both STOP and STOP-SOFF inputs	3
	FW-BLK/RV-BLK input action	Sets how to stop the motor when the FW-BLK input or the RV-BLK input is turned ON.	0: Immediate stop 1: Deceleration stop	1

■ Hardware overtravel

Hardware overtravel is a function that limits the range of movement by installing the limit sensors (FW-LS, RV-LS) at the upper and lower limits of the moving range. If the "FW-LS/RV-LS input action" parameter is set, the motor can be stopped when the limit sensor is detected.

Related parameter

MEXE02 code	Name	Description	Setting range	Initial value
p7	FW-LS/RV-LS input action	Sets how to stop the motor when the FW-LS input or the RV-LS input is turned ON.	−1: Use as the sensor for return-to-home 0: Immediate stop 1: Deceleration stop 2: Immediate stop with alarm 3: Deceleration stop with alarm	2

■ Software overtravel

Software overtravel is a function that sets the upper and lower limits of the moving range with the parameters and limits the range of movement.
Software overtravel is enabled while coordinates are set. Refer to p.96 for setting the coordinates.
If the "Software overtravel" parameter is set to "0: Immediate stop" or "1: Deceleration stop," the motor can be stopped according to the setting of the parameter when the software limit is reached. And if it is set to "2: Immediate stop with alarm" or "3: Deceleration stop with alarm," an alarm will be generated to stop the motor when the software limit is reached.

Related parameters

MEXE02 code	Name	Description	Setting range	Initial value
p4	Software overtravel	Sets the operation when the software overtravel is detected.	−1: Disable 0: Immediate stop 1: Deceleration stop 2: Immediate stop with alarm 3: Deceleration stop with alarm	3
	Positive software limit	Sets the value of software limit in the forward direction.	−2,147,483,648 to 2,147,483,647 steps	2,147,483,647
	Negative software limit	Sets the value of software limit in the reverse direction.		−2,147,483,648

memo When selecting "1: Deceleration stop" or "3: Deceleration stop with alarm," make sure the distance from the position the motor starts decelerating until that it stops. If there is a risk that a load may bring into contact with the mechanism during deceleration, change the setting such as by setting the stopping method to "0: Immediate stop" or "2: Immediate stop with alarm," or by shortening the value of the stopping deceleration of the operation data.

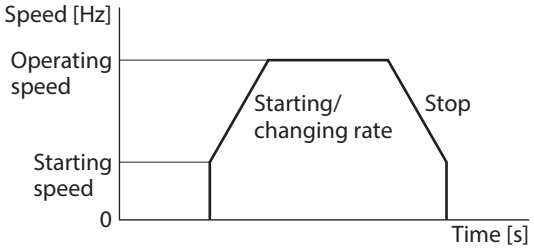
■ Escape from the limit sensor

It is possible to escape in the reverse direction when the limit in the forward direction is detected and in the forward direction when that in the reverse direction is detected.

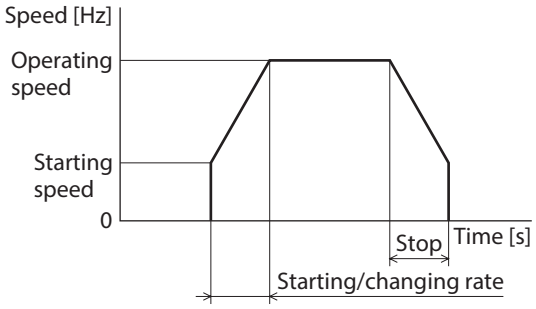
2-10 Acceleration/deceleration unit

The unit of acceleration/deceleration can be set using the "Acceleration/deceleration unit" parameter.
The acceleration/deceleration rate (kHz/s, ms/kHz) and acceleration/deceleration time (s) can be set as a unit.

When "0: kHz/s" or "2: ms/kHz" is set



When "1: s" is set



Related parameter

MEXE02 code	Name	Description	Setting range	Initial value
p4	Acceleration/deceleration unit	Sets the acceleration/deceleration unit.	0: kHz/s 1: s 2: ms/kHz	0

Note The maximum acceleration/deceleration value is fixed at 1 GHz/s, and the minimum acceleration/deceleration value is fixed at 1 Hz/s. When the "Acceleration/deceleration unit" parameter is set to "1: s," set the acceleration/deceleration time so that the acceleration/deceleration rate falls within this range.

2-11 Starting speed

Set the operating speed of the motor when starting operation. If the operating speed is set to a value less than the starting speed, operation will start at the operating speed.

Related parameters

MEXE02 code	Name	Description	Setting range	Initial value
p4	Starting speed	Sets the starting speed for stored data operation or continuous macro operation.	0 to 4,000,000 Hz	500
p5	(JOG) Starting speed	Sets the starting speed for JOG macro operation.	0 to 4,000,000 Hz	500
	(ZHOME) Starting speed	Sets the starting speed for high-speed return-to-home operation.		500
	(HOME) Starting speed	Sets the starting speed for return-to-home operation.	1 to 4,000,000 Hz	500

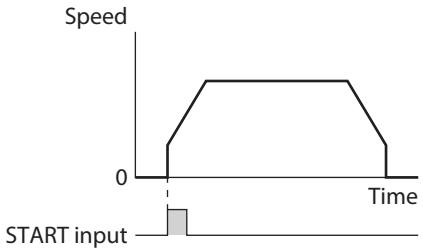
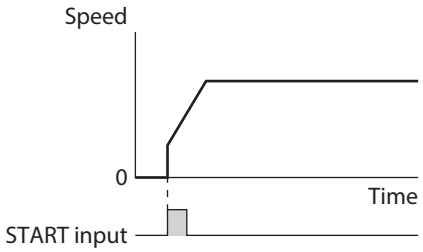
3 Direct data operation

3-1 Overview of direct data operation

Direct data operation is a function can start operation at the same time as rewriting of the data. It is suitable for applications that change the setting of the operation data frequently, such as changing the speed or travel amount according to a load.
The setting of direct data operation is performed via EtherNet/IP. Refer to p.179 for Implicit message and p.194 for examples of executing operation.
Direct data operation is executed with TRIG of fixed I/O (IN).
A condition to execute direct data operation can be selected from the following two types using the TRIG-MODE of fixed I/O (IN).

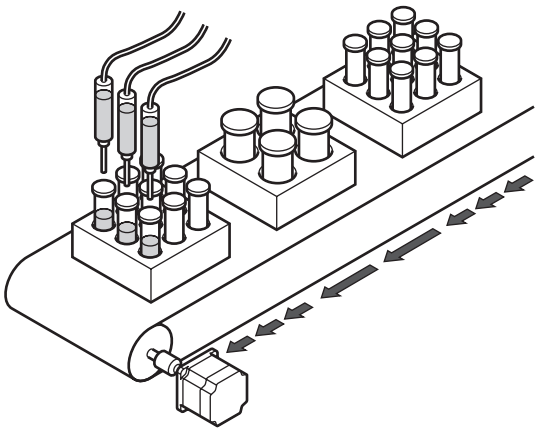
- Start at ON edge of TRIG: The motor will start rotating according to the operation data being set when the TRIG is turned ON.
- Start at ON level of TRIG: The motor will start rotating at the same time when the data of the trigger set in the "Direct data operation trigger setting" parameter is changed.

■ Types of direct data operation

Method of operation	Operation type	Operation example
Positioning direct data operation	• Absolute positioning • Incremental positioning (based on command position) • Incremental positioning (based on feedback position) • Wrap absolute positioning • Wrap proximity positioning • Wrap forward direction absolute positioning • Wrap reverse direction absolute positioning	
Continuous direct data operation	Continuous operation	

■ Application example 1 of direct data operation

The position (travel amount) or the speed should be adjusted each time a load is changed because the feed rate is different in each load.



- **Setting example**
  - Position (travel amount): Change as desired
  - Speed: Change as desired
  - TRIG-MODE: Start at ON edge of TRIG
- **Operation processing flow**

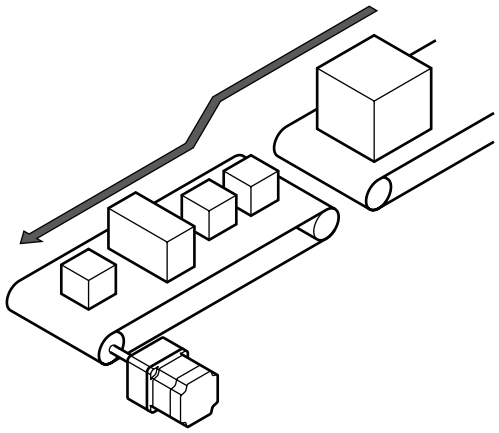
  Descriptions are given using the scanner as the subject.

  1. Write the position and the speed.
  2. Turn the TRIG ON.
- **Result**

  When the TRIG is turned ON, the changed value is updated immediately, and operation is performed with the new position and speed.

■ Application example 2 of direct data operation

The speed should be changed immediately with the touch screen because a large load is inspected at a lower speed.



- **Setting example**
  - Speed: Change as desired
  - Trigger: Speed (setting value of trigger: –4)
  - TRIG-MODE: Start at ON level of TRIG
- **Operation processing flow**

  Descriptions are given using the scanner as the subject.

  1. Write "–4" to the "Direct data operation trigger setting" parameter.
  2. Write the data of the speed.
  3. Turn the TRIG ON.
  4. Change the speed.
- **Result**

  When the TRIG is turned ON, operation is started. If the speed is changed, the changed value is updated immediately, and the operation is performed at the new speed.

3-2 OUTPUT data and parameters required for direct data operation

- **Related Output data**

Byte	Name	Description	Setting range	Initial value
6, 7	Direct data operation operation type	This is used to set the operation type for direct data operation.	0: No setting 1: Absolute positioning 2: Incremental positioning (based on command position) 3: Incremental positioning (based on feedback position) 7: Continuous operation 8: Wrap absolute positioning 9: Wrap proximity positioning 10: Wrap forward direction absolute positioning 11: Wrap reverse direction absolute positioning	2
8 to 11	Direct data operation position	This is used to set the target position for direct data operation.	–2,147,483,648 to 2,147,483,647 steps	0
12 to 15	Direct data operation speed	This is used to set the operating speed for direct data operation.	–4,000,000 to 4,000,000 Hz	1,000
16 to 19	Direct data operation starting/changing rate	This is used to set the acceleration/deceleration rate or the acceleration/deceleration time for direct data operation.	1 to 1,000,000,000 (1 = 0.001)*	1,000,000
20 to 23	Direct data operation stopping deceleration	This is used to set the stopping deceleration rate or the stop time for direct data operation.		1,000,000
24, 25	Direct data operation torque limiting value	This is used to set the torque limiting value for direct data operation.	0 to 10,000 (1 = 0.1 %)	1,000
26, 27	Direct data operation forwarding destination	This is used to select the stored area when the next direct data is transferred during direct data operation.	0: Execution memory 1: Buffer memory	0

* The setting unit is followed the "Acceleration/deceleration unit" parameter.

- **Related parameter**

Parameter ID		Name	Description	Setting range	Initial value
Dec	Hex				
24852	6114h	Direct data operation trigger setting	Sets the trigger to execute direct data operation. The trigger setting is enabled only when the TRIG-MODE is set to "1: Start at ON level."	–6: Operation type –5: Position –4: Speed –3: Starting/changing rate –2: Stopping deceleration –1: Torque limiting value 0: Disable 1: Apply all data	1

■ Trigger setting

This is a trigger to start operation at the same time as rewriting of data in direct data operation.
The trigger setting is enabled only when the TRIG-MODE is set to "1: Start at ON level."

- **When the trigger setting is "0"**

  Direct data operation is disabled.

- **When the trigger setting is "1"**

  When the TRIG is turned from OFF to ON, direct data operation is started. After that, if any of data is changed, the motor will be started. The motor will be started only when data is changed.

- **When the trigger setting is "−1 to −6"**

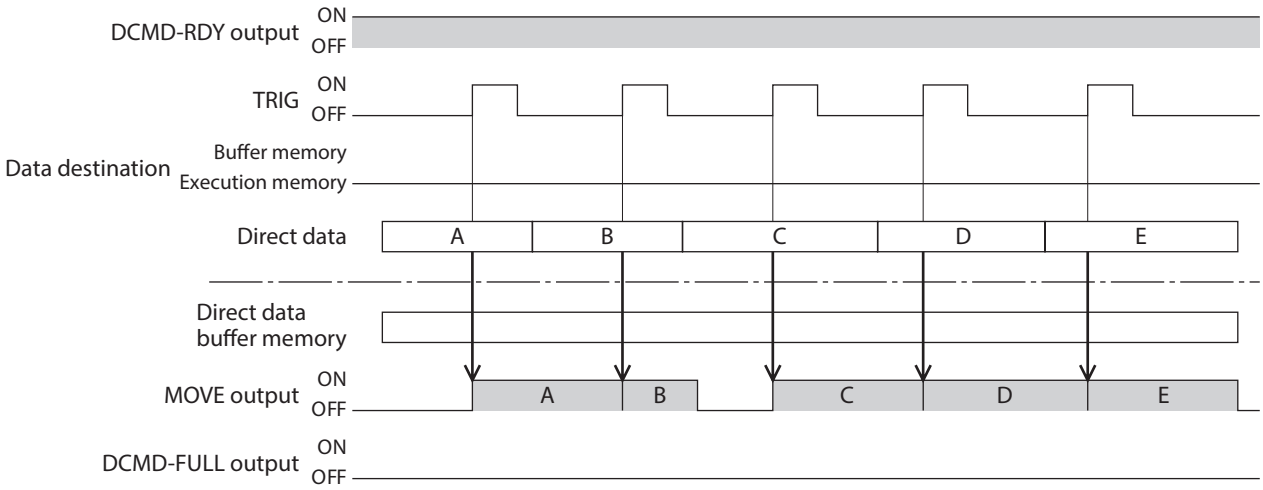
  When the TRIG is turned from OFF to ON, direct data operation is started. After that, only when the data corresponding to the trigger is changed, the motor will be started. Even if data other than the trigger is changed, the motor will not be started.

■ Data destination

During direct data operation, the stored area when the next direct data is transferred can be selected.

- **When the forwarding destination is set to "0: Execution memory"**

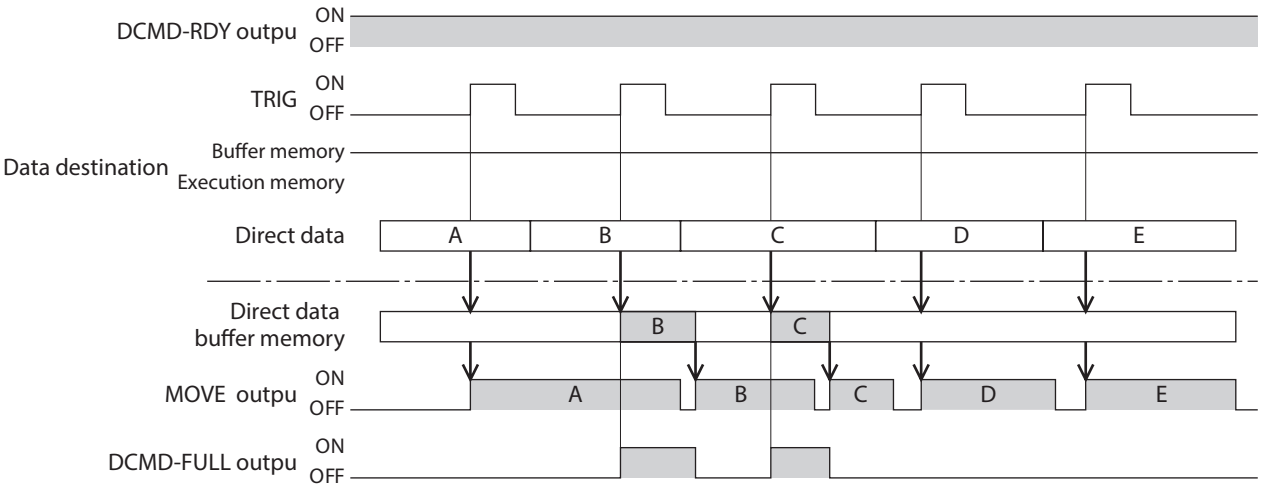
  If the TRIG is turned from OFF to ON or the data corresponding to the trigger is changed, the data during operation can be rewritten to the next direct data.



Note If the trigger is written while the DCMD-FULL output is an ON state, the direct data is not updated to the operation.

- **When the data destination is set to "1: Buffer memory"**

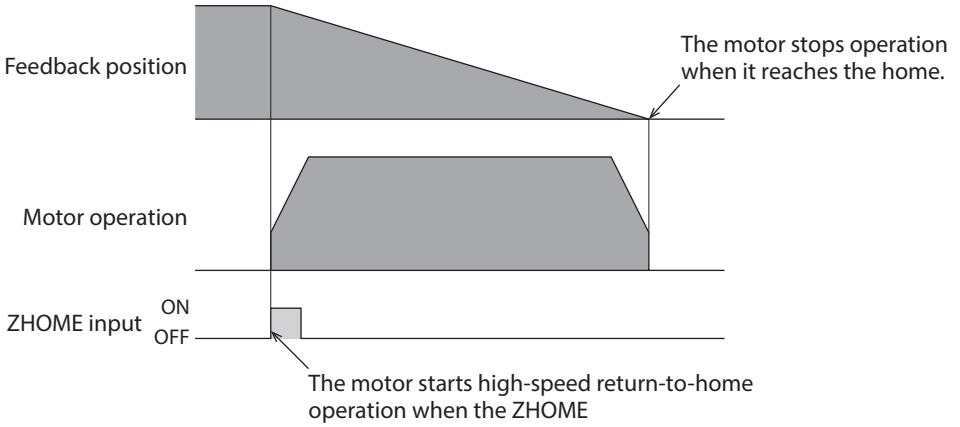
  If the TRIG is turned from OFF to ON or the data corresponding to the trigger is changed, the next direct data is saved in the buffer memory. When the data during operation is completed, operation of the buffer memory is automatically started. One set of direct data can be stored in the buffer memory.
  If the next direct data is written to the buffer memory, the DCMD-FULL output is turned ON.
  During stop or continuous operation, if "Buffer memory" is specified, the data is not saved in the buffer memory and is rewritten to the next direct data immediately.



4 Return-to-home operation

4-1 High-speed return-to-home operation

High-speed return-to-home operation is operation to return to the mechanical home on the absolute coordinates set in advance. Since the home is recognized by the ABZO sensor, return-to-home operation can be executed at the same speed as that of the normal positioning operation without using an external sensor.
When the ZHOME input is turned ON, high-speed return-to-home is started. The motor stops when the operation stop signal is turned ON on the way of operation.



Note

- The home is not fixed at the time of factory shipment or immediately after the resolution is changed. If high-speed return-to-home operation is started under this condition, information of Start ZHOME error is generated, and operation is not performed. Be sure to set the home before starting high-speed return-to-home operation.
- High-speed return-to-home operation cannot be executed while the electrical home coordinates are enabled (EL-PRST input is ON).

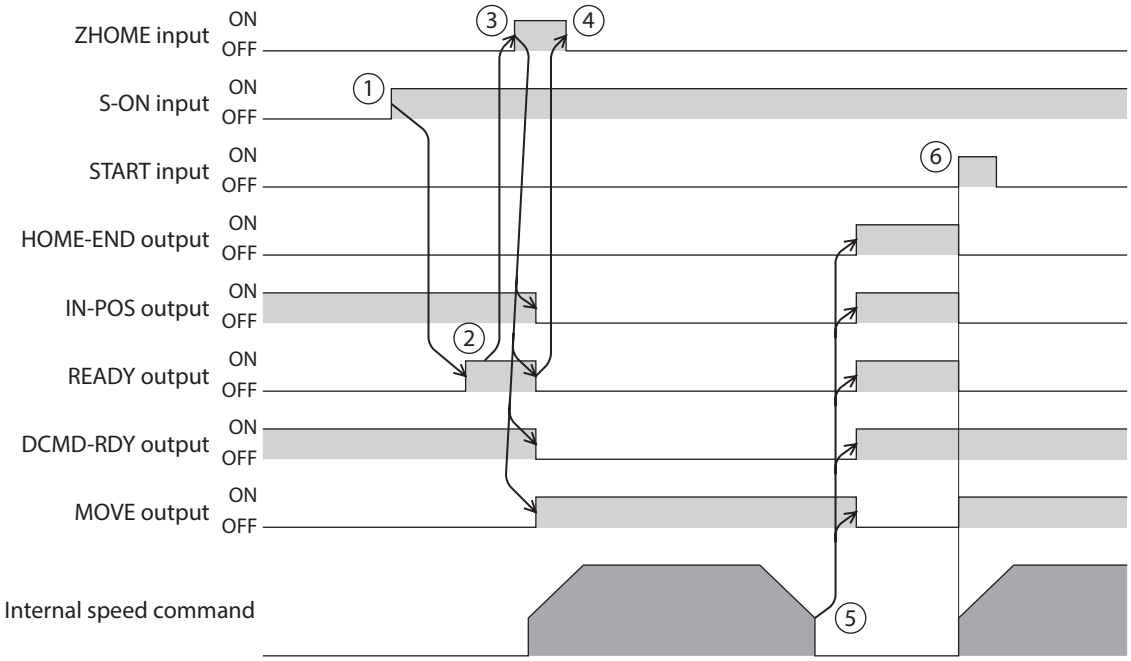
Related parameters

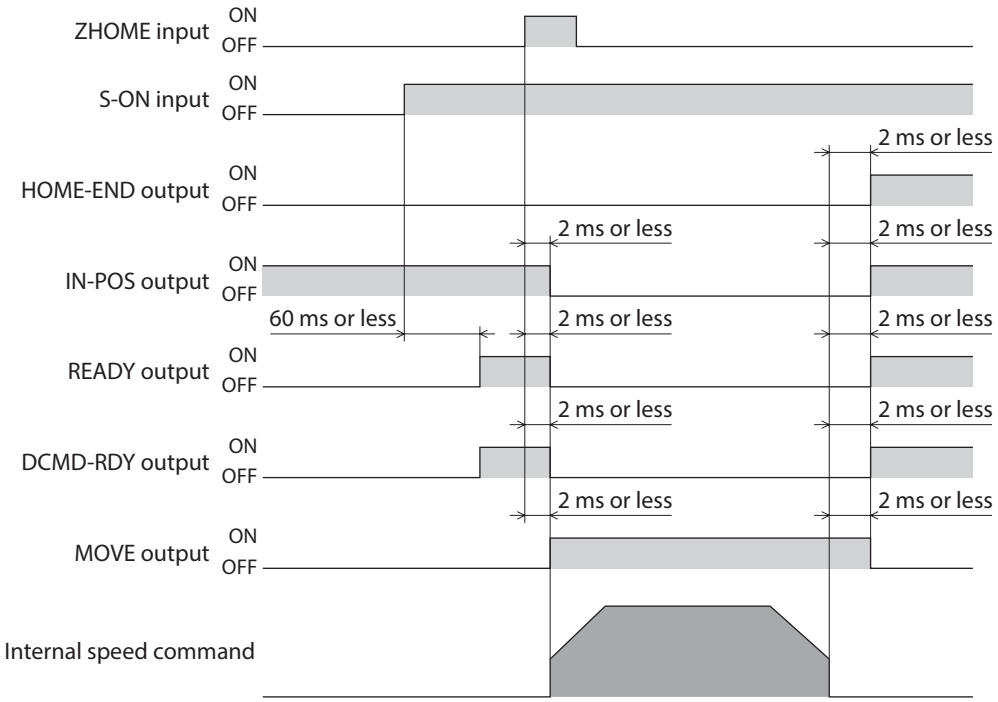
MEXE02 code	Name	Description	Setting range	Initial value
p5	(ZHOME) Operating speed	Sets the operating speed for high-speed return-to-home operation.	1 to 4,000,000 Hz	5,000
	(ZHOME) Acceleration/ deceleration	Sets the acceleration/ deceleration rate or the acceleration/deceleration time for high-speed return-to-home operation.	1 to 1,000,000,000 (1 = 0.001)*	1,000,000
	(ZHOME) Starting speed	Sets the starting speed for high-speed return-to-home operation.	0 to 4,000,000 Hz	500
	JOG/HOME/ZHOME command filter time constant	Sets the time constant for the command filter.	1 to 200 ms	1
	JOG/HOME/ZHOME torque limit value	Sets the torque limiting value.	0 to 10,000 (1 = 0.1 %)	1,000

* The setting unit is followed the "Acceleration/deceleration unit" parameter.

■ Timing chart

1. Turn the S-ON input ON.
2. Check the READY output is being ON.
3. Turn the ZHOME input ON.
   The IN-POS output, the READY output, and the DCMD-RDY output are turned OFF, the MOVE output is turned ON, and the motor starts operation.
4. Check the READY output has been turned OFF and turn the ZHOME input OFF.
5. When the motor reaches the mechanical home, the HOME-END output, the IN-POS output, the READY output, and the DCMD-RDY output are turned ON, and the MOVE output is turned OFF.
6. Turn the START input ON.
   The HOME-END output, the IN-POS output, and the READY output are turned OFF, the MOVE output is turned ON, and the motor starts operation.





4-2 Return-to-home operation

Return-to-home operation is operation to detect the home using an external sensor.
It is executed to return from the present position to the home when the main power supply and the control power supply is turned on or positioning operation is completed.
There are three types of return-to-home operation shown below.

Item	Description	Features
2-sensor mode	When the limit sensor is detected, the motor rotates in the reverse direction and pull out of the limit sensor. After pulling out of the limit sensor, the motor rotates according to the value set in the "(HOME) Backward steps in 2 sensor home-seeking" parameter and stops. The position at which the motor stopped is set as the home.	• Two sensors are required externally. • The operating speed is at a low rate (starting speed of return-to-home)
3-sensor mode	When the limit sensor is detected, the motor rotates in the reverse direction and pull out of the limit sensor. After that, it stops when the ON edge of the HOME sensor is detected. The position at which the motor stopped is set as the home.	• Three sensors are required externally.* • The operating speed is at a high rate (operating speed of return-to-home).
One-way rotation mode	The motor stops when the ON edge of the HOME sensor is detected. After that, until the OFF edge of the HOME sensor is detected, it pulls out of the sensor according to the speed set in the "(HOME) Last speed" parameter. After pulling out of the HOME sensor, the motor rotates according to the value set in the "(HOME) Operating amount in unidirectional home-seeking" parameter and stops. The position at which the motor stopped is set as the home.	• One external sensor is required • The operating speed is at a high rate (operating speed of home-seeking). • Not reversed.

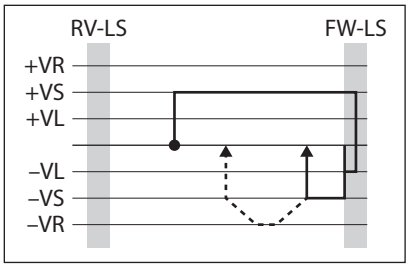
* The home can be detected even using one external sensor. In this case, connect only the HOME sensor.

memo An input signal for an external sensor necessary for return-to-home operation is not assigned to an input terminal at the time of shipment. Assign an input signal for an external sensor to an input terminal using the "DIN input function" parameter, and then execute return-to-home operation.
Refer to p.132 for the assignment of signals.

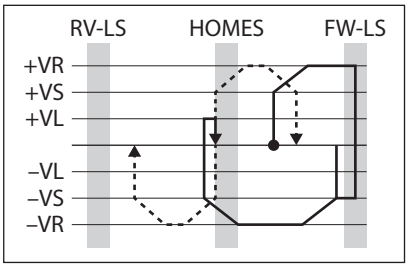
Explanation of code

- VR: (HOME) Operating speed
- VS: (HOME) Starting speed
- VL: (HOME) Last speed
- - - -: Orbit when the home offset is set

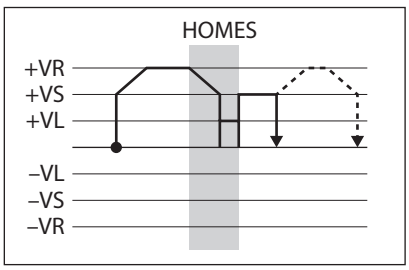
• 2-Sensor mode



• 3-Sensor mode



• One-way rotation mode



Related parameters

MEXE02 code	Name	Description	Setting range	Initial value
p4	Preset position	Sets the preset position.	–2,147,483,648 to 2,147,483,647 steps	0
p5	JOG/HOME/ZHOME command filter time constant	Sets the time constant for the command filter.	1 to 200 ms	1
	JOG/HOME/ZHOME torque limit value	Sets the torque limiting value.	0 to 10,000 (1 = 0.1 %)	1,000
	(HOME) Home-seeking mode	Sets the return-to-home method.	0: 2-sensor 1: 3-sensor 2: One-way rotation	1
	(HOME) Starting direction	Sets the starting direction for detecting the home.	0: Negative side 1: Positive side	1
	(HOME) Acceleration/ deceleration	Sets the acceleration/deceleration rate or the acceleration/ deceleration time for return-to-home operation.	1 to 1,000,000,000 (1 = 0.001)*	1,000,000
	(HOME) Starting speed	Sets the starting speed for return-to-home operation.	1 to 4,000,000 Hz	500
	(HOME) Operating speed	Sets the operating speed for return-to-home operation.		1,000
	(HOME) Last speed	Sets the operating speed when finally positioning with the home.	1 to 10,000 Hz	500
	(HOME) Backward steps in 2 sensor home-seeking	Sets the amount of backward steps after return-to-home operation in 2-sensor mode.	0 to 8,388,607 steps	500
	(HOME) Operating amount in uni-directional home-seeking	Sets the operating amount after return-to-home operation in one-way rotation mode.		

* The setting unit is followed the "Acceleration/deceleration unit" parameter.

memo

- The ABSPEN output is turned OFF since the coordinates are not fixed during return-to-home operation.
- In return-to-home operation, after return-to-home operation is completed, the position preset (P-PRESET) is executed to set the coordinates. Therefore, the machine coordinates of the home are depended on the "Preset position" parameter.

■ Additional function

- **Home offset**

  This is a function that performs positioning operation of the value set in the "(HOME) Position offset" parameter after return-to-home operation and sets the stopped position as the home.

- **Detection of external sensor (signal)**

  Using the SLIT input or the ZSG output concurrently with return-to-home operation can detect the home more accurately.

memo

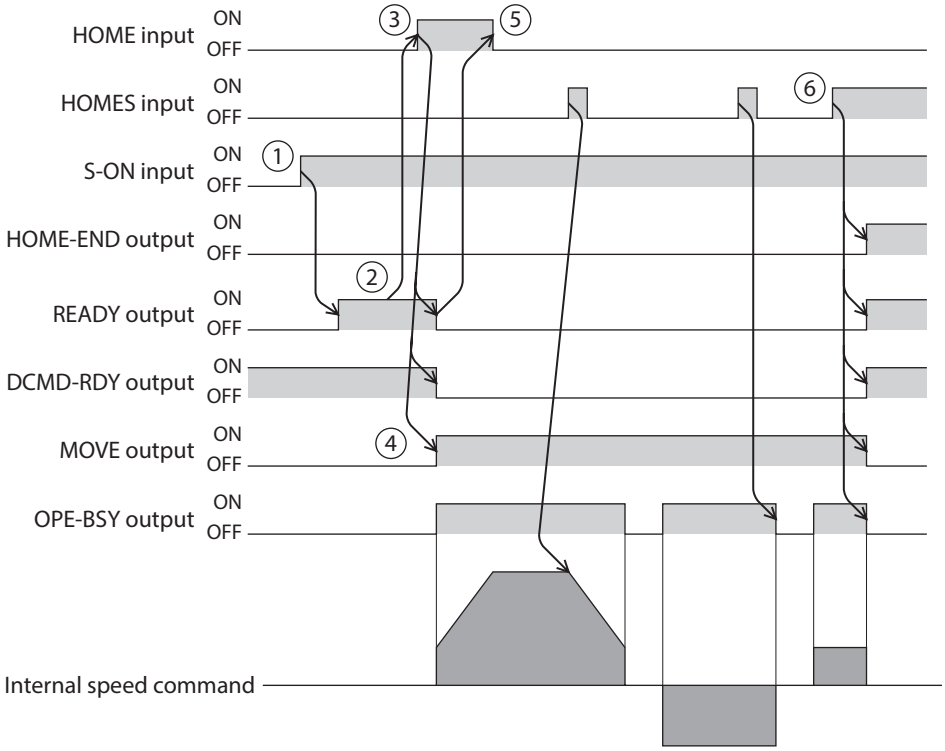
When the "JOG/HOME/ZHOME operation setting" parameter is set to "0: Prioritize ABZO setting," the parameter according to the mechanism is automatically applied. When the customer sets a desired operation information, set the "JOG/HOME/ZHOME operation setting" parameter to "1: Manual setting."

Related parameters

MEXE02 code	Name	Description	Setting range	Initial value
p5	(HOME) SLIT detection	Sets whether to use the SLIT input together when returning to the home.	0: Disable 1: Enable	0
	(HOME) ZSG signal detection	Sets whether to use the ZSG output together when returning to the home.	0: Disable 2: ZSG output	0
	(HOME) Position offset	Sets the amount of offset from the home.	–2,147,483,647 to 2,147,483,647 steps	0

■ Timing chart (3-sensor mode)

1. Turn the S-ON input ON.
2. Check the READY output is being ON.
3. Turn the HOME input ON.
4. The READY output and the DCMD-RDY output are turned OFF, the MOVE output is turned ON, and return-to-home operation is started.
5. Check the READY output has been turned OFF and turn the HOME input OFF.
6. The HOMES input is turned ON and return-to-home operation is completed.
   The HOME-END output, the READY output, and the DCMD-RDY output are turned ON, and the MOVE output and the OPE-BSY output are turned OFF.



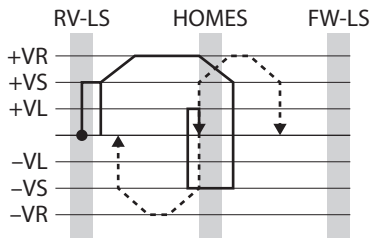
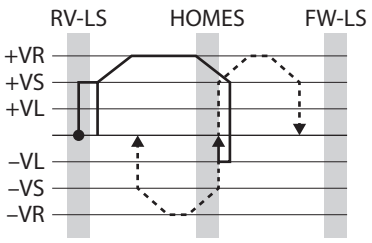
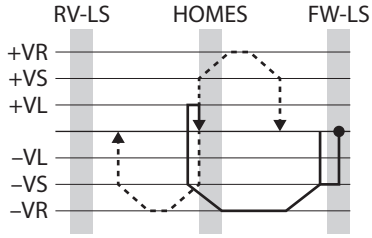
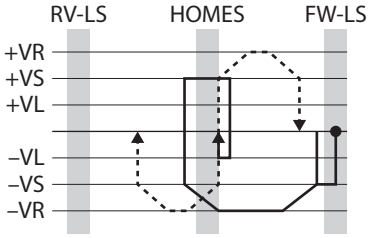
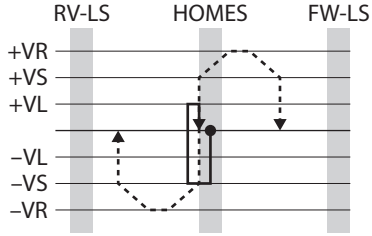
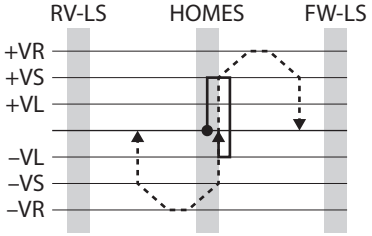
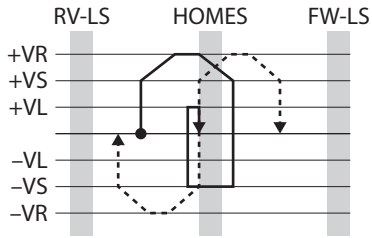
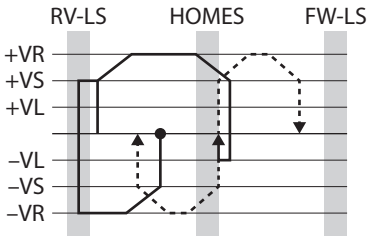
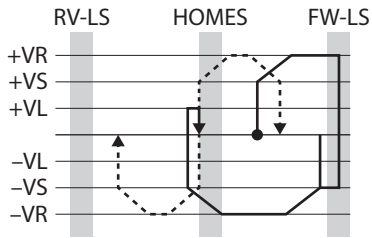
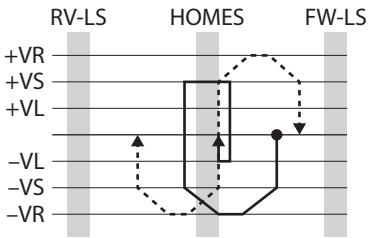
■ Operation sequence

● 3-sensor mode

When the limit sensor is detected during operation, the motor rotates in the reverse direction and pulls out of the limit sensor. The motor operates at the (HOME) Operating speed and stops when the ON edge of the HOME sensor is detected. The position at which the motor stopped is set as the home.

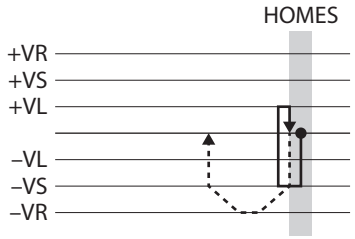
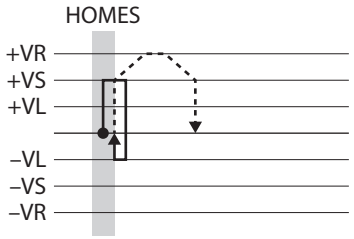
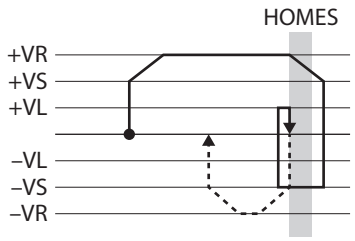
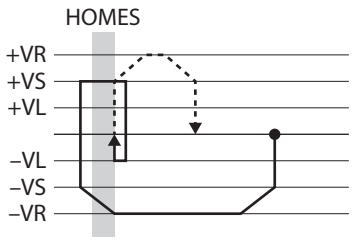
Explanation of code

- VR: (HOME) Operating speed
- VS: (HOME) Starting speed
- VL: (HOME) Last speed
- - - -: Orbit when the home offset is set

Starting position of return-to-home operation	Starting direction of return-to-home operation: Positive direction	Starting direction of return-to-home operation: Negative direction
RV-LS		
FW-LS		
HOMES		
Between HOMES and RV-LS		
Between HOMES and FW-LS		

When using the HOME sensor only (rotating machine etc.)

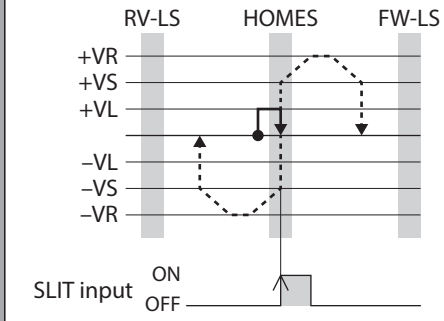
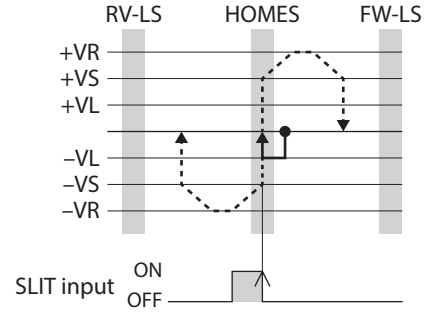
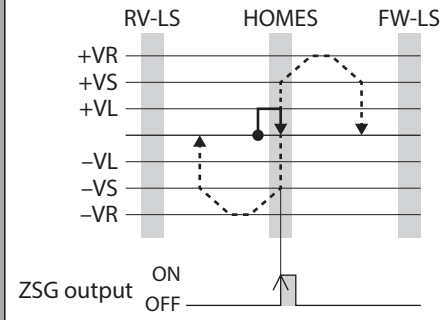
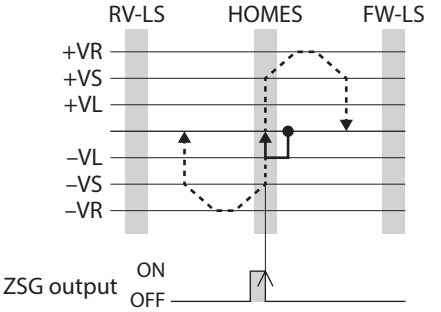
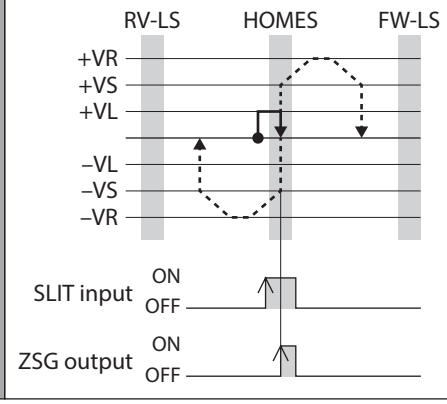
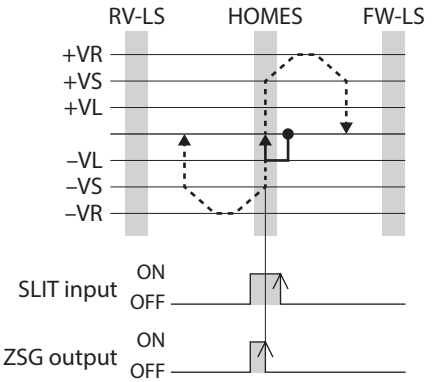
If the limit sensor is not used, in case of a rotating mechanism for example, the sequence is as follows.

Starting position of return-to-home operation	Starting direction of return-to-home operation: Positive direction	Starting direction of return-to-home operation: Negative direction
HOMES		
Other than HOMES		

Note Depending on the value set in the "(HOME) Acceleration/deceleration" parameter, the motor may decelerate to a stop in excess of the HOME sensor after the HOME sensor was detected. There is a risk of contact if the distance between the mechanical end and the HOME sensor is close, so provide enough distance between them.

When the SLIT input and/or the ZSG output are used concurrently

Even after return-to-home operation is completed, operation is continued until an external signal is detected. If an external signal is detected while the HOME sensor is ON, return-to-home operation is completed.

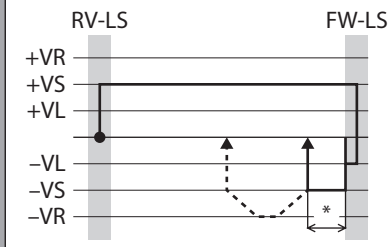
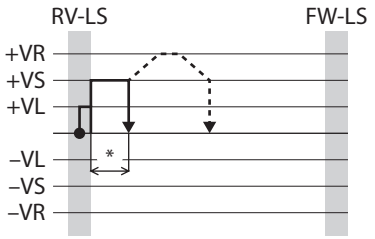
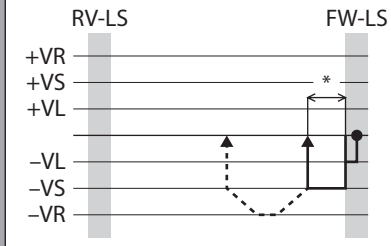
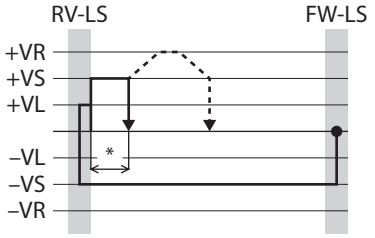
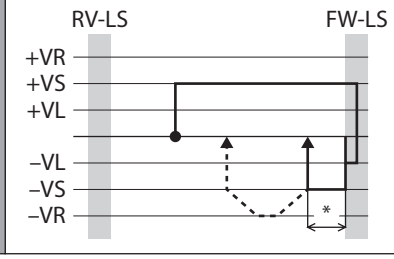
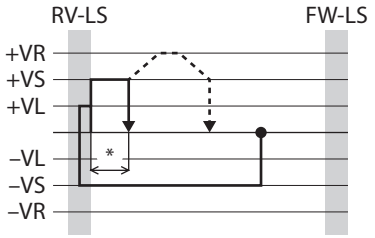
Home detection signal	Starting direction of return-to-home operation: Positive direction	Starting direction of return-to-home operation: Negative direction
SLIT input		
ZSG output		
SLIT input and ZSG output		

2-sensor mode

The motor operates in the starting direction of return-to-home at the (HOME) Starting speed. When the limit sensor is detected, the motor rotates in the reverse direction and pulls out of the limit sensor at the (HOME) Last speed. After pulling out of the limit sensor, the motor operates according to the value set in the (HOME) Backward steps in 2 sensor home-seeking at the (HOME) Starting speed, and stops. The position at which the motor stopped is set as the home.

Explanation of code

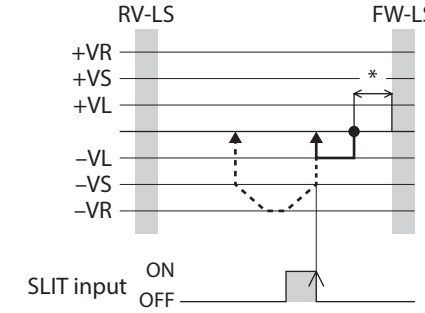
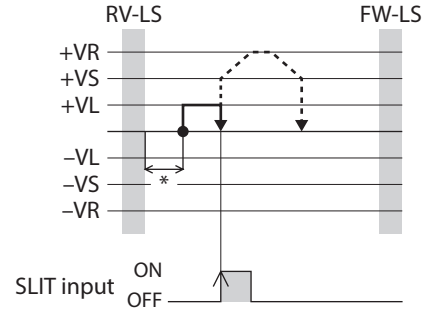
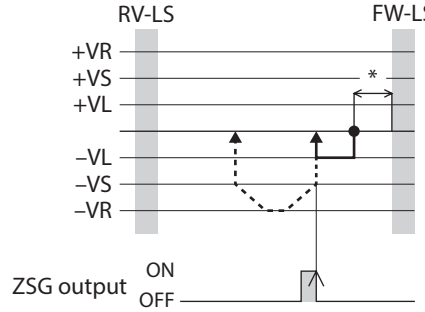
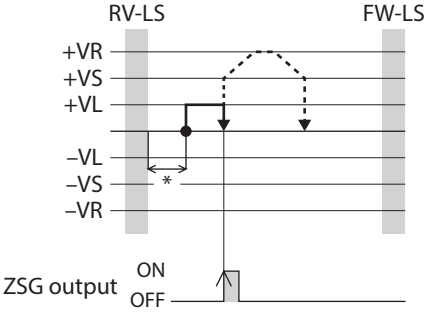
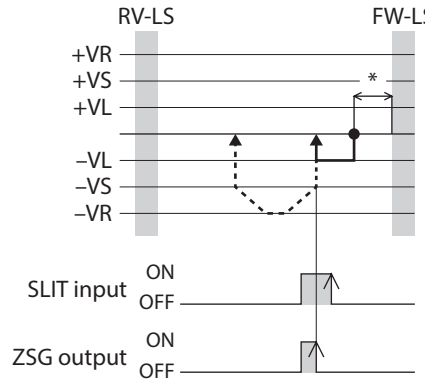
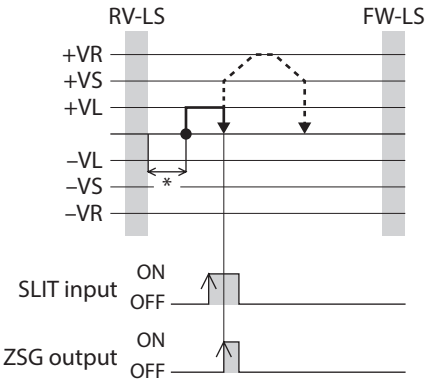
- VR: (HOME) Operating speed
- VS: (HOME) Starting speed
- VL: (HOME) Last speed
- - - -: Orbit when the home offset is set

Starting position of return-to-home operation	Starting direction of return-to-home operation: Positive direction	Starting direction of return-to-home operation: Negative direction
RV-LS		
FW-LS		
Between RV-LS and FW-LS		

* The motor pulls out of the limit sensor, and rotates according to the value set in the "(HOME) Backward steps in 2 sensor home-seeking."

When the SLIT input and/or the ZSG output are used concurrently

Even after return-to-home operation is completed, operation is continued until an external signal is detected. If an external signal is detected, return-to-home operation is completed.

Home detection signal	Starting direction of return-to-home operation: Positive direction	Starting direction of return-to-home operation: Negative direction
SLIT input		
ZSG output		
SLIT input and ZSG output		

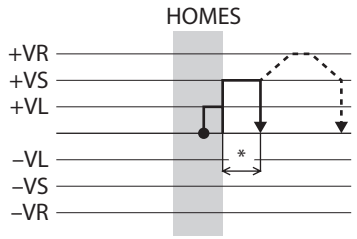
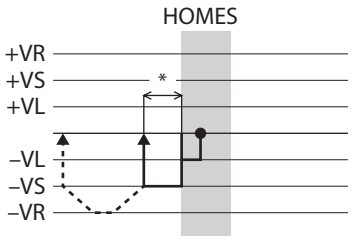
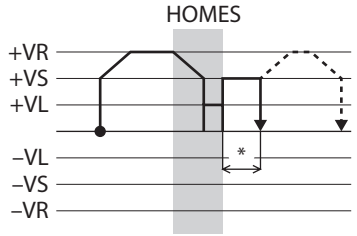
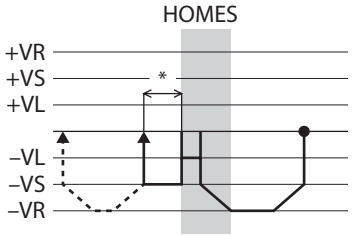
* The motor pulls out of the limit sensor, and rotates according to the value set in the "(HOME) Backward steps in 2 sensor home-seeking."

One-way rotation mode

The motor operates in the starting direction of return-to-home at the (HOME) Operating speed, and it decelerates to a stop when the HOME sensor is detected. After that, the motor pulls out of the range of the HOME sensor at the (HOME) Last speed, operates according to the value set in the (HOME) Operating amount in uni-directional home-seeking at the (HOME) Starting speed, and stops. The stop position is set as the home.

Explanation of code

- VR: (HOME) Operating speed
- VS: (HOME) Starting speed
- VL: (HOME) Last speed
- - - -: Orbit when the home offset is set

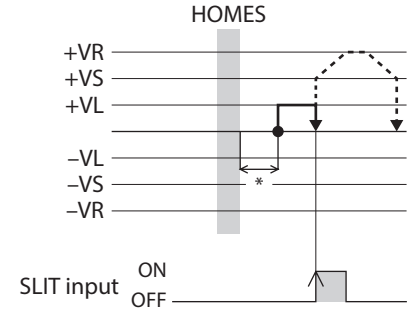
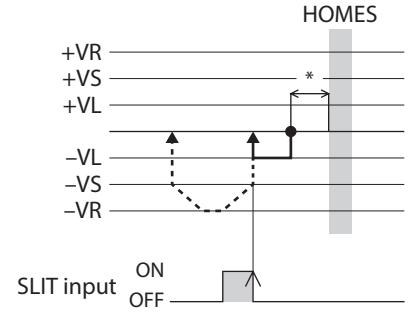
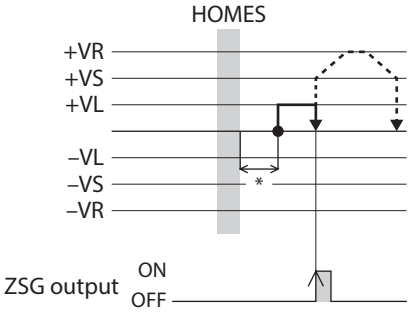
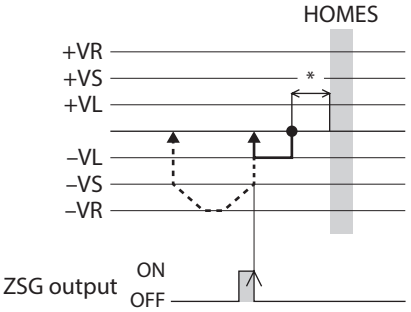
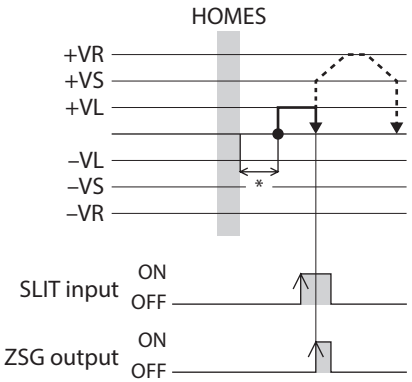
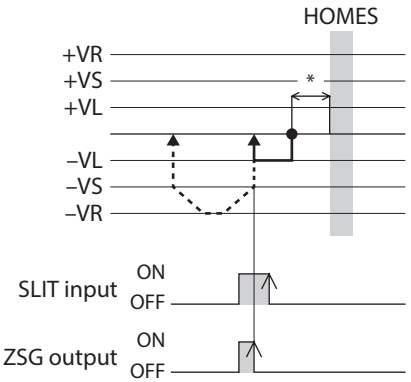
Starting position of return-to-home operation	Starting direction of return-to-home operation: Positive direction	Starting direction of return-to-home operation: Negative direction
HOMES		
Other than HOMES		

* The motor pulls out of the HOME sensor, and rotates according to the value set in the "(HOME) Operating amount in uni-directional home-seeking."

Note When the operation is started from a position other than the HOME sensor, if the motor pulls out of the HOME sensor during deceleration stop after detection of the HOME sensor, an alarm of Return-to-home error is generated. Set the "(HOME) Acceleration/deceleration" parameter so that the motor can stop in the range of the HOME sensor.

When the SLIT input and/or the ZSG output are used concurrently

Even after return-to-home operation is completed, operation is continued until an external signal is detected. If an external signal is detected, return-to-home operation is completed.

Home detection signal	Starting direction of return-to-home operation: Positive direction	Starting direction of return-to-home operation: Negative direction
SLIT input		
ZSG output		
SLIT input and ZSG output		

* The motor pulls out of the HOME sensor, and rotates according to the value set in the "(HOME) Operating amount in uni-directional home-seeking."

5 Macro operation

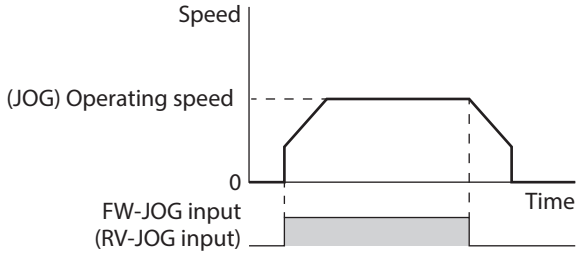
Macro operation is an operating method that turns a specific input signal ON to automatically execute operation corresponding to the signal. Macro operation includes JOG operation, inching operation, and continuous operation. The travel amount, the operating speed, the acceleration/deceleration, the stopping deceleration, etc. for each operation are set with parameters.

5-1 Types of macro operation

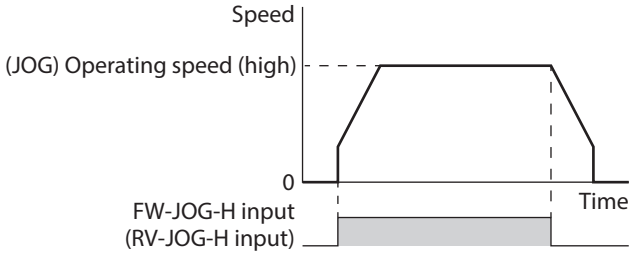
Note Link of operation data, loop function, and event jump function cannot be used in macro operation. To link operation data, use stored data operation.

■ JOG macro operation

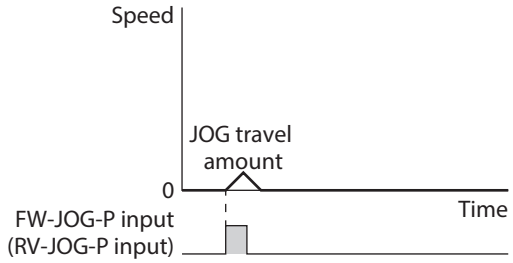
JOG macro operation is operation that uses parameters specific to JOG.



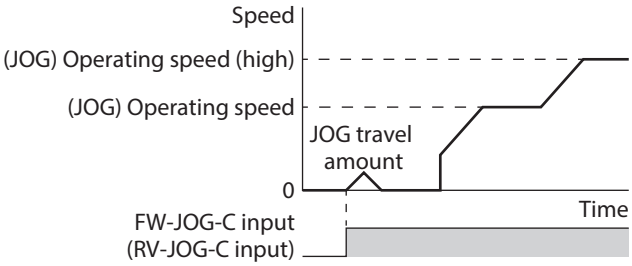
JOG operation ⇨p.85



High-speed JOG operation ⇨p.87



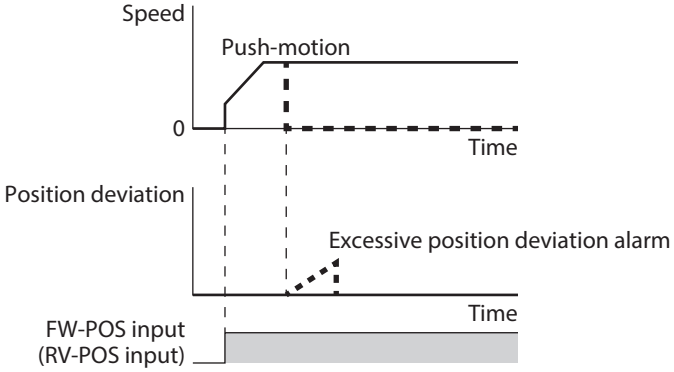
Inching operation ⇨p.89



Combined JOG operation ⇨p.91

■ Continuous macro operation

Continuous macro operation is operation that uses "Speed," "Starting/changing rate," "Starting/changing rate," and "Torque limiting value" of operation data.

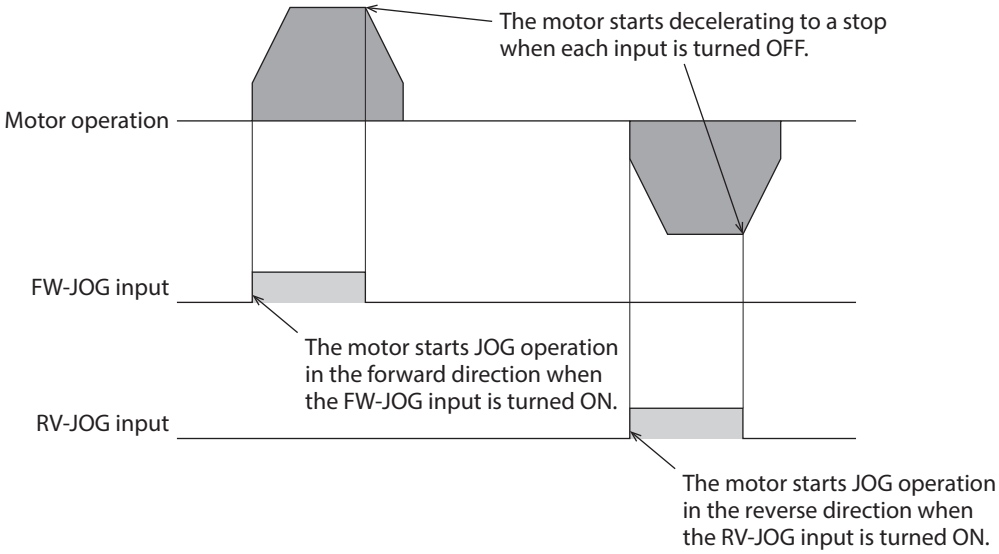


Continuous operation ⇨p.93

5-2 JOG operation

In JOG operation, the motor operates continuously in one direction while the FW-JOG input or the RV-JOG input is being ON.
If the signal having input is turned OFF, the motor decelerates to a stop. The motor operation can be stopped by inputting the operation stop signal.

■ Operation example



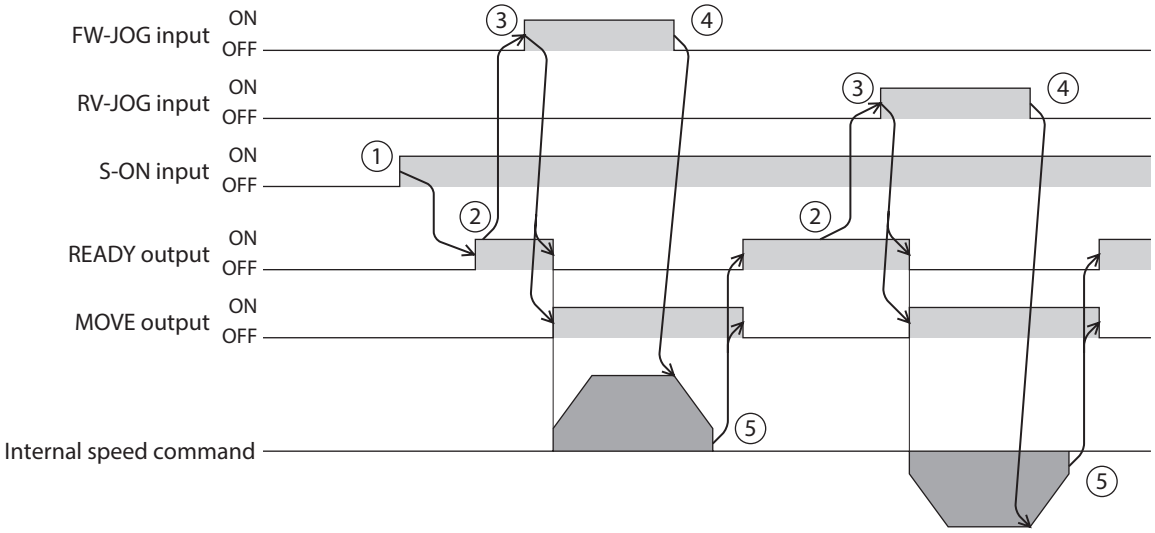
Related parameters

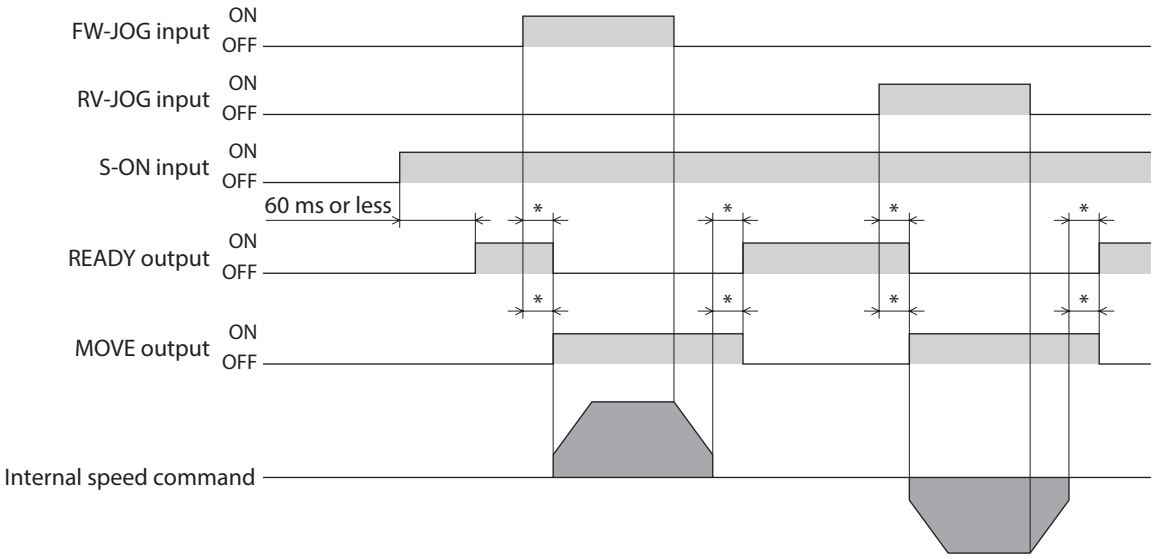
MEXE02 code	Name	Description	Setting range	Initial value
p5	JOG/HOME/ZHOME command filter time constant	Sets the time constant for the command filter.	1 to 200 ms	1
	JOG/HOME/ZHOME torque limit value	Sets the torque limiting value.	0 to 10,000 (1 = 0.1 %)	1,000
	(JOG) Operating speed	Sets the operating speed for JOG operation and inching operation.	1 to 4,000,000 Hz	1,000
	(JOG) Acceleration/ deceleration	Sets the acceleration/deceleration rate or the acceleration/deceleration time for JOG macro operation.	1 to 1,000,000,000 (1 = 0.001)*	1,000,000
	(JOG) Starting speed	Sets the starting speed for JOG macro operation.	0 to 4,000,000 Hz	500

* The setting unit is followed the "Acceleration/deceleration unit" parameter.

■ Timing chart

1. Turn the S-ON input ON.
2. Check the READY output is being ON.
3. Turn the FW-JOG input (or RV-JOG input) ON.
   The READY output is turned OFF, the MOVE output is turned ON, and the motor starts operation.
4. Turn the FW-JOG input (or RV-JOG input) OFF.
   The motor starts deceleration stop.
5. When the motor stops, the READY output is turned ON and the MOVE output is turned OFF.



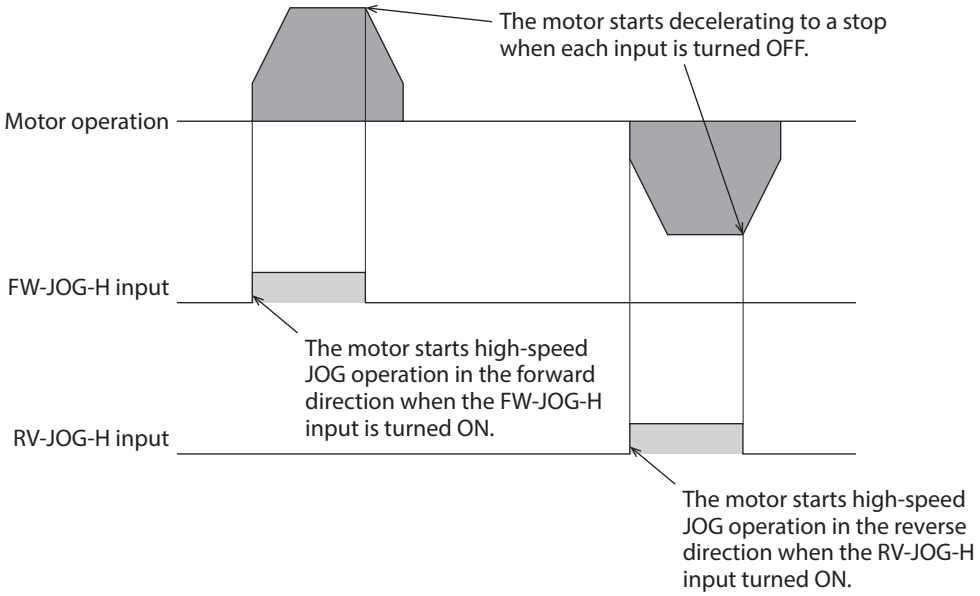


* 2 ms or less

5-3 High-speed JOG operation

In high-speed JOG operation, the motor performs continuous operation in one direction while the FW-JOG-H input or the RV-JOG-H input is being ON. If the signal having input is turned OFF, the motor decelerates to a stop. The motor operation can be stopped by inputting the operation stop signal.

■ Operation example



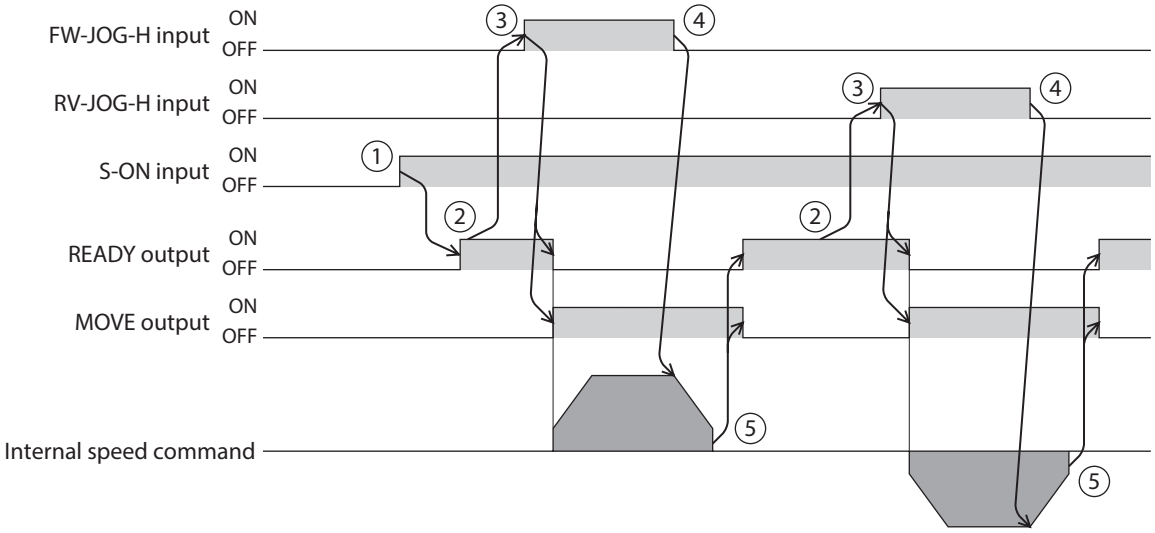
Related parameters

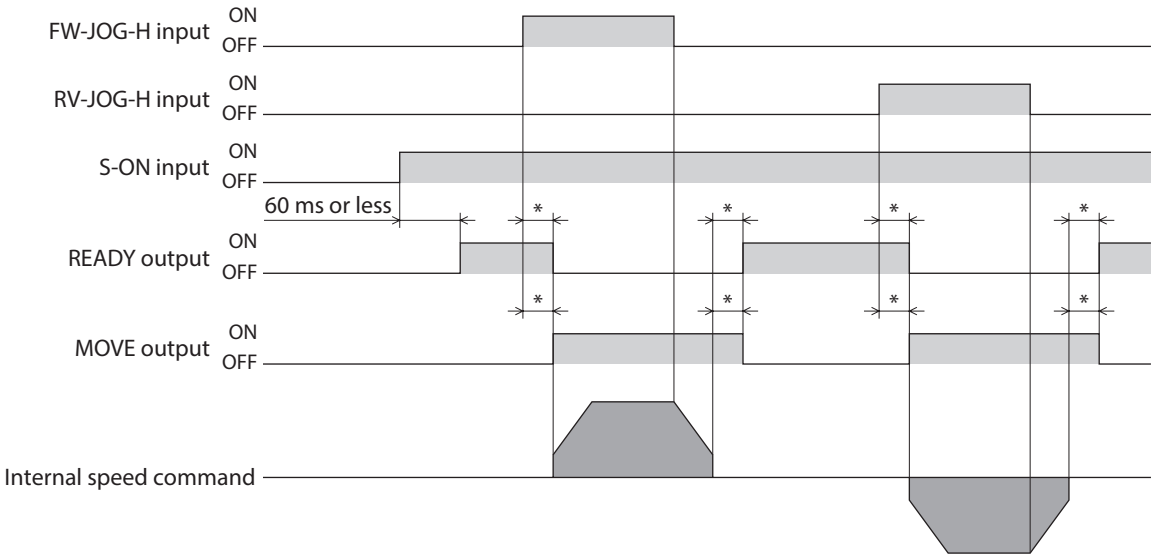
MEXE02 code	Name	Description	Setting range	Initial value
p5	JOG/HOME/ZHOME command filter time constant	Sets the time constant for the command filter.	1 to 200 ms	1
	JOG/HOME/ZHOME torque limit value	Sets the torque limiting value.	0 to 10,000 (1 = 0.1 %)	1,000
	(JOG) Acceleration/ deceleration	Sets the acceleration/deceleration rate or the acceleration/deceleration time for JOG macro operation.	1 to 1,000,000,000 (1 = 0.001)*	1,000,000
	(JOG) Starting speed	Sets the starting speed for JOG macro operation.	0 to 4,000,000 Hz	500
	(JOG) Operating speed (high)	Sets the operating speed for high-speed JOG operation.	1 to 4,000,000 Hz	5,000

* The setting unit is followed the "Acceleration/deceleration unit" parameter.

■ Timing chart

1. Turn the S-ON input ON.
2. Check the READY output is being ON.
3. Turn the FW-JOG-H input (or RV-JOG-H input) ON.
   The READY output is turned OFF, the MOVE output is turned ON, and the motor starts operation.
4. Turn the FW-JOG-H input (or RV-JOG-H input) OFF.
   The motor starts deceleration stop.
5. When the motor stops, the READY output is turned ON and the MOVE output is turned OFF.



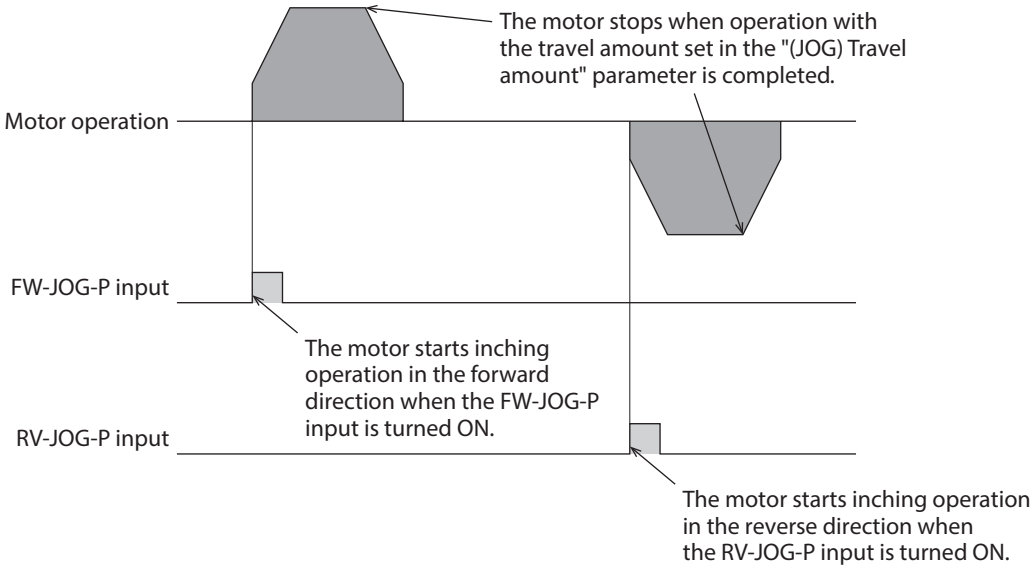


* 2 ms or less

5-4 Inching operation

In inching operation, the motor performs positioning operation when the FW-JOG-P input or the RV-JOG-P input is turned from OFF to ON.
The motor stops when it rotates by the number of steps set in "(JOG) Travel amount" parameter.

■ Operation example



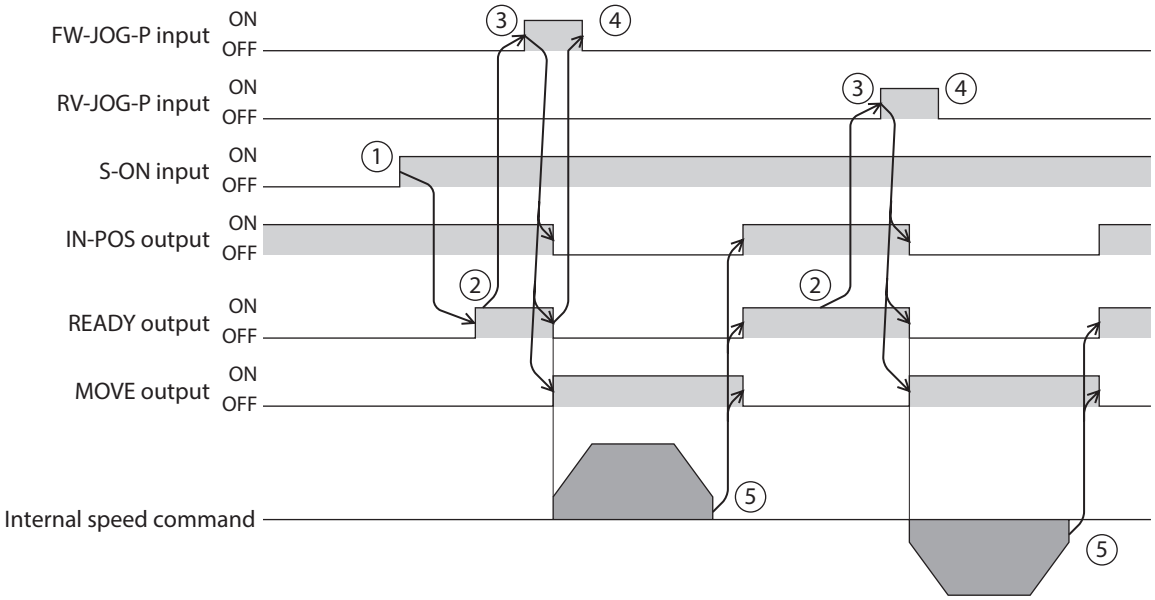
Related parameters

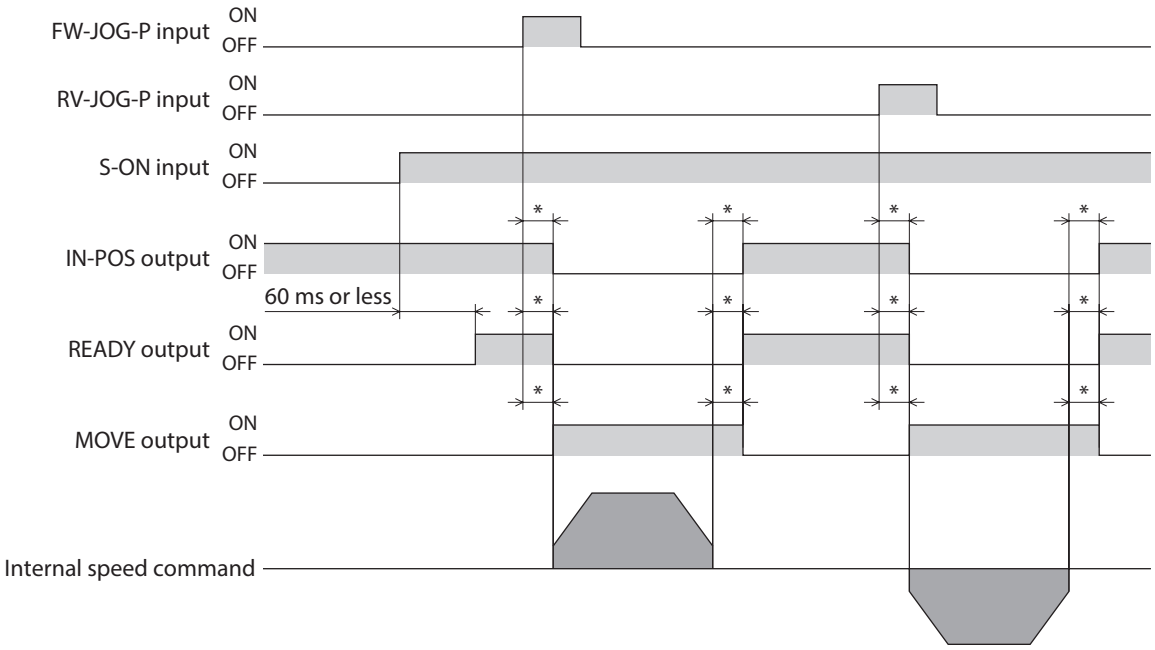
MEXE02 code	Name	Description	Setting range	Initial value
p5	JOG/HOME/ZHOME command filter time constant	Sets the time constant for the command filter.	1 to 200 ms	1
	JOG/HOME/ZHOME torque limit value	Sets the torque limiting value.	0 to 10,000 (1 = 0.1 %)	1,000
	(JOG) Travel amount	Sets the travel amount for inching operation.	1 to 8,388,607 steps	1
	(JOG) Operating speed	Sets the operating speed for JOG operation and inching operation.	1 to 4,000,000 Hz	1,000
	(JOG) Acceleration/ deceleration	Sets the acceleration/deceleration rate or the acceleration/deceleration time for JOG macro operation.	1 to 1,000,000,000 (1 = 0.001)*	1,000,000
	(JOG) Starting speed	Sets the starting speed for JOG macro operation.	0 to 4,000,000 Hz	500

* The setting unit is followed the "Acceleration/deceleration unit" parameter.

■ Timing chart

1. Turn the S-ON input ON.
2. Check the READY output is being ON.
3. Turn the FW-JOG-P input (or RV-JOG-P input) ON.
   The IN-POS output and the READY output are turned OFF, the MOVE output is turned ON, and the motor starts operation.
4. Check the READY output has been turned OFF and turn the FW-JOG-P input (or RV-JOG-P) input OFF.
5. When the motor stops, the IN-POS output and the READY output are turned ON and the MOVE output is turned OFF.



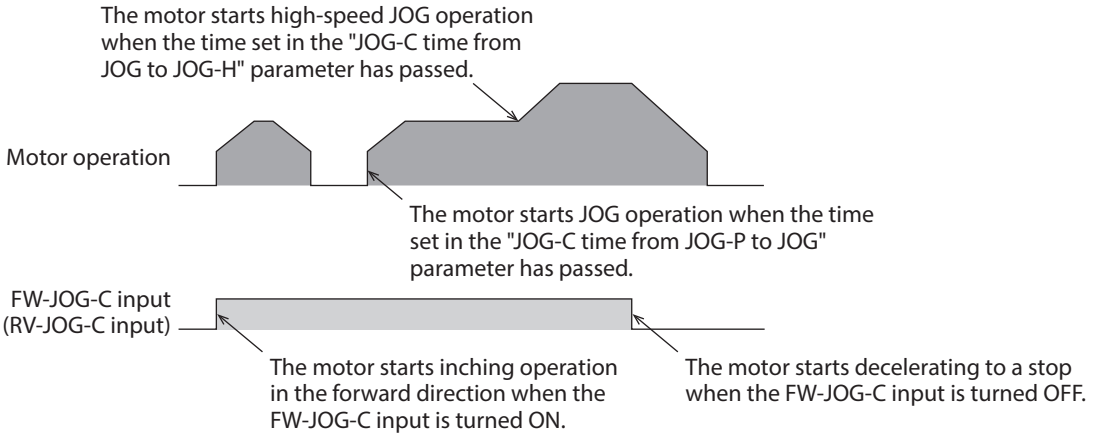


* 2 ms or less

5-5 Combined JOG operation

In combined JOG operation, operation transitions in order of inching operation, JOG operation, and high-speed JOG operation while the FW-JOG-C input or the RV-JOG-C input is ON. The motor starts operation when the FW-JOG-C input or the RV-JOG-C input is turned from OFF to ON, and it decelerates to a stop when the input of an ON state is turned OFF.

■ Operation example



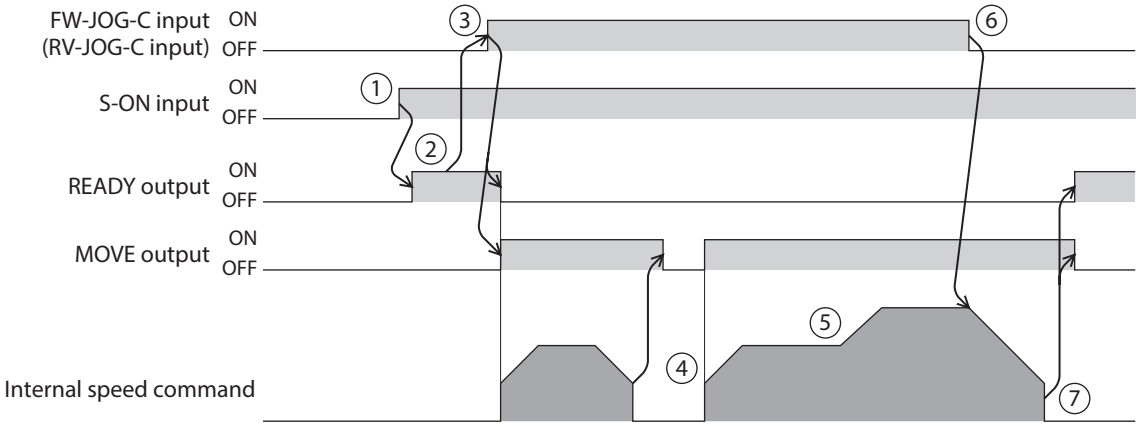
Related parameters

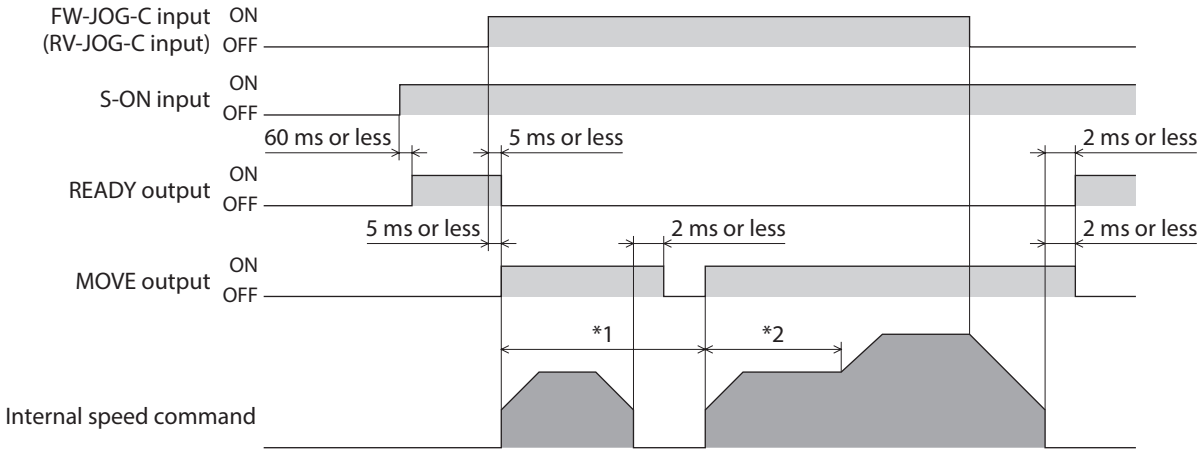
MEXE02 code	Name	Description	Setting range	Initial value
p5	JOG/HOME/ZHOME command filter time constant	Sets the time constant for the command filter.	1 to 200 ms	1
	JOG/HOME/ZHOME torque limit value	Sets the torque limiting value.	0 to 10,000 (1 = 0.1 %)	1,000
	(JOG) Travel amount	Sets the travel amount for inching operation.	1 to 8,388,607 steps	1
	(JOG) Operating speed	Sets the operating speed for JOG operation and inching operation.	1 to 4,000,000 Hz	1,000
	(JOG) Acceleration/ deceleration	Sets the acceleration/deceleration rate or the acceleration/deceleration time for JOG macro operation.	1 to 1,000,000,000 (1 = 0.001)*	1,000,000
	(JOG) Starting speed	Sets the starting speed for JOG macro operation.	0 to 4,000,000 Hz	500
	(JOG) Operating speed (high)	Sets the operating speed for high-speed JOG operation.	1 to 4,000,000 Hz	5,000
p7	JOG-C time from JOG-P to JOG	Sets the timing to transit from inching operation to JOG operation in combined JOG operation.	1 to 5,000 (1=0.001 s)	500
	JOG-C time from JOG to JOG-H	Sets the timing to transit from JOG operation to high-speed JOG operation in combined JOG operation.		1,000

* The setting unit is followed the "Acceleration/deceleration unit" parameter.

■ Timing chart

1. Turn the S-ON input ON.
2. Check the READY output is being ON.
3. Turn the FW-JOG-C input (or RV-JOG-C input) ON.
   The READY output is turned OFF, the MOVE output is turned ON, and the motor starts inching operation.
4. The motor starts JOG operation when the time set in the "JOG-C time from JOG-P to JOG" parameter has passed.
5. The motor starts high-speed JOG operation when the time set in the "JOG-C time from JOG to JOG-H" parameter has passed.
6. Turn the FW-JOG-C input (or RV-JOG-C input) OFF.
   The motor starts deceleration stop.
7. When the motor stops, the READY output is turned ON and the MOVE output is turned OFF.





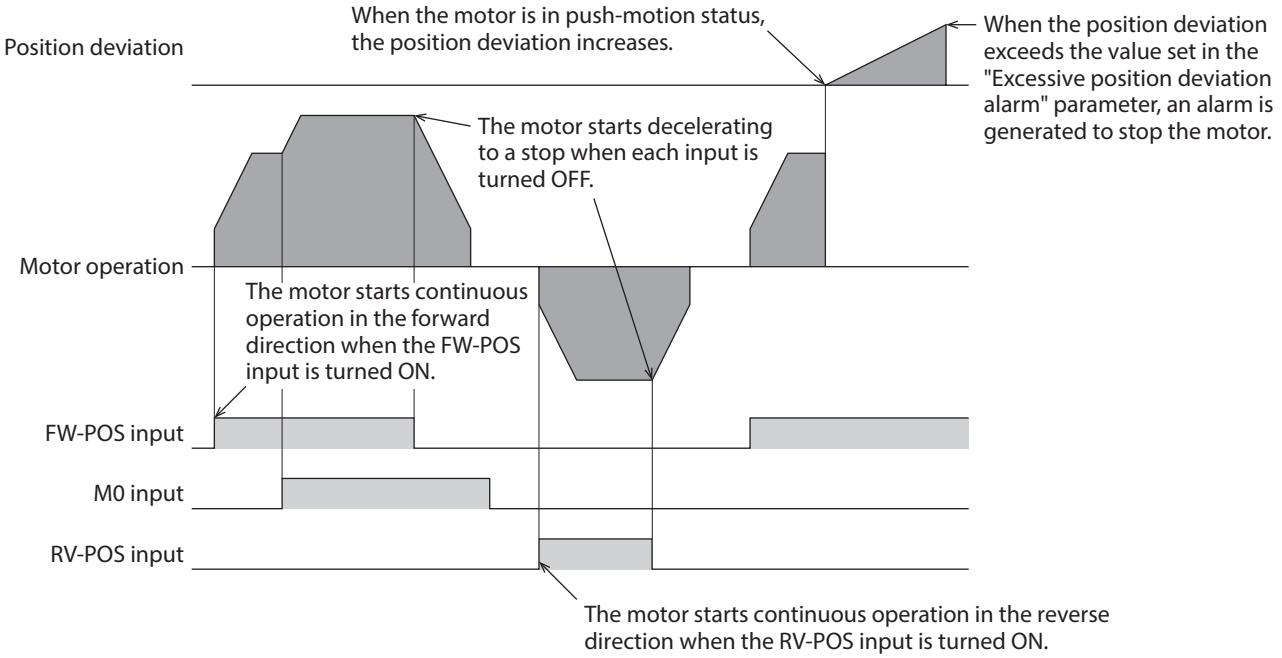
*1 It is set with the "JOG-C time from JOG-P to JOG" parameter.
*2 It is set with the "JOG-C time from JOG to JOG-H" parameter.

5-6 Continuous operation

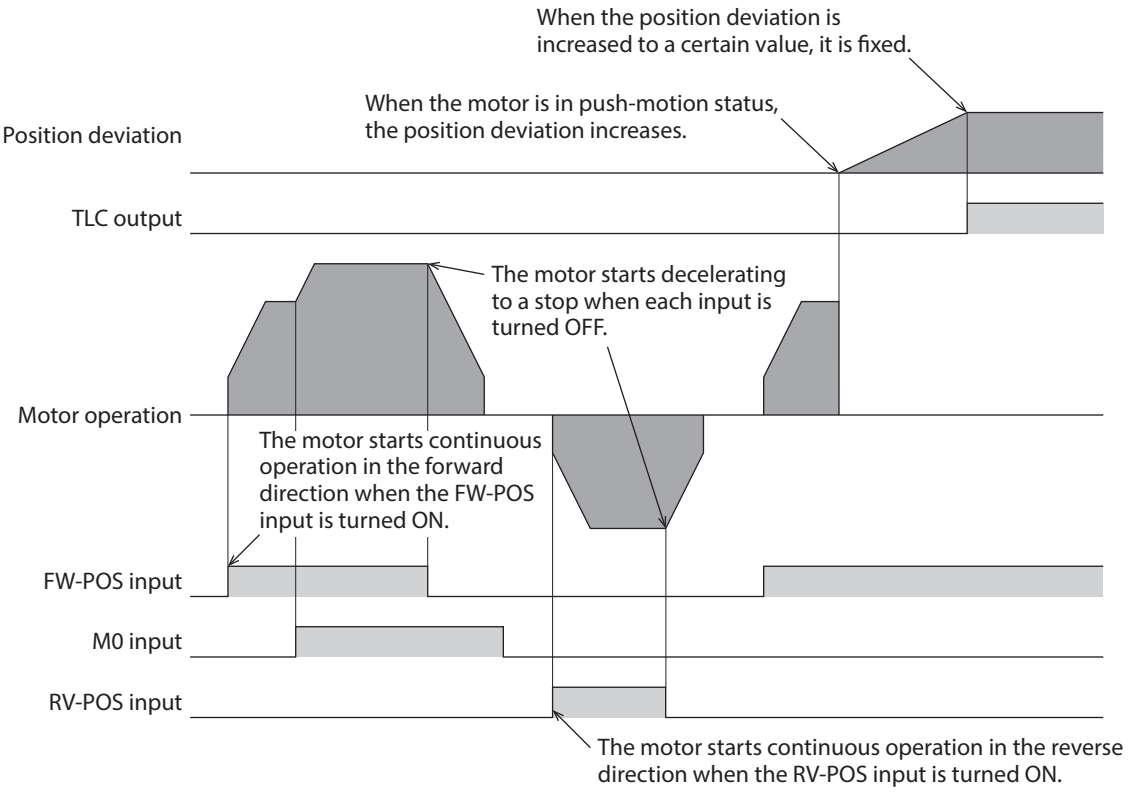
The motor performs continuous operation at the operating speed corresponding to the operation data number being selected while the FW-POS input or the RV-POS input is ON. When the operation data number is changed during continuous operation, the speed will be changed.
When the FW-POS input or the RV-POS input is turned OFF, the motor decelerate to a stop. If the signal of the same direction is turned ON while decelerating, the motor will accelerate again and continue the operation.
If both the FW-POS input and the RV-POS input are turned ON simultaneously, the motor decelerates to a stop.

■ Operation example

● Position control mode



● Speed control mode



Related operation data

MEXE02 code	Name	Description	Setting range	Initial value
p1	Speed	Sets the operating speed. Positioning operation is performed at an absolute operating speed. For continuous operation, setting a positive value rotates the motor in the forward direction, and setting a negative value rotates it in the reverse direction.	–4,000,000 to 4,000,000 Hz	1,000
	Starting/changing rate	Sets the acceleration/deceleration rate or the acceleration/deceleration time when staring or changing the speed.	1 to 1,000,000,000 (1 = 0.001)*	1,000,000
	Stopping deceleration	Sets the deceleration rate or the deceleration time when stopping.		1,000,000
	Torque limiting value	Sets the torque limiting value.	0 to 10,000 (1 = 0.1 %)	1,000

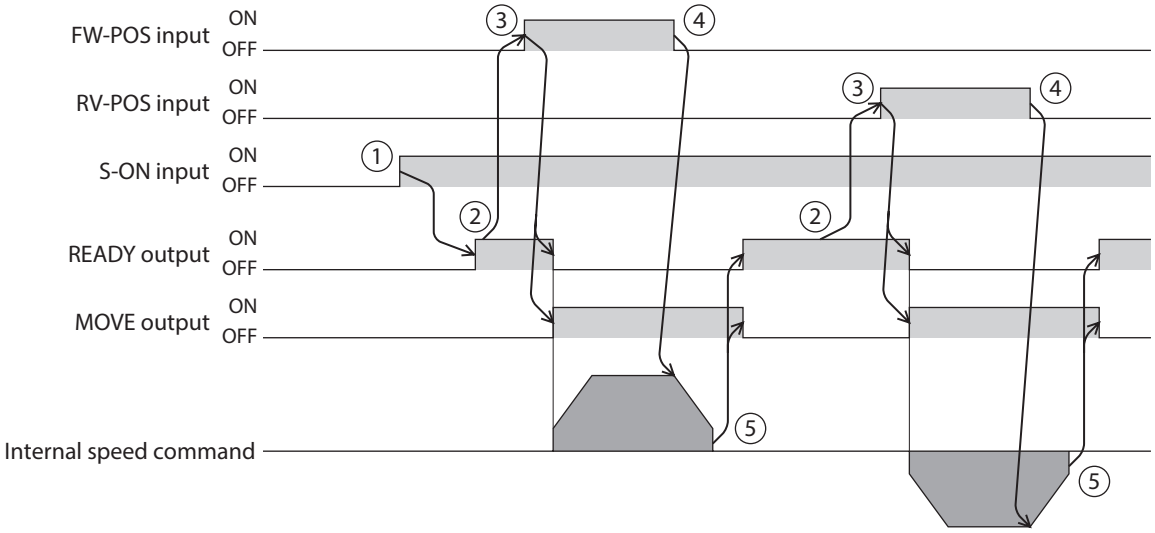
* The setting unit is followed the "Acceleration/deceleration unit" parameter.

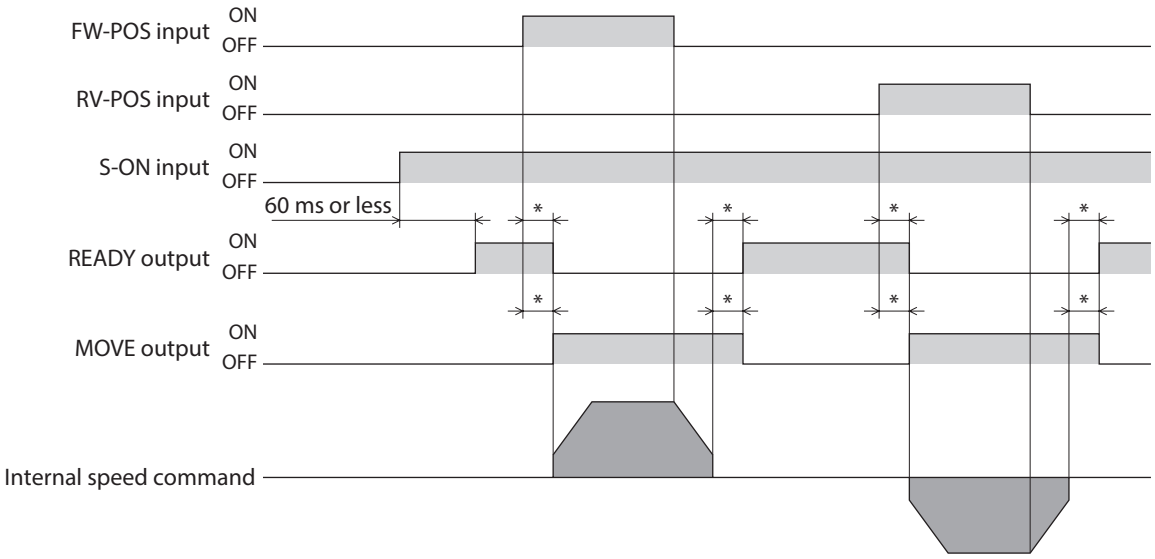
Related parameter

MEXE02 code	Name	Description	Setting range	Initial value
p4	Starting speed	Sets the starting speed for stored data operation or continuous macro operation.	0 to 4,000,000 Hz	500

■ Timing chart

1. Turn the S-ON input ON.
2. Check the READY output is being ON.
3. Turn the FW-POS input (or RV-POS input) ON.
   The READY output is turned OFF, the MOVE output is turned ON, and the motor starts operation.
4. Turn the FW-POS input (or RV-POS input) OFF.
   The motor starts deceleration stop.
5. When the motor stops, the READY output is turned ON and the MOVE output is turned OFF.





* 2 ms or less

6 Coordinates management

6-1 Overview of coordinates management

The **AZX** Series manages the position coordinates of the motor with the ABZO sensor (mechanical multi-rotation absolute sensor). The present coordinates are mechanically recorded inside the ABZO sensor. Therefore, even if the output shaft is rotated by an external force when the control power supply is in an OFF state, the absolute coordinates with respect to the home can be maintained.
Set the coordinates according to the following flow.

Connect a motor and a driver, and turn on the control power supply.
Initial coordinates are automatically generated.

↓

Set the mechanical home.
Factory home or user home

↓

Set the electrical home as necessary.

↓

Set the initial coordinates generation range and the wrap range.

↓

Turn off the control power supply and on again.
Changed parameters will be enabled.

■ About ABZO sensor

The ABZO sensor is a mechanical multi-rotation absolute sensor that does not require a battery.
It stores the present position as an absolute position until the number of revolutions of the motor output shaft exceeds 1,800. The present position is stored even if the control power supply is turned off.
When the number of revolutions exceeds 1,800, the count number is reset to 0 and is newly started from 1.

■ Initial coordinate generation

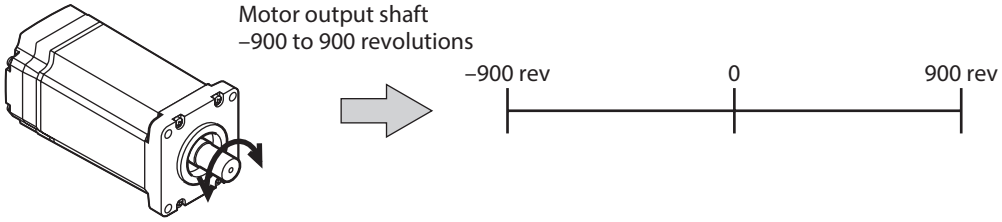
"Initial coordinate generation" indicates to decide how to use the rotation range of up to 1,800 revolutions that the ABZO sensor can manage. There are four parameters required for initial coordinate generation as shown below. These parameters are read when the control power supply is turned on.

- Initial coordinate generation & wrap coordinate setting
- Initial coordinate generation & wrap setting range
- Initial coordinate generation & wrap range offset ratio
- Initial coordinate generation & wrap range offset value

memo Regardless of whether the wrap function is enabled or disabled, the initial coordinate is generated when the control power supply is turned on.

- **Example of factory setting of the motor**

  To use coordinates both in forward and reverse directions, 1,800 revolutions are divided into positive and negative revolutions, 50 % for each direction.



- **Setting example of motorized actuator**

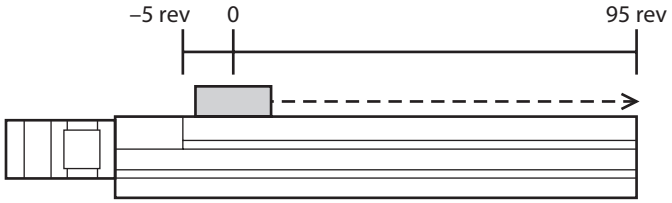
  The following is an example to set the home of a motorized actuator at the position of 30 mm from the motor side.
  - Motorized actuator stroke: 600 mm
  - Motorized actuator pitch: 6 mm/rev

  Concept of initial coordinate

$$\text{Initial coordinate generation range} = \frac{\text{Stroke}}{\text{Pitch}} = \frac{600}{6} = 100 \text{ rev}$$

$$\text{Wrap range offset ratio} = \frac{\text{Home position}}{\text{Stroke}} \times 100 = \frac{30}{600} \times 100 = 5\ (\%)$$

  From the above, the actual coordinate is in the range of –5 to 95 revolutions.



  Setting examples of parameters

MEXE02 code	Name	Setting value
p5	Initial coordinate generation & wrap coordinate setting	Manual setting
	Initial coordinate generation & wrap setting range	100.0 rev
	Initial coordinate generation & wrap range offset ratio	5.00 %
	Initial coordinate generation & wrap range offset value	0 step

■ Wrap function

The wrap function is a function to automatically preset the position information of the present position when the number of revolutions of the motor output shaft exceeds the set range. Setting the wrap offset can restrict the operation area of equipment or control an index table with coordinates on the positive and negative sides.
Refer to p.104 for the specific setting methods.

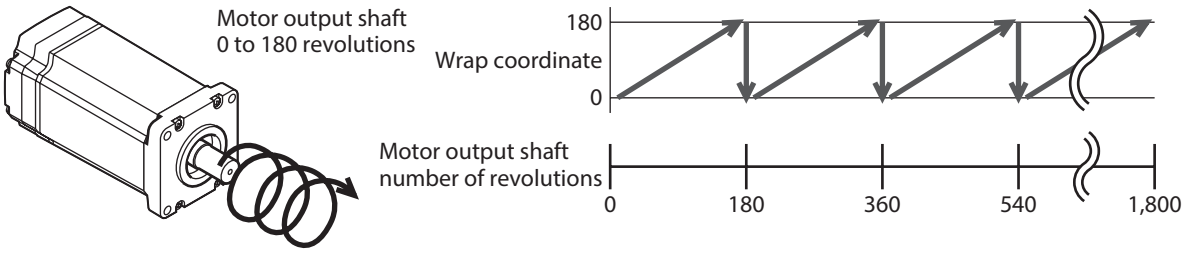
memo

The wrap function is enabled at the time of shipment. Disable the wrap function when it is not used. Set the parameters as follows.
- "Initial coordinate generation & wrap coordinate setting" parameter: 1 (Manual setting)
- "Wrap setting" parameter: 0 (Disable)

● Concept of wrap setting

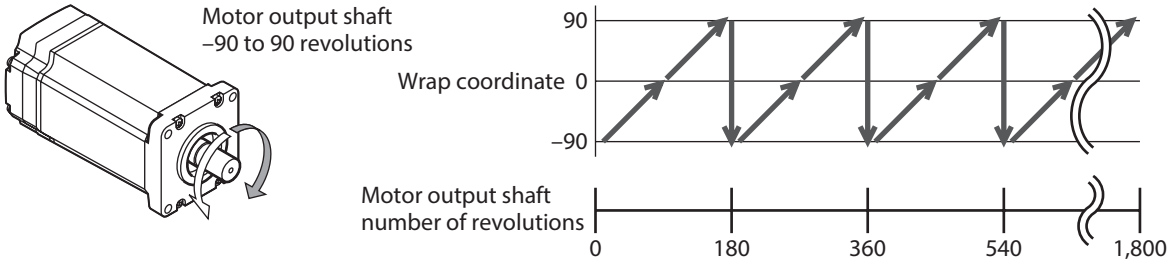
With the wrap setting, 1,800 revolutions managed by the ABZO sensor are divided evenly to generate coordinates within the number of revolutions divided evenly.
Therefore, set a value that becomes an integer when 1,800 is divided.

Example:
If the wrap function is activated when the motor rotates by 180 revolutions in the same direction.



The present position of the motor is preset every 180 revolutions, however, the 32-bit counter in the driver is not preset.

Example: When the range of use of the motor is offset to −90 to 90 revolutions

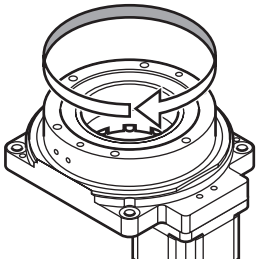


When the wrap setting range is exceeded, the sign is reversed.

● Setting example of index table

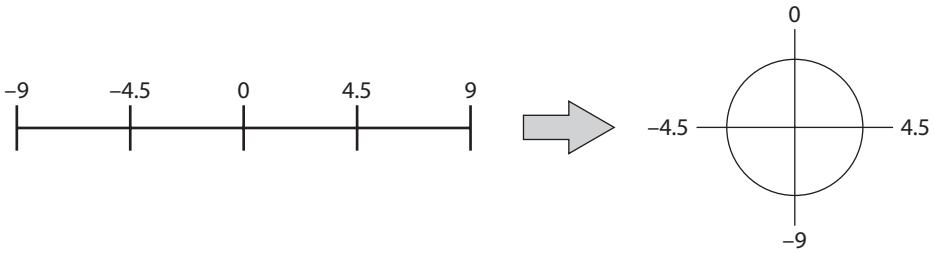
This is an example in which the index table is made rotate once when the motor output shaft rotates by 18 revolutions.

- Gear ratio of motor:18



Concept of initial coordinate

To rotate the index table in both directions, 18 revolutions are divided into positive and negative revolutions, 50 % for each direction.



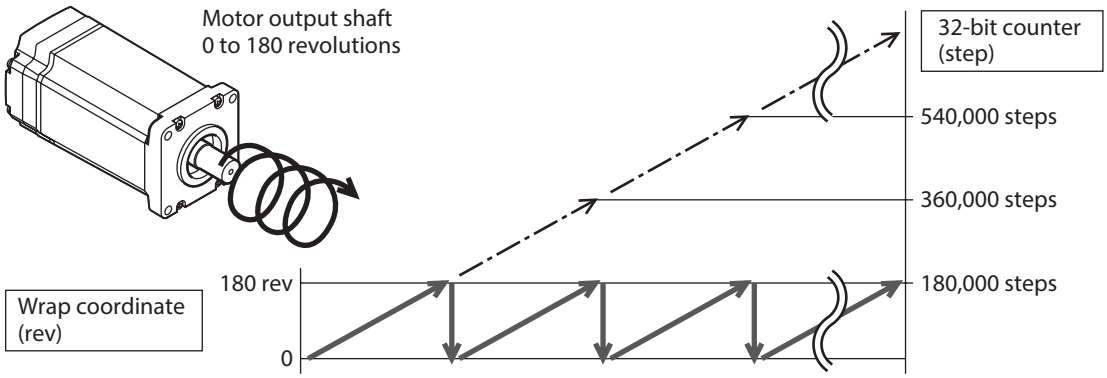
Setting examples of parameters

MEXE02 code	Name	Setting value
p5	Initial coordinate generation & wrap coordinate setting	Manual setting
	Initial coordinate generation & wrap setting range	18.0 rev
	Initial coordinate generation & wrap range offset ratio	50.00 %
	Initial coordinate generation & wrap range offset value	0 step
	Wrap setting	Enable

- **Relation between the wrap function and the 32-bit counter inside the driver**

The 32-bit counter inside the driver outputs the position information of the motor as the number of steps regardless of whether the wrap function is enabled or disabled.
When the wrap function is enabled, the relation between the wrap coordinate and the 32-bit counter is shown below.

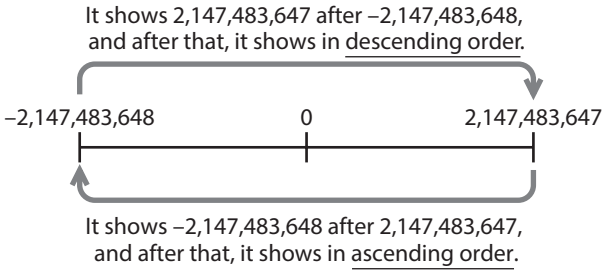
Example:
If the wrap function is activated when the motor rotates by 180 revolutions in the same direction.



The present position of the motor is preset by 180 revolutions, however, the 32-bit counter is not preset.
The value of the 32-bit counter can be checked using the following methods.

- Status monitor window of **MEXE02** software
- Monitor command of EtherNet/IP

The 32-bit counter goes around between –2,147,483,648 and 2,147,483,647.



6-2 Coordinate origin

There are two types of homes for the **AZX** Series, a mechanical home and an electrical home. When coordinates are set, the ABSPEN output is turned ON.

Note The following operations cannot be executed if coordinates are not set.
- High-speed return-to-home operation
- Absolute positioning operation (when the "Permission of absolute positioning without setting absolute coordinates" parameter is "0: Disable")

Related parameter

MEXE02 code	Name	Description	Setting range	Initial value
p4	Permission of absolute positioning without setting absolute coordinates	Permits absolute positioning operation in a state where coordinates are not set.	0: Disable 1: Enable	0

■ Mechanical home

The mechanical home is a position of the home stored by the ABZO sensor. The mechanical home includes the "factory home" written in the ABZO sensor at the time of factory shipment and the "user home" set by performing return-to-home operation or the position preset.

● Factory home

The factory home is set in products with which the mechanism is pre-assembled to the motor, such as motorized actuators. It cannot be changed.
If the factory home is set, the ORGN-STLD output is turned ON.

● User home

When the user home is set by performing return-to-home operation or the position preset, the PRST-STLD output is turned ON.
To make the user home an unset state, execute [Position preset clear] under the [Communication] menu of the **MEXE02** software. The user home cannot be made an unset state via EtherNet/IP.
If the user home is set, the home information is written to the non-volatile memory. The non-volatile memory can be rewritten approximately 100,000 times.

■ Mechanical home setting

To set the mechanical home coordinates, perform the position preset or return-to-home operation. If the mechanical home coordinates are set, operation is performed on the coordinates centered on the mechanical home.

● Position preset

If the position preset is executed, the command position and the feedback position becomes the value set in the "Preset position" parameter and the home is set.

Related parameters

MEXE02 code	Name	Description	Setting range	Initial value
p4	Preset position	Sets the preset position.	−2,147,483,648 to 2,147,483,647 steps	0
	Permission of absolute positioning without setting absolute coordinates	Permits absolute positioning operation in a state where coordinates are not set.	0: Disable 1: Enable	0

● Return-to-home operation

When return-to-home operation is performed, the mechanical home can be set.

■ Electrical home

The electrical home is a home that is set in the driver. When the EL-PRST input is turned ON, the electrical home is set, and the motor operates on the coordinate system with the electrical home as the home. If the EL-PRST input is turned OFF, the electrical home is cleared. The ELPRST-MON output is being ON while the electrical home is set.
Even if the electrical home is set, it is not written to the non-volatile memory.

■ Electrical home setting

The command position when the EL-PRST input is turned from OFF to ON will be the electrical home. While the EL-PRST input is ON, operation is performed on the coordinates centered on the electrical home.
When the position preset or return-to-home operation is performed in a state where the EL-PRST input is an ON state, the mechanical home and the electrical home will simultaneously be a value set in the "Preset position" parameter.
Turning the EL-PRST input from ON to OFF returns to the mechanical home coordinates.

Note High-speed return-to-home operation cannot be executed while the electrical home coordinates are used.

■ A state where coordinates are not set

Coordinates will be an unset state in the following cases. The ABSPEN output is turned OFF.

- Factory shipment state
- When the position preset is performed in a state where the "Preset position" parameter is set to a value other than "0" and then the resolution is changed.
- When [Position preset clear] under the [Communication] menu of the **MEXE02** software is executed.
- During return-to-home operation

6-3 Parameters related to ABZO sensor

With the **AZX** Series, the specifications of the ABZO sensor and parameters based on the pre-assembled mechanism to the motor are written in the ABZO sensor in advance. Normally, the setting of the ABZO sensor is prioritized than a parameter set via EtherNet/IP or using the **MEXE02** software.

Related parameters

MEXE02 code	Name	Description	Setting range	Initial value
p5	Mechanism settings	To change the mechanism settings parameter, select "Manual setting."	0: Prioritize ABZO setting 1: Manual setting	0
	Initial coordinate generation & wrap coordinate setting	To change the initial coordinate generation & wrap coordinate parameter, select "Manual setting."	0: Prioritize ABZO setting 1: Manual setting	0
	Mechanism limit parameter setting	Disables the ABZO setting of the mechanism limit parameter.	0: Follow ABZO setting 1: Disable	0
	Mechanism protection parameter setting	Disables the ABZO setting of the mechanism protection parameter.	0: Follow ABZO setting 1: Disable	0
	JOG/HOME/ZHOME operation setting	To change the parameter for JOG operation, return-to-home operation, and high-speed return-to-home operation, select "Manual setting."	0: Prioritize ABZO setting 1: Manual setting	0

■ When parameters of the wrap function are set

- **Setting example: When the wrap range is set to −50 to 50 revolutions**

1. Change the "Initial coordinate generation & wrap coordinate setting" parameter to "1: Manual setting."
2. Set each parameter as follows.

MEXE02 code	Name	Setting value
p5	Initial coordinate generation & wrap setting range	100.0 rev
	Initial coordinate generation & wrap range offset ratio	50.00 %
	Initial coordinate generation & wrap range offset value	0 step
	Wrap setting	Enable
	The number of the RND-ZERO output in wrap range	1

6-4 Mechanism settings parameter

The mechanism settings parameter is a parameter required when used in combination with a mechanism, such as geared motors or motorized actuators.

Related parameters

MEXE02 code	Name	Description	Setting range	Initial value
p5	Mechanism settings	To change the mechanism settings parameter, select "Manual setting."	0: Prioritize ABZO setting 1: Manual setting	0
	Electronic gear A	Sets the denominator of the electronic gear.	1 to 65,535	1
	Electronic gear B	Sets the numerator of the electronic gear.		
	Motor rotation direction	Sets the rotation direction of the motor output shaft.	0: Positive side=Counterclockwise 1: Positive side=Clockwise 2: Positive side=Counterclockwise (the driver parameter is applied)* 3: Positive side=Clockwise (the driver parameter is applied)*	1
	Mechanism type	This is a reserved function. It cannot be used.	–	0
	Mechanism lead	Sets the lead of the ball screw.	1 to 32,767	1
	Mechanism lead decimal digit setting	Sets the number of decimal places when the lead of the ball screw contains a decimal point.	0: × 1 mm 1: × 0.1 mm 2: × 0.01 mm 3: × 0.001 mm	0
	Gear ratio setting	Sets the gear ratio for geared motor. When "0: Gear ratio setting disable" is set, the gear ratio is considered as "1."	0: Gear ratio setting disable 1 to 32,767: Gear ratio (1 = 0.01)	0

* If "2: Positive side = Counterclockwise (the driver parameter is applied)" or "3: Positive side = Clockwise (the driver parameter is applied)" is selected, the fixed value of the ABZO sensor is prioritized for parameters other than the "Motor rotation direction" parameter.

6-5 Initial coordinate generation & wrap coordinate parameters

These are parameters to be used when the coordinate system is generated.

■ Wrap function

Refer to p.98 for the wrap function.

● Related operation types

Set the wrap function when performing stored data operation shown below.

- Wrap absolute positioning operation
- Wrap proximity positioning operation
- Wrap forward direction absolute positioning operation
- Wrap reverse direction absolute positioning operation

● Related parameters

MEXE02 code	Name	Description	Setting range	Initial value
p5	Initial coordinate generation & wrap coordinate setting	To change the initial coordinate generation & wrap coordinate parameter, select "Manual setting."	0: Prioritize ABZO setting 1: Manual setting	0
	Initial coordinate generation & wrap setting range	Sets the wrap range. The command position returns to 0 when the motor rotates by the number of times set here.	Refer to the next table. (1 = 0.1 rev)	10
	Initial coordinate generation & wrap range offset ratio	Sets the offset ratio of the wrap range.	0 to 10,000 (1 = 0.01 %)	5,000
	Initial coordinate generation & wrap range offset value	Sets the offset amount of the wrap range.	−536,870,912 to 536,870,911 steps	0
	Wrap setting	Sets the wrap function.	0: Disable 1: Enable	1

Value that can be set in the "Initial coordinate generation & wrap setting range" parameter

Since the internal coordinate of the ABZO sensor is 1,800 revolutions, select a value from the table to set in the "Initial coordinate generation & wrap setting range" parameter.

memo The table shows the values when setting with the **MEXE02** software. When setting via EtherNet/IP, multiply the values in the table by 10.

Wrap setting range [rev]						
0.5	1.8	4.8	12.0	25.0	72.0	200.0
0.6	2.0	5.0	12.5	30.0	75.0	225.0
0.8	2.4	6.0	14.4	36.0	90.0	300.0
0.9	2.5	7.2	15.0	37.5	100.0	360.0
1.0	3.0	7.5	18.0	40.0	112.5	450.0
1.2	3.6	8.0	20.0	45.0	120.0	600.0
1.5	4.0	9.0	22.5	50.0	150.0	900.0
1.6	4.5	10.0	24.0	60.0	180.0	1,800.0

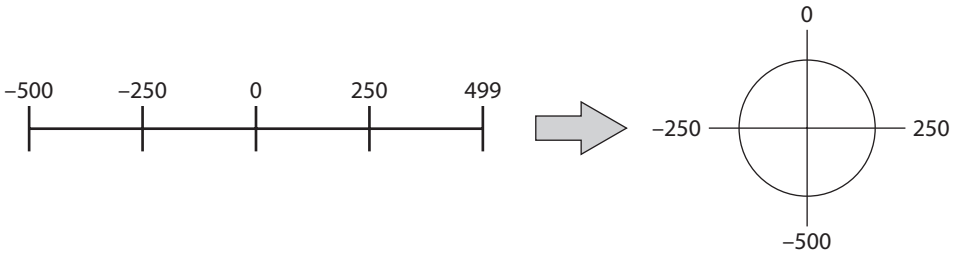
- **Setting example**
  When setting the "Initial coordinate generation & wrap range offset ratio" parameter to "50 %" and the "Initial coordinate generation & wrap range offset value" parameter to "0 step"

Example 1: Coordinates when the wrap setting range is 1 revolution and the resolution is 1,000 P/R

MEXE02 code	Name	Setting value
p5	Electronic gear A	1
	Electronic gear B	1
	Initial coordinate generation & wrap coordinate setting	Manual setting
	Initial coordinate generation & wrap setting range	1.0 rev
	Initial coordinate generation & wrap range offset ratio	50.00 %
	Initial coordinate generation & wrap range offset value	0 step
	Wrap setting	Enable

Coordinates example

When the parameters are set as shown in the table, the motor can be operated on coordinates in the figure.

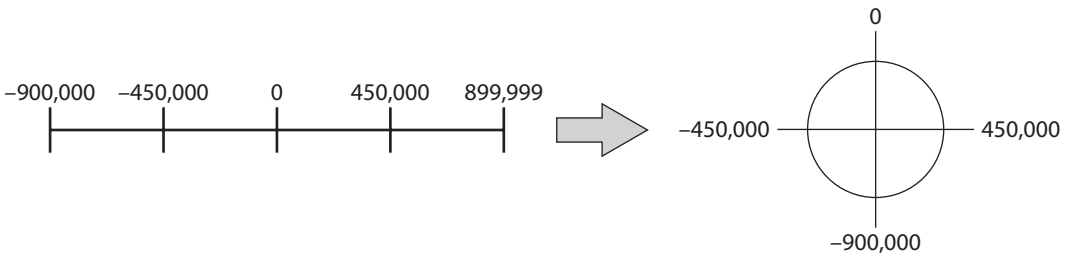


Example 2: Coordinates when the wrap setting range is 1,800 revolutions and the resolution is 1,000 P/R

MEXE02 code	Name	Setting value
p5	Electronic gear A	1
	Electronic gear B	1
	Initial coordinate generation & wrap coordinate setting	Manual setting
	Initial coordinate generation & wrap setting range	1,800.0 rev
	Initial coordinate generation & wrap range offset ratio	50.00 %
	Initial coordinate generation & wrap range offset value	0 step
	Wrap setting	Enable

Coordinates example

When the parameters are set as shown in the table, the motor can be operated on coordinates in the figure.



Note If the "Wrap setting" parameter or the "Initial coordinate generation & wrap setting range" parameter is changed, the absolute position may be shifted. When the parameter is changed, perform the position preset (P-PRESET) or return-to-home operation.

- **Setting condition of the "Initial coordinate generation & wrap setting range" parameter**

  When the wrap range satisfies the following conditions, continuous rotation in the same direction can be performed while the home is maintained.

  Condition 1) $\dfrac{1{,}800}{\text{Wrap setting range}} = \text{To be an integer}$

  Condition 2) $\text{Wrap setting range} \times \text{Resolution} = \text{Wrap setting range} \times \dfrac{\text{Electronic gear B}}{\text{Electronic gear A}} \times 1{,}000 = \text{To be an integer}$

  Note If the setting conditions of the "Initial coordinate generation & wrap setting range" parameter is not satisfied even when the "Wrap setting" parameter is set to "1: Enable," information of Wrap setting error will be generated. If the control power supply is turned on again or Configuration is executed in a state where information of Wrap setting error is generated, an alarm of Wrap setting error will be generated.

  Setting example 1

  - Wrap setting range: 100 rev
  - Resolution: 1,000 P/R (electronic gear A=1, electronic gear B=1)
  - Motor: Standard motor (gear ratio 1)

  Condition 1) $\dfrac{1{,}800}{\text{Wrap setting range}} = \dfrac{1{,}800}{100} = 18$

  Condition 2) $\text{Wrap setting range} \times \dfrac{\text{Electronic gear B}}{\text{Electronic gear A}} \times 1{,}000 = 100 \times \dfrac{1}{1} \times 1{,}000 = 100{,}000$

  The setting conditions are satisfied since both the conditions (1) and (2) are integers. The wrap function can be used.

  Setting example 2

  - Wrap setting range: 4.5 rev
  - Resolution: 1,000 P/R (electronic gear A=1, electronic gear B=1)
  - Actuator: **DGII** Series (gear ratio 18)

  Condition 1) $\dfrac{1{,}800}{\text{Wrap setting range}} = \dfrac{1{,}800}{4.5} = 400$

  Condition 2) $\text{Wrap setting range} \times \dfrac{\text{Electronic gear B}}{\text{Electronic gear A}} \times 1{,}000 = 4.5 \times \dfrac{1}{1} \times 1{,}000 = 4{,}500$

  The setting conditions are satisfied since both the conditions (1) and (2) are integers. In this setting, the wrap function is executed every time the output table of the **DGII** Series rotates by 90 degrees.

  Setting example 3

  - Wrap setting range: 1,000 rev
  - Resolution: 1,000 P/R (electronic gear A=1, electronic gear B=1)
  - Motor: **PS** geared motor (gear ratio 5)

  Condition 1) $\dfrac{1{,}800}{\text{Wrap setting range}} = \dfrac{1{,}800}{1{,}000} = 1.8$

  Condition 2) $\text{Wrap setting range} \times \dfrac{\text{Electronic gear B}}{\text{Electronic gear A}} \times 1{,}000 = 1{,}000 \times \dfrac{1}{1} \times 1{,}000 = 1{,}000{,}000$

  The setting conditions are not satisfied since the condition (1) is not an integer. Information of Wrap setting error is generated and the wrap function cannot be executed.

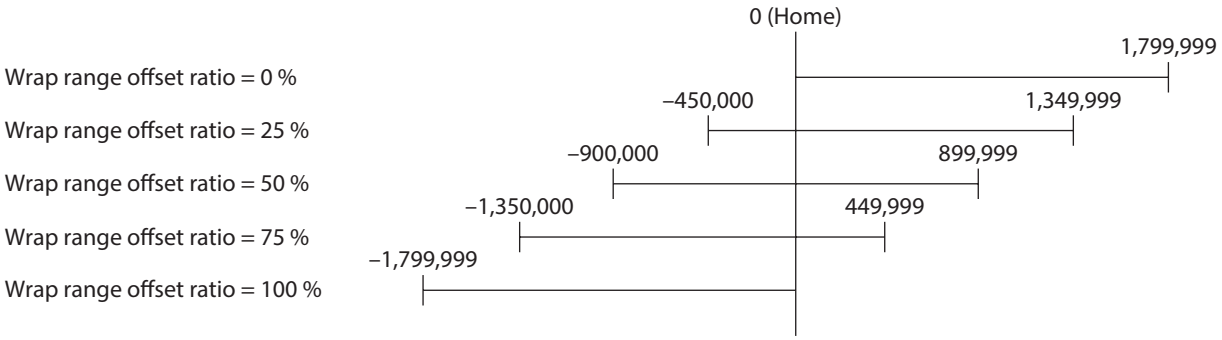
■ Wrap offset function

The position of the boundary point of the wrap range can be offset by using the mechanical home as a reference. The wrap offset is set with the "Initial coordinate generation & wrap range offset ratio" parameter and the "Initial coordinate generation & wrap range offset value" parameter.

● Wrap offset ratio setting

When the "Initial coordinate generation & wrap range offset ratio" parameter is set, the wrap range can be offset in the negative direction.

Setting example: When the wrap range is 1,800 revolutions and the resolution is 1,000 P/R.

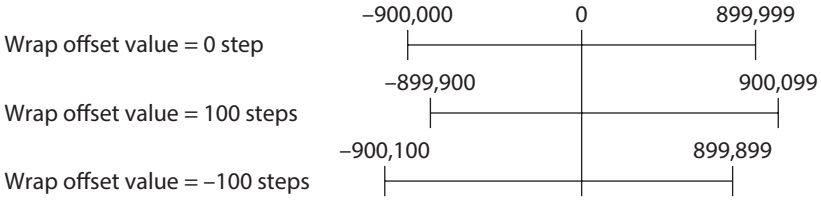


● Wrap range offset value setting

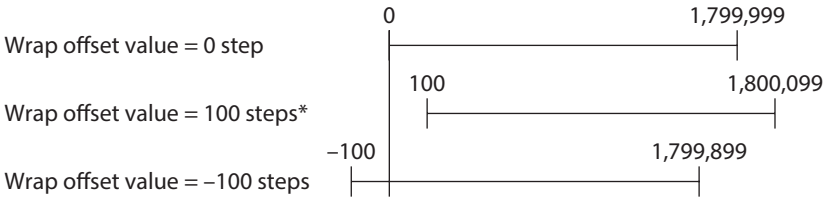
The coordinates can be shifted in a step unit for the coordinate system having offset with the "Initial coordinate generation & wrap range offset ratio" parameter.

Note When the coordinates are set with the "Initial coordinate generation & wrap range offset value" parameter, information of Wrap setting error is generated if the home is not included in the coordinates. If the control power supply is turned on again or Configuration is executed in a state where information of Wrap setting error is generated, an alarm of Wrap setting error will be generated.

Setting example 1: When the wrap range is 1,800 revolutions, the resolution is 1,000 P/R, and the wrap offset ratio setting is 50 %.



Setting example 2: When the wrap range is 1,800 revolutions, the resolution is 1,000 P/R, and the wrap offset ratio setting is 0 %.



* Information of wrap setting error is generated

■ RND-ZERO output

The RND-ZERO output is a signal that is output for each division boundary point when the wrap range is divided evenly with the home as a reference.
The number of divisions can be set with the "The number of the RND-ZERO output in wrap range" parameter. The RND-ZERO output is output when the "Wrap setting" parameter is set to "1: Enable."

- **Example of use 1**
  When the RND-ZERO signal is output for every rotation of the output shaft
  (When the wrap range is 1,800 revolutions and the gear ratio of a geared motor is 5)

$$\text{The number of the RND-ZERO output in wrap range} = \frac{\text{Wrap setting range}}{\text{Gear ratio}} = \frac{1{,}800}{5} = 360$$

This example of use can check that the position of the motor is in the home. With a geared motor, it can be used as a phase Z signal that outputs one pulse for every rotation.

- **Example of use 2**
  When the moving range is evenly divided by 90 degrees and the RND-ZERO signal is output for a certain travel amount
  (When the wrap range is 1,800 revolutions and the gear ratio of a motorized actuator is 18)

$$\text{Resolution of movable range} = \frac{360°}{90°} = 4$$

$$\text{The number of the RND-ZERO output in wrap range} = \frac{\text{Wrap setting range}}{\text{Gear ratio}} \times \text{Resolution of movable range} = \frac{1{,}800}{18} \times 4 = 400$$

This example of use can output a signal regularly during operation of the motorized actuator or hollow rotary actuator. It can be used to synchronize multiple motors and to operate by inputting the RND-ZERO signal to other system.

Related parameter

MEXE02 code	Name	Description	Setting range	Initial value
p5	The number of the RND-ZERO output in wrap range	Sets the number of times to turn the RND-ZERO output ON in the wrap range.	1 to 536,870,911 divisions	1

6-6 Mechanism limit

Depending on the motorized actuator, the mechanism limit (mechanical end) has been stored in the ABZO sensor at the time of shipment. (Fixed value)
If a product having set the home reached the mechanism limit stored in the ABZO sensor, an alarm of Mechanical overtravel will be generated.
The details of the ABZO information (fixed value) can be checked using the unit information monitor of the **MEXE02** software.
The ABZO information (fixed value) is normally used, but if it is necessary to disable, change the "Mechanism limit parameter setting" parameter to "1: Disable."

Related parameter

MEXE02 code	Name	Description	Setting range	Initial value
p5	Mechanism limit parameter setting	Disables the ABZO setting of the mechanism limit parameter.	0: Follow ABZO setting 1: Disable	0

Note If the "Mechanism limit parameter setting" parameter is changed to "1: Disable," the alarm function using the ABZO information (fixed value) is also disabled.

6-7 Mechanism protection

In the case of a motorized actuator, the maximum values for the starting speed and operating speed are stored in the ABZO sensor at the time of shipment. (Fixed value)
If the motor is operated in excess of the fixed value of the ABZO sensor, an alarm of Operation data error will be generated.
The details of the ABZO information (fixed value) can be checked using the unit information monitor of the **MEXE02** software.
The ABZO information (fixed value) is normally used, but if it is necessary to disable, change the "Mechanism protection parameter setting" parameter to "1: Disable."

Related parameter

MEXE02 code	Name	Description	Setting range	Initial value
p5	Mechanism protection parameter setting	Disables the ABZO setting of the mechanism protection parameter.	0: Follow ABZO setting 1: Disable	0

Note If the "Mechanism protection parameter setting" parameter is changed to "1: Disable," the alarm function using the ABZO information (fixed value) is also disabled.

6-8 Coordinate information monitor function

There are two methods to synchronize the coordinate system managed by the ABZO sensor and that of the host controller as shown below.

- Clear the encoder counter of the host controller to 0 after high-speed return-to-home operation, position preset, or return-to-home operation is completed.
- Match the values of the present position of the ABZO sensor and the encoder counter value of the host controller with the coordinate information monitor function or via EtherNet/IP.
  The coordinate information monitor function is equipped with the I/O position output function and the pulse request function.

■ I/O position output function

The I/O position output function is a function to send the position information or alarm information to the host controller via clock synchronization type serial communication (SPI communication) according to the monitor request inputs (MON-REQ0, MON-REQ1). When a pulse is input to the MON-CLK input, the information output from MON-OUT is switched when the pulse is started. Communication is executed from the least significant bit (LSB first). Data whose position information is 32 bits (*) and alarm information 8 bits (*) are sent, and checksum is sent finally. The checksum is the lower 8 bits obtained by dividing the transmitted data by 1 byte and adding each value.

* Data is represented in a complement of 2.

Related parameters

MEXE02 code	Name	Description	Setting range	Initial value
p7	MON-REQ0 output data selection	Selects information to be output by the I/O position output function when the MON-REQ input is turned ON.	1: Feedback position 2: Feedback position (32-bit counter) 3: Command position 4: Command position (32-bit counter) 8: Alarm code (8 bits) 9: Feedback position and alarm code 10: Feedback position (32-bit counter) and alarm code 11: Command position and alarm code 12: Command position (32-bit counter) and alarm code	1
	MON-REQ1 output data selection			8

Information that can be output in the I/O position output function is as follows.

- **Present coordinates**

The coordinates of the present position is sent in 32-bit data.
Set the position information to be output using the "MON-REQ0 output data selection" parameter and the "MON-REQ1 output data selection" parameter.

- Feedback position
  The present position detected by the ABZO sensor is output. When the "Wrap setting" parameter is set to "1: Enable," a value in the wrap range is output.
- Feedback position (32-bit counter)
  The present position detected by the ABZO sensor is output. Regardless of the "Wrap setting" parameter, the value when the wrap setting is disabled is displayed.
- Command position (32 bits)
  The command position of the driver is output. When the "Wrap setting" parameter is set to "1: Enable," a value in the wrap range is output.
- Command position (32-bit counter)
  The command position of the driver is output. Regardless of the "Wrap setting" parameter, the value when the wrap setting is disabled is displayed.

Output example:
When the motor rotates 700 steps from the mechanical home position, in the forward direction (when the settings of the parameters are as shown in the table)

MEXE02 code	Name	Setting value
p5	Electronic gear A	1
	Electronic gear B	1
	Initial coordinate generation & wrap setting range	1.0 rev
	Initial coordinate generation & wrap range offset ratio	50.00 %
	Initial coordinate generation & wrap range offset value	0 step

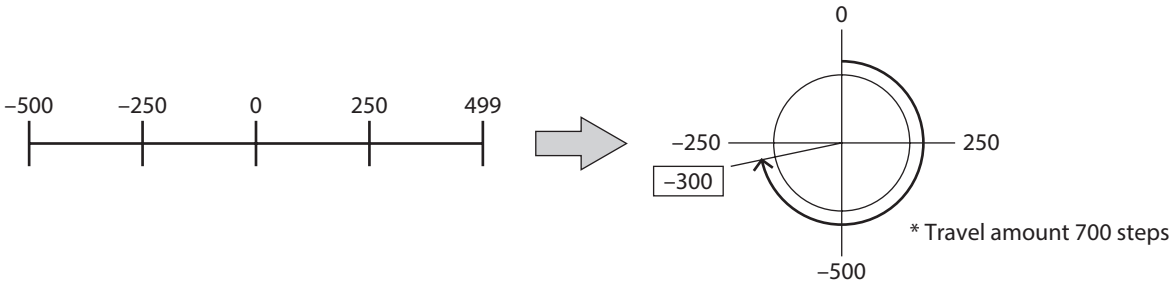
Since the wrap range is –500 to 499 steps, the present coordinates are output as follows.

Command position (32 bits): –300 steps

Binary number	1111 1111 1111 1111 1111 1110 1101 0100
Transmission data (LSB first)	0010 1011 0111 1111 1111 1111 1111 1111

Command position (32-bit counter): 700 steps

Binary number	0000 0000 0000 0000 0000 0010 1011 1100
Transmission data (LSB first)	0011 1101 0100 0000 0000 0000 0000 0000



- **Alarm code**

The alarm code presently generated is sent in 8-bit data. (⇨"2-4 Alarm list" on p.247)

Output example: When an alarm of Overload (alarm code 30h) is generated.

Binary number	0011 0000
Transmission data (LSB first)	0000 1100

- **Present position plus alarm code**

  The present position information and the alarm code are send in succession.

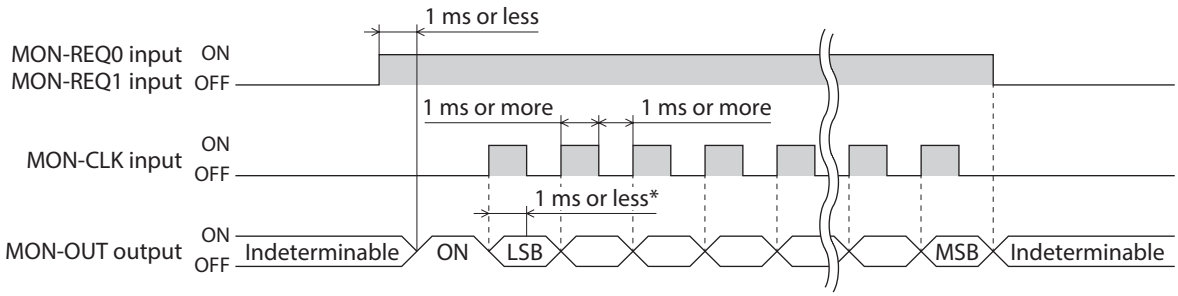
  Output example:
  When the feedback position and the alarm code are output while an alarm of Hardware overtravel (alarm code: 66h) is generated with the feedback position 300 steps.

  - Checksum
    Feedback position : 300 steps = 0000 0000 0000 0000 0000 0001 0010 1100
    Alarm code : 66h = 0110 0110
    Checksum : 0000 0000 + 0000 0000 + 0000 0001 + 0010 1100 + 0110 0110 = 1001 0011
  - Data output from the driver

0011 0100 1000 0000 0000 0000 0000 0000	0110 0110	1100 1001
Feedback position	Alarm code	Check sum

- **Timing chart**

  1. When the MON-REQ0 input or the MON-REQ1 input is turned ON, the command position, the feedback position, and the alarm code at that moment are recorded, and the MON-OUT output is turned ON.
  2. Check the MON-OUT output is turned ON and input the clock signal to the MON-CLK input.
  3. Information set in the "MON-REQ0 output data selection" and "MON-REQ1 output data selection" parameters is output from the MON-OUT output in synchronization with the clock signal.
  4. When the necessary information has been obtained, turn the MON-REQ input OFF.
     Data is output in LSB first. If the checksum does not need to be checked, the output can be canceled.



* It is the time from the detection of the ON edge of the MON-CLK input to actual settlement of the status of the MON-OUT output.

memo The maximum frequency of the clock signal to be input to the MON-CLK input is 500 Hz.

■ Pulse request function

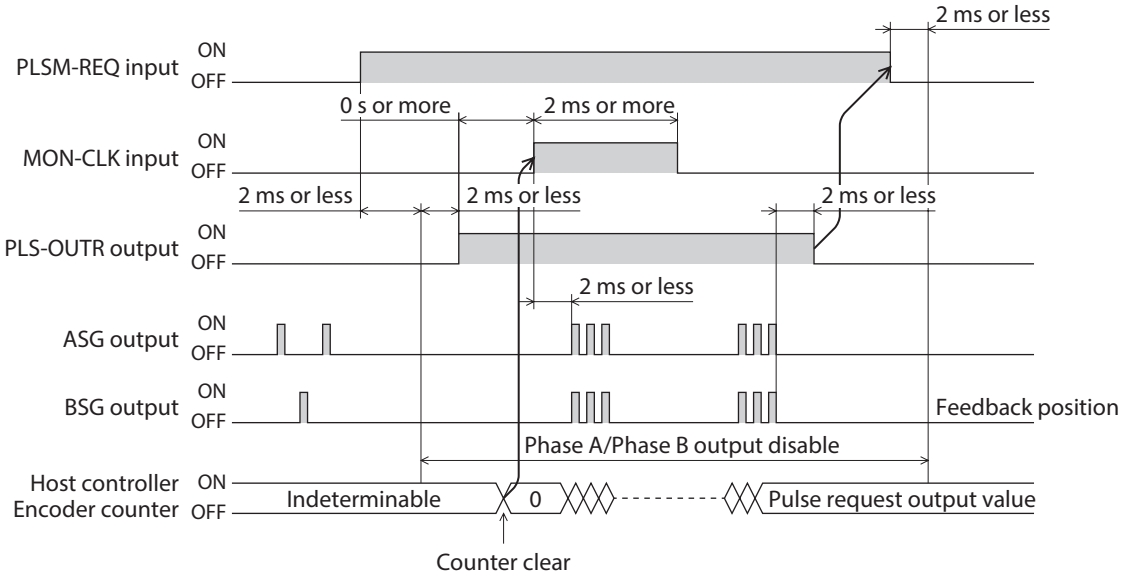
The pulse request function is a function to transmit the present position (absolute position) to the host controller using the phase A and phase B outputs. When the encoder counter of the host controller and the phase A and phase B outputs of the driver are connected to execute the pulse request function, the present position of the driver can be output as phase A and phase B pulses. If the encoder counter of the host controller is set to "0" beforehand, the coordinate system of the ABZO sensor and that of the host controller can be easily synchronized.

Related parameters

MEXE02 code	Name	Description	Setting range	Initial value
p7	PLS-OUT output data selection	Selects the information to be output by the pulse request function.	0: Command position 1: Command position (32-bit counter) 2: Feedback position 3: Feedback position (32-bit counter)	0
	PLS-OUT maximum frequency	Sets the frequency of the output pulse used with the pulse request function.	1 to 10,000 (1=0.1 kHz)	100

● Timing chart

1. When the PLSM-REQ input is turned ON, the ASG output and the BSG output at that moment are latched, and the present command position and feedback position are recorded. Before the PLSM-REQ input is turned OFF, the present feedback position is not output from the ASG output and the BSG output even if the motor shaft rotates.
2. Check the PLS-OUTR output is turned ON and clear the encoder counter of the host controller to "0."
3. Turn the MON-CLK input ON.
   When information set in the "PLS-OUT output data selection" parameter is output from the ASG output and the BSG output, the PLS-OUTR output is turned OFF.
4. Check the PLS-OUTR output has been turned OFF and turn the PLSM-REQ input OFF.



Note Do not operate the motor while the coordinate information is output. If the motor is operated, the present position cannot be synchronized between the ABZO sensor and the host controller.

7 Torque limiting function

The maximum output torque of the motor can be limited.
Sets when limiting the output torque of the motor according to a load.
When the TRQ-LMT input is turned ON, the torque limiting function is enabled.

Related operation data

MEXE02 code	Name	Description	Setting range	Initial value
p1	Torque limiting value	Sets the torque limiting value.	0 to 10,000 (1 = 0.1 %)	1,000

Related parameters

MEXE02 code	Name	Description	Setting range	Initial value
p4	Torque limit setting at motor standstill	Selects how to limit the operating torque when the motor stops. When "0: Follow the selection number" is selected, the torque limiting value selected when the motor stops is applied. When "1: Maintain the previous operating torque limit" is selected, the torque limiting value having been executed before the motor stops is applied. If the motor puts into a non-excitation state, the torque limiting value being selected in the operation data is applied.	0: Follow the selection number 1: Maintain the previous operating torque limit (reset by excitation OFF)	1
p5	JOG/HOME/ZHOME torque limit value	Sets the torque limiting value.	0 to 10,000 (1 = 0.1 %)	1,000
p7	STOP input stopping torque limit value	Sets the torque limiting value when the STOP input is turned ON. When "0: Use profile torque limit continuously" is set, the torque limiting value of the operation data being executed is applied.	0: Use profile torque limit continuously 1 to 10,000 (1 = 0.1 %)	0

Related Output data

Byte	Name	Description	Setting range	Initial value
24, 25	Direct data operation torque limiting value	This is used to set the torque limiting value for direct data operation.	0 to 10,000 (1 = 0.1 %)	1,000

8 Driver control mode

Two control modes are available in the driver and can be set using the parameter.

- **Position control mode**

  This is used to control the position of the motor.
  Even if a load exceeding the motor torque is applied during operation, the command position will reach the target position.

- **Speed control mode**

  This is used to control the speed of the motor.
  If a load exceeding the motor torque is applied during operation, the command position may not reach the target position because the position deviation is fixed (slip occurs).
  Since the position deviation is fixed, an alarm of Excessive position deviation will not be generated even if the motor is in the push-motion status.

- **Related parameter**

MEXE02 code	Name	Description	Setting range	Initial value
p4	Driver control mode	Sets the control mode of the driver.	0: Position control mode 1: Speed control mode	0

memo The "Driver control mode" parameter is effective for drivers of version 2.00 or later.

4 I/O signals

This part explains input signals and output signals.

◆Table of contents

1 Overview of I/O signals

1-1 Overview of input signals

■ Direct input

Direct input (DIN) is a method in which a signal is input directly by connecting the I/O cable to the connector.
If the composite input function is used, a single input can turn two signals ON simultaneously, achieving saving of wiring.

Name	Description
Input function	Selects an input signal to be assigned to DIN.
Inverting mode	ON-OFF setting of the signal can be changed.
ON signal dead-time	The input signal is turned ON when the time having set is exceeded. This can be used for taking measures to eliminate noise or for adjusting the timing between devices.
1-shot signal	The input signal having been turned ON is automatically turned OFF after 250 µs.
Composite input function	When DIN is turned ON, the signal selected here is also turned ON.

Setting example: When the FW-POS input is turned ON, continuous operation is performed with the operation data No. 1.

If parameters are set as shown in the table, operation of the operation data No. 1 is executed when the FW-POS input is turned ON.

MEXE02 code	Name	Setting value
p8	Input function	FW-POS
	Inverting mode	Non invert
	ON signal dead-time	0 ms
	1-shot signal	1-shot signal function is disabled
	Composite input function	M0

■ Virtual input

Virtual input (VIR-IN) is a method in which a signal set in virtual input is input by using output of a signal set in the virtual input source.
No wiring is required and this function can be used together with direct I/O because of the input method using the internal I/O. Up to four virtual inputs can be set.

Name	Description
Virtual input function	Selects an input signal to be assigned to VIR-IN. When a signal of the virtual input source is output, VIR-IN is also turned ON.
Virtual input source selection	Selects an output signal to be the trigger of VIR-IN.
Virtual input inverting mode	ON-OFF setting of the signal can be changed.
Virtual input ON signal dead time	The input signal is turned ON when the time having set is exceeded. This can be used for taking measures to eliminate noise or for adjusting the timing between devices.
Virtual input 1 shot signal mode	The input signal having been turned ON is automatically turned OFF after 250 µs.

Setting example: When the TLC output is turned ON, turn the STOP input ON to stop the motor.

If parameters are set as shown in the table, the motor stops when the output torque reaches the upper limit.

MEXE02 code	Name	Setting value
p11	Virtual input (VIR-IN0) function	STOP
	Virtual input (VIR-IN0) source selection	TLC
	Virtual input (VIR-IN0) inverting mode	Non invert
	Virtual input (VIR-IN0) ON signal dead time	0 ms
	Virtual input (VIR-IN0) 1 shot signal mode	1-shot signal function is disabled

1-2 Overview of output signals

■ Direct output

Direct output (DOUT) is a method in which a signal is output directly by connecting the I/O cable to the connector. If the composite output function is used, the logical combination result of two output signals can be output in a single signal.

Name	Description
(Normal) Output function	Selects an output signal to be assigned to DOUT.
Inverting mode	ON-OFF setting of the signal can be changed.
OFF delay time	The output signal is turned OFF when the time having set is exceeded. This can be used for taking measures to eliminate noise or for adjusting the timing between devices.
Composite logical combination	Sets the logical combination [AND (logical product) or OR (logical sum)] of the composite output function.
Composite output function	Selects an output signal for logical operation with the signal of DOUT. When logical combination of the two signals has been established, DOUT is turned ON.
Composite inverting mode	Changes ON-OFF setting of the signal selected in the composite output function.

Setting example: When the HOME-END output and the AREA0 output are turned ON, HOME-END (DOUT0) is output.

If parameters are set as shown in the table, the status of completing return-to-home and reaching to the specified position can be checked by a single output signal (DOUT0).

MEXE02 code	Name	Setting value
p9	(Normal) Output function	HOME-END
	Inverting mode	Non invert
	OFF delay time	0 ms
	Composite logical combination	AND
	Composite output function	AREA0
	Composite inverting mode	Non invert

■ User output

User output (USR-OUT) is a method in which a signal is output by using the internal I/O.
Assign two types of signals (A and B) to a single user output. USR-OUT is output when the logical combination of A and B is established.
No wiring is required and this function can be used together with direct I/O. Up to two user outputs can be set.

Name	Description
User output source A function	Selects the output function A.
User output source A inverting mode	Changes ON/OFF of the output function A.
User output source B function	Selects the output function B.
User output source B inverting mode	Changes ON/OFF of the output function B.
User output logical operation	Sets the logical combination [AND (logical product) or OR (logical sum)] of the output function sources A and B.

Setting example: When the IN-POS output and the READY output are turned ON, USR-OUT is output.

If parameters are set as shown in the table, the status of completing positioning operation and being ready to start operation can be checked by a single output signal (USR-OUT0).

MEXE02 code	Name	Setting value
p11	User output (USR-OUT0) source A function	IN-POS
	User output (USR-OUT0) source A inverting mode	Non invert
	User output (USR-OUT0) source B function	READY
	User output (USR-OUT0) source B inverting mode	Non invert
	User output (USR-OUT0) logical operation	AND

1-3 Setting contents of input signals and output signals

■ Direct input

● Input function

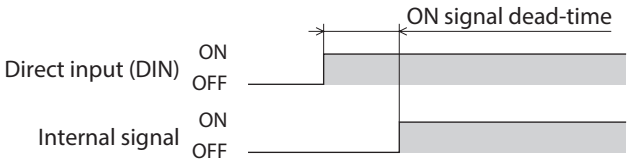
MEXE02 code	Name	Description	Setting range	Initial value
p8	DIN0 input function	Selects an input signal to be assigned to DIN.	Input signals list ⇨p.125	37: ZHOME
	DIN1 input function			1: FREE
	DIN2 input function			5: STOP
	DIN3 input function			8: ALM-RST
	DIN4 input function			48: FW-JOG
	DIN5 input function			49: RV-JOG

● Change of ON-OFF setting of input signals

MEXE02 code	Name	Description	Setting range	Initial value
p8	DIN0 inverting mode	Changes ON-OFF setting of DIN.	0: Non invert 1: Invert	0
	DIN1 inverting mode			0
	DIN2 inverting mode			0
	DIN3 inverting mode			0
	DIN4 inverting mode			0
	DIN5 inverting mode			0

- **ON signal dead-time**

MEXE02 code	Name	Description	Setting range	Initial value
p8	DIN0 ON signal dead-time	Sets the ON signal dead-time of DIN.	0 to 250 ms	0
	DIN1 ON signal dead-time			0
	DIN2 ON signal dead-time			0
	DIN3 ON signal dead-time			0
	DIN4 ON signal dead-time			0
	DIN5 ON signal dead-time			0



- **1-shot signal**

MEXE02 code	Name	Description	Setting range	Initial value
p8	DIN0 1 shot signal	Sets the 1-shot signal function of DIN.	0: 1-shot signal function is disabled 1: 1-shot signal function is enabled	0
	DIN1 1 shot signal			0
	DIN2 1 shot signal			0
	DIN3 1 shot signal			0
	DIN4 1 shot signal			0
	DIN5 1 shot signal			0

Note The HMI input is a signal that is recommended to use as normally closed (always ON). When the HMI input is assigned to DIN, use in a state of keeping the "1-shot signal" parameter as "0: 1-shot signal function is disabled."

- **Composite input function**

MEXE02 code	Name	Description	Setting range	Initial value
p8	DIN0 composite input function	Selects an input signal to be assigned to DIN as the composite input function.	Input signals list ⇨p.125	0: No function
	DIN1 composite input function			0: No function
	DIN2 composite input function			0: No function
	DIN3 composite input function			0: No function
	DIN4 composite input function			0: No function
	DIN5 composite input function			0: No function

■ Virtual input

● Virtual input function

MEXE02 code	Name	Description	Setting range	Initial value
p11	Virtual input (VIR-IN0) function	Selects an input signal to be assigned to VIR-IN.	Input signals list ⇨p.125	0: No function
	Virtual input (VIR-IN1) function			0: No function
	Virtual input (VIR-IN2) function			0: No function
	Virtual input (VIR-IN3) function			0: No function

● Virtual input source selection

MEXE02 code	Name	Description	Setting range	Initial value
p11	Virtual input (VIR-IN0) source selection	Selects an output signal to be the trigger of VIR-IN.	Output signals list ⇨p.127	128: CONST-OFF
	Virtual input (VIR-IN1) source selection			128: CONST-OFF
	Virtual input (VIR-IN2) source selection			128: CONST-OFF
	Virtual input (VIR-IN3) source selection			128: CONST-OFF

● Virtual input inverting mode

MEXE02 code	Name	Description	Setting range	Initial value
p11	Virtual input (VIR-IN0) inverting mode	Changes ON-OFF setting of VIR-IN.	0: Non invert 1: Invert	0
	Virtual input (VIR-IN1) inverting mode			0
	Virtual input (VIR-IN2) inverting mode			0
	Virtual input (VIR-IN3) inverting mode			0

● Virtual input ON signal dead time

MEXE02 code	Name	Description	Setting range	Initial value
p11	Virtual input (VIR-IN0) ON signal dead time	Sets the ON signal dead-time of VIR-IN.	0 to 250 ms	0
	Virtual input (VIR-IN1) ON signal dead time			0
	Virtual input (VIR-IN2) ON signal dead time			0
	Virtual input (VIR-IN3) ON signal dead time			0

● **Virtual input 1 shot signal mode**

MEXE02 code	Name	Description	Setting range	Initial value
p11	Virtual input (VIR-IN0) 1 shot signal mode	Enables the 1-shot signal function of VIR-IN.	0: 1-shot signal function is disabled 1: 1-shot signal function is enabled	0
	Virtual input (VIR-IN1) 1 shot signal mode			0
	Virtual input (VIR-IN2) 1 shot signal mode			0
	Virtual input (VIR-IN3) 1 shot signal mode			0

■ Direct output

● **(Normal) Output function**

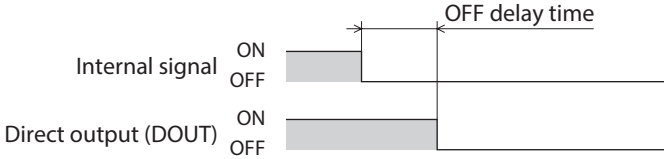
MEXE02 code	Name	Description	Setting range	Initial value
p9	DOUT0 (Normal) output function	Selects an output signal to be assigned to DOUT.	Output signals list ⇨p.127	144: HOME-END
	DOUT1 (Normal) output function			138: IN-POS
	DOUT2 (Normal) output function			0: No function
	DOUT3 (Normal) output function			132: READY
	DOUT4 (Normal) output function			134: MOVE
	DOUT5 (Normal) output function			130: ALM-B

● **Inverting mode**

MEXE02 code	Name	Description	Setting range	Initial value
p9	DOUT0 inverting mode	Changes ON-OFF setting of DOUT.	0: Non invert 1: Invert	0
	DOUT1 inverting mode			0
	DOUT2 inverting mode			0
	DOUT3 inverting mode			0
	DOUT4 inverting mode			0
	DOUT5 inverting mode			0

● **OFF delay time**

MEXE02 code	Name	Description	Setting range	Initial value
p9	DOUT0 OFF delay time	Sets the OFF delay time of DOUT.	0 to 250 ms	0
	DOUT1 OFF delay time			0
	DOUT2 OFF delay time			0
	DOUT3 OFF delay time			0
	DOUT4 OFF delay time			0
	DOUT5 OFF delay time			0



- **Composite logical combination**

MEXE02 code	Name	Description	Setting range	Initial value
p9	DOUT0 composite logical combination	Sets the composite logical combination of DOUT.	0: AND 1: OR	1
	DOUT1 composite logical combination			1
	DOUT2 composite logical combination			1
	DOUT3 composite logical combination			1
	DOUT4 composite logical combination			1
	DOUT5 composite logical combination			1

- **Composite output function**

MEXE02 code	Name	Description	Setting range	Initial value
p9	DOUT0 composite output function	Selects an output signal for logical operation with the signal of DOUT.	Output signals list ⇨p.127	128: CONST-OFF
	DOUT1 composite output function			128: CONST-OFF
	DOUT2 composite output function			128: CONST-OFF
	DOUT3 composite output function			128: CONST-OFF
	DOUT4 composite output function			128: CONST-OFF
	DOUT5 composite output function			128: CONST-OFF

- **Composite inverting mode**

MEXE02 code	Name	Description	Setting range	Initial value
p9	DOUT0 composite inverting mode	Changes ON-OFF setting of the composite output function of DOUT.	0: Non invert 1: Invert	0
	DOUT1 composite inverting mode			0
	DOUT2 composite inverting mode			0
	DOUT3 composite inverting mode			0
	DOUT4 composite inverting mode			0
	DOUT5 composite inverting mode			0

■ User output

● User output source A function

MEXE02 code	Name	Description	Setting range	Initial value
p11	User output (USR-OUT0) source A function	Sets the output source A of USR-OUT.	Output signals list ⇨p.127	128: CONST-OFF
	User output (USR-OUT1) source A function			128: CONST-OFF

● User output source A inverting mode

MEXE02 code	Name	Description	Setting range	Initial value
p11	User output (USR-OUT0) source A inverting mode	Changes ON/OFF setting of the output source A of USR-OUT.	0: Non invert 1: Invert	0
	User output (USR-OUT1) source A inverting mode			0

● User output source B function

MEXE02 code	Name	Description	Setting range	Initial value
p11	User output (USR-OUT0) source B function	Sets the output source B of USR-OUT.	Output signals list ⇨p.127	128: CONST-OFF
	User output (USR-OUT1) source B function			128: CONST-OFF

● User output source B inverting mode

MEXE02 code	Name	Description	Setting range	Initial value
p11	User output (USR-OUT0) source B inverting mode	Changes ON/OFF setting of the output source B of USR-OUT.	0: Non invert 1: Invert	0
	User output (USR-OUT1) source B inverting mode			0

● User output logical operation

MEXE02 code	Name	Description	Setting range	Initial value
p11	User output (USR-OUT0) logical operation	Sets the logical combination of the output sources A and B of USR-OUT.	0: AND 1: OR	1
	User output (USR-OUT1) logical operation			1

2 Signals list

Assign I/O signals using the **MEXE02** software or via industrial network.

2-1 Input signals list

To assign signals via EtherNet/IP, use the "Assignment number" in the table instead of the signal name.
Refer to "4 Input signals" on p.138 for details about each signal.

Assignment number	Signal name	Function
0	Not used	Set when the input terminal is not used.
1	FREE	Shut off the motor current to put the motor into a non-excitation state. In the case of an electromagnetic brake motor, the electromagnetic brake is released.
2	S-ON	Put the motor into an excitation state.
3	CLR	Clear the deviation (position deviation) between the command position and the feedback position.
4	STOP-SOFF	Stop the motor to put the motor into a non-excitation state.
5	STOP	Stop the motor.
7	BREAK-ATSQ	Switch from automatic sequential to manual sequential. Continuous sequential operation is not changed.
8	ALM-RST	Reset the alarm being generated presently.
9	P-PRESET	Rewrite the mechanical home to the present position.
10	EL-PRST	Switch to the coordinate system with the electrical home as the home.
12	ETO-CLR	If the ETO-CLR input is turned ON after both the HWTO1 and HWTO2 inputs are turned ON to release the power removal function, the motor puts into an excitation state.
13	LAT-CLR	Clear the latch information.
14	INFO-CLR	Clear the information status.
16	HMI	Release the function limitation of the **MEXE02** software.
22	TRQ-LMT	Execute the torque limiting.
23	SPD-LMT	Execute the speed limiting.
26	FW-BLK	Stop the operation in the forward direction.
27	RV-BLK	Stop the operation in the reverse direction.
28	FW-LS	This is a signal to be input from the limit sensor in the forward direction.
29	RV-LS	This is a signal to be input from the limit sensor in the reverse direction.
30	HOMES	This is a signal input from the mechanical home sensor.
31	SLIT	This is a signal to be input from the slit sensor.
32	START	Execute stored data operation.
33	SSTART	Execute stored data operation. In manual sequential operation, operation of the next data number is executed.
35	NEXT	Transition to the linked operation data number forcibly.
36	HOME	Execute return-to-home operation.
37	ZHOME	Execute high-speed return-to-home operation.
40	D-SEL0	Execute direct data operation.
41	D-SEL1	
42	D-SEL2	
43	D-SEL3	
44	D-SEL4	
45	D-SEL5	
46	D-SEL6	

Assignment number	Signal name	Function
47	D-SEL7	Execute direct data operation.
48	FW-JOG	Execute JOG operation in the forward direction.
49	RV-JOG	Execute JOG operation in the reverse direction.
50	FW-JOG-H	Execute high-speed JOG operation in the forward direction.
51	RV-JOG-H	Execute high-speed JOG operation in the reverse direction.
52	FW-JOG-P	Execute inching operation in the forward direction.
53	RV-JOG-P	Execute inching operation in the reverse direction.
54	FW-JOG-C	Execute combined JOG operation in the forward direction.
55	RV-JOG-C	Execute combined JOG operation in the reverse direction.
56	FW-POS	Execute continuous operation in the forward direction.
57	RV-POS	Execute continuous operation in the reverse direction.
64	M0	Select the operation data number using eight bits.
65	M1	
66	M2	
67	M3	
68	M4	
69	M5	
70	M6	
71	M7	
75	TEACH	Perform teaching.
76	MON-REQ0	Select information to be output by the I/O position output function.
77	MON-REQ1	
78	MON-CLK	Send information of the coordinate information monitor function.
79	PLSM-REQ	Enable the pulse request function.
80	R0	These are general signals.
81	R1	
82	R2	
83	R3	
84	R4	
85	R5	
86	R6	
87	R7	
88	R8	
89	R9	
90	R10	
91	R11	
92	R12	
93	R13	
94	R14	
95	R15	

2-2 Output signals list

To assign signals via EtherNet/IP, use the "Assignment number" in the table instead of the signal name.
Refer to "5 Output signals" on p.158 for details about each signal.

Assignment number	Signal name	Function
0	Not used	Set when the output terminal is not used.
1	FREE_R	Output in response to an input signal.
2	S-ON_R	
3	CLR_R	
4	STOP-SOFF_R	
5	STOP_R	
7	BREAK-ATSQ_R	
8	ALM-RST_R	
9	P-PRESET_R	
10	EL-PRST_R	
12	ETO-CLR_R	
13	LAT-CLR_R	
14	INFO-CLR_R	
16	HMI_R	
22	TRQ-LMT_R	
23	SPD-LMT_R	
26	FW-BLK_R	
27	RV-BLK_R	
28	FW-LS_R	
29	RV-LS_R	
30	HOMES_R	
31	SLIT_R	
32	START_R	
33	SSTART_R	
35	NEXT_R	
36	HOME_R	
37	ZHOME_R	
40	D-SEL0_R	
41	D-SEL1_R	
42	D-SEL2_R	
43	D-SEL3_R	
44	D-SEL4_R	
45	D-SEL5_R	
46	D-SEL6_R	
47	D-SEL7_R	
48	FW-JOG_R	
49	RV-JOG_R	
50	FW-JOG-H_R	
51	RV-JOG-H_R	
52	FW-JOG-P_R	
53	RV-JOG-P_R	
54	FW-JOG-C_R	
55	RV-JOG-C_R	

Assignment number	Signal name	Function
56	FW-POS_R	Output in response to an input signal.
57	RV-POS_R	
64	M0_R	
65	M1_R	
66	M2_R	
67	M3_R	
68	M4_R	
69	M5_R	
70	M6_R	
71	M7_R	
75	TEACH_R	
76	MON-REQ0_R	
77	MON-REQ1_R	
78	MON-CLK_R	
79	PLSM-REQ_R	
80	R0_R	
81	R1_R	
82	R2_R	
83	R3_R	
84	R4_R	
85	R5_R	
86	R6_R	
87	R7_R	
88	R8_R	
89	R9_R	
90	R10_R	
91	R11_R	
92	R12_R	
93	R13_R	
94	R14_R	
95	R15_R	
128	CONST-OFF	Output an OFF state all the time.
129	ALM-A	Output the alarm status of the driver (normally open).
130	ALM-B	Output the alarm status of the driver (normally closed).
131	SYS-RDY	Output when the control power supply of the driver is turned on.
132	READY	Output when the driver is ready to operate.
134	MOVE	Output while the motor operates.
135	INFO	Output the information status of the driver.
136	SYS-BSY	Output when the driver is in an internal processing state.
137	ETO-MON	Output after the HWTO1 input or the HWTO2 input is turned OFF until the motor is excited.
138	IN-POS	Output when positioning operation is completed.
139	ZV	Output when the feedback speed reaches the speed 0.
140	TLC	Output when the output torque reaches the maximum output torque or the torque limiting value.
141	VA	Output when the operating speed reaches the target speed.
142	SON-MON	Output when the motor is in an excitation state.

Assignment number	Signal name	Function
144	HOME-END	Output when high-speed return-to-home operation or return-to-home operation is completed, or position preset is executed.
145	ABSPEN	Output when coordinates have been set.
146	ELPRST-MON	Output when the electrical home coordinates are enabled.
149	PRST-DIS	After preset, this signal is turned ON when preset is required again before the motor is operated.
150	PRST-STLD	Output when the mechanical home has been set.
151	ORGN-STLD	Output when the mechanical home suitable to the product is set at the time of factory shipment.
152	RND-OVF	The output is inverted when the wrap range is exceeded. (Toggle action)
153	FW-SLS	Output when the software limit in the forward direction is reached.
154	RV-SLS	Output when the software limit in the reverse direction is reached.
155	ZSG	Output every time the feedback position of the motor rotates by one revolution from the position having preset.
156	RND-ZERO	Output if the motor is at the home of the wrap range when the "Wrap setting" parameter is set to "1: Enable."
159	MAREA	Output when the motor is within the area that was set to the operation data.
160	AREA0	Output when the motor is within the area.
161	AREA1	
162	AREA2	
163	AREA3	
164	AREA4	
165	AREA5	
166	AREA6	
167	AREA7	
168	MPS	Output when the main power supply is in an ON state.
169	MBC	Output when the electromagnetic brake is in a state of releasing the motor shaft.
170	RG	Output when the driver is in a regeneration state.
172	EDM-MON	Output when both the HWTO1 and HWTO2 inputs are turned OFF.
173	HWTOIN-MON	Output when either the HWTO1 input or the HWTO2 input is turned OFF.
176	MON-OUT	Output information corresponding to the request of the I/O position output function.
177	PLS-OUTR	Output when the pulse request function is ready to execute.
180	USR-OUT0	Output a logical product (AND) or a logical sum (OR) for two types of output signals.
181	USR-OUT1	
192	TRQ-LMTD	Output while the torque limiting is performed.
193	SPD-LMTD	Output while the speed limiting is performed.
195	SLIP*	Output when a slip has occurred in the motor.
196	OPE-BSY	Output while internal oscillation is performed.
198	SEQ-BSY	Output while stored data operation is performed.
199	DELAY-BSY	Output when the driver is set in a standby state (Drive-complete delay time, Dwell),
200	JUMP0-LAT	Output when the (Low) I/O event number trigger is detected.
201	JUMP1-LAT	Output when the (High I/O event number trigger is detected.
202	NEXT-LAT	Output when the operation is transitioned by the NEXT input.
204	DCMD-RDY	Output when direct data operation is ready to execute.
205	DCMD-FULL	Output when data is being written to the buffer area of direct data operation.
206	OL-DTCT	Output when the output torque reaches the torque to detect the overload alarm.

Assignment number	Signal name	Function
207	M-CHG	The output is inverted when the operation data number is transitioned. (Toggle action)
208	M-ACT0	Output the status of the M0 input corresponding to the operation data number during operation.
209	M-ACT1	Output the status of the M1 input corresponding to the operation data number during operation.
210	M-ACT2	Output the status of the M2 input corresponding to the operation data number during operation.
211	M-ACT3	Output the status of the M3 input corresponding to the operation data number during operation.
212	M-ACT4	Output the status of the M4 input corresponding to the operation data number during operation.
213	M-ACT5	Output the status of the M5 input corresponding to the operation data number during operation.
214	M-ACT6	Output the status of the M6 input corresponding to the operation data number during operation.
215	M-ACT7	Output the status of the M7 input corresponding to the operation data number during operation.
216	D-END0	Output when the operation of the specified operation data number is completed.
217	D-END1	
218	D-END2	
219	D-END3	
220	D-END4	
221	D-END5	
222	D-END6	
223	D-END7	
224	INFO-USRIO	Output when the corresponding information is generated. Refer to p.260 for the information list.
225	INFO-POSERR	
226	INFO-DRVTMP	
227	INFO-MTRTMP	
228	INFO-OVOLT	
229	INFO-UVOLT	
230	INFO-TLCTIME	
231	INFO-LOAD	
232	INFO-SPD	
233	INFO-START	
234	INFO-ZHOME	
235	INFO-PR-REQ	
237	INFO-EGR-E	
238	INFO-RND-E	
240	INFO-FW-OT	
241	INFO-RV-OT	
242	INFO-CULD0	
243	INFO-CULD1	
244	INFO-TRIP	
245	INFO-ODO	
247	INFO-TRQ	
248	INFO-STLTIME	
252	INFO-DSLMTD	
253	INFO-IOTEST	

Assignment number	Signal name	Function
254	INFO-CFG	Output when the corresponding information is generated. Refer to p.260 for the information list.
255	INFO-RBT	

* It is effective for drivers of version 2.00 or later.

3 Signal type

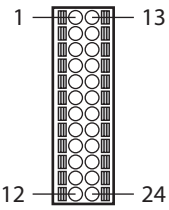
3-1 Direct I/O

Direct I/O is I/O to be accessed via the I/O signal connector.

■ Assignment to input terminals

Use parameters to assign the input signals to the input terminals DIN0 to DIN5.
Refer to "2-1 Input signals list" on p.125 for input signals that can be assigned.

Connector terminal number	Terminal name	Initial value
3	DIN0	ZHOME
4	DIN2	STOP
6	DIN4	FW-JOG



Connector terminal number	Terminal name	Initial value
15	DIN1	FREE
16	DIN3	ALM-RST
18	DIN5	RV-JOG

● **Related parameters**

MEXE02 code	Name	Description	Setting range	Initial value
p8	DIN0 input function	Selects an input signal to be assigned to DIN.	Input signals list ⇨p.125	37: ZHOME
	DIN1 input function			1: FREE
	DIN2 input function			5: STOP
	DIN3 input function			8: ALM-RST
	DIN4 input function			48: FW-JOG
	DIN5 input function			49: RV-JOG

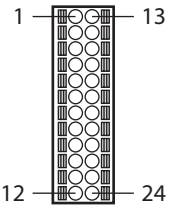
Note

- When the same input signal is assigned to multiple input terminals, the function will be executed if any of the terminals becomes active.
- When the HMI input is not assigned to an input terminal, this input will always be in an ON state. If it is assigned to both direct I/O and remote I/O, the function will be executed only when both of them are turned ON.

■ Assignment to output terminals

Use parameters to assign the output signals to the output terminals DOUT0 to DOUT5.
Refer to "2-2 Output signals list" on p.127 for output signals that can be assigned.

Connector terminal number	Terminal name	Initial value
7	DOUT0	HOME-END
8	DOUT2	Not used
9	DOUT4	MOVE



Connector terminal number	Terminal name	Initial value
19	DOUT1	IN-POS
20	DOUT3	READY
21	DOUT5	ALM-B

● Related parameters

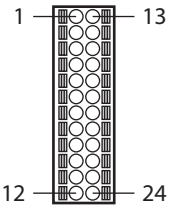
MEXE02 code	Name	Description	Setting range	Initial value
p9	DOUT0 (Normal) output function	Selects an output signal to be assigned to DOUT.	Output signals list ⇨p.127	144: HOME-END
	DOUT1 (Normal) output function			138: IN-POS
	DOUT2 (Normal) output function			0: No function
	DOUT3 (Normal) output function			132: READY
	DOUT4 (Normal) output function			134: MOVE
	DOUT5 (Normal) output function			130: ALM-B

■ Pin assignments list

memo

- All input signals of the driver are photocoupler inputs.
- The status of signals is shown as follows.
  I/O signals for normally open: "ON: Current-carrying" "OFF: Not current-carrying"
  I/O signals for normally closed: "ON: Not current-carrying" "OFF: Current-carrying"

Pin No.	Signal name	Description*
1	NC	No connection
2	NC	No connection
3	IN0	Control input 0 (ZHOME)
4	IN2	Control input 2 (STOP)
5	IN-COM 0-3	IN0 to IN3 inputs common
6	IN4	Control input 4 (FW-JOG)
7	OUT0	Control output 0 (HOME-END)
8	OUT2	Control output 2 (not used)
9	OUT4	Control output 4 (MOVE)
10	OUT-COM	Output common
11	ASG+	Phase A pulse output positive
12	BSG+	Phase B pulse output positive

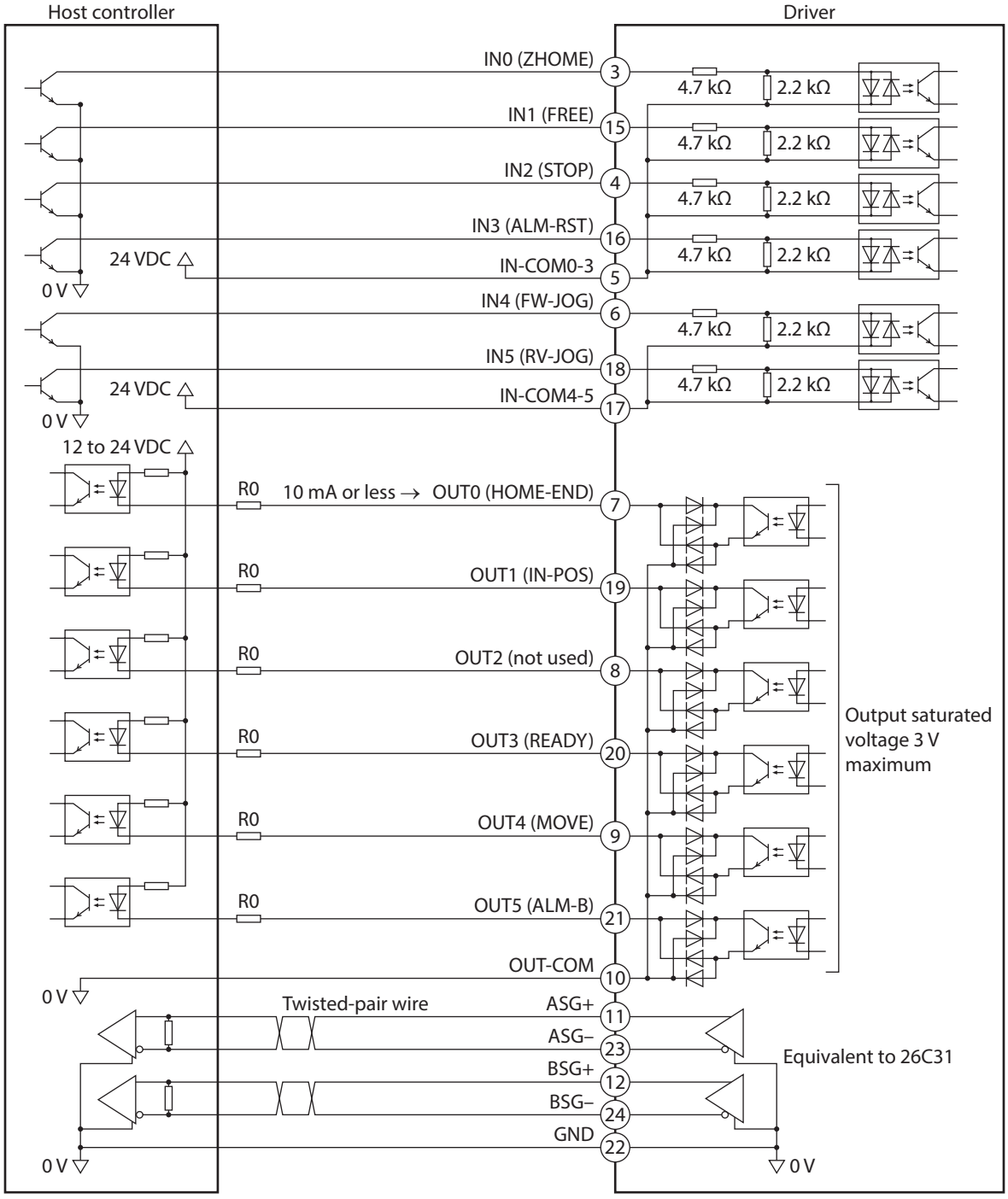


Pin No.	Signal name	Description*
13	NC	No connection
14	NC	No connection
15	IN1	Control input 1 (FREE)
16	IN3	Control input 3 (ALM-RST)
17	IN-COM 4-5	IN4, IN5 Inputs common
18	IN5	Control input 5 (RV-JOG)
19	OUT1	Control output 1 (IN-POS)
20	OUT3	Control output 3 (READY)
21	OUT5	Control output 5 (ALM-B)
22	GND	GND
23	ASG–	Phase A pulse output negative
24	BSG–	Phase B pulse output negative

* ( ): Initial value

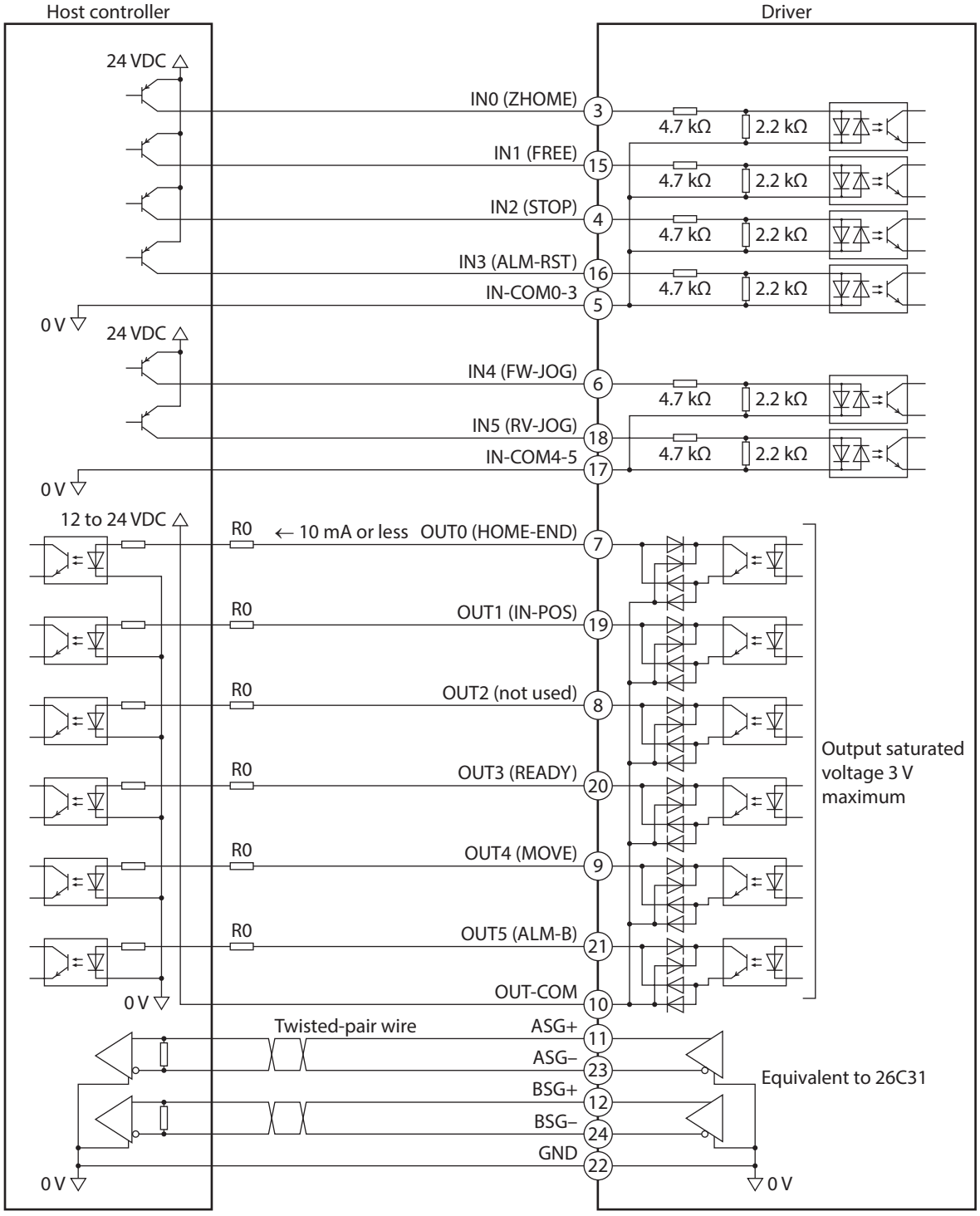
■ Connection example with a current sink output circuit

Values in parentheses ( ) in the figure are initial values.



■ Connection example with a current source output circuit

Values in parentheses ( ) in the figure are initial values.



3-2 Remote I/O

Remote I/O is I/O to be accessed via EtherNet/IP.

■ Assignment to input signals

Use parameters to assign the input signals to R-IN0 to R-IN15 of remote I/O.
Refer to "2-1 Input signals list" on p.125 for input signals that can be assigned.

Remote I/O signal name	Initial value	Remote I/O signal name	Initial value
R-IN0	No function	R-IN8	No function
R-IN1	No function	R-IN9	No function
R-IN2	No function	R-IN10	No function
R-IN3	No function	R-IN11	No function
R-IN4	No function	R-IN12	No function
R-IN5	No function	R-IN13	No function
R-IN6	No function	R-IN14	No function
R-IN7	No function	R-IN15	No function

● Related parameters

MEXE02 code	Name	Description	Setting range	Initial value
p10	R-IN0 input function	Selects an input signal to be assigned to R-IN.	Input signals list ⇨p.125	0: No function
	R-IN1 input function			0: No function
	R-IN2 input function			0: No function
	R-IN3 input function			0: No function
	R-IN4 input function			0: No function
	R-IN5 input function			0: No function
	R-IN6 input function			0: No function
	R-IN7 input function			0: No function
	R-IN8 input function			0: No function
	R-IN9 input function			0: No function
	R-IN10 input function			0: No function
	R-IN11 input function			0: No function
	R-IN12 input function			0: No function
	R-IN13 input function			0: No function
	R-IN14 input function			0: No function
	R-IN15 input function			0: No function

Note

- When the same input signal is assigned to multiple input terminals, the function will be executed if any of the terminals becomes active.
- When the HMI input is not assigned to an input terminal, this input will always be in an ON state. If it is assigned to both direct I/O and remote I/O, the function will be executed only when both of them are turned ON.

■ Assignment to output signals

Use parameters to assign the output signals to R-OUT0 to R-OUT15 of remote I/O.
Refer to "2-2 Output signals list" on p.127 for output signals that can be assigned.

Remote I/O signal name	Initial value
R-OUT0	M0_R
R-OUT1	M1_R
R-OUT2	M2_R
R-OUT3	START_R
R-OUT4	HOME-END
R-OUT5	READY
R-OUT6	INFO
R-OUT7	ALM-A

Remote I/O signal name	Initial value
R-OUT8	SYS-BSY
R-OUT9	AREA0
R-OUT10	AREA1
R-OUT11	AREA2
R-OUT12	ZSG
R-OUT13	MOVE
R-OUT14	IN-POS
R-OUT15	TLC

● **Related parameters**

MEXE02 code	Name	Description	Setting range	Initial value
p10	R-OUT0 output function	Selects an output signal to be assigned to R-OUT.	Output signals list ⇨p.127	64: M0_R
	R-OUT1 output function			65: M1_R
	R-OUT2 output function			66: M2_R
	R-OUT3 output function			32: START_R
	R-OUT4 output function			144: HOME-END
	R-OUT5 output function			132: READY
	R-OUT6 output function			135: INFO
	R-OUT7 output function			129: ALM-A
	R-OUT8 output function			136: SYS-BSY
	R-OUT9 output function			160: AREA0
	R-OUT10 output function			161: AREA1
	R-OUT11 output function			162: AREA2
	R-OUT12 output function			155: ZSG
	R-OUT13 output function			134: MOVE
	R-OUT14 output function			138: IN-POS
	R-OUT15 output function			140: TLC

4 Input signals

4-1 Operation control

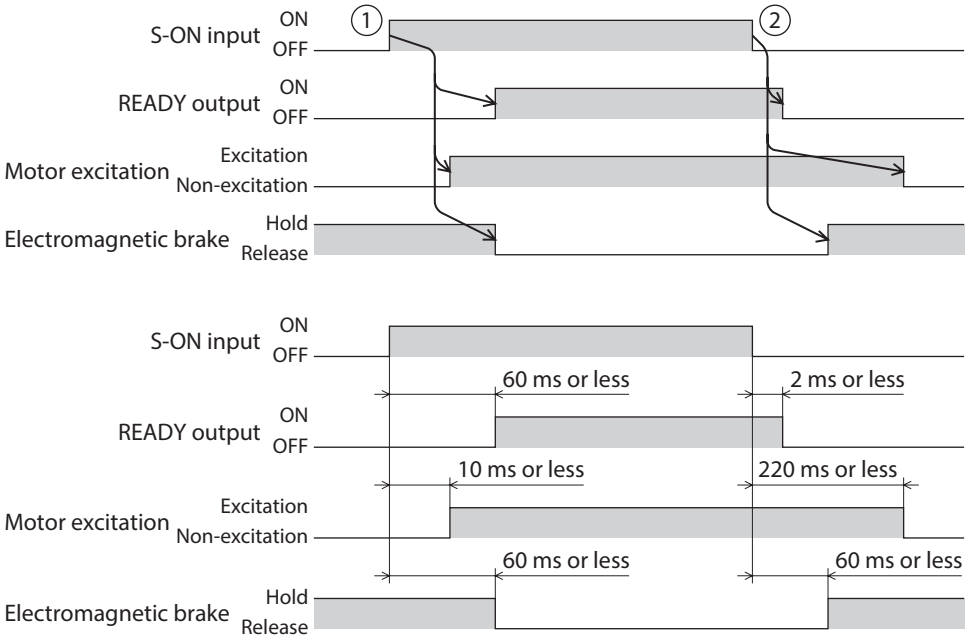
■ Excitation switching signals

These signals are used to switch the motor excitation state between excitation and non-excitation.

- **S-ON input**

Turning the S-ON input ON causes the motor to put into an excitation state. Turning it OFF causes the motor to put into a non-excitation state.

1. When the S-ON input is turned ON, the motor puts into an excitation state to turn the READY output ON.
   In the case of an electromagnetic brake motor, the motor puts into an excitation state before the electromagnetic brake is in a state of releasing the motor shaft.
2. When the S-ON input is turned OFF, the READY output is turned OFF to put the motor into a non-excitation state.
   In the case of an electromagnetic brake motor, the electromagnetic brake is in a state of holding the motor shaft before the motor puts into a non-excitation state.



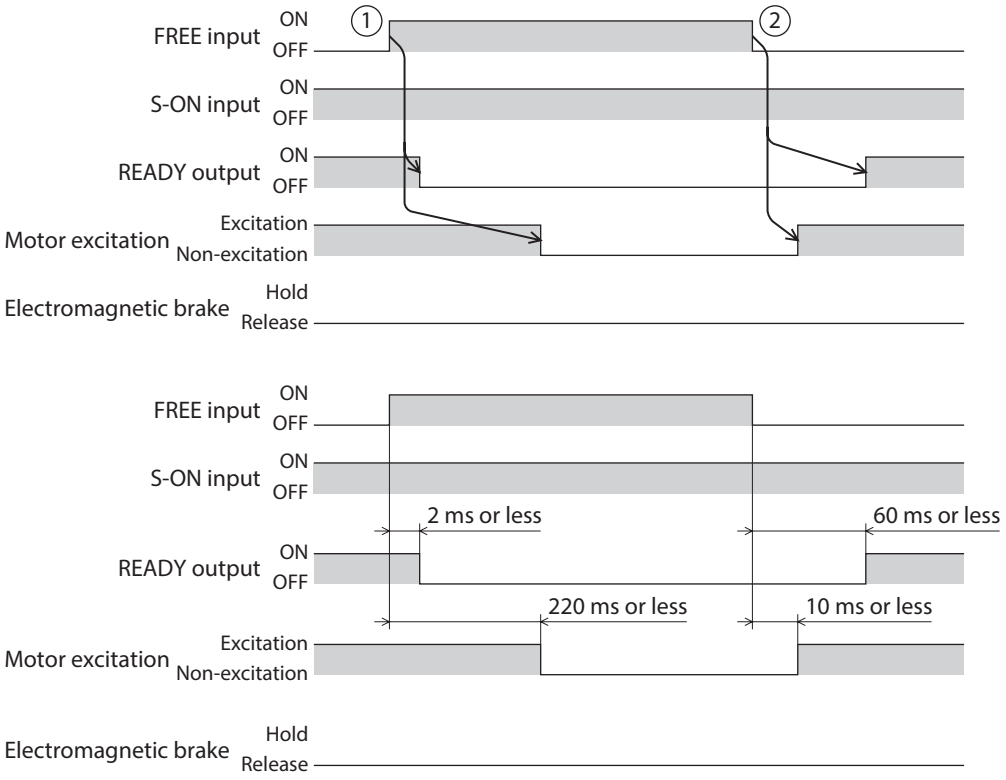
- **FREE input**

Turning the FREE input ON causes the motor current to shut off and the motor to put into a non-excitation state. The output shaft can be rotated manually since the motor holding force is lost. In the case of an electromagnetic brake motor, the electromagnetic brake is also in a sate of releasing the motor shaft.

Note When a load is installed vertically, do not turn the FREE input ON. The motor loses its holding force, and the load may fall.

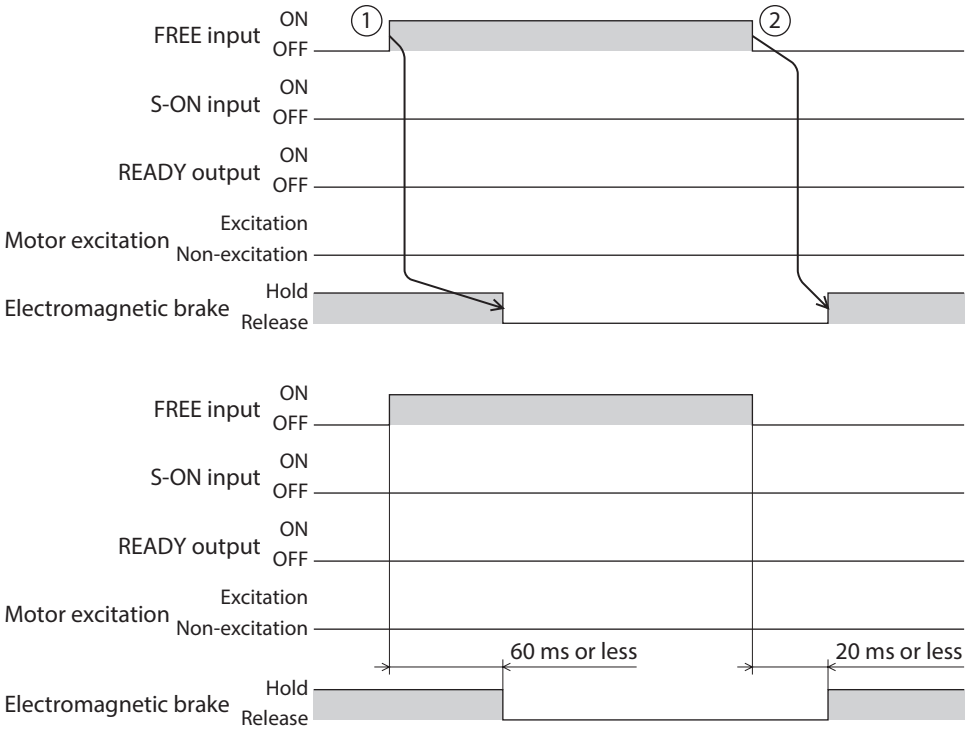
When the motor is in an excitation state

1. When the FREE input is turned ON, the READY output is turned OFF to put the motor into a non-excitation state.
2. When the FREE input is turned OFF, the motor puts into an excitation state to turn the READY output ON.



When the motor is in a non-excitation state

1. When the FREE input is turned ON, the electromagnetic brake is in a state of releasing the motor shaft.
2. When the FREE input is turned OFF, the electromagnetic brake is in a state of holding the motor shaft.



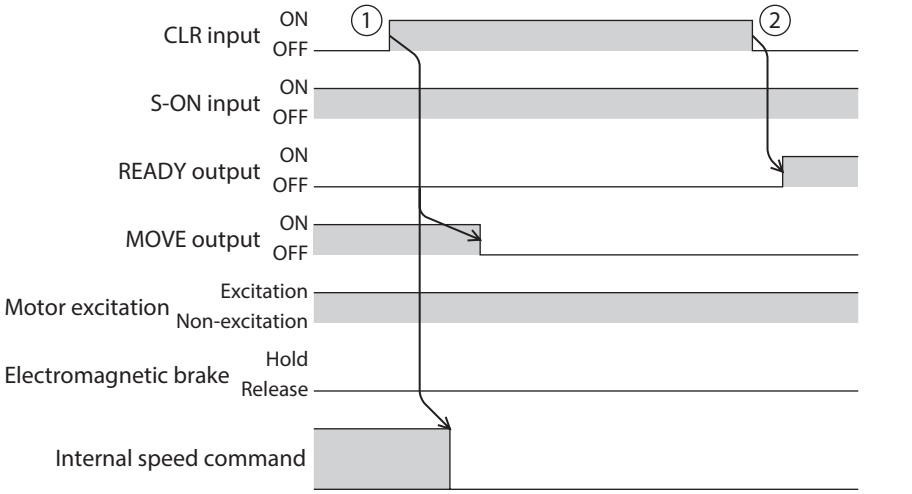
■ Operation stop signals

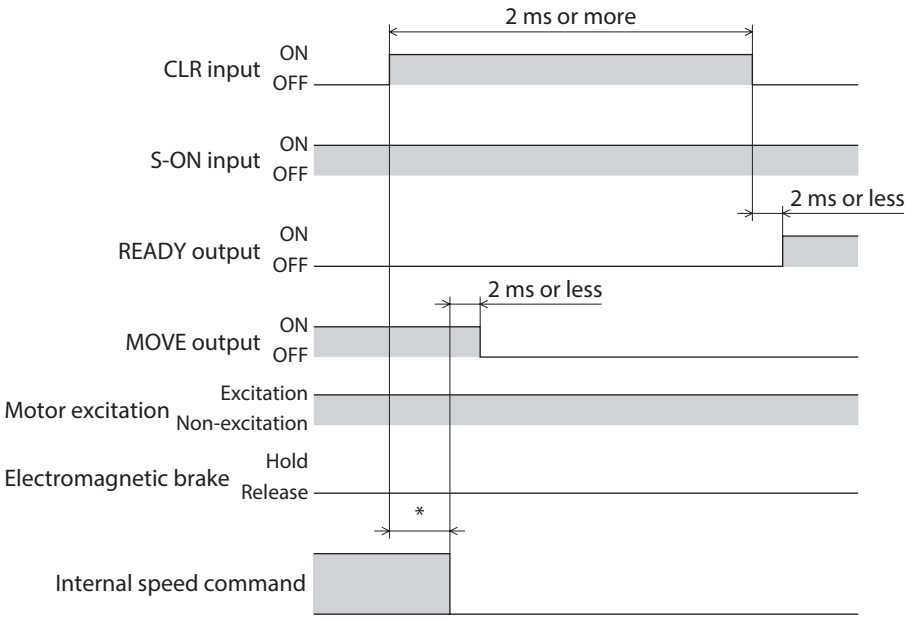
These signals are used to stop the motor operation. The IN-POS output is not turned ON even if the operation stop signal is turned ON.

● CLR input

Turning the CLR input ON causes the position deviation counter to clear and the position deviation between the command position and the feedback position to set to zero. The motor immediately stops at the present feedback position when it is operating. The remaining travel amount is cleared.

1. When the CLR input is turned ON during operation, the motor stops and the position deviation is also cleared.
2. When the CLR input is turned OFF, the READY output is turned ON.





* It varies depending on the driving condition.

- **STOP-SOFF input**

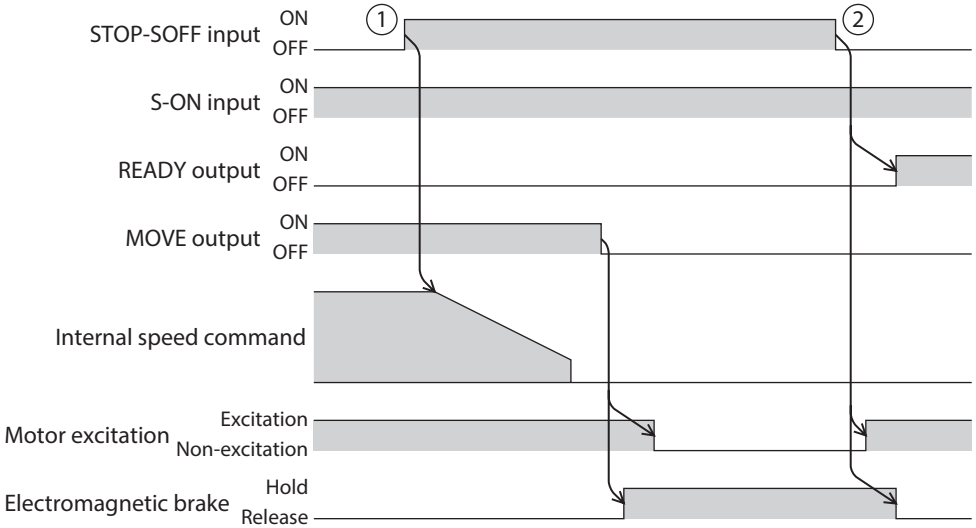
Turning the STOP-SOFF input ON causes the motor to stop according to the setting of the "STOP/STOP-SOFF input action" parameter. When the operation is stopped, the motor puts into a non-excitation state and the remaining travel amount is cleared.

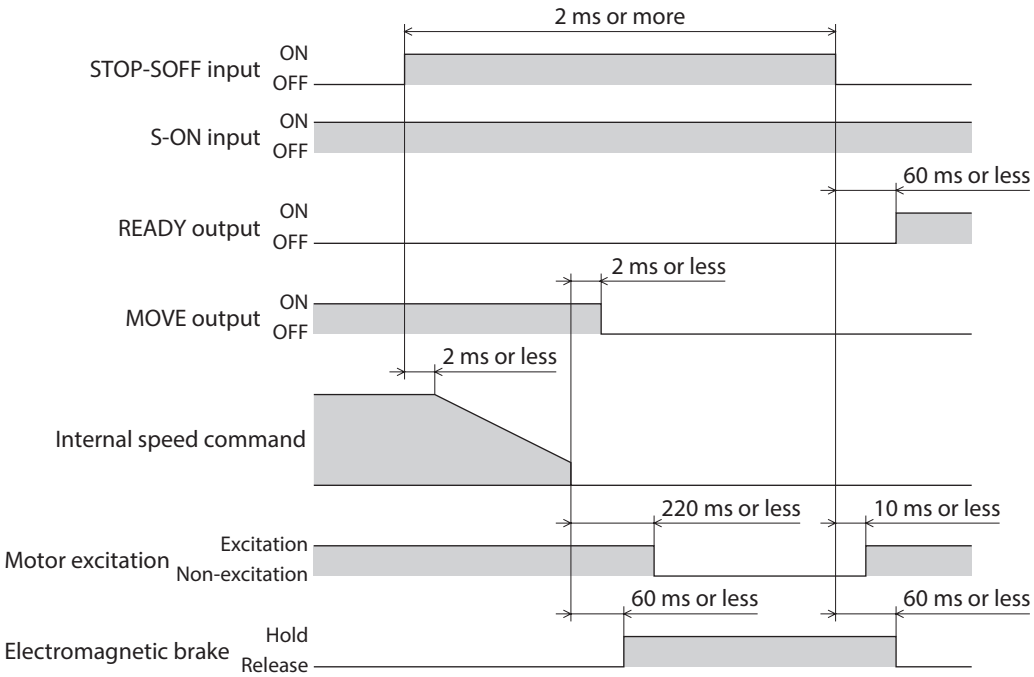
Related parameter

MEXE02 code	Name	Description	Setting range	Initial value
p7	STOP/STOP-SOFF input action	Sets how to stop the motor when the STOP input or the STOP-SOFF input is turned ON.	0: Immediate stop for both STOP and STOP-SOFF inputs 1: Deceleration stop for STOP input, immediate stop for STOP-SOFF input 2: Immediate stop for STOP input, deceleration stop for STOP-SOFF input 3: Deceleration stop for both STOP and STOP-SOFF inputs	3

How to stop the motor when the STOP-SOFF input is turned ON is "Deceleration stop" (when the motor stops while the STOP-SOFF input is ON)

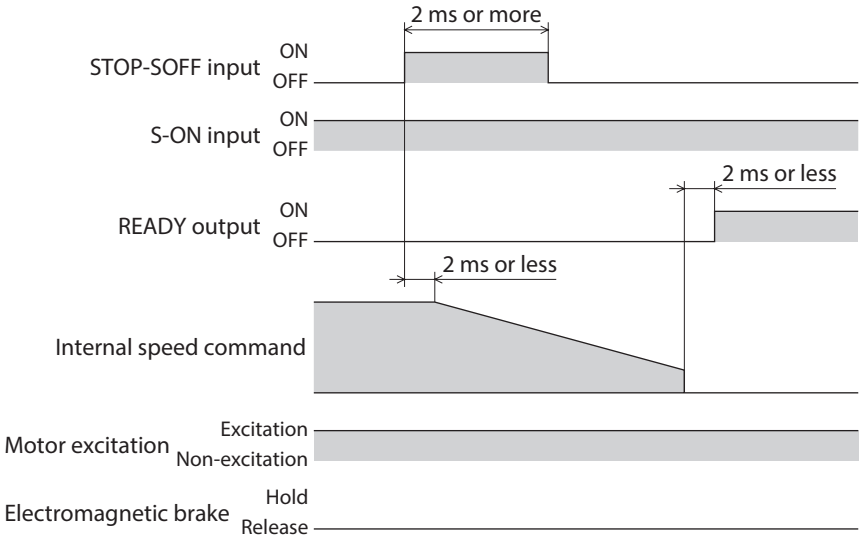
1. When the STOP-SOFF input is turned ON during operation, the motor starts the stopping movement. When the motor stops, it puts into a non-excitation state.
2. When the STOP-SOFF input is turned OFF, the motor puts into an excitation state to turn the READY output ON.





How to stop the motor when the STOP-SOFF input is turned ON is "Deceleration stop" (when the motor does not stop while the STOP-SOFF input is ON)

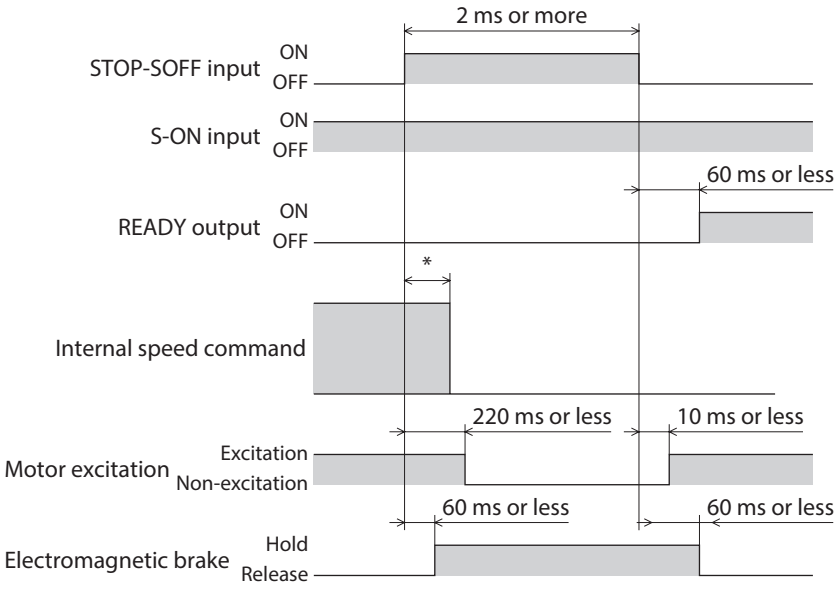
1. When the STOP-SOFF input is turned ON during operation, the motor starts the stopping movement. Even after the STOP-SOFF input is turned OFF, the motor continues the deceleration operation until it stops.
2. When the motor stops, the READY output is turned ON.



memo When the setting of the STOP/STOP-SOFF input action is "Deceleration stop" (when the motor does not stop while the STOP-SOFF input is ON), the motor does not put into a non-excitation state even if it stops.

How to stop the motor when the STOP-SOFF input is turned ON is "Immediate stop"

1. When the STOP-SOFF input is turned ON during operation, the motor stops at the command position at the time when the ON status of the STOP-SOFF input was detected, and puts into a non-excitation state.
2. When the STOP-SOFF input is turned OFF, the motor puts into an excitation state to turn the READY output ON.



* It varies depending on the driving condition.

- **STOP input**

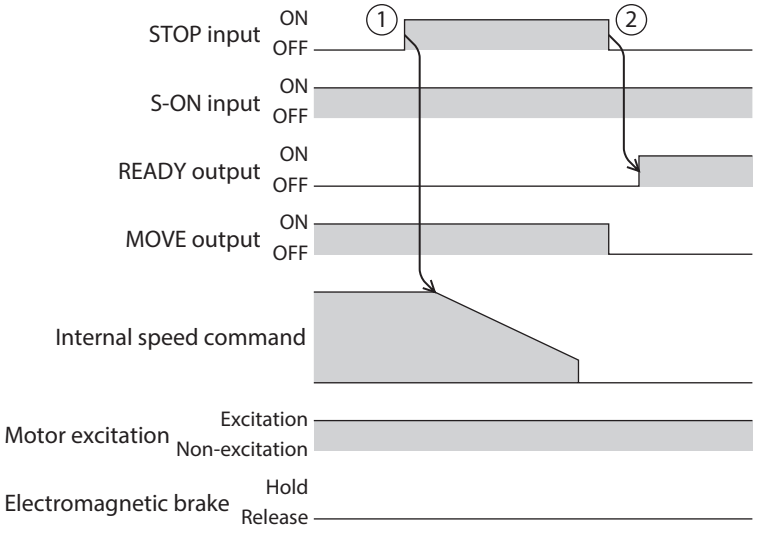
Turning the STOP input ON causes the motor to stop according to the setting of the "STOP/STOP-SOFF input action" parameter. When the operation is stopped, the remaining travel amount is cleared.

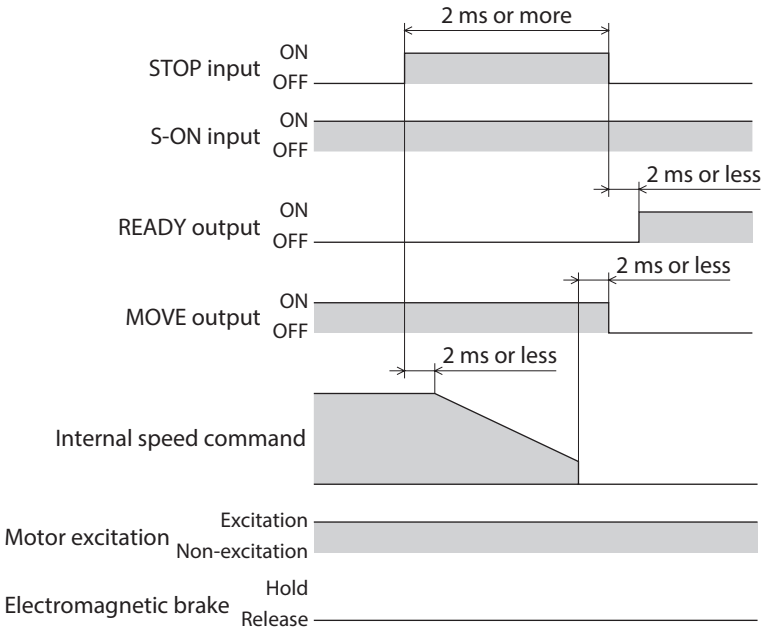
Related parameter

MEXE02 code	Name	Description	Setting range	Initial value
p7	STOP/STOP-SOFF input action	Sets how to stop the motor when the STOP input or the STOP-SOFF input is turned ON.	0: Immediate stop for both STOP and STOP-SOFF inputs 1: Deceleration stop for STOP input, immediate stop for STOP-SOFF input 2: Immediate stop for STOP input, deceleration stop for STOP-SOFF input 3: Deceleration stop for both STOP and STOP-SOFF inputs	3

How to stop the motor when the STOP input is turned ON is "Deceleration stop" (when the motor stops while the STOP input is ON)

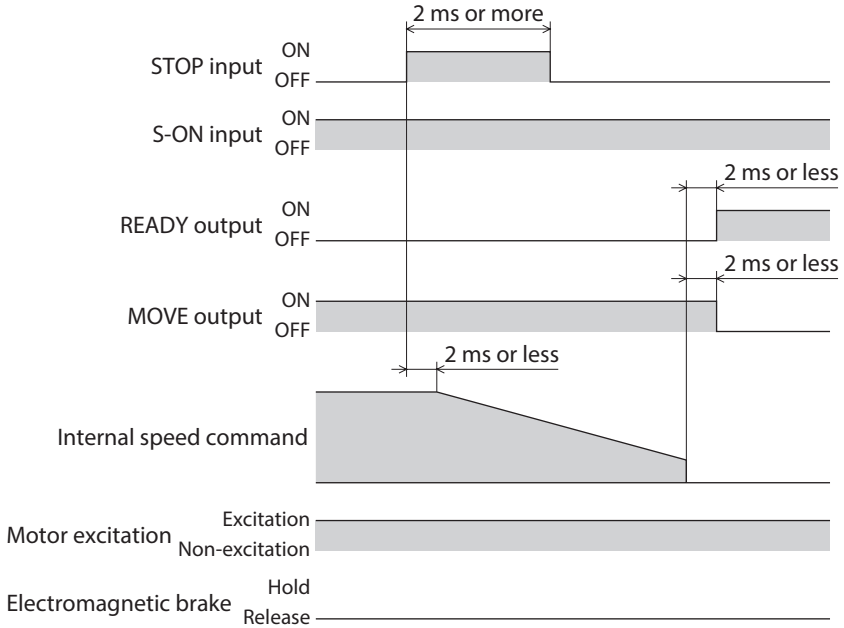
1. When the STOP input is turned ON during operation, the motor starts the stopping movement.
2. When the STOP input is turned OFF, the READY output is turned ON.





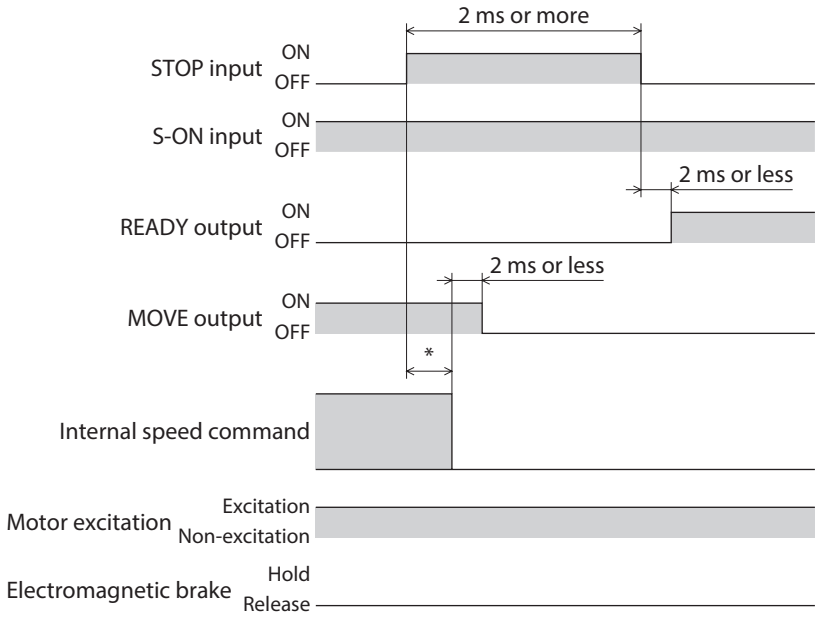
How to stop the motor when the STOP input is turned ON is "Deceleration stop" (when the motor does not stop while the STOP input is ON)

1. When the STOP input is turned ON during operation, the motor starts the stopping movement. Even after the STOP input was turned OFF, the motor continues the deceleration operation until it stops.
2. When the motor stops, the READY output is turned ON.



How to stop the motor when the STOP input is turned ON is "Immediate stop"

1. When the STOP input is turned ON during operation, the motor stops at the command position at the time when the ON status of the STOP input was detected.
2. When the STOP input is turned OFF, the READY output is turned ON.



* It varies depending on the driving condition.

- **FW-BLK input, RV-BLK input**

Turning the FW-BLK input or the RV-BLK input ON causes the operation to stop according to the setting of the "FW-BLK/RV-BLK input action" parameter. Turning the FW-BLK input ON causes the operation in the forward direction to stop, and turning the RV-BLK input ON causes that in the reverse direction to stop. When the operation is stopped, the remaining travel amount is cleared. While an input that have stopped the operation is being ON, the motor will not operate even if an operation start signal to operate in the same direction as the stop signal is input. An operation start signal in the opposite direction can be used to operate.

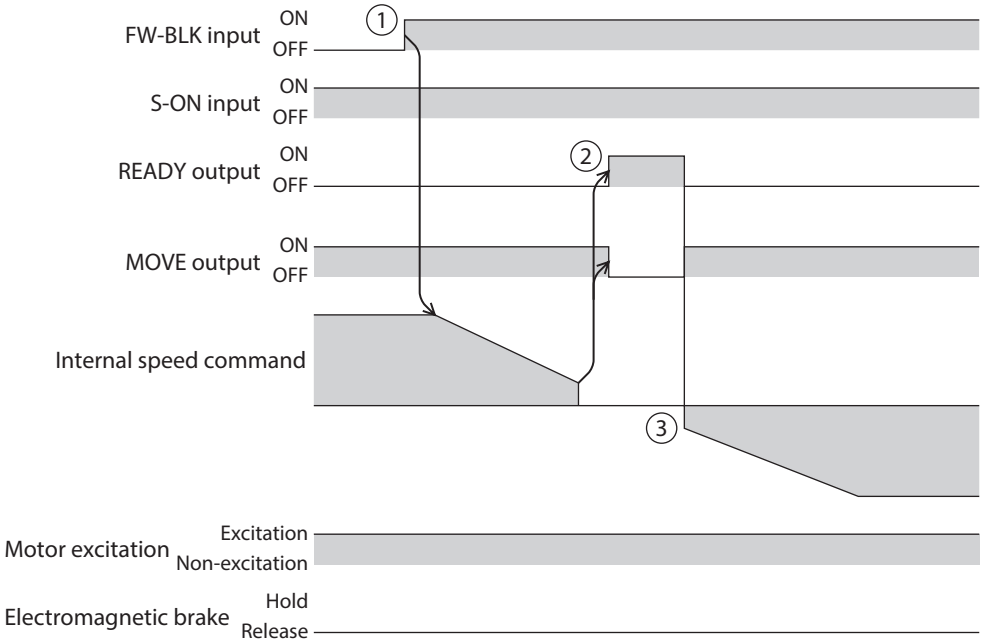
Related parameter

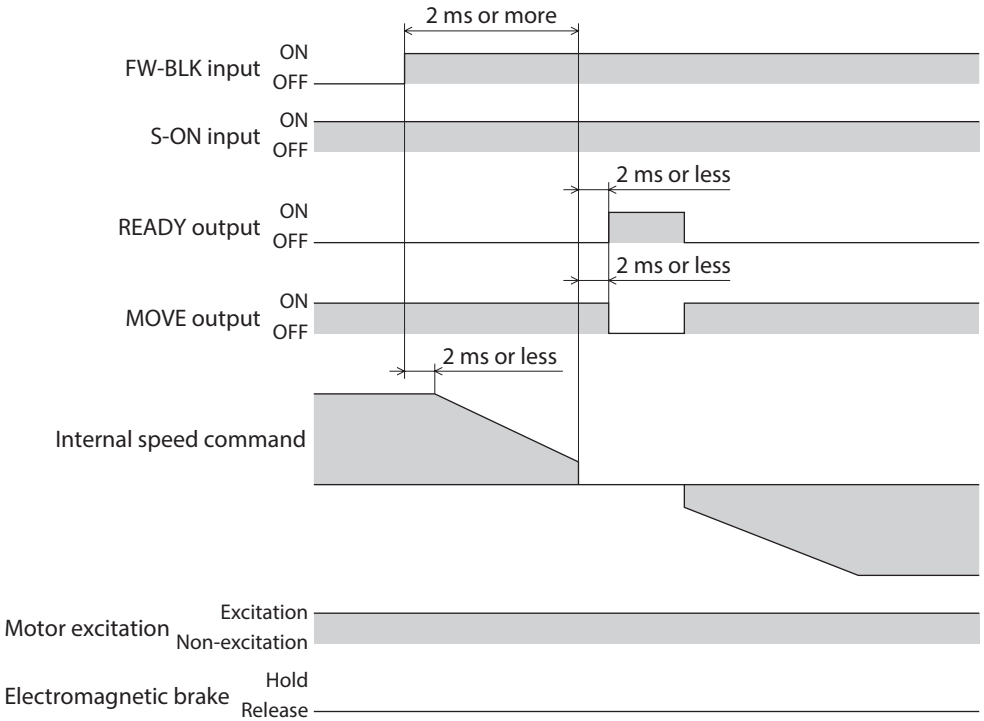
MEXE02 code	Name	Description	Setting range	Initial value
p7	FW-BLK/RV-BLK input action	Sets how to stop the motor when the FW-BLK input or the RV-BLK input is turned ON.	0: Immediate stop 1: Deceleration stop	1

memo The following information is generated when the FW-BLK input or the RV-BLK input is turned ON.
- When the FW-BLK input is turned ON: Forward operation prohibition
- When the RV-BLK input is turned ON: Reverse operation prohibition

When the setting of the FW-BLK/RV-BLK input action is "Deceleration stop" (when the motor stops while the FW-BLK input is ON)

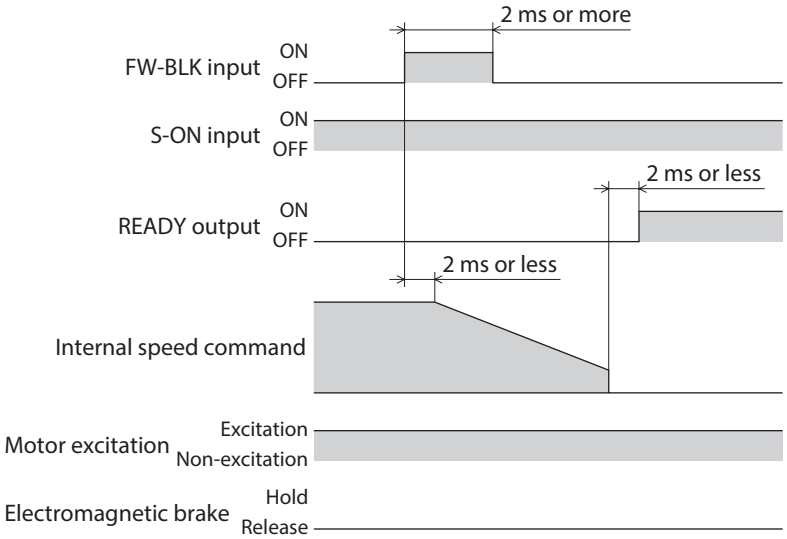
1. When the FW-BLK input is turned ON during operation in the forward direction, the motor starts the stopping movement.
2. When the operation is stopped, the READY output is turned ON.
3. If an operation start signal in the reverse direction is input while the FW-BLK input is ON, the READY output is turned OFF to start operation.





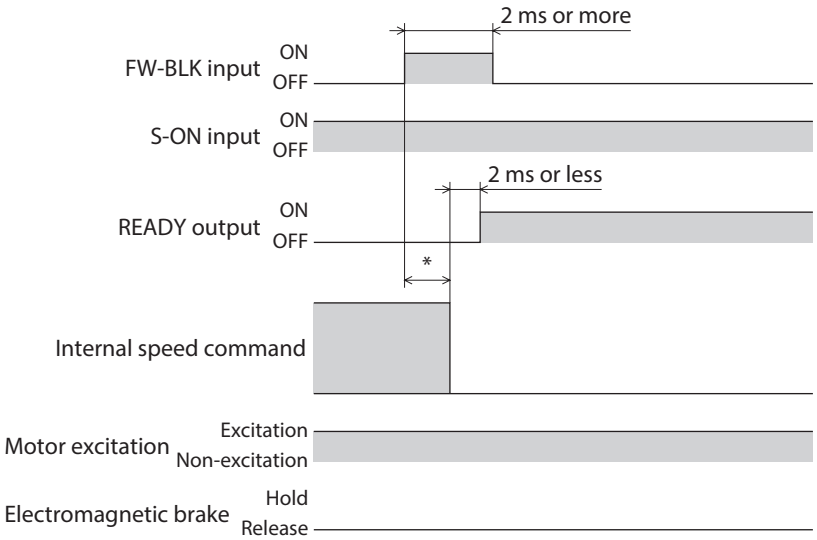
When the setting of the FW-BLK/RV-BLK input action is "Deceleration stop" (when the motor does not stop while the FW-BLK input is ON)

1. When the FW-BLK input is turned ON during operation in the forward direction, the motor starts the stopping movement.
2. Even after the FW-BLK input is turned OFF, the motor continues the deceleration operation until it stops. When the operation is stopped, the READY output is turned ON.



When the setting of the FW-BLK/RV-BLK input action is "Immediate stop"

1. When the FW-BLK input is turned ON during operation in the forward direction, the motor stops.
2. The motor stops at the command position at the time when the ON status of the FW-BLK input was detected.



* It varies depending on the driving condition.

■ Signals used for stored data operation

- **BREAK-ATSQ input**

  The operation is switched from automatic sequential to manual sequential while the BREAK-ATSQ input is ON.

- **START input**

  Selecting the operation data number to turn the START input ON starts stored data operation.
  In the case of manual sequential operation, the operation data number to be the starting point is started.

- **SSTART input**

  Turning the SSTART input ON causes stored data operation to start.
  In manual sequential operation, operation based on the next operation data number linked is started every time the SSTART input is turned ON. In other than manual sequential operation, operation based on the operation data number selected is started.

- **D-SEL0 to D-SEL7 inputs**

Turning any of the D-SEL0 to D-SEL7 inputs ON causes stored data operation based on the set operation data number to start.
Operation can be performed only by turning any of the D-SEL0 to D-SEL7 inputs ON, the steps of selecting the operation data number can be saved.

Related parameters

MEXE02 code	Name	Description	Setting range	Initial value
p7	D-SEL drive start function	Sets how to start operation when the D-SEL input is turned ON.	0: Only operation data number selection 1: Operation data number selection with START function	1
	D-SEL0 operation number selection	Sets the operation data number corresponding to the D-SEL input.	0 to 255: Operation data number	0
	D-SEL1 operation number selection			1
	D-SEL2 operation number selection			2
	D-SEL3 operation number selection			3
	D-SEL4 operation number selection			4
	D-SEL5 operation number selection			5
	D-SEL6 operation number selection			6
	D-SEL7 operation number selection			7

- **M0 to M7 inputs**

Select a desired operation data number for positioning operation or continuous operation based on a combination of ON-OFF status of the M0 to M7 inputs.

Operation data number	M7	M6	M5	M4	M3	M2	M1	M0
0	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
1	OFF	OFF	OFF	OFF	OFF	OFF	OFF	**ON**
2	OFF	OFF	OFF	OFF	OFF	OFF	**ON**	OFF
3	OFF	OFF	OFF	OFF	OFF	OFF	**ON**	**ON**
• • •	• • •	• • •	• • •	• • •	• • •	• • •	• • •	• • •
252	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	OFF	OFF
253	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	OFF	**ON**
254	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	OFF
255	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**

Setting example 1: When the operation data No. 8 (binary number: 0000 1000) is specified

Operation data number	M7	M6	M5	M4	M3	M2	M1	M0
8	OFF	OFF	OFF	OFF	**ON**	OFF	OFF	OFF

Setting example 2: When the operation data No. 116 (binary number: 0111 0100) is specified

Operation data number	M7	M6	M5	M4	M3	M2	M1	M0
116	OFF	**ON**	**ON**	**ON**	OFF	**ON**	OFF	OFF

- **NEXT input**

Turning the NEXT input ON during operation causes the present operation to forcibly transition to the operation data number linked. If the next data number is not set, the present operation is continued. This is a signal necessary when performing a different operation on the way of continuous operation.

Setting example 1:
If a sensor is detected in the middle of unidirectional continuous operation, the motor stops after moving 5,000 steps from the feedback position.

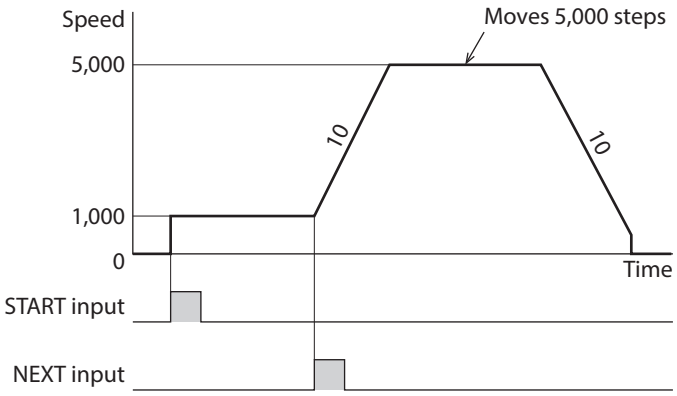
1. Assign the NEXT input to the DIN input function.
2. Connect the sensor to DIN that the NEXT input was assigned.

Setting the operation data

Data No.	Operation type	Position [step]	Speed [Hz]	Starting/changing rate [kHz/s]	Stopping deceleration [kHz/s]
No. 0	Continuous operation	0	1,000	1,000.000	1,000.000
No. 1	Incremental positioning (based on command position)	5,000	5,000	10.000	10.000

Data No.	Link	Next data number
No. 0	Continuous sequential operation	↓ (+1)
No. 1	No link	Stop

Operation example

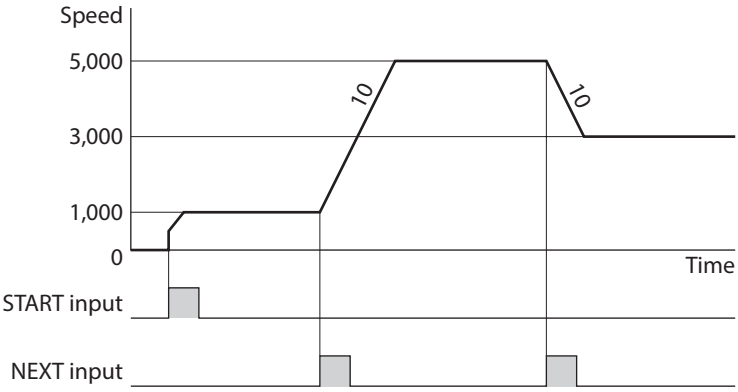


Setting example 2:
Link multiple continuous operations having different speeds with continuous sequential operation, and change the operating speed in a desired timing.

Setting the operation data

Data No.	Operation type	Speed [Hz]	Starting/ changing rate [kHz/s]	Stopping deceleration [kHz/s]	Link	Next data number
No. 0	Continuous operation	1,000	10.000	10.000	Continuous sequential operation	↓(+1)
No. 1	Continuous operation	5,000	10.000	10.000	Continuous sequential operation	↓(+1)
No. 2	Continuous operation	3,000	10.000	10.000	No link	Stop

Operation example



■ Signal used for high-speed return-to-home

- **ZHOME input**

  Turning the ZHOME input ON causes high-speed return-to-home operation to start.

Note The home has been set for some motorized actuators at the time of shipment. However, in the case of a motor only, the home has not been set at the time of shipment. In addition, the home becomes an unset state when the resolution is changed. If high-speed return-to-home operation is started under this condition, information of Start ZHOME error is generated, and operation is not performed. Be sure to set the home before performing high-speed return-to-home operation.

■ Signal used for high-speed return-to-home

- **HOME input**

  Turning the HOME input ON causes return-to-home operation to start. When return-to-home operation is completed and the motor stops, the HOME-END output is turned ON.

■ Signals used for macro operation

- **FW-JOG input, RV-JOG input**

  Turning the FW-JOG input ON causes JOG operation in the forward direction to execute and turning the RV-JOG input ON causes that in reverse direction to execute.

- **FW-JOG-H input, RV-JOG-H input**

  Turning the FW-JOG-H input ON causes high-speed JOG operation in the forward direction to execute and turning the RV-JOG-H input ON causes that in the reverse direction to execute.

- **FW-JOG-P input, RV-JOG-P input**

  Turning the FW-JOG-P input ON causes inching operation in the forward direction to execute and turning the RV-JOG-P input ON causes that in reverse direction to execute.

- **FW-JOG-C input, RV-JOG-C input**

  Turning the FW-JOG-C input ON causes combined JOG operation in the forward direction to execute and turning the RV-JOG-C input ON causes that in reverse direction to execute.

- **FW-POS input, RV-POS input**

  Selecting the operation data number to turn the FW-POS input or the RV-POS input ON causes continuous operation at the operating speed corresponding to the selected operation data number to start. Turning the FW-POS input ON causes the motor to rotate in the forward direction and turning the RV-POS input ON causes it to rotate in the reverse direction.
  If the signal of the same rotation direction is turned ON while the motor decelerates to a stop, the motor accelerates again and continues operation.
  If both the FW-POS input and the RV-POS input are turned ON simultaneously, the motor decelerates to a stop.
  When the operation data number is changed during continuous operation, the operating speed is changed to that of the operation data number changed.

4-2 Coordinates management

■ External sensor input signals

- **FW-LS input, RV-LS input**

  These are input signals from the limit sensors. The FW-LS input is a sensor in the forward direction and the RV-LS input is that in the reverse direction.
  - Return-to-home:
    When the FW-LS input or the RV-LS input is detected, return-to-home operation is performed according to the setting of the "(HOME) Home-seeking mode" parameter.
  - Other than return-to-home:
    Detect the hardware overtravel to stop the motor. When the "FW-LS/RV-LS input action" parameter is set to "−1: Use as the sensor for return-to-home," the motor does not stop.

  Related parameter

MEXE02 code	Name	Description	Setting range	Initial value
p7	FW-LS/RV-LS input action	Sets how to stop the motor when the FW-LS input or the RV-LS input is turned ON.	−1: Use as the sensor for return-to-home 0: Immediate stop 1: Deceleration stop 2: Immediate stop with alarm 3: Deceleration stop with alarm	2

- **HOMES input**

  This is an input signal from the mechanical home sensor when the "(HOME) Home seeking mode" parameter is set to "1: 3-sensor" or "2: One-way rotation."

  Related parameter

MEXE02 code	Name	Description	Setting range	Initial value
p5	(HOME) Home-seeking mode	Sets the return-to-home method.	0: 2-sensor 1: 3-sensor 2: One-way rotation	1

- **SLIT input**

  Connect when returning to the home using a sensor with slit.
  When executing return-to-home operation, using the SLIT input concurrently can detect the home more accurately.

■ Coordinate preset signals

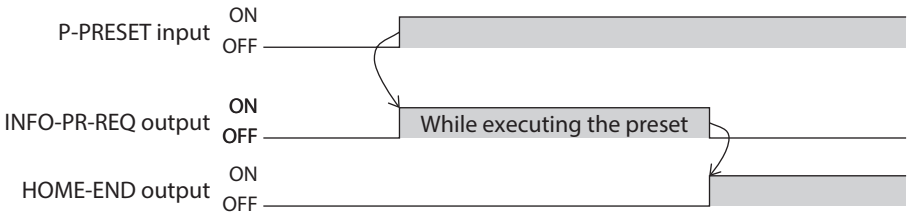
This signal is used to preset the mechanical home or the electrical home.

● P-PRESET input

Turning the P-PRESET input ON can rewrite the command position and the feedback position to the value set in the "Preset position" parameter.
At the same time, they are written to the non-volatile memory.
However, position preset cannot be executed while the motor is being operated.

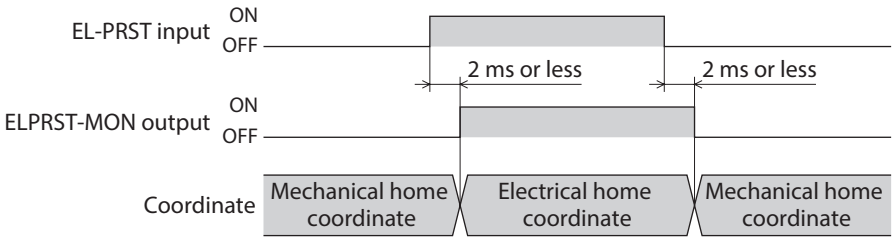
Note Even if the motor is being stopped, position preset cannot be executed while the TLC output is ON.

The INFO-PR-REQ output is being ON while position preset is executed. When the position preset is completed, the HOME-END output is turned ON.



● EL-PRST input

The coordinate system is switched to that with the electrical home as the home while the EL-PRST input is ON.
The coordinate position when the EL-PRST input is turned from OFF to ON is the electrical home, and the motor operates in the electrical home coordinate system.
Turning the EL-PRST input OFF returns to the coordinate system with the mechanical home as the home.
Setting a different home (electrical home) from the mechanical home can control the motor in a different coordinate temporarily.



memo
- If the EL-PRST input is turned ON during operation, the command position and the feedback position at that time is set to the electrical home coordinates. However, the target position of the operation being executed remains at the position in the mechanical home coordinate system. Execute the operation in the electrical home coordinate system after stopping the operation.
- High-speed return-to-home operation cannot be executed while the EL-PRST input is ON.

■ Coordinate information monitor function signals

These signals are used for the coordinate information monitor function.
Refer to p.109 for details about the coordinate information monitor function.

● MON-REQ0 input, MON-REQ1 input

Select information to be output by the I/O position output function.
Turning the MON-REQ input ON causes the information selected with each parameter to output.

Related parameters

MEXE02 code	Name	Description	Setting range	Initial value
p7	MON-REQ0 output data selection	Selects information to be output by the I/O position output function when the MON-REQ input is turned ON.	1: Feedback position 2: Feedback position (32-bit counter) 3: Command position 4: Command position (32-bit counter) 8: Alarm code (8 bits) 9: Feedback position and alarm code 10: Feedback position (32-bit counter) and alarm code 11: Command position and alarm code 12: Command position (32-bit counter) and alarm code	1
	MON-REQ1 output data selection			8

● MON-CLK input

Turning the MON-CLK input ON causes information of the coordinate information monitor function to send.

I/O position output function:

Input the clock for synchronous communication when monitoring information. When the MON-CLK input is turned from OFF to ON, the value to be sent is set and sends from the MON-OUT output.

Pulse request function:

When the MON-CLK input is turned from OFF to ON, information is started sending.

● PLSM-REQ input

Turning the PLSM-REQ input from OFF to ON causes the coordinate information that is sent by the pulse request function to set.

Related parameters

MEXE02 code	Name	Description	Setting range	Initial value
p7	PLS-OUT output data selection	Selects the information to be output by the pulse request function.	0: Command position 1: Command position (32-bit counter) 2: Feedback position 3: Feedback position (32-bit counter)	0
	PLS-OUT maximum frequency	Sets the frequency of the output pulse used with the pulse request function.	1 to 10,000 (1 = 0.1 kHz)	100

4-3 Management of driver

■ Status releasing signals

These signals are used to release the signal or status that is not released automatically.

● ALM-RST input

If an alarm is generated, the motor will stop. At this time, turning the ALM-RST input from OFF to ON causes the alarm to reset (the alarm will be reset at the ON edge of the ALM-RST input). Be sure to remove the cause of the alarm and ensure safety before resetting the alarm.
Note that some alarms cannot be reset with the ALM-RST input.
Refer to "2-4 Alarm list" on p.247 for alarms.

● LAT-CLR input

Turning the LAT-CLR input ON causes the latch status to clear.
Refer to p.275 for details about the latch function.

● INFO-CLR input

This signal is enabled when the "Information auto clear" parameter is set to "0: Disable (not turned OFF automatically)."
Turning the INFO-CLR input ON causes the information status to clear.

■ Driver function change signals

● HMI input

Turning the HMI input ON causes the function limitation of the **MEXE02** software to release. Turning it OFF causes the function to be limited.
The functions to be limited are shown below.

- I/O test
- Teaching/remote operation
- Writing of operation data and parameters
- [Reset] of the [Communication] menu

Note

- When the HMI input is not assigned to direct I/O or remote I/O, this input will always be in an ON state. If it is assigned to both direct I/O and remote I/O, the function will be executed only when both of them are turned ON.
- When the HMI input is assigned to the DIN input function, do not set the "1-shot signal" parameter to "Enable."

● TEACH input

Turning the TEACH input from OFF to ON causes the teaching function to execute.
Teaching is a function that sets the present position as "Position" of the operation data. The operation type when "Position" is set by the teaching function can be set with the "TEACH operation type setting" parameter.
The operation data number written by the teaching function is set with the M0 to M7 inputs.

Related parameter

MEXE02 code	Name	Description	Setting range	Initial value
p7	TEACH operation type setting	Selects the operation type when "Position" is set by the teaching function.	–1: Not set 1: Absolute positioning 8: Wrap absolute positioning	1

● TRQ-LMT input

Turning the TRQ-LMT input ON causes the torque to limit.

- **SPD-LMT input**

  Turning the SPD-LMT input ON causes the operating speed to limit.

  Related parameters

MEXE02 code	Name	Description	Setting range	Initial value
p7	SPD-LMT speed limit type selection	Selects the setting method of the speed limit value.	0: Ratio 1: Value	0
	SPD-LMT speed limit ratio	Sets the percentage of the speed limit based on "Speed" of the operation data being 100 %. This is enabled when the "SPD-LMT speed limit type selection" parameter is set to "0: Ratio."	1 to 100 %	50
	SPD-LMT speed limit value	Sets the speed limit value as "Value." This is enabled when the "SPD-LMT speed limit type selection" parameter is set to "1: Value."	1 to 4,000,000 Hz	1,000

5 Output signals

5-1 Management of driver

■ Driver status indication signals

- **ALM-A output, ALM-B output**

  If an alarm is generated, the ALM-A output is turned ON and the ALM-B output is turned OFF. At the same time, the PWR/ALM LED on the driver will blink in red, and the motor will stop. When an alarm to put the motor into a non-excitation state is generated, the motor stops before putting into a non-excitation state.
  The ALM-A output is normally open and the ALM-B output is normally closed.

- **SYS-RDY output**

  After the control power supply is turned on, when output signals are ready to operate ON-OFF and signals are enabled to input, the SYS-RDY output is turned ON.

- **INFO output**

  If information is generated, the INFO output is turned ON.

  Related parameters

MEXE02 code	Name	Description	Setting range	Initial value
p6	Information auto clear	When the cause of information is eliminated, the INFO output and the bit output of the corresponding information are turned OFF automatically.	0: Disable (not turned OFF automatically) 1: Enable (turned OFF automatically)	1
	Information LED condition	Sets the LED status when information is generated.	0: LED does not blink 1: LED blinks	1

- **SYS-BSY output**

  The SYS-BSY output is turned ON while the driver executes the maintenance command.

- **Output of information signals**

  If corresponding information is generated, each output signal is turned ON.
  Refer to "3-2 Information list" on p.260 for details about information.

■ Hardware status indication

- **SON-MON output**

  The SON-MON output is turned ON while the motor is in an excitation state.

- **MPS output**

  The MPS output is turned ON when the main power supply is turned on.

- **MBC output**

  Use this signal when controlling the electromagnetic brake by the host controller.
  The MBC output is turned ON when the electromagnetic brake releases the motor shaft, and OFF when it holds.
  Detect the ON-OFF status of the MBC output using the host controller, and control the electromagnetic brake.

- **RG output**

  The RG output is turned ON when the driver comes into a regeneration state due to an increase in the input voltage.

5-2 Management of operation

■ Operation status indication

● READY output

The READY output is turned ON when stored data operation, macro operation, and return-to-home operation are ready to start. Input the operation start command to the driver after the READY output is turned ON.
The READY output is turned ON when all of the following conditions are satisfied.

- The control power supply and the main power supply of the driver are turned on.
- All inputs which start operation are OFF.
- The FREE input is OFF.
- The S-ON input is ON.
- The STOP input is OFF.
- The STOP-SOFF input is OFF
- The CLR input is OFF.
- An alarm is not being generated.
- The motor is not operated.
- The following monitors or menus are not executed with the **MEXE02** software.
  – Teaching, remote operation
  – I/O test
  – Data writing
  – Reset
- The following commands are not executed via EtherNet/IP.
  – Configuration
  – Batch data initialization
  – All data batch initialization
  – Read batch NV memory
  – Write batch NV memory
  – Read from backup
  – Write to backup

● MOVE output

The MOVE output is turned ON while the motor operates.

Related parameter

MEXE02 code	Name	Description	Setting range	Initial value
p7	MOVE minimum ON time	Sets the minimum time during which the MOVE output remains ON.	0 to 255 ms	0

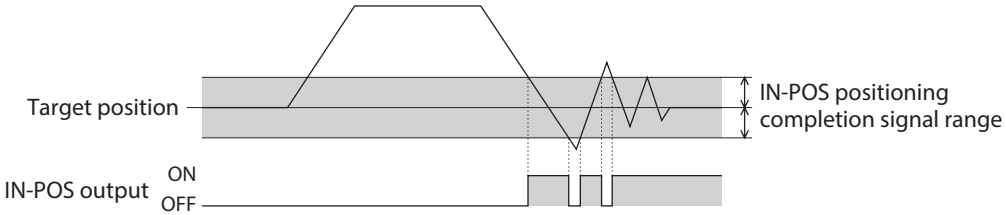
● OPE-BSY output

The OPE-BSY output is turned ON while the driver executes internal oscillation.
Internal oscillation is executed during the following operation.

- Stored data operation
- Macro operation
- Direct data operation
- Return-to-home operation

- **IN-POS output**

After completion of positioning operation, when the motor was converged in a position of the "IN-POS positioning completion signal range" parameter against the command position, the IN-POS output is turned ON.



Related parameters

MEXE02 code	Name	Description	Setting range	Initial value
p7	IN-POS positioning completion signal range	Sets the output range of the IN-POS output (angle range in which the motor is converged) with the target position as a center.	0 to 180 (1 = 0.1°)	18
	IN-POS positioning completion signal offset	Sets the amount of offset from the target position.	−18 to 18 (1 = 0.1°)	0

memo
The IN-POS output is not turned ON in the following cases.
· When continuous operation is stopped.
· When operation is interrupted by an operation stop signal such as the STOP input.
· When a slip occurs.

- **TLC output**

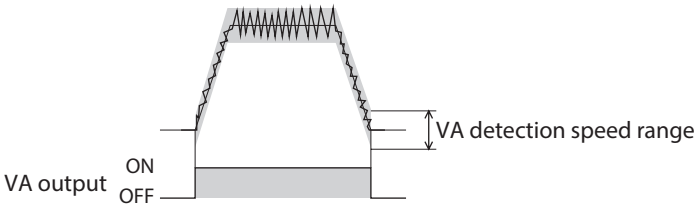
The TLC output is turned ON when the output torque reaches the maximum output torque or the torque limiting value.

- **VA output**

The VA output is turned ON when the operating speed reaches the target speed.
The judgment criterion can be set using the "VA mode selection" parameter.

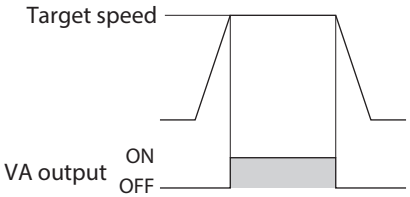
When the "VA mode selection" parameter is set to "0: Feedback speed attainment (speed at feedback position)"

When the motor feedback speed falls in the setting range of the "VA detection speed range" parameter with the command speed as a center, the VA output is turned ON.



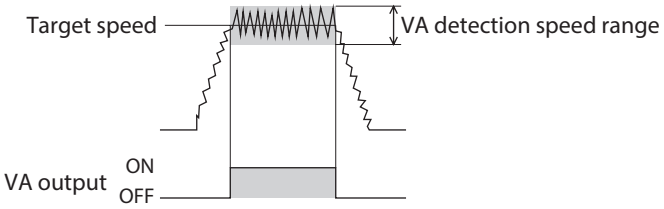
When the "VA mode selection" parameter is set to "1: Speed at command position (only internal profile)"

When the motor command speed matches the target speed, the VA output is turned ON.



When the "VA mode selection" parameter is set to "2: Speed at feedback position & command position (only internal profile)

When the motor feedback speed falls in the setting range of the "VA detection speed range" parameter with the target speed as a center, the VA output is turned ON.



Related parameters

MEXE02 code	Name	Description	Setting range	Initial value
p7	VA mode selection	Selects the judgment criterion of the VA output.	0: Feedback speed attainment (speed at feedback position) 1: Speed at command position (only internal profile) 2: Speed at feedback position & command position (only internal profile)	0
	VA detection speed range	Sets the allowable range of the judgment criterion for the feedback speed when the "VA mode selection" parameter is set to "0: Feedback speed attainment (speed at feedback position)" or "2: Speed at feedback position & command position (only internal profile)."	1 to 200 r/min	30

- **SLIP output**

This signal is output when a slip has occurred in the motor. If the SLIP output is turned ON during positioning operation, check that the command position has reached the target position.

memo The SLIP output is effective for drivers of version 2.00 or later.

- **TRQ-LMTD output**

This signal is enabled when the torque limiting is being performed. When the motor output torque reaches the torque limiting value, the TRQ-LMTD output is turned ON. Refer to p.113 for the torque limiting function.

- **SPD-LMTD output**

This signal is enabled when the speed limiting is being performed. If the operating speed increases equal to or higher than the value set in the "SPD-LMT speed limit ratio" parameter or the "SPD-LMT speed limit value" parameter, it is limited to turn the SPD-LMTD output ON.

Related parameters

MEXE02 code	Name	Description	Setting range	Initial value
p7	SPD-LMT speed limit type selection	Selects the setting method of the speed limit value.	0: Ratio 1: Value	0
	SPD-LMT speed limit ratio	Sets the percentage of the speed limit based on "Speed" of the operation data being 100 %. This is enabled when the "SPD-LMT speed limit type selection" parameter is set to "0: Ratio."	1 to 100 %	50
	SPD-LMT speed limit value	Sets the speed limit value as "Value." This is enabled when the "SPD-LMT speed limit type selection" parameter is set to "1: Value."	1 to 4,000,000 Hz	1,000

- **HOME-END output**

  The HOME-END output is turned ON in the following cases.
  - When high-speed return-to-home operation is completed.
  - When return-to-home operation is completed.
  - When the position preset is executed and coordinates are set.

  This signal is turned OFF in the following state.
  - When the control power supply is turned on.
  - When operation is started.

- **M-CHG output**

  This signal is enabled in operations that use the operation data such as stored data operation and continuous macro operation.
  The ON-OFF status of the M-CHG output is inverted when operation is started or when the operation data number is switched during operation.

- **M-ACT0 output to M-ACT7 output**

  These signals are enabled in operations that use the operation data such as stored data operation and continuous macro operation.
  The operation data number presently being operated is output in binary.
  The status of the signal output in the previous operation is maintained in operations that does not use the operation data such as high-speed return-to-home operation and JOG operation.

  Output example:
  When high-speed return-to-home operation is executed after positioning operation with the operation data No. 1 is executed, and operation is finally executed with the operation data No. 3.

  1. When positioning operation of the operation data No. 1 is performed, the signal (M-ACT0) corresponding to the operation data No. 1 is turned ON.
  2. When high-speed return-to-home operation is performed, the signal state of the operation data No. 1 (M-ACT0 is ON) is maintained.
  3. When positioning operation of the operation data No. 3 is performed, the signals (M-ACT0 and M-ACT1) corresponding to the operation data No. 3 are turned ON.

- **D-END0 output to D-END7 output**

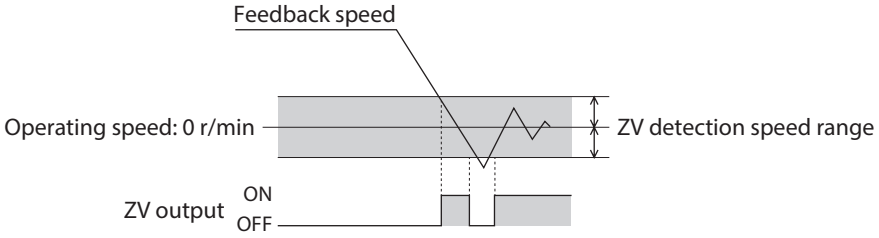
  These signals are enabled in operations that use the operation data such as stored data operation and continuous macro operation.
  They are turned OFF when operation is started and ON when operation of the specified operation data number is completed.
  Use them to check each operation has been completed during link operation.

  Related parameters

MEXE02 code	Name	Description	Setting range	Initial value
p7	D-END0 operation number selection	Sets the operation data number corresponding to the D-END output.	0 to 255: Operation data number	0
	D-END1 operation number selection			1
	D-END2 operation number selection			2
	D-END3 operation number selection			3
	D-END4 operation number selection			4
	D-END5 operation number selection			5
	D-END6 operation number selection			6
	D-END7 operation number selection			7

- **ZV output**

  When the feedback speed is equal to or less than the speed set in the "ZV detection speed range" parameter with the operating speed 0 r/min as a center, the ZV output is turned ON.



Related parameters

MEXE02 code	Name	Description	Setting range	Initial value
p7	ZV detection speed range	Sets the output range (one side) of the ZV output with the operating speed 0 r/min as a center.	0 to 200 r/min	15

- **OL-DTCT output**

  The OL-DTCT output is turned ON when the output torque reaches the torque to detect the overload alarm.
  Refer to p.253 for detection of the overload alarm.

■ Stored data operation status indication

- **SEQ-BSY output**

  The SEQ-BSY output is turned ON while stored data operation is performed.

- **DELAY-BSY output**

  The DELAY-BSY output is turned ON when the driver is in a state of the waiting time after operation (drive-complete delay time) or the standby state (Dwell).

■ Direct data operation status indication

- **DCMD-FULL output**

  The DCMD-FULL output is turned ON when data is being written to the buffer area of direct data operation.

- **DCMD-RDY output**

  This signal is output when the driver is ready to start direct data operation.
  The DCMD-RDY output is turned ON when all of the following conditions are satisfied.
  - The control power supply and the main power supply of the driver are turned on.
  - The S-ON input is ON.
  - The STOP input is OFF.
  - The STOP-SOFF input is OFF
  - The CLR input is OFF.
  - An alarm is not being generated.
  - Return-to-home operation or macro operation is not executed.
  - The following monitors or menus are not executed with the **MEXE02** software.
    – Teaching, remote operation
    – I/O test
    – Data writing
    – Reset
  - The following commands are not executed via EtherNet/IP.
    – Configuration
    – Batch data initialization
    – All data batch initialization
    – Read batch NV memory
    – Write batch NV memory
    – Read from backup
    – Write to backup

■ Motor position indication

These signals are output according to the motor position.

● ZSG output

This signal is turned ON every time the feedback position of the motor increases by one round from the position having preset by "ZSG preset" of the **MEXE02** software or the maintenance command "ZSG-PRESET" of EtherNet/IP.

Related parameter

MEXE02 code	Name	Description	Setting range	Initial value
p7	ZSG signal width	Sets the output range of the ZSG output.	1 to 1,800 (1 = 0.1°)	18

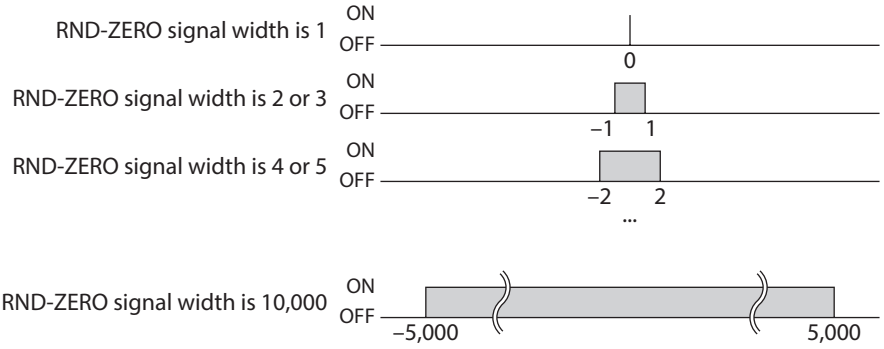
memo Set the "ZSG signal width" parameter according to the operating speed so that the ZSG output is output at least 1 ms.

● RND-ZERO output

If the position set with the "RND-ZERO signal source" parameter is in the home of the wrap range when the "Wrap setting" parameter is set to "1: Enable," the RND-ZERO output is turned ON.
Using the "The number of the RND-ZERO output in wrap range" parameter can output the signal for each interval by equally dividing the wrap range by a desired number of divisions.

Related parameters

MEXE02 code	Name	Description	Setting range	Initial value
p5	The number of the RND-ZERO output in wrap range	Sets the number of times to turn the RND-ZERO output ON in the wrap range.	1 to 536,870,911 divisions	1
p7	RND-ZERO signal width	Sets the output width of the RND-ZERO output.	1 to 10,000 steps	10
	RND-ZERO signal source	Sets the criterion of the RND-ZERO output.	0: Based on feedback position 1: Based on command position	0



- **MAREA output**

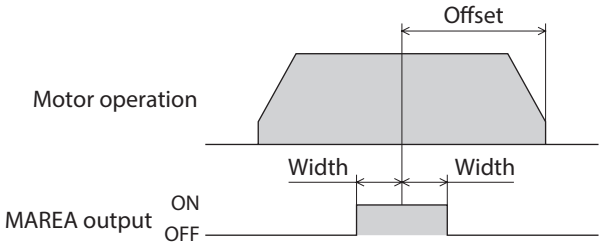
The MAREA output is turned ON when the motor is within the set area.

Related parameter

MEXE02 code	Name	Description	Setting range	Initial value
p7	MAREA output source	Sets the criterion to turn the MAREA output ON and the status of the MAREA output after operation.	0: Feedback position (ON after operation) 1: Command position (ON after operation) 2: Feedback position (MAREA output OFF at completion) 3: Command position (MAREA output OFF at completion)	0

Related operation data

MEXE02 code	Name	Description	Setting range	Initial value
p1	Area offset	Sets the distance from the center position of the range in which the MAREA output is turned ON to the target position of positioning operation. Sets the distance to the operation starting position in the case of continuous operation.	−2,147,483,648 to 2,147,483,647 steps	0
	Area width	Sets the range in which the MAREA output is turned ON.	−1: Disable 0 to 4,194,303 steps	−1



Setting example 1:
When MAREA is turned ON in a range of ±10 steps with the position of 5,000 steps as a center in incremental positioning operation which travel distance is 10.000 steps.

- Area offset: −5,000 steps
- Area width: 10 steps

Setting example 2:
When MAREA is turned ON in a range of ±100 steps with the coordinate 1,000 as a center in absolute positioning operation from the present position 5,000 steps to the target position −8.000 steps.

- Area offset: 9,000 steps
- Area width: 100 steps

memo When "Operation type" of the operation data is set to "Continuous operation," the offset (area) is based on the operation starting position.

● AREA0 to AREA7 outputs

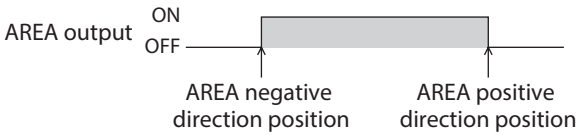
The AREA outputs are turned ON when the motor is inside the set area.
They are turned ON when the motor is inside the area even if the motor stops.

Related parameters

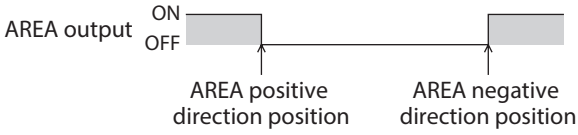
MEXE02 code	Name	Description	Setting range	Initial value
p7	AREA0 positive direction position/ offset to AREA7 positive direction position/ offset	Sets the positive direction position or offset from the target position for the AREA output.	−2,147,483,648 to 2,147,483,647 steps	0
	AREA0 negative direction position/ detection range to AREA7 negative direction position/ detection range	Sets the negative direction position or distance from the offset position for the AREA output.		0
	AREA0 range setting mode to AREA7 range setting mode	Sets the range setting mode for the AREA output.	0: Range setting with absolute value 1: Offset/width setting from the target position	0
	AREA0 positioning standard to AREA7 positioning standard	Sets the judgment criterion of the position for AREA output.	0: Based on feedback position 1: Based on command position	0

When the "AREA range setting mode" parameter is "Range setting with absolute value"

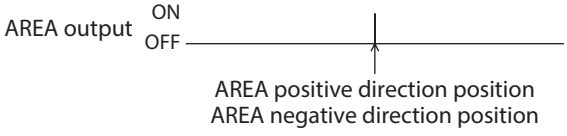
- When a value in the "AREA positive direction position/ offset" parameter is larger than that in the "AREA negative direction position/ detection range" parameter
  When the motor position is equal to or larger than a value in the "AREA negative direction position/ detection range" parameter or equal to or smaller than that in the "AREA positive direction position/ offset" parameter, the AREA output is turned ON.



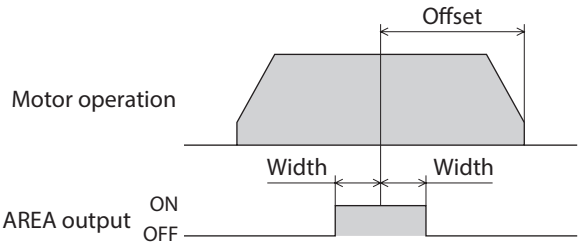
- When a value in the "AREA positive direction position/ offset" parameter is smaller than that in the "AREA negative direction position/ detection range" parameter
  When the motor position is equal to or smaller than a value in the "AREA positive direction position/ offset" parameter or equal to or larger than that in the "AREA negative direction position/ detection range" parameter, the AREA output is turned ON.



- When a value in the "AREA positive direction position/ offset" parameter is equal to that in the "AREA negative direction position/ detection range" parameter
  When the motor position is equal to values in the "AREA negative direction position/ detection range" parameter and the "AREA positive direction position/ offset" parameter, the AREA output is turned ON.



When the "AREA range setting mode" parameter is "1: Offset/width setting from the target position"



- **FW-SLS output, RV-SLS output**

  When the command position is exceeded the range set in the "Software limit" parameter when the "Software overtravel" parameter is set to other than "–1 Disable," the FW-SLS output or the RV-SLS output is turned ON.

- **RND-OVF output**

  ON-OFF of the RND-OVF output is inverted when the wrap range is exceeded.

■ Position monitor function

Refer to "Pulse request function" on p.112 for details about the position monitor function.

- **MON-OUT output**

  This is a signal used for I/O position output function. Coordinate information or alarm information is output.

- **PLS-OUTR output**

  This signal is turned ON when the pulse request function is ready, and the PLS-OUTR output is turned OFF when the output of coordinate information by pulse is completed.

■ Coordinate status indication

- **ELPRST-MON output**

  The ELPRST-MON output is turned ON when the electrical home coordinates are enabled.

- **ABSPEN output**

  The ABSPEN output is turned ON when the coordinates are set.

- **PRST-DIS output**

  The PRST-DIS output is turned ON when the home is required to set again.
  If the "Preset position" parameter is set to other than "0," the PRST-DIS output is turned ON when the resolution is changed after the position preset or return-to-home operation is performed.
  When the PRST-DIS output has been turned ON, perform the position preset or return-to-home operation to set the home.

  memo If the resolution is changed in a state where the "Preset position" parameter is set to "0," coordinates are automatically set again. Therefore, the PRST-DIS output is not turned ON even if the resolution is changed.

- **PRST-STLD output**

  The PRST-STLD output is turned ON when the position preset is performed and the home information is stored in the ABZO sensor.

- **ORGN-STLD output**

  Products such as motorized actuators whose home is set at the time of factory shipment are delivered in a state where the ORGN-STLD output is ON.

5-3 Latch information indication

Refer to "5 Latch function" on p.275 for details about the latch function.

- **JUMP0-LAT output, JUMP1-LAT output**

  The JUMP0-LAT output is turned ON when the (Low) I/O event number trigger is detected, and the JUMP1-LAT output is turned ON when the (High) I/O event number trigger is detected. When the LAT-CLR input is turned from OFF to ON, the JUMP0-LAT output and the JUMP1-LAT output are turned OFF.

- **NEXT-LAT output**

  When the NEXT input is turned from OFF to ON, the NEXT-LAT output is turned ON. When the LAT-CLR input is turned from OFF to ON, the NEXT-LAT output is turned OFF.

5-4 Response outputs

A response output is a signal to output the ON-OFF status of the corresponding input signal.
The table below shows the correspondences between input signals and output signals.

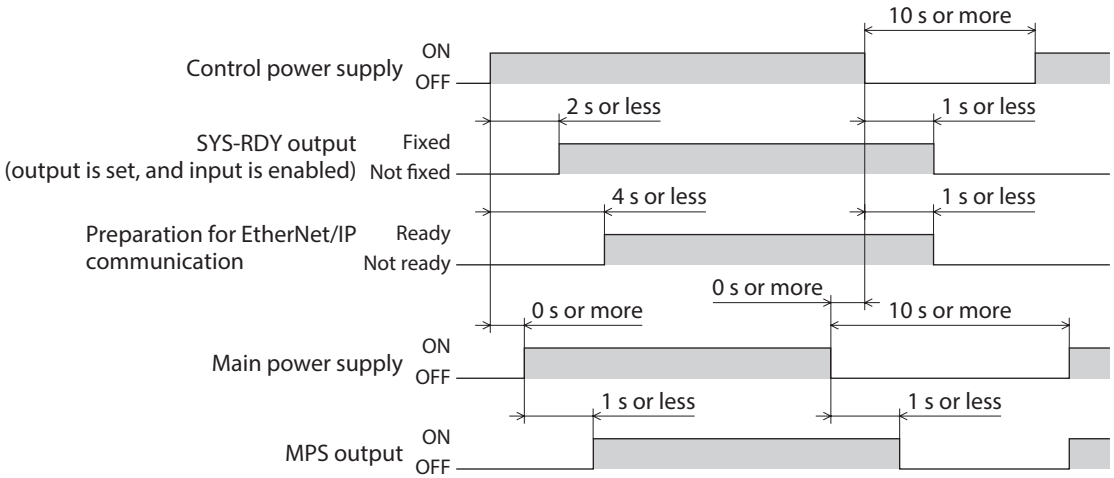
Input signal	Output signal
FREE	FREE_R
S-ON	S-ON_R
CLR	CLR_R
STOP-SOFF	STOP-SOFF_R
STOP	STOP_R
BREAK-ATSQ	BREAK-ATSQ_R
ALM-RST	ALM-RST_R
P-PRESET	P-PRESET_R
EL-PRST	EL-PRST_R
ETO-CLR	ETO-CLR_R
LAT-CLR	LAT-CLR_R
INFO-CLR	INFO-CLR_R
HMI	HMI_R
TRQ-LMT	TRQ-LMT_R
SPD-LMT	SPD-LMT_R
FW-BLK	FW-BLK_R
RV-BLK	RV-BLK_R
FW-LS	FW-LS_R
RV-LS	RV-LS_R
HOMES	HOMES_R
SLIT	SLIT_R
START	START_R
SSTART	SSTART_R
NEXT	NEXT_R
HOME	HOME_R

Input signal	Output signal
ZHOME	ZHOME_R
D-SEL0	D-SEL0_R
D-SEL1	D-SEL1_R
D-SEL2	D-SEL2_R
D-SEL3	D-SEL3_R
D-SEL4	D-SEL4_R
D-SEL5	D-SEL5_R
D-SEL6	D-SEL6_R
D-SEL7	D-SEL7_R
FW-JOG	FW-JOG_R
RV-JOG	RV-JOG_R
FW-JOG-H	FW-JOG-H_R
RV-JOG-H	RV-JOG-H_R
FW-JOG-P	FW-JOG-P_R
RV-JOG-P	RV-JOG-P_R
FW-JOG-C	FW-JOG-C_R
RV-JOG-C	RV-JOG-C_R
FW-POS	FW-POS_R
RV-POS	RV-POS_R
M0	M0_R
M1	M1_R
M2	M2_R
M3	M3_R
M4	M4_R
M5	M5_R

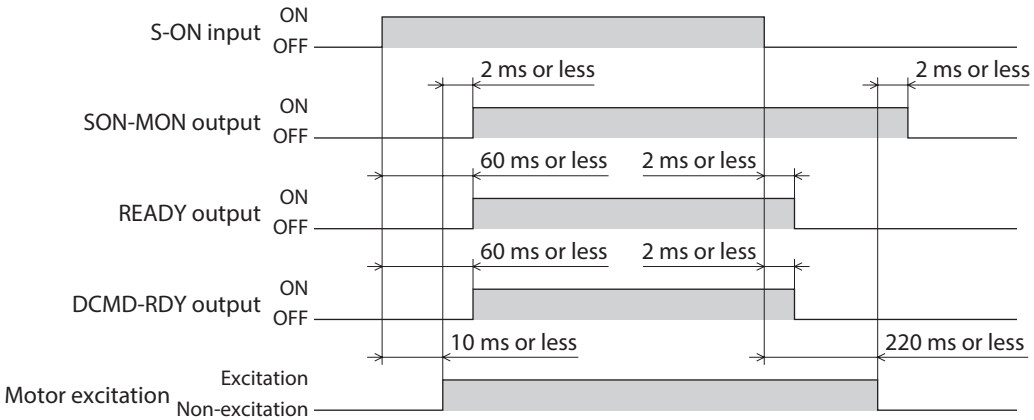
Input signal	Output signal
M6	M6_R
M7	M7_R
TEACH	TEACH_R
MON-REQ0	MON-REQ0_R
MON-REQ1	MON-REQ1_R
MON-CLK	MON-CLK_R
PLSM-REQ	PLSM-REQ_R
R0	R0_R
R1	R1_R
R2	R2_R
R3	R3_R
R4	R4_R
R5	R5_R
R6	R6_R
R7	R7_R
R8	R8_R
R9	R9_R
R10	R10_R
R11	R11_R
R12	R12_R
R13	R13_R
R14	R14_R
R15	R15_R

6 Timing chart

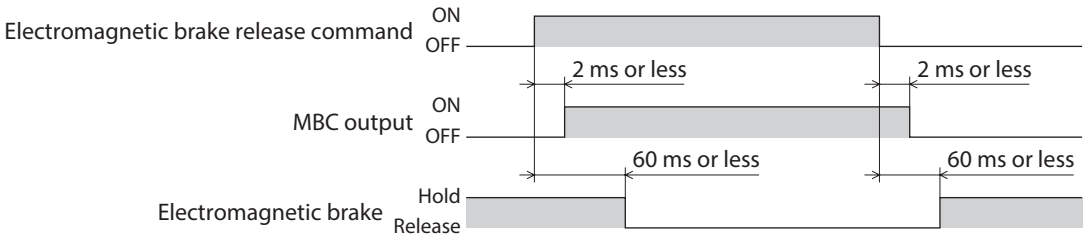
■ Power ON



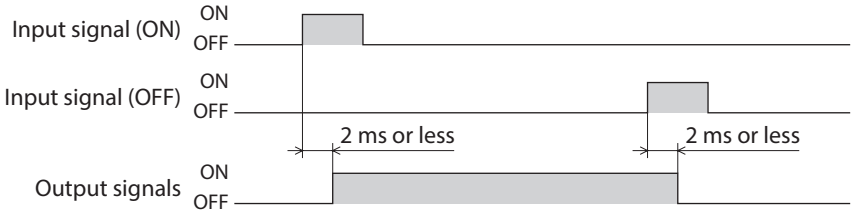
■ Excitation



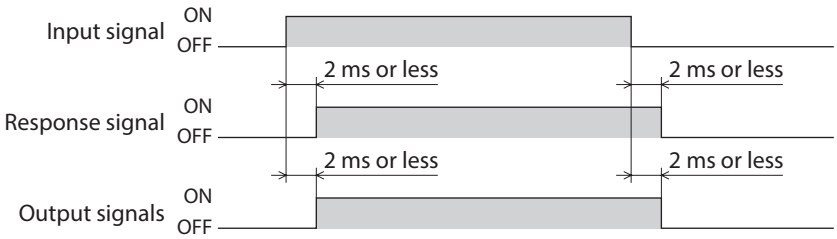
■ Electromagnetic brake



■ I/O signals (when the output is switched according to the ON edge of the input signal)



■ I/O signals (when the output is switched with the ON/OFF edge of the input signal)



5 Control via EtherNet/IP

This part explains how to control via EtherNet/IP.

◆Table of contents

1 Guidance

If you are new to this product, read this section to understand the operation flow.
This is an example how to set the operation data and start the motor using a scanner.

STEP 1	Installation and connection
↓	
STEP 2	Before starting operation
↓	
STEP 3	Setting of IP address
↓	
STEP 4	Starting of motor

- **Operating conditions**

This operation is performed under the following conditions.

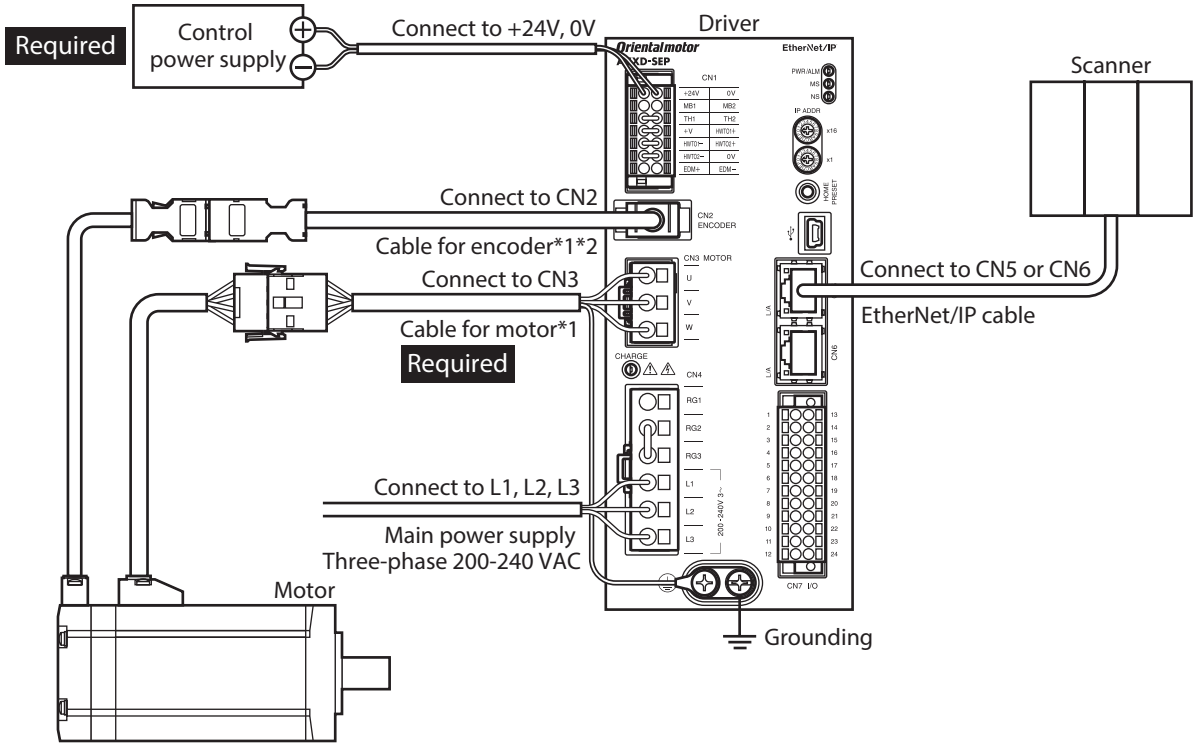
- Number of drivers connected: 1 unit
- IP address: 192.168.1.2

Note

- Before operating the motor, check the condition of the surrounding area to ensure safety.
- Before starting based on the guidance, import the EDS file to the setting tool of the scanner and register the system configuration in advance. For details, contact your nearest Oriental Motor sales office.

STEP 1 Check the installation and the connection.

The figure shows models for three-phase 200 to 240 VAC input.



*1 Purchase is required separately.
*2 Use the cable for encoder when the length of the encoder cable of motor is not enough.

STEP 2 Make preparations for operation.

Refer to "2 Before starting operation" and "3 Operation", and set the following.

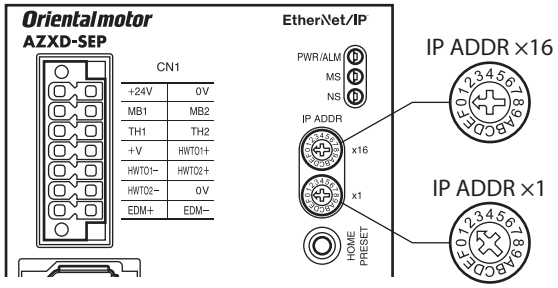
- Setting of resolution ⇨ p.18
- Home setting ⇨ p.20
- Coordinate setting ⇨ p.96

STEP 3 Set an IP address.

Set an IP address using the IP address setting switches (IP ADDR ×16, ×1) of the driver.

1. Set the IP address setting switches as shown below.

   Settings: ×16: 0, ×1: 2 (192.168.1.2)



2. Turn on the control power supply again.

Note After setting the switches, turn off the control power supply and turn on again. The setting is enabled when the control power supply is turned on again.

STEP 4 The scanner starts the motor.

As an example, this section explains how to perform the following positioning operation.

- **Setting example**
  - Operation data number: 1
  - Position: 5,000 steps
  - Other settings: Initial values
- **Operation processing flow**

Descriptions are given using the scanner as the subject.

1. Set the following operation data to turn the WR-REQ ON.
   The operation data is set in the driver. When the setting is completed, the WR-END is turned ON.

Byte	Description	Setting value	Note
34, 35	Write parameter ID	3104	Parameter ID of "Operation type" of operation data No. 1
36 to 39	Write data	1	Operation type: Absolute positioning

2. Turn the WR-REQ OFF.
   The WR-END is returned to OFF.
3. Set the following operation data to turn the WR-REQ ON.
   The operation data is set in the driver. When the setting is completed, the WR-END is turned ON.

Byte	Description	Setting value	Note
34, 35	Write parameter ID	3105	Parameter ID of "Position" of operation data No. 1
36 to 39	Write data	5,000	Position: 5,000 steps

4. Turn the WR-REQ OFF.
   The WR-END is returned to OFF.
5. Turn the S-ON ON.
6. Check the READY has been turned ON.
7. Select the operation data No. 1 to turn the START ON.
   Absolute positioning operation is started.
8. Check the READY has been turned OFF, and turn the START OFF.

STEP 5 Were you able to operate?

How did it go? Were you able to operate properly? If the motor does not operate, check the following points.

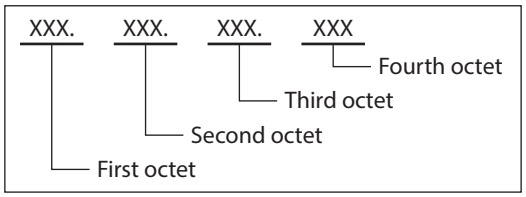
- Is the PWR/ALM LED blinking in red?
  An alarm is being generated. Refer to p.245 for details.
- Are the main power supply, the control power supply, the motor, and the EtherNet/IP cable connected securely?
- Is the IP address set correctly?
- Is the NS LED lit in red or blinking in red?
  A communication error is being detected. Refer to p.244 for details.

2 Communication specifications

Communication standards		EtherNet/IP (conforms to CT18)
Vendor ID		187: Oriental Motor Co., Ltd.
Device type		43: Generic Device
Transmission rate		10/100 Mbps (autonegotiation)
Communication mode		Full duplex/Half duplex (autonegotiation)
Cable specifications		Shielded twisted pair (STP) cable straight-through/crossover cable, category 5e or higher is recommended
Number of occupied bytes	Output (scanner → driver)	40 bytes
	Input (driver → scanner)	56 bytes
Implicit communication	Number of connections	2
	Connection type	Exclusive Owner, Input Only
	Communication cycle (RPI)	1 to 3,200 ms
	Connection type (scanner → driver)	Point–to–Point
	Connection type (driver → scanner)	Point–to–Point, Multicast
	Data trigger	Cyclic
IP address setting method		IP address setting switch, parameter, DHCP
Network topology		Star, Linear bus, Ring (Device Level Ring)

3 Setting of IP address

The IP address, subnet mask, and default gateway are configured as shown in the figure, respectively.



3-1 Setting method of IP address

The following three methods can be used to set the IP address, subnet mask, and default gateway.

Setting method	Set item			Specific setting method		
	IP address setting switches		"Configuration Control" parameter	IP address	Subnet mask	Default gateway
	×16	×1				
IP address setting switches	0	1	0*	First octet to third octet: Parameters Forth octet: IP address setting switches	Parameters	Parameters
	F	E				
	F	F	0*	192.168.1.1	255.255.255.0	0.0.0.0
Parameters	0	0	0	Parameters	Parameters	Parameters
DHCP server	0	0	2	DHCP server	DHCP server	DHCP server

* If both the IP address setting switches are set to other than "0," the "Configuration Control" parameter is automatically set to "0: Parameter."

3-2 When using the IP address setting switches

■ Setting of IP address

Set the first octet to third octet with the parameters. Set the forth octet with the IP address setting switches.

- **First octet to third octet**

Related parameters

MEXE02 code	Name	Description	Setting range	Initial value
p12	IP Address 1	Sets the first octet of the IP address.	0 to 255	192
	IP Address 2	Sets the second octet of the IP address.		168
	IP Address 3	Sets the third octet of the IP address.		1

● Fourth octet

Set the fourth octet of the IP address using the IP address setting switches (IP ADDR ×16, ×1).
The IP address setting switches are hexadecimal numbers. Convert the IP address from decimal to hexadecimal to set.

Factory setting: ×16: 0, ×1: 0 (Setting of parameter or DHCP server is enabled)

Setting example

Setting of switches		Value of IP address	Note
×16	×1		
0	0	The setting of the parameter or DHCP server is enabled.	Whether either the parameter or the DHCP server is enabled can be checked with the "Configuration Control" parameter.
0	1	XXX.XXX.XXX.1	The fourth octet is set to "1."
F	E	XXX.XXX.XXX.254	The fourth octet is set to "254."
F	F	192.168.1.1	This value is applied regardless of the setting of the parameter and DHCP server.

Note

- When the switches were set, turn on the control power supply again. The new setting will be enabled when the control power supply is turned on again.
- When connecting two or more EtherNet/IP compatible products, set so that an IP address is not duplicated. If an IP address is duplicated, a communication error of the "IP address conflict" is detected.

■ Setting of subnet mask and default gateway

Set the subnet mask and default gateway with the parameters.

Related parameters

MEXE02 code	Name	Description	Setting range	Initial value
p12	Network Mask 1	Sets the first octet of the subnet mask.	0 to 255	255
	Network Mask 2	Sets the second octet of the subnet mask.		255
	Network Mask 3	Sets the third octet of the subnet mask.		255
	Network Mask 4	Sets the fourth octet of the subnet mask.		0
	Gateway Address 1	Sets the first octet of the default gateway.	0 to 255	0
	Gateway Address 2	Sets the second octet of the default gateway.		0
	Gateway Address 3	Sets the third octet of the default gateway.		0
	Gateway Address 4	Sets the fourth octet of the default gateway.		0

memo

When the switch is set to "FF," the following values are applied regardless of the setting of the parameter or the DHCP server.

- Subnet mask: 255.255.255.0
- Default gateway: 0.0.0.0

3-3 When setting with parameters

Set both the IP address setting switches of the driver to "0" and the "Configuration Control" parameter to "0: Parameter." The parameters and the DHCP server cannot be used in combination.

Related parameters

MEXE02 code	Name	Description	Setting range	Initial value
p12	Configuration Control	Sets how to obtain the IP address.	0: Parameter 2: DHCP server	2
	IP Address 1	Sets the first octet of the IP address.	0 to 255	192
	IP Address 2	Sets the second octet of the IP address.		168
	IP Address 3	Sets the third octet of the IP address.		1
	IP Address 4	Sets the fourth of the IP address.		1
	Network Mask 1	Sets the first octet of the subnet mask.	0 to 255	255
	Network Mask 2	Sets the second octet of the subnet mask.		255
	Network Mask 3	Sets the third octet of the subnet mask.		255
	Network Mask 4	Sets the fourth octet of the subnet mask.		0
	Gateway Address 1	Sets the first octet of the default gateway.	0 to 255	0
	Gateway Address 2	Sets the second octet of the default gateway.		0
	Gateway Address 3	Sets the third octet of the default gateway.		0
	Gateway Address 4	Sets the fourth octet of the default gateway.		0

Note When connecting two or more EtherNet/IP compatible products, set so that an IP address is not duplicated. If an IP address is duplicated, a communication error of the "IP address conflict" is detected.

3-4 When setting with DHCP server

The IP address, subnet mask and default gateway are automatically assigned from the DHCP server.
Set both the IP address setting switches of the driver to "0" and the "Configuration Control" parameter to "2: DHCP server." The parameters and the DHCP server cannot be used in combination.

memo If the control power supply is shut off, the IP address obtained from the DHCP server is cleared.

Related parameter

MEXE02 code	Name	Description	Setting range	Initial value
p12	Configuration Control	Sets how to obtain the IP address.	0: Parameter 2: DHCP server	2

4 Implicit message

4-1 Implicit message format

This section shows transfer contents of implicit message. The order of data is in little-endian format.
Contents of implicit message cannot be changed since they are fixed.

Byte	Input (driver → scanner)	Output (scanner → driver)
0, 1	Remote I/O (R-OUT)	Remote I/O (R-IN)
2, 3	Operation data number selection_R	Operation data number selection
4, 5	Fixed I/O (OUT)	Fixed I/O (IN)
6, 7	Present alarm	Direct data operation operation type
8, 9	Feedback position (lower)	Direct data operation position (lower)
10, 11	Feedback position (upper)	Direct data operation position (upper)
12, 13	Feedback speed [Hz] (lower)	Direct data operation speed (lower)
14, 15	Feedback speed [Hz] (upper)	Direct data operation speed (upper)
16, 17	Command position (lower)	Direct data operation starting/changing rate (lower)
18, 19	Command position (upper)	Direct data operation starting/changing rate (upper)
20, 21	Torque monitor	Direct data operation stopping deceleration (lower)
22, 23	Load factor monitor	Direct data operation stopping deceleration (upper)
24, 25	Information (lower)	Direct data operation torque limiting value
26, 27	Information (upper)	Direct data operation forwarding destination
28, 29	Reserved	Reserved
30, 31	Read parameter ID_R	Read parameter ID
32, 33	Read/write status	Write request
34, 35	Write parameter ID_R	Write parameter ID
36, 37	Read data (lower)	Write data (lower)
38, 39	Read data (upper)	Write data (upper)
40, 41	Assignable monitor 0 (lower)	–
42, 43	Assignable monitor 0 (upper)	–
44, 45	Assignable monitor 1 (lower)	–
46, 47	Assignable monitor 1 (upper)	–
48, 49	Assignable monitor 2 (lower)	–
50, 51	Assignable monitor 2 (upper)	–
52, 53	Assignable monitor 3 (lower)	–
54, 55	Assignable monitor 3 (upper)	–

4-2 Input data

Data transferred from a driver to a scanner is called Input data.

■ Input data format

Contents of the Input data are as follows. The order of data is in little-endian format.

Assembly Instance	Attribute	Byte	Size (byte)	Description
100	3	0, 1	2	Remote I/O (R-OUT)
		2, 3	2	Operation data number selection_R
		4, 5	2	Fixed I/O (OUT)
		6, 7	2	Present alarm
		8 to 11	4	Feedback position
		12 to 15	4	Feedback speed [Hz]
		16 to 19	4	Command position
		20, 21	2	Torque monitor
		22, 23	2	Load factor monitor
		24 to 27	4	Information
		28, 29	2	Reserved
		30, 31	2	Read parameter ID_R
		32, 33	2	Read/write status
		34, 35	2	Write parameter ID_R
		36 to 39	4	Read data
		40 to 43	4	Assignable monitor 0
		44 to 47	4	Assignable monitor 1
		48 to 51	4	Assignable monitor 2
		52 to 55	4	Assignable monitor 3

■ Details of Input data

- **Remote I/O (R-OUT)**

This is the I/O accessed via EtherNet/IP.
The assignments of signals can be changed using the "R-OUT output function" parameters.

Bit	Name	Description	Initial assignment
0	R-OUT0	Output in response to a signal assigned with the "R-OUT output function" parameter.	64: M0_R
1	R-OUT1		65: M1_R
2	R-OUT2		66: M2_R
3	R-OUT3		32: START_R
4	R-OUT4		144: HOME-END
5	R-OUT5		132: READY
6	R-OUT6		135: INFO
7	R-OUT7		129: ALM-A
8	R-OUT8		136: SYS-BSY
9	R-OUT9		160: AREA0
10	R-OUT10		161: AREA1
11	R-OUT11		162: AREA2
12	R-OUT12		155: ZSG
13	R-OUT13		134: MOVE
14	R-OUT14		138: IN-POS
15	R-OUT15		140: TLC

- **Operation data number selection_R**

Bit	Name	Description
0	M0_R	Output in response to an input signal.
1	M1_R	
2	M2_R	
3	M3_R	
4	M4_R	
5	M5_R	
6	M6_R	
7	M7_R	
8 to 15	Reserved	0 is returned.

- **Fixed I/O (OUT)**

This is the I/O accessed via EtherNet/IP.
Assignments of signals cannot be changed.

Bit	Name	Description
0	SEQ-BSY	Output while stored data operation is performed.
1	MOVE	Output while the motor operates.
2	IN-POS	Output when positioning operation is completed.
3	START_R	Output in response to an input signal.
4	HOME-END	Output when high-speed return-to-home operation or return-to-home operation is completed, or position preset is executed.
5	READY	Output when the driver is ready to operate.
6	DCMD-RDY	Output when the driver is ready to start direct data operation.
7	ALM-A	Output the alarm status of the driver. (Normally open)
8	TRIG_R	Output in response to an input signal.
9	TRIG-MODE_R	
10	SET-ERR	Output when an error occurs in any of the settings of operation type, position, speed, starting/changing rate, stopping deceleration, torque limiting value, and forwarding destination for direct data operation.
11	EXE-ERR	Output when direct data operation is failed to execute.
12	DCMD-FULL	Output when data is being written to the buffer area of direct data operation.
13	STOP_R	Output in response to an input signal.
14	ETO-MON	Output after the HWTO1 input or the HWTO2 input is turned OFF until the motor is excited.
15	TLC	Output when the output torque reaches the upper limit value.

- **Present alarm**

Bit	Name	Description
0 to 15	Present alarm	This indicates the alarm code presently being generated.

- **Feedback position**

Bit	Name	Description
0 to 31	Feedback position	This indicates the present feedback position. When the wrap function is enabled, the value on the wrap coordinates is indicated.

- **Feedback speed [Hz]**

Bit	Name	Description
0 to 31	Feedback speed [Hz]	This indicates the present feedback speed.

- **Command position**

Bit	Name	Description
0 to 31	Command position	This indicates the present command position. When the wrap function is enabled, the value on the wrap coordinates is indicated.

- **Torque monitor**

Bit	Name	Description
0 to 15	Torque monitor	This indicates the output torque presently generated as a percentage of the rated torque. (1 = 0.1 %)

- **Load factor monitor**

Bit	Name	Description
0 to 15	Load factor monitor	This indicates the motor output power presently generated as a percentage of the maximum output power in the continuous duty region. (1 = 0.1 %)

- **Information**

Bit	Name	Description
0 to 31	Information	This indicates the information code presently being generated.

- **Read parameter ID_R**

Bit	Name	Description
0 to 15	Read parameter ID_R	This indicates a response of the read parameter ID.

- **Read/write status**

Bit	Name	Description
0 to 6	Reserved	0 is returned.
7	RD-ERR	Output when an error occurred in reading. If reading is performed properly, the RD-ERR is turned OFF.
8	WR-END	Output in response to the WR-REQ. The WR-END is also turned ON while the WR-REQ is ON. OFF: Write request waiting ON: Write completed
9	SYS-BSY	Output when the driver is in an internal processing state.
10	Reserved	0 is returned.
11	WR-SET-ERR	Output when the write parameter ID or the write data is out of the setting range.
12	WR-IF-ERR	Output when writing cannot be executed due to user I/F communication in progress.
13	WR-NV-ERR	Output when writing cannot be executed due to non-volatile memory processing in progress.
14	WR-EXE-ERR	Output when a command cannot be executed.
15	WR-ERR	Output when an error occurred in writing. If the WR-REQ is turned OFF or writing is performed properly, the WR-ERR is also turned OFF.

- **Write parameter ID_R**

Bit	Name	Description
0 to 15	Write parameter ID_R	This indicates a response of the write parameter ID .

- **Read data**

Bit	Name	Description
0 to 31	Read data	This indicates the value of the parameter shown in the parameter ID_R.

● **Assignable monitor**

Bit	Name	Description
0 to 31	Assignable monitor n*	This indicates the value of the parameter set in the "Assignable monitor address n" parameter.

* n: 0 to 3

4-3 Output data

Data transferred from a scanner to a driver is called Output data.

■ Output data format

Contents of the Output data are as follows. The order of data is in little-endian format.

Assembly Instance	Attribute	Byte	Size (byte)	Description
101	3	0, 1	2	Remote I/O (R-IN)
		2, 3	2	Operation data number selection
		4, 5	2	Fixed I/O (IN)
		6, 7	2	Direct data operation operation type
		8 to 11	4	Direct data operation position
		12 to 15	4	Direct data operation speed
		16 to 19	4	Direct data operation starting/changing rate
		20 to 23	4	Direct data operation stopping deceleration
		24, 25	2	Direct data operation torque limiting value
		26, 27	2	Direct data operation forwarding destination
		28, 29	2	Reserved
		30, 31	2	Read parameter ID
		32, 33	2	Write request
		34, 35	2	Write parameter ID
		36 to 39	4	Write data

■ Details of Output data

● Remote I/O (R-IN)

This is the I/O accessed via EtherNet/IP.
The assignments of signals can be changed using the "R-IN input function" parameters.

Bit	Name	Description	Initial assignment
0	R-IN0	These are used to execute the signal assigned with the "R-IN input function" parameter.	0: Not used
1	R-IN1		
2	R-IN2		
3	R-IN3		
4	R-IN4		
5	R-IN5		
6	R-IN6		
7	R-IN7		
8	R-IN8		
9	R-IN9		
10	R-IN10		
11	R-IN11		
12	R-IN12		
13	R-IN13		
14	R-IN14		
15	R-IN15		

● Operation data number selection

Bit	Name	Description	Initial value
0	M0	The operation data number is selected using eight bits.	0
1	M1		
2	M2		
3	M3		
4	M4		
5	M5		
6	M6		
7	M7		
8 to 15	Reserved	A value is disregarded.	0

- **Fixed I/O (IN)**

This is the I/O accessed via EtherNet/IP.
Assignments of signals cannot be changed.

Bit	Name	Description	Initial value
0	FW-JOG	This is used to execute JOG operation in the forward direction.	0
1	RV-JOG	This is used to execute JOG operation in the reverse direction.	
2	S-ON	This is used to put the motor into an excitation state.	
3	START	This is used to execute stored data operation.	
4	ZHOME	This is used to execute high-speed return-to-home operation.	
5	STOP	This is used to stop the motor.	
6	FREE	This is used to shut off the motor current to put the motor into a non-excitation state. When an electromagnetic brake motor is used, the electromagnetic brake is in a state of releasing the motor shaft.	
7	ALM-RST	This is used to reset the alarm being generated presently.	
8	TRIG	This is used to execute direct data operation.	
9	TRIG-MODE	This is used to set the judgment criterion for the TRIG. 0: Start at ON edge 1: Start at ON level	
10	ETO-CLR	This is used to put the motor into an excitation state after releasing the power removal status.	
11	TRQ-LMT	This is used to limit the torque with the torque limiting value of the operation data.	
12	FW-JOG-P	This is used to execute inching operation in the forward direction.	
13	RV-JOG-P	This is used to execute inching operation in the reverse direction.	
14	FW-POS	This is used to execute continuous operation in the forward direction.	
15	RV-POS	This is used to execute continuous operation in the reverse direction.	

- **Direct data operation operation type**

Bit	Name	Description	Setting range	Initial value
0 to 15	Direct data operation operation type	This is used to set the operation type for direct data operation.	0: No setting 1: Absolute positioning 2: Incremental positioning (based on command position) 3: Incremental positioning (based on feedback position) 7: Continuous operation 8: Wrap absolute positioning 9: Wrap proximity positioning 10: Wrap forward direction absolute positioning 11: Wrap reverse direction absolute positioning	2

- **Direct data operation position**

Bit	Name	Description	Setting range	Initial value
0 to 31	Direct data operation position	This is used to set the target position for direct data operation.	–2,147,483,648 to 2,147,483,647 steps	0

- **Direct data operation speed**

Bit	Name	Description	Setting range	Initial value
0 to 31	Direct data operation speed	This is used to set the operating speed for direct data operation.	–4,000,000 to 4,000,000 Hz	1,000

- **Direct data operation starting/changing rate**

Bit	Name	Description	Setting range	Initial value
0 to 31	Direct data operation starting/changing rate	This is used to set the starting/changing rate or the starting/changing time for direct data operation.	1 to 1,000,000,000 (1 = 0.001)*	1,000,000

* The setting unit is followed the "Acceleration/deceleration unit" parameter.

- **Direct data operation stopping deceleration**

Bit	Name	Description	Setting range	Initial value
0 to 31	Direct data operation stopping deceleration	This is used to set the stopping deceleration rate or the stop time for direct data operation.	1 to 1,000,000,000 (1 = 0.001)*	1,000,000

* The setting unit is followed the "Acceleration/deceleration unit" parameter.

- **Direct data operation torque limiting value**

Bit	Name	Description	Setting range	Initial value
0 to 15	Direct data operation torque limiting value	This is used to set the torque limiting value for direct data operation.	0 to 10,000 (1 = 0.1 %)	1,000

- **Direct data operation forwarding destination**

Bit	Name	Description	Setting range	Initial value
0 to 15	Direct data operation forwarding destination	This is used to select the stored area when the next direct data is transferred during direct data operation.	0: Execution memory 1: Buffer memory	0

- **Read parameter ID**

Bit	Name	Description	Setting range	Initial value
0 to 15	Read parameter ID	This is used to set the parameter ID to be read from.	Parameter list ⇨p.243	0

- **Write request**

Bit	Name	Description	Setting range	Initial value
0	WR-REQ	This is used to set the write request.	0: Disable 1: Write request (ON edge)	0
1 to 15	Reserved	A value is disregarded.	–	0

- **Write parameter ID**

Bit	Name	Description	Setting range	Initial value
0 to 15	Write parameter ID	This is used to set the parameter ID to be written to.	Parameter list ⇨p.243	0

- **Write data**

Bit	Name	Description	Setting range	Initial value
0 to 31	Write data	This is used to set a value to be written to the parameter specified by the write parameter ID.	Parameter list ⇨p.243	0

4-4 Processing order of Implicit communication

The processing order of Implicit communication is shown below.

Data writing

↓

Setting of operation command

↓

Data reading

memo

- If multiple operation commands are set in the Implicit message format, the operation command of direct data operation is prioritized.
- If the operation commands for remote I/O (R-IN) and fixed I/O (IN) are set at the same time, operation will be as follows.
  · If the same operation command is set: The motor will start.
  · If different operation commands are set: The motor will not start, and information of Start operation error will be generated.

4-5 Data writing

This section explains the flow that data is written from the scanner to the driver via Implicit communication.

■ Area of Implicit message format used

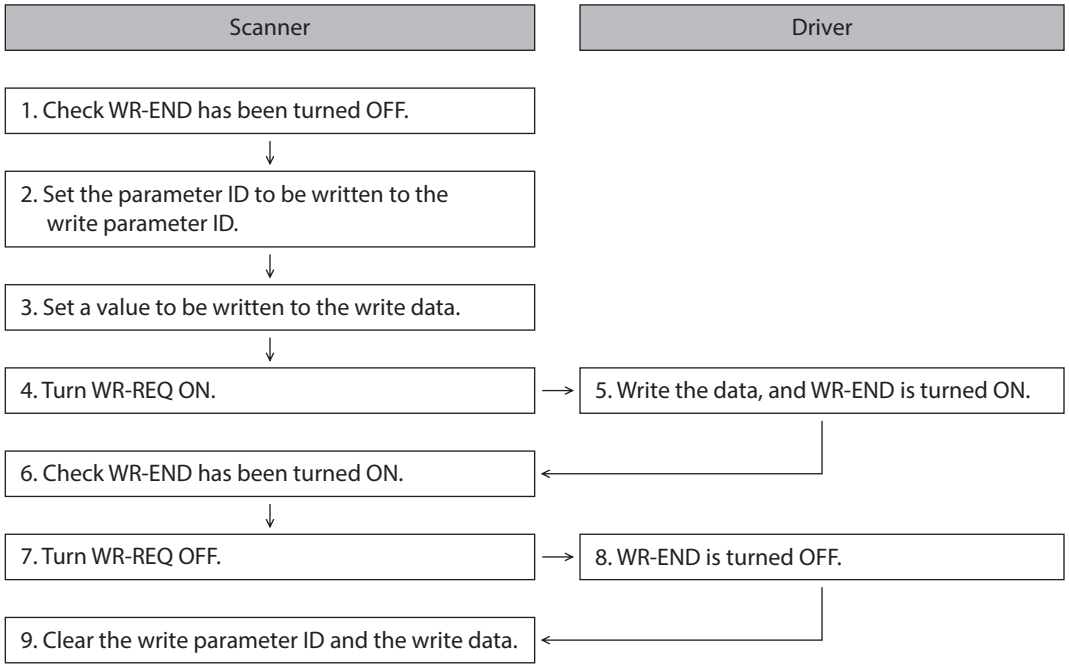
Input (transfer from driver to scanner)

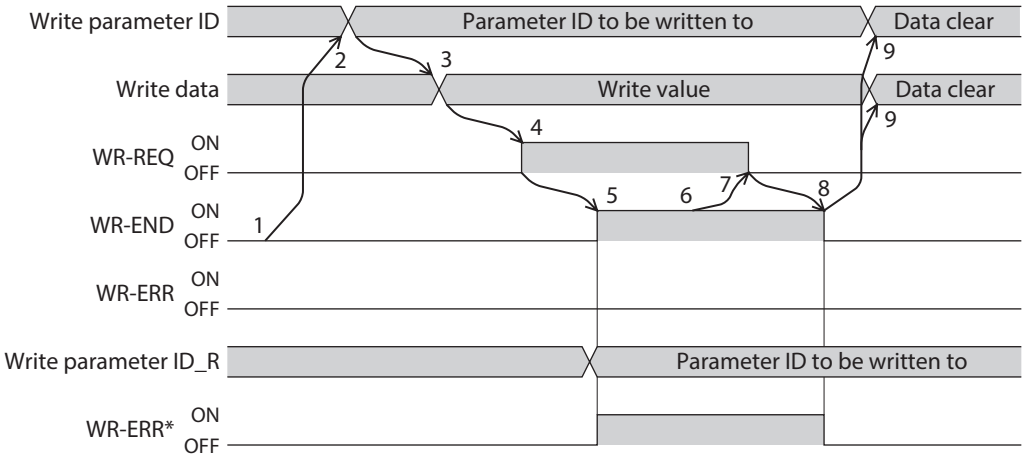
Byte	Description
32, 33	Read/write status
34, 35	Write parameter ID_R

Output (transfer from scanner to driver)

Byte	Description
32, 33	Write request
34, 35	Write parameter ID
36 to 39	Write data

■ Flow that data is written to





* If an error occurs while data is being written, the WR-END and the WR-ERR are simultaneously turned ON.

4-6 Data reading

This section explains the flow that data is read from the driver to the scanner via Implicit communication.
There are the following two methods to read data.

- Use an area of "Read data"
- Use an area of "Assignable monitor"

■ When an area of read data is used

● Area of Implicit message format used

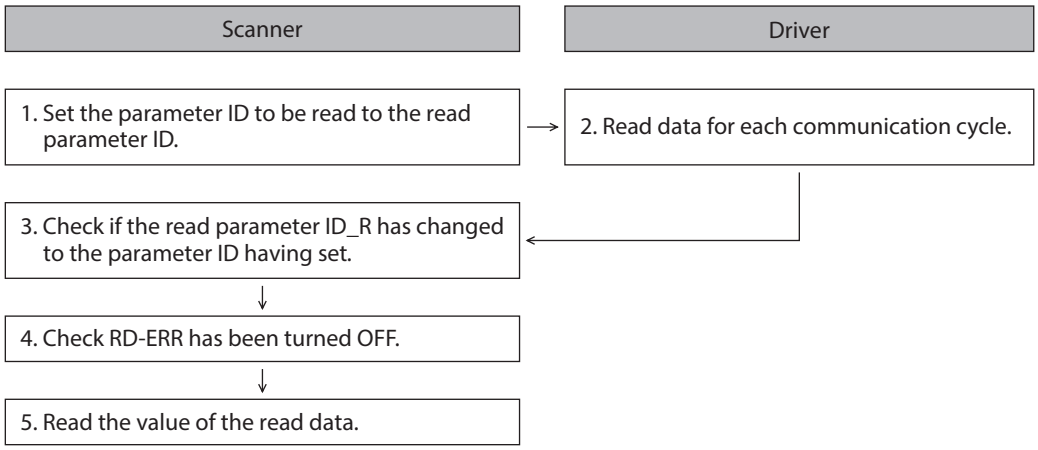
Input (transfer from driver to scanner)

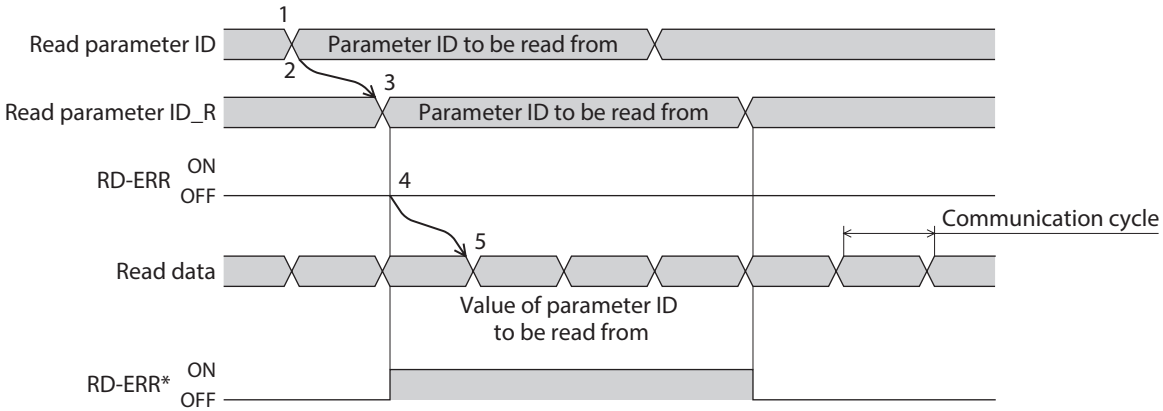
Byte	Description
30, 31	Read parameter ID_R
32, 33	Read/write status
36 to 39	Read data

Output (transfer from scanner to driver)

Byte	Description
30, 31	Read parameter ID

● Flow that data is read from





* If the parameter ID out of setting range is set to the read parameter ID, the RD-ERR is turned ON at the same time when the read parameter ID_R is updated.

■ When an area of assignable monitor is used

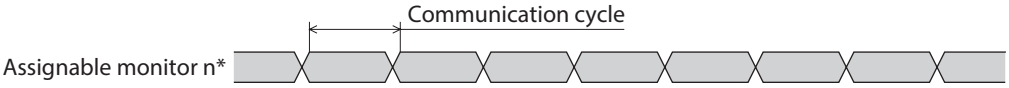
- **Area of Implicit message format used**

Input (transfer from driver to scanner)

Byte	Description
40 to 55	Assignable monitor 0 to assignable monitor 3

- **Flow that data is read from**

Scanner	Driver
Set the "Assignable monitor address" parameter	→ Read the parameter value set in the "Assignable monitor address" parameter for each communication cycle.



* n: 0 to 3

- **Related parameters**

MEXE02 code	Name	Description	Setting range	Initial value
p12	Assignable monitor address 0	These are used to set the parameter ID to show on the assignable monitor.	Parameter list ⇨p.243	124: Driver temperature
	Assignable monitor address 1			125: Motor temperature
	Assignable monitor address 2			109: Cumulative load monitor
	Assignable monitor address 3			127: Tripmeter

5 Example of execution for operation

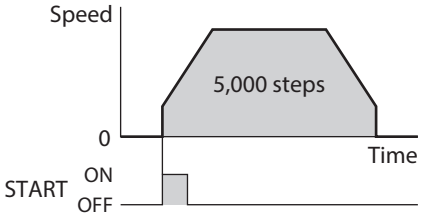
This chapter describes operations that operation data is set using the write data area.
The method to execute operation is common to fixed I/O and remote I/O.

Note Before operating the motor, check the condition of the surrounding area to ensure safety.

5-1 Stored data (SD) operation

As an example, this section explains how to execute the following positioning operation.

- **Setting example**
  - Operation data number: 1
  - Operation type: Absolute positioning
  - Position: 5,000 steps
  - Other settings: Initial values



- **Operation processing flow**

Descriptions are given using the scanner as the subject.

1. Set the following operation data.

• Output (scanner → driver)

Byte	Description	Setting value	Note
34, 35	Write parameter ID	3104	Parameter ID of "Operation type" of operation data No. 1
36 to 39	Write data	1	Operation type: Absolute positioning

2. Turn the WR-REQ ON.
The operation data is set in the driver. When the setting is completed, the WR-END is turned ON.

• Output (scanner → driver)

Byte	Description	Bit	Signal name	Setting value
32, 33	Write request	0	WR-REQ	1

• Input (driver → scanner)

Byte	Description	Bit	Signal name	Response
32, 33	Read/write status	8	WR-END	1
34, 35	Write parameter ID_R	–	–	3104

3. Turn the WR-REQ OFF.
The WR-END is returned to OFF.

• Output (scanner → driver)

Byte	Description	Bit	Signal name	Setting value
32, 33	Write request	0	WR-REQ	0

• Input (driver → scanner)

Byte	Description	Bit	Signal name	Response
32, 33	Read/write status	8	WR-END	0

4. Set the following operation data.

• Output (scanner → driver)

Byte	Description	Setting value	Note
34, 35	Write parameter ID	3105	Parameter ID of "Position" of operation data No. 1
36 to 39	Write data	5,000	Position: 5,000 steps

5. Turn the WR-REQ ON.
The operation data is set in the driver. When the setting is completed, the WR-END is turned ON.

• Output (scanner → driver)

Byte	Description	Bit	Signal name	Setting value
32, 33	Write request	0	WR-REQ	1

• Input (driver → scanner)

Byte	Description	Bit	Signal name	Response
32, 33	Read/write status	8	WR-END	1
34, 35	Write parameter ID_R	–	–	3105

6. Turn the WR-REQ OFF.
The WR-END is returned to OFF.

• Output (scanner → driver)

Byte	Description	Bit	Signal name	Setting value
32, 33	Write request	0	WR-REQ	0

• Input (driver → scanner)

Byte	Description	Bit	Signal name	Response
32, 33	Read/write status	8	WR-END	0

7. Turn the S-ON ON.
The motor puts into an excitation state.

• Output (scanner → driver)

Byte	Description	Bit	Signal name	Setting value
4, 5	Fixed I/O (IN)	2	S-ON	1

8. Check the READY has been turned ON.

• Input (driver → scanner)

Byte	Description	Bit	Signal name	Response
4, 5	Fixed I/O (OUT)	5	READY	1

9. Selects the operation data No. 1.

• Output (scanner → driver)

Byte	Description	Bit	Signal name	Setting value
2, 3	Operation data number selection	0	M0	1

10. Turn the START ON.
Absolute positioning operation is started.

• Output (scanner → driver)

Byte	Description	Bit	Signal name	Setting value
4, 5	Fixed I/O (IN)	3	START	1

11. Check the READY has been turned OFF.

• Input (driver → scanner)

Byte	Description	Bit	Signal name	Response
4, 5	Fixed I/O (OUT)	5	READY	0

12. Turn the START OFF.

• Output (scanner → driver)

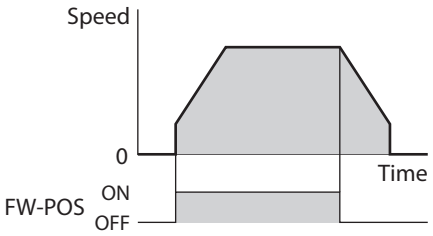
Byte	Description	Bit	Signal name	Setting value
4, 5	Fixed I/O (IN)	3	START	0

5-2 Macro operation

As an example, this section explains how to execute the following continuous operation.

● Setting example

- Operation data number: 0
- Rotation direction: Forward direction
- Other settings: Initial values



● Operation processing flow

Descriptions are given using the scanner as the subject.

1. Turn the S-ON ON.
   The motor puts into an excitation state.

• Output (scanner → driver)

Byte	Description	Bit	Signal name	Setting value
4, 5	Fixed I/O (IN)	2	S-ON	1

2. Check the READY has been turned ON.

• Input (driver → scanner)

Byte	Description	Bit	Signal name	Response
4, 5	Fixed I/O (OUT)	5	READY	1

3. Select the operation data No. 0.

• Output (scanner → driver)

Byte	Description	Setting value
2, 3	Operation data number selection	0

4. Turn the FW-POS ON.
   Continuous operation is started.

• Output (scanner → driver)

Byte	Description	Bit	Signal name	Setting value
4, 5	Fixed I/O (IN)	14	FW-POS	1

5. Turn the FW-POS OFF.
   The motor decelerates to a stop.

• Output (scanner → driver)

Byte	Description	Bit	Signal name	Setting value
4, 5	Fixed I/O (IN)	14	FW-POS	0

5-3 Direct data operation

A condition to execute direct data operation can be selected from the ON edge or ON level of TRIG of fixed I/O (IN). A condition can be selected with the TRIG-MODE of fixed I/O (IN).

■ When direct data operation is executed at ON edge of TRIG

As an example, this section explains how to perform the following direct data operation.

● Setting example

- Operation type: Absolute positioning
- Position: 5,000 steps
- Speed: 1,000 Hz
- Starting/changing rate: 1,000 kHz/s
- Stopping deceleration: 1,000 kHz/s
- Torque limiting value: 100 %
- Forwarding destination: Execution memory

● Operation processing flow

Descriptions are given using the scanner as the subject.

1. Turn the S-ON ON.
   The motor puts into an excitation state.

   • Output (scanner → driver)

Byte	Description	Bit	Signal name	Setting value
4, 5	Fixed I/O (IN)	2	S-ON	1

2. Check the DCMD-RDY has been turned ON.

   • Input (driver → scanner)

Byte	Description	Bit	Signal name	Response
4, 5	Fixed I/O (OUT)	6	DCMD-RDY	1

3. Set the following data.

   • Output (scanner → driver)

Byte	Description	Setting value	Note
4, 5	TRIG-MODE [bit 9 of fixed I/O (IN)]	0	Start at ON edge
6, 7	Direct data operation operation type	1	Absolute positioning
8 to 11	Direct data operation position	5,000	5,000 steps
12 to 15	Direct data operation speed	1,000	1,000 Hz
16 to 19	Direct data operation starting/changing rate	1,000,000	1,000 kHz/s
20 to 23	Direct data operation stopping deceleration	1,000,000	1,000 kHz/s
24, 25	Direct data operation torque limiting value	1,000	100.0 %
26, 27	Direct data operation forwarding destination	0	Execution memory

4. Turn the TRIG ON.
   Direct data operation is started.

   • Output (scanner → driver)

Byte	Description	Bit	Signal name	Setting value
4, 5	Fixed I/O (IN)	8	TRIG	1

5. Check the TRIG_R has been turned ON.

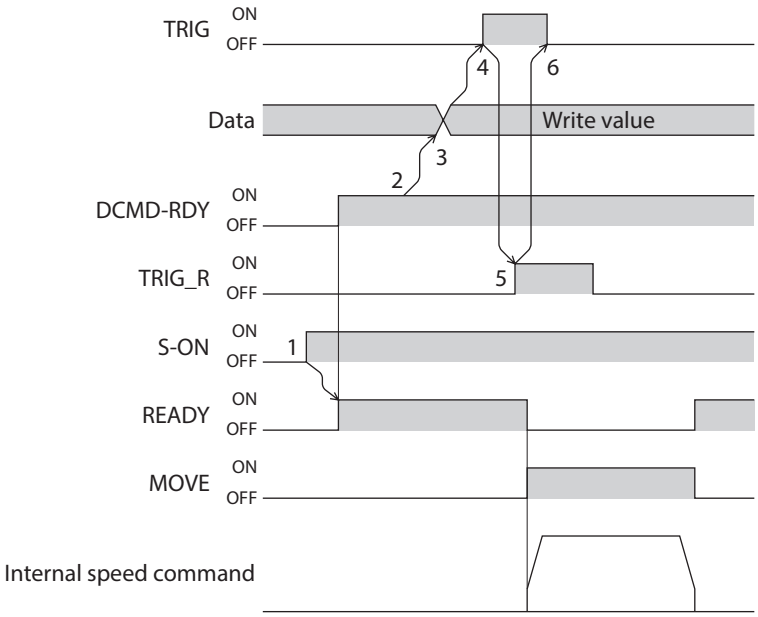
   • Input (driver → scanner)

Byte	Description	Bit	Signal name	Response
4, 5	Fixed I/O (OUT)	8	TRIG_R	1

6. Turn the TRIG OFF.

• Output (scanner → driver)

Byte	Description	Bit	Signal name	Setting value
4, 5	Fixed I/O (IN)	8	TRIG	0



memo The torque limiting function is not activated if the TRQ-LMT remains in an OFF state. The motor torque is output up to the peak torque.

■ When direct data operation is executed at ON level of TRIG

This section explains how to execute the following direct data operation with setting the trigger to "Position." Set the trigger with the "Direct data operation trigger setting" parameter.

● Setting example

- Position of Operation 1: 7,000 steps
- Position of Operation 2: 3,000 steps
- Operation type: Absolute positioning
- Speed: 1,000 Hz
- Starting/changing rate: 1,000 kHz/s
- Stopping deceleration: 1,000 kHz/s
- Torque limiting value: 100 %
- Forwarding destination: Execution memory

● Operation processing flow

Descriptions are given using the scanner as the subject.

1. Sets the following parameters.

• Output (scanner → driver)

Byte	Description	Setting value	Note
34, 35	Write parameter ID	24852	Parameter ID of "Direct data operation trigger setting"
36 to 39	Write data	−5	Position

2. Turn the WR-REQ ON.
The parameter information is set in the driver. When the setting is completed, the WR-END is turned ON.

• Output (scanner → driver)

Byte	Description	Bit	Signal name	Setting value
32, 33	Write request	0	WR-REQ	1

• Input (driver → scanner)

Byte	Description	Bit	Signal name	Response
32, 33	Read/write status	8	WR-END	1

3. Turn the WR-REQ OFF.
The WR-END is returned to OFF.

• Output (scanner → driver)

Byte	Description	Bit	Signal name	Setting value
32, 33	Write request	0	WR-REQ	0

• Input (driver → scanner)

Byte	Description	Bit	Signal name	Response
32, 33	Read/write status	8	WR-END	0

4. Turn the S-ON ON.
The motor puts into an excitation state.

• Output (scanner → driver)

Byte	Description	Bit	Signal name	Setting value
4, 5	Fixed I/O (IN)	2	S-ON	1

5. Check the DCMD-RDY has been turned ON.

• Input (driver → scanner)

Byte	Description	Bit	Signal name	Response
4, 5	Fixed I/O (OUT)	6	DCMD-RDY	1

6. Set the following data.

• Output (scanner → driver)

Byte	Description	Setting value	Note
4, 5	TRIG-MODE [bit 9 of fixed I/O (IN)]	1	Start at ON level
6, 7	Direct data operation operation type	1	Absolute positioning
8 to 11	Direct data operation position	7,000	7,000 steps
12 to 15	Direct data operation speed	1,000	1,000 Hz
16 to 19	Direct data operation starting/changing rate	1,000,000	1,000 kHz/s
20 to 23	Direct data operation stopping deceleration	1,000,000	1,000 kHz/s
24, 25	Direct data operation torque limiting value	1,000	100.0 %
26, 27	Direct data operation forwarding destination	0	Execution memory

7. Turn the TRIG ON.
Direct data operation of the operation 1 is started.

• Output (scanner → driver)

Byte	Description	Bit	Signal name	Setting value
4, 5	Fixed I/O (IN)	8	TRIG	1

8. Check the operation 1 is completed, and set the following data.
Direct data operation of the operation 2 is started.

• Output (scanner → driver)

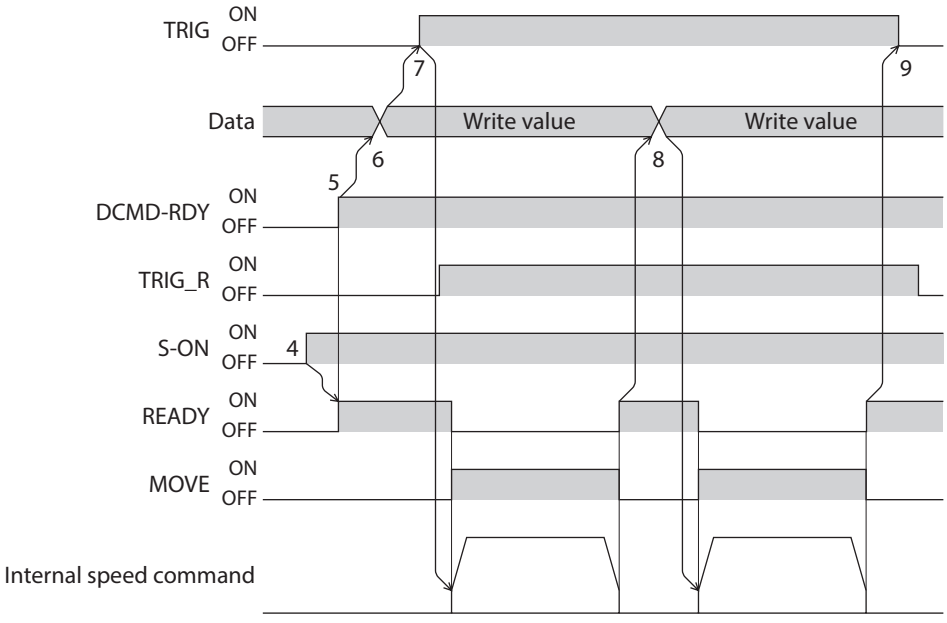
Byte	Description	Setting value	Note
8 to 11	Direct data operation position	3,000	3,000 steps

memo
- To execute direct data operation of the operation 2, set a different value from the operation 1 in the "Position" of the operation 2.
- If a value other than the "Position" is changed, direct data operation of the operation 2 will not be executed.

9. Check the operation 2 is completed, and turn the TRIG OFF.

• Output (scanner → driver)

Byte	Description	Bit	Signal name	Setting value
4, 5	Fixed I/O (IN)	8	TRIG	0



6 Parameter list

This part describes the parameter lists to be set via EtherNet/IP.
Data and parameters described here can also be set using the MEXE02 software.

◆Table of contents

1 Timing for parameter to update

All data used with the driver is 32 bits wide.
Parameters are stored in the RAM or the non-volatile memory. The parameters in the RAM are erased once the control power supply is shut off, but the parameters in the non-volatile memory are remained to store even if the control power supply is shut off.
When the control power supply of the driver is turned on, the parameters stored in the non-volatile memory are transfered to the RAM, and recalculation and setup for the parameters are executed in the RAM.

Parameters set via Implicit communication are saved in the RAM. To save the parameters stored in the RAM to the non-volatile memory, execute the "Write batch NV memory" of the maintenance command.
When a parameter is changed, the timing to update the new value varies depending on the parameter. Check on “Notation rules”.

memo

- Parameters set via Implicit communication are saved in the RAM. For parameters required for turning on the control power supply again, be sure to save them in the non-volatile memory before turning off the power.
- The non-volatile memory can be rewritten approximately 100,000 times.
- Parameters having set with the **MEXE02** software are stored in the non-volatile memory if "Data writing" is performed.

■ Notation rules

● Timing to update

In this part, each update timing is represented in an alphabet.

Notation	Update timing	Description
A	Update immediately	Recalculation and setup are immediately executed when the parameter is written.
B	Update after operation stop	Recalculation and setup are executed when the operation is stopped.
C	Update after executing Configuration	Recalculation and setup are executed after Configuration is executed or the control power supply is turned on again.
D	Update after turning on the control power supply again	Recalculation and setup are executed after the control power supply is turned on again.

● READ and WRITE

READ/WRITE may be represented as follows in this manual.

Notation	Description
R	READ
W	WRITE
R/W	READ/WRITE

2 Maintenance commands

Maintenance commands are used to execute the alarm reset, clear latch information, batch processing of the non-volatile memory and others.
When executing a command other than "Alarm history details," set the parameter ID to the write parameter ID and turn the WR-REQ ON. Setting the write data is not necessary.

Note The maintenance commands include processing in which the memory is operated, such as batch processing of the non-volatile memory and P-PRESET. Exercise caution not to execute them unnecessarily in succession.

Parameter ID		Name	Description	Setting range	Initial value
Dec	Hex				
192	00C0h	Alarm reset	Resets the alarm being generated presently. Some alarms cannot be reset.	–	–
194	00C2h	Clear alarm history	Clears the alarm history.		
197	00C5h	P-PRESET execution	Presets the command position.		
198	00C6h	Configuration	Executes recalculation and setup of the parameter.		
199	00C7h	Batch data initialization (excluding communication parameters)	Restores the parameters stored in the non-volatile memory to their initial values. (Excluding parameters related to communication setting)		
200	00C8h	Read batch NV memory	Reads the parameters stored in the non-volatile memory to the RAM. All operation data and parameters stored in the RAM are overwritten.		
201	00C9h	Write batch NV memory	Writes the parameters stored in the RAM to the non-volatile memory. The non-volatile memory can be rewritten approximately 100,000 times.		
202	00CAh	All data batch initialization (including communication parameters)	Restores all parameters stored in the non-volatile memory to their initial values.		
203	00CBh	Read from backup	Reads all the data from the backup area.		
204	00CCh	Write to backup	Writes all the data to the backup area.		
205	00CDh	Clear latch information	Clears the latch information.		
206	00CEh	Clear sequence history	Clears the sequence history.		
207	00CFh	Clear tripmeter	Clears the tripmeter.		
208	00D0h	Execute ETO-CLR input	After both the HWTO1 and HWTO2 inputs are turned ON to release the power removal function, the motor puts into an excitation state.		
209	00D1h	ZSG-PRESET	Sets the position of phase Z again.		
210	00D2h	Clear ZSG-PRESET	Clears the position data of phase Z that was set again with the "ZSG-PRESET" command.		
211	00D3h	Clear information	Clears the information.		
212	00D4h	Clear information history	Clears the information history.		
213	00D5h	Alarm history details	When writing the number of history (1 to 10) to this command and executing the "Alarm history details" of the monitor command, the detailed items of the specified alarm history can be checked.	0: Not selected 1 to 10: Alarm history	0

■ Configuration

Configuration can be executed when all of the following conditions are satisfied.

- An alarm is not being generated.
- The motor is not operated.
- The following commands are not executed via EtherNet/IP.
  – Batch data initialization
  – All data batch initialization
  – Read batch NV memory
  – Write batch NV memory
  – Read from backup
  – Write to backup
- The following monitors or menus are not executed with the **MEXE02** software.
  – Teaching, remote operation
  – I/O test
  – Data writing
  – Reset

The table below shows the driver status before and after Configuration is executed.

Item	Configuration is ready to execute	Configuration is being executed	After Configuration is executed
PWR/ALM LED	Green light	Blink in green and red colors simultaneously	Based on the driver condition.
Electromagnetic brake	Hold/Release	Hold	
Motor excitation	Excitation/non-excitation	Non-excitation	
Output signal	Enable	Disable	Enable
Input signal	Enable	Disable	Enable

memo Even if monitor is executed while Configuration is being executed, the correct monitor value may not return.

3 Monitor commands

Monitor commands are used to monitor the command position, the command speed, the alarm and information history, etc.
All commands are used for read (READ).

Parameter ID		Name	Description
Dec	Hex		
64	0040h	Present alarm	This indicates the alarm code presently being generated.
65	0041h	Alarm history 1	This indicates the latest alarm history. When an alarm is present, the code is also indicated in the alarm history 1 simultaneously.
66	0042h	Alarm history 2	This indicates the alarm history.
67	0043h	Alarm history 3	
68	0044h	Alarm history 4	
69	0045h	Alarm history 5	
70	0046h	Alarm history 6	
71	0047h	Alarm history 7	
72	0048h	Alarm history 8	
73	0049h	Alarm history 9	
74	004Ah	Alarm history 10	This indicates the oldest alarm history.
97	0061h	Present selected data number	This indicates the operation data number presently selected. The priority is in order of the direct selection (D-SEL), and the M0 to M7 inputs.
98	0062h	Present operation data number	This indicates the operation data number presently being operated in stored data operation or continuous macro operation. In operation without using operation data, "–1" is displayed. "–1" is displayed also during stop.
99	0063h	Command position	This indicates the present command position. When the wrap function is enabled, the value on the wrap coordinates is indicated.
100	0064h	Command speed (r/min)	This indicates the present command speed. (r/min)
101	0065h	Command speed (Hz)	This indicates the present command speed. (Hz)
102	0066h	Feedback position	This indicates the present feedback position. When the wrap function is enabled, the value on the wrap coordinates is indicated.
103	0067h	Feedback speed (r/min)	This indicates the present feedback speed. (r/min)
104	0068h	Feedback speed (Hz)	This indicates the present feedback speed. (Hz)
105	0069h	Remaining dwell time	This indicates the remaining time in the drive-complete delay time or dwell time.
106	006Ah	Direct I/O	This indicates the status of direct I/O, the extended input, the differential output, and the virtual input. (Arrangement of bits ⇨p.208)
107	006Bh	Torque monitor (1 = 0.1 %)	This indicates the output torque presently generated as a percentage of the rated torque.
108	006Ch	Load factor monitor (1 = 0.1 %)	This indicates the motor output power presently generated as a percentage of the maximum output power in the continuous duty region.
109	006Dh	Cumulative load monitor	This indicates the integrated value of the load during operation. (Internal unit) The load is cumulated regardless of the rotation direction of the motor.
110	006Eh	Torque limiting value	This indicates the present torque limiting value.

Parameter ID		Name	Description
Dec	Hex		
111	006Fh	Target position	• This indicates the target command position in operations shown below as absolute coordinates. Positioning SD operation, inching operation, high-speed return-to-home operation, return-to-home operation (during offset movement), positioning direct data operation • This indicates the operation starting position in operations shown below. Continuous SD operation, continuous macro operation, JOG macro operation other than inching operation, return-to-home operation (when sensors are used), continuous direct data operation
112	0070h	Next number	This indicates the operation data number specified in "Next data number" of the operation data in operation. The value is latched even after the operation is completed. When "Link" is set to "No Link" or "Next data number" is set to "Stop,""–1" is displayed.
113	0071h	Loop origin number	This indicates the operation data number that is the starting point of the loop in loop operation (extended loop operation). When loop is not executed or stopped, "–1" is displayed.
114	0072h	Loop count	This indicates the present number of loop times in loop operation (extended loop operation). When operation other than loop is executed or loop is stopped, 0 is displayed.
115	0073h	Event monitor command position (NEXT)	Latches the position when the latch trigger in parentheses ( ) is generated. The value is overwritten if the same latch trigger is generated while latching. When the latch is cleared, 0 is displayed.
116	0074h	Event monitor feedback position (NEXT)	
117	0075h	Event monitor command position (JUMP0 – Low event)	
118	0076h	Event monitor feedback position (JUMP0 – Low event)	
119	0077h	Event monitor command position (JUMP1 – High event)	
120	0078h	Event monitor feedback position (JUMP1 – High event)	
121	0079h	Event monitor command position (Operation stop)	
122	007Ah	Event monitor feedback position (Operation stop)	
123	007Bh	Information	This indicates the information code presently being generated.
124	007Ch	Driver temperature	This indicates the present driver temperature. (1 = 0.1 °C)
125	007Dh	Motor temperature	This indicates the present motor temperature. (1 = 0.1 °C)
126	007Eh	Odometer (1 = 0.1 kRev)	This indicates the cumulative travel distance of the motor in revolutions. This cannot be cleared on the customer side.
127	007Fh	Tripmeter (1 = 0.1 kRev)	This indicates the travel distance of the motor in revolutions. This can be cleared on the customer side.
128	0080h	Sequence history 1	This indicates the history of operation data numbers executed until now. "–1" is displayed when stopped. During operation, the value same as the "Present operation data number" is also displayed in the sequence history 1.
129	0081h	Sequence history 2	
130	0082h	Sequence history 3	
131	0083h	Sequence history 4	
132	0084h	Sequence history 5	
133	0085h	Sequence history 6	
134	0086h	Sequence history 7	
135	0087h	Sequence history 8	
136	0088h	Sequence history 9	

Parameter ID		Name	Description
Dec	Hex		
137	0089h	Sequence history 10	This indicates the history of operation data numbers executed until now. "–1" is displayed when stopped. During operation, the value same as the "Present operation data number" is also displayed in the sequence history 1.
138	008Ah	Sequence history 11	
139	008Bh	Sequence history 12	
140	008Ch	Sequence history 13	
141	008Dh	Sequence history 14	
142	008Eh	Sequence history 15	
143	008Fh	Sequence history 16	
144	0090h	Feedback position 32-bit counter	This is 32-bit counter of the feedback position. It counts independently of the wrap function. When the control power supply is turned on again, it returns within the wrap coordinates.
145	0091h	Command position 32-bit counter	This is 32-bit counter of the command position. It counts independently of the wrap function. When the control power supply is turned on again, it returns to the wrap coordinates.
147	0093h	Loop count buffer	This indicates the present number of loop times in loop operation (extended loop operation). The value is kept until the operation start signal is turned ON.
150	0096h	Settling time (ms)	This indicates the time from when the command is completed until the IN-POS output is turned ON.
160	00A0h	Main power supply count	This indicates the number of times that the main power supply was turned on.
161	00A1h	Main power supply time (min)	This indicates the time elapsed since the main power supply was turned on in minutes.
162	00A2h	Control power supply count	This indicates the number of times that the control power supply was turned on.
163	00A3h	Inverter voltage (1 = 0.1 V)	This indicates the inverter voltage of the driver.
166	00A6h	IP ADDR SW0	This indicates the input status of the IP address setting switch (×16).
167	00A7h	IP ADDR SW1	This indicates the input status of the IP address setting switch (×1).
169	00A9h	Elapsed time from BOOT (ms)	This indicates the time elapsed since the control power supply was turned on.
184	00B8h	I/O status 1	This indicates the ON-OFF status of the internal I/O. (Arrangement of bits ⇨p.208)
185	00B9h	I/O status 2	
186	00BAh	I/O status 3	
187	00BBh	I/O status 4	
188	00BCh	I/O status 5	
189	00BDh	I/O status 6	
190	00BEh	I/O status 7	
191	00BFh	I/O status 8	
1280	0500h	Alarm history details (Alarm code)	This indicates the content of the alarm history specified by the "Alarm history details" of the maintenance command. (Alarm history ⇨p.245)
1281	0501h	Alarm history details (Sub code)	
1282	0502h	Alarm history details (Driver temperature)	
1283	0503h	Alarm history details (Motor temperature)	
1284	0504h	Alarm history details (Inverter voltage)	
1285	0505h	Alarm history details (Physical I/O input)	
1286	0506h	Alarm history details (R-I/O output)	
1287	0507h	Alarm history details (Operation information 0)	

Parameter ID		Name	Description
Dec	Hex		
1288	0508h	Alarm history details (Operation information 1)	This indicates the content of the alarm history specified by the "Alarm history details" of the maintenance command. (Alarm history ⇨p.245)
1289	0509h	Alarm history details (Feedback position)	
1290	050Ah	Alarm history details (Elapsed time from Boot) [ms]	
1291	050Bh	Alarm history details (Elapsed time from starting operation) [ms]	
1292	050Ch	Alarm history details (Main power supply time) [min]	
1296	0510h	Information history 1	This indicates the latest information history. (Information history ⇨p.259) When information is being generated, its code is also indicated on the information history 1 simultaneously.
1297	0511h	Information history 2	This indicates the information history.
1298	0512h	Information history 3	
1299	0513h	Information history 4	
1300	0514h	Information history 5	
1301	0515h	Information history 6	
1302	0516h	Information history 7	
1303	0517h	Information history 8	
1304	0518h	Information history 9	
1305	0519h	Information history 10	
1306	051Ah	Information history 11	
1307	051Bh	Information history 12	
1308	051Ch	Information history 13	
1309	051Dh	Information history 14	
1310	051Eh	Information history 15	
1311	051Fh	Information history 16	This indicates the oldest information history.
1312	0520h	Information time history 1 (ms)	This indicates the history of the time when the latest information was generated. When information is being generated, its code is also indicated on the information history 1 simultaneously.
1313	0521h	Information time history 2 (ms)	This indicates the history of the time when information was generated.
1314	0522h	Information time history 3 (ms)	
1315	0523h	Information time history 4 (ms)	
1316	0524h	Information time history 5 (ms)	
1317	0525h	Information time history 6 (ms)	
1318	0526h	Information time history 7 (ms)	
1319	0527h	Information time history 8 (ms)	
1320	0528h	Information time history 9 (ms)	
1321	0529h	Information time history 10 (ms)	
1322	052Ah	Information time history 11 (ms)	
1323	052Bh	Information time history 12 (ms)	
1324	052Ch	Information time history 13 (ms)	
1325	052Dh	Information time history 14 (ms)	
1326	052Eh	Information time history 15 (ms)	
1327	052Fh	Information time history 16 (ms)	This indicates the history of the time when the oldest information was generated.

Parameter ID		Name	Description
Dec	Hex		
1472	05C0h	Latch monitor status (NEXT)	Latches the first information in which an event in parentheses ( ) is generated. The information is maintained until the latch is cleared.
1473	05C1h	Latch monitor command position (NEXT)	
1474	05C2h	Latch monitor feedback position (NEXT)	
1475	05C3h	Latch monitor target position (NEXT)	
1476	05C4h	Latch monitor operation number (NEXT)	
1477	05C5h	Latch monitor number of loop (NEXT)	
1480	05C8h	Latch monitor status (I/O event – Low event)	
1481	05C9h	Latch monitor command position (I/O event – Low event)	
1482	05CAh	Latch monitor feedback position (I/O event – Low event)	
1483	05CBh	Latch monitor target position (I/O event – Low event)	
1484	05CCh	Latch monitor operation number (I/O event – Low event)	
1485	05CDh	Latch monitor number of loop (I/O event – Low event)	
1488	05D0h	Latch monitor status (I/O event – High event)	
1489	05D1h	Latch monitor command position (I/O event – High event)	
1490	05D2h	Latch monitor feedback position (I/O event – High event)	
1491	05D3h	Latch monitor target position (I/O event – High event)	
1492	05D4h	Latch monitor operation number (I/O event – High event)	
1493	05D5h	Latch monitor number of loop (I/O event – High event)	
1496	05D8h	Latch monitor status (Operation stop)	
1497	05D9h	Latch monitor command position (Operation stop)	
1498	05DAh	Latch monitor feedback position (Operation stop)	
1499	05DBh	Latch monitor target position (Operation stop)	
1500	05DCh	Latch monitor operation number (Operation stop)	
1501	05DDh	Latch monitor number of loop (Operation stop)	
1504	05E0h	FFT Value (1st peak)	This indicate the result of the fast Fourier transform (FFT) analysis for the target set in the "FFT target" parameter.
1505	05E1h	FFT Frequency (1st peak)	
1506	05E2h	FFT Value (2nd peak)	
1507	05E3h	FFT Frequency (2nd peak)	
1508	05E4h	FFT Value (3rd peak)	
1509	05E5h	FFT Frequency (3rd peak)	

Parameter ID		Name	Description
Dec	Hex		
1510	05E6h	FFT Value (4th peak)	This indicate the result of the fast Fourier transform (FFT) analysis for the target set in the "FFT target" parameter.
1511	05E7h	FFT Frequency (4th peak)	

■ Direct I/O

The arrangement of bits for direct I/O is indicated.

Parameter ID		Description							
Dec	Hex								
106	006Ah	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
		BSG	ASG	–	–	–	–	–	–
		Bit 23	Bit 22	Bit 21	Bit 20	Bit 19	Bit 18	Bit 17	Bit 16
		–	–	DOUT5	DOUT4	DOUT3	DOUT2	DOUT1	DOUT0
		Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
		VIR-IN3	VIR-IN2	VIR-IN1	VIR-IN0	–	EXT-IN	–	–
		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
		–	–	DIN5	DIN4	DIN3	DIN2	DIN1	DIN0

■ I/O status

The arrangement of bits for internal I/O is indicated.

● **Input signal**

Parameter ID		Description							
Dec	Hex								
184	00B8h	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
		SLIT	HOMES	RV-LS	FW-LS	RV-BLK	FW-BLK	–	–
		Bit 23	Bit 22	Bit 21	Bit 20	Bit 19	Bit 18	Bit 17	Bit 16
		SPD-LMT	TRQ-LMT	–	–	–	–	–	HMI
		Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
		–	INFO-CLR	LAT-CLR	ETO-CLR	–	EL-PRST	P-PRESET	ALM-RST
		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
		BREAK-ATSQ	–	STOP	STOP-SOFF	CLR	S-ON	FREE	No function
185	00B9h	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
		–	–	–	–	–	–	RV-POS	FW-POS
		Bit 23	Bit 22	Bit 21	Bit 20	Bit 19	Bit 18	Bit 17	Bit 16
		RV-JOG-C	FW-JOG-C	RV-JOG-P	FW-JOG-P	RV-JOG-H	FW-JOG-H	RV-JOG	FW-JOG
		Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
		D-SEL7	D-SEL6	D-SEL5	D-SEL4	D-SEL3	D-SEL2	D-SEL1	D-SEL0
		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
		–	–	ZHOME	HOME	NEXT	–	SSTART	START

Parameter ID		Description							
Dec	Hex								
186	00BAh	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
		R15	R14	R13	R12	R11	R10	R9	R8
		Bit 23	Bit 22	Bit 21	Bit 20	Bit 19	Bit 18	Bit 17	Bit 16
		R7	R6	R5	R4	R3	R2	R1	R0
		Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
		PLSM-REQ	MON-CLK	MON-REQ1	MON-REQ0	TEACH	–	–	–
		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
		M7	M6	M5	M4	M3	M2	M1	M0
187	00BBh	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
		–	–	–	–	–	–	–	–
		Bit 23	Bit 22	Bit 21	Bit 20	Bit 19	Bit 18	Bit 17	Bit 16
		–	–	–	–	–	–	–	–
		Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
		–	–	–	–	–	–	–	–
		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
		–	–	–	–	–	–	–	–

- **Output signals**

Parameter ID		Description							
Dec	Hex								
188	00BCh	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
		MAREA	–	–	RND-ZERO	ZSG	RV-SLS	FW-SLS	RND-OVF
		Bit 23	Bit 22	Bit 21	Bit 20	Bit 19	Bit 18	Bit 17	Bit 16
		ORGN-STLD	PRST-STLD	PRST-DIS	–	–	ELPRST-MON	ABSPEN	HOME-END
		Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
		–	SON-MON	VA	TLC	ZV	IN-POS	ETO-MON	SYS-BSY
		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
		INFO	MOVE	–	READY	SYS-RDY	ALM-B	ALM-A	CONST-OFF
189	00BDh	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
		–	–	–	–	–	–	–	–
		Bit 23	Bit 22	Bit 21	Bit 20	Bit 19	Bit 18	Bit 17	Bit 16
		–	–	USR-OUT1	USR-OUT0	–	–	PLS-OUTR	MON-OUT
		Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
		–	–	HWTOIN-MON	EDM-MON	–	RG	MBC	MPS
		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
		AREA7	AREA6	AREA5	AREA4	AREA3	AREA2	AREA1	AREA0

Parameter ID		Description							
Dec	Hex								
190	00BEh	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
		D-END7	D-END6	D-END5	D-END4	D-END3	D-END2	D-END1	D-END0
		Bit 23	Bit 22	Bit 21	Bit 20	Bit 19	Bit 18	Bit 17	Bit 16
		M-ACT7	M-ACT6	M-ACT5	M-ACT4	M-ACT3	M-ACT2	M-ACT1	M-ACT0
		Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
		M-CHG	OL-DTCT	DCMD-FULL	DCMD-RDY	–	NEXT-LAT	JUMP1-LAT	JUMP0-LAT
		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
		DELAY-BSY	SEQ-BSY	–	OPE-BSY	–	–	SPD-LMTD	TRQ-LMTD
191	00BFh	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
		INFO-RBT	INFO-CFG	INFO-IOTEST	INFO-DSLMTD	–	–	–	INFO-STLTIME
		Bit 23	Bit 22	Bit 21	Bit 20	Bit 19	Bit 18	Bit 17	Bit 16
		INFO-TRQ	–	INFO-ODO	INFO-TRIP	INFO-CULD1	INFO-CULD0	INFO-RV-OT	INFO-FW-OT
		Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
		–	INFO-RND-E	INFO-EGR-E	–	INFO-PR-REQ	INFO-ZHOME	INFO-START	INFO-SPD
		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
		INFO-LOAD	INFO-TLCTIME	INFO-UVOLT	INFO-OVOLT	INFO-MTRTMP	INFO-DRVTMP	INFO-POSERR	INFO-USRIO

4 Operation data R/W commands

This is a method in which the parameter ID (base address) of the base operation data number is specified to input data.
Refer to "4-3 Setting example" on p.214 for how to use the base address.

4-1 Base address of each operation data number

Base address		Operation data number	Base address		Operation data number	Base address		Operation data number	Base address		Operation data number
Dec	Hex		Dec	Hex		Dec	Hex		Dec	Hex	
3072	0C00h	No. 0	4256	10A0h	No. 37	5440	1540h	No. 74	6624	19E0h	No. 111
3104	0C20h	No. 1	4288	10C0h	No. 38	5472	1560h	No. 75	6656	1A00h	No. 112
3136	0C40h	No. 2	4320	10E0h	No. 39	5504	1580h	No. 76	6688	1A20h	No. 113
3168	0C60h	No. 3	4352	1100h	No. 40	5536	15A0h	No. 77	6720	1A40h	No. 114
3200	0C80h	No. 4	4384	1120h	No. 41	5568	15C0h	No. 78	6752	1A60h	No. 115
3232	0CA0h	No. 5	4416	1140h	No. 42	5600	15E0h	No. 79	6784	1A80h	No. 116
3264	0CC0h	No. 6	4448	1160h	No. 43	5632	1600h	No. 80	6816	1AA0h	No. 117
3296	0CE0h	No. 7	4480	1180h	No. 44	5664	1620h	No. 81	6848	1AC0h	No. 118
3328	0D00h	No. 8	4512	11A0h	No. 45	5696	1640h	No. 82	6880	1AE0h	No. 119
3360	0D20h	No. 9	4544	11C0h	No. 46	5728	1660h	No. 83	6912	1B00h	No. 120
3392	0D40h	No. 10	4576	11E0h	No. 47	5760	1680h	No. 84	6944	1B20h	No. 121
3424	0D60h	No. 11	4608	1200h	No. 48	5792	16A0h	No. 85	6976	1B40h	No. 122
3456	0D80h	No. 12	4640	1220h	No. 49	5824	16C0h	No. 86	7008	1B60h	No. 123
3488	0DA0h	No. 13	4672	1240h	No. 50	5856	16E0h	No. 87	7040	1B80h	No. 124
3520	0DC0h	No. 14	4704	1260h	No. 51	5888	1700h	No. 88	7072	1BA0h	No. 125
3552	0DE0h	No. 15	4736	1280h	No. 52	5920	1720h	No. 89	7104	1BC0h	No. 126
3584	0E00h	No. 16	4768	12A0h	No. 53	5952	1740h	No. 90	7136	1BE0h	No. 127
3616	0E20h	No. 17	4800	12C0h	No. 54	5984	1760h	No. 91	7168	1C00h	No. 128
3648	0E40h	No. 18	4832	12E0h	No. 55	6016	1780h	No. 92	7200	1C20h	No. 129
3680	0E60h	No. 19	4864	1300h	No. 56	6048	17A0h	No. 93	7232	1C40h	No. 130
3712	0E80h	No. 20	4896	1320h	No. 57	6080	17C0h	No. 94	7264	1C60h	No. 131
3744	0EA0h	No. 21	4928	1340h	No. 58	6112	17E0h	No. 95	7296	1C80h	No. 132
3776	0EC0h	No. 22	4960	1360h	No. 59	6144	1800h	No. 96	7328	1CA0h	No. 133
3808	0EE0h	No. 23	4992	1380h	No. 60	6176	1820h	No. 97	7360	1CC0h	No. 134
3840	0F00h	No. 24	5024	13A0h	No. 61	6208	1840h	No. 98	7392	1CE0h	No. 135
3872	0F20h	No. 25	5056	13C0h	No. 62	6240	1860h	No. 99	7424	1D00h	No. 136
3904	0F40h	No. 26	5088	13E0h	No. 63	6272	1880h	No. 100	7456	1D20h	No. 137
3936	0F60h	No. 27	5120	1400h	No. 64	6304	18A0h	No. 101	7488	1D40h	No. 138
3968	0F80h	No. 28	5152	1420h	No. 65	6336	18C0h	No. 102	7520	1D60h	No. 139
4000	0FA0h	No. 29	5184	1440h	No. 66	6368	18E0h	No. 103	7552	1D80h	No. 140
4032	0FC0h	No. 30	5216	1460h	No. 67	6400	1900h	No. 104	7584	1DA0h	No. 141
4064	0FE0h	No. 31	5248	1480h	No. 68	6432	1920h	No. 105	7616	1DC0h	No. 142
4096	1000h	No. 32	5280	14A0h	No. 69	6464	1940h	No. 106	7648	1DE0h	No. 143
4128	1020h	No. 33	5312	14C0h	No. 70	6496	1960h	No. 107	7680	1E00h	No. 144
4160	1040h	No. 34	5344	14E0h	No. 71	6528	1980h	No. 108	7712	1E20h	No. 145
4192	1060h	No. 35	5376	1500h	No. 72	6560	19A0h	No. 109	7744	1E40h	No. 146
4224	1080h	No. 36	5408	1520h	No. 73	6592	19C0h	No. 110	7776	1E60h	No. 147

Base address		Operation data number
Dec	Hex	
7808	1E80h	No. 148
7840	1EA0h	No. 149
7872	1EC0h	No. 150
7904	1EE0h	No. 151
7936	1F00h	No. 152
7968	1F20h	No. 153
8000	1F40h	No. 154
8032	1F60h	No. 155
8064	1F80h	No. 156
8096	1FA0h	No. 157
8128	1FC0h	No. 158
8160	1FE0h	No. 159
8192	2000h	No. 160
8224	2020h	No. 161
8256	2040h	No. 162
8288	2060h	No. 163
8320	2080h	No. 164
8352	20A0h	No. 165
8384	20C0h	No. 166
8416	20E0h	No. 167
8448	2100h	No. 168
8480	2120h	No. 169
8512	2140h	No. 170
8544	2160h	No. 171
8576	2180h	No. 172
8608	21A0h	No. 173
8640	21C0h	No. 174

Base address		Operation data number
Dec	Hex	
8672	21E0h	No. 175
8704	2200h	No. 176
8736	2220h	No. 177
8768	2240h	No. 178
8800	2260h	No. 179
8832	2280h	No. 180
8864	22A0h	No. 181
8896	22C0h	No. 182
8928	22E0h	No. 183
8960	2300h	No. 184
8992	2320h	No. 185
9024	2340h	No. 186
9056	2360h	No. 187
9088	2380h	No. 188
9120	23A0h	No. 189
9152	23C0h	No. 190
9184	23E0h	No. 191
9216	2400h	No. 192
9248	2420h	No. 193
9280	2440h	No. 194
9312	2460h	No. 195
9344	2480h	No. 196
9376	24A0h	No. 197
9408	24C0h	No. 198
9440	24E0h	No. 199
9472	2500h	No. 200
9504	2520h	No. 201

Base address		Operation data number
Dec	Hex	
9536	2540h	No. 202
9568	2560h	No. 203
9600	2580h	No. 204
9632	25A0h	No. 205
9664	25C0h	No. 206
9696	25E0h	No. 207
9728	2600h	No. 208
9760	2620h	No. 209
9792	2640h	No. 210
9824	2660h	No. 211
9856	2680h	No. 212
9888	26A0h	No. 213
9920	26C0h	No. 214
9952	26E0h	No. 215
9984	2700h	No. 216
10016	2720h	No. 217
10048	2740h	No. 218
10080	2760h	No. 219
10112	2780h	No. 220
10144	27A0h	No. 221
10176	27C0h	No. 222
10208	27E0h	No. 223
10240	2800h	No. 224
10272	2820h	No. 225
10304	2840h	No. 226
10336	2860h	No. 227
10368	2880h	No. 228

Base address		Operation data number
Dec	Hex	
10400	28A0h	No. 229
10432	28C0h	No. 230
10464	28E0h	No. 231
10496	2900h	No. 232
10528	2920h	No. 233
10560	2940h	No. 234
10592	2960h	No. 235
10624	2980h	No. 236
10656	29A0h	No. 237
10688	29C0h	No. 238
10720	29E0h	No. 239
10752	2A00h	No. 240
10784	2A20h	No. 241
10816	2A40h	No. 242
10848	2A60h	No. 243
10880	2A80h	No. 244
10912	2AA0h	No. 245
10944	2AC0h	No. 246
10976	2AE0h	No. 247
11008	2B00h	No. 248
11040	2B20h	No. 249
11072	2B40h	No. 250
11104	2B60h	No. 251
11136	2B80h	No. 252
11168	2BA0h	No. 253
11200	2BC0h	No. 254
11232	2BE0h	No. 255

4-2 Parameter ID

The setting item of operation data is set with the operation data R/W command.
The parameter ID for the setting item is arranged based on the base address of the operation data number.
(Base address ⇨p.211)
For example, in the case of the setting item "Position," 1 is added to the base address.

Parameter ID	Name	Setting range*1	Initial value	Update
Base address +0	Operation type	1: Absolute positioning 2: Incremental positioning (based on command position) 3: Incremental positioning (based on feedback position) 7: Continuous operation 8: Wrap absolute positioning 9: Wrap proximity positioning 10: Wrap forward direction absolute positioning 11: Wrap reverse direction absolute positioning	2	B
Base address +1	Position	−2,147,483,648 to 2,147,483,647 steps	0	B
Base address +2	Speed	−4,000,000 to 4,000,000 Hz	1,000	B
Base address +3	Starting/changing rate	1 to 1,000,000,000 (1 = 0.001)*2	1,000,000	B
Base address +4	Stopping deceleration			
Base address +5	Torque limiting value	0 to 10,000 (1 = 0.1 %)	1,000	B
Base address +6	Drive-complete delay time	0 to 65,535 (1 = 0.001 s)	0	B
Base address +7	Link	0: No link 1: Manual sequential 2: Automatic sequential 3: Continuous sequential operation	0	B
Base address +8	Next data number	−256: No link [Stop] −2: Operation data number after next one [↓↓(+2)] −1: Next operation data number [↓(+1)] 0 to 255: Operation data number	−1	B
Base address +9	Area offset	−2,147,483,648 to 2,147,483,647 steps	0	B
Base address +10	Area width	−1: Disable 0 to 4,194,303 steps	−1	B
Base address +11	Loop count	0: No loop [−] 2 to 255: Number of loop times [loop 2{ to loop 255{]	0	B
Base address +12	Loop offset	−4,194,304 to 4,194,303 steps	0	B
Base address +13	Loop end number	0: Not the loop end point [−] 1: Loop end point [}L-End]	0	B
Base address +14	(Low) I/O event number	−1: Disable [−] 0 to 31: Operation I/O event number	−1	B
Base address +15	(High) I/O event number			

*1 A value in the brackets [ ] is shown on the screen of the **MEXE02** software.
*2 The setting unit is followed the "Acceleration/deceleration unit" parameter.

4-3 Setting example

As an example, this section explains how to set the following operation data to the operation data No. 0 to No. 2.

Setting item	Operation data No. 0	Operation data No. 1	Operation data No. 2
Operation type	Absolute positioning	Incremental positioning (based on command position)	Incremental positioning (based on feedback position)
Position [step]	1,000	1,000	1,000
Speed [Hz]	1,000	1,000	1,000

■ Setting of operation data No. 0

Seeing the table on p.211, we can find that the base address of the operation data No. 0 is "3072 (0C00h)."
Based on this base address, the parameter ID for the setting item is calculated from the table on p.213.

Base address
3072 (0C00h)

Setting item	Parameter ID			Setting value
	Calculation method	Dec	Hex	
Operation type	Base address +0	3072 + 0 = 3072	0C00h	1
Position	Base address +1	3072 + 1 = 3073	0C01h	1,000
Speed	Base address +2	3072 + 2 = 3074	0C02h	1,000

■ Setting of operation data No. 1

From the table on p.211, we can find that the base address of the operation data No. 1 is "3104 (0C20h)."
Based on this base address, the parameter ID for the setting item is calculated from the table on p.213.

Base address
3104 (0C20h)

Setting item	Parameter ID			Setting value
	Calculation method	Dec	Hex	
Operation type	Base address +0	3104 + 0 = 3104	0C20h	2
Position	Base address +1	3104 + 1 = 3105	0C21h	1,000
Speed	Base address +2	3104 + 2 = 3106	0C22h	1,000

■ Setting of operation data No. 2

From the table on p.211, we can find that the base address of the operation data No. 2 is "3136 (0C40h)."
Based on this base address, the parameter ID for the setting item is calculated from the table on p.213.

Base address
3136 (0C40h)

Setting item	Parameter ID			Setting value
	Calculation method	Dec	Hex	
Operation type	Base address +0	3136 + 0 = 3136	0C40h	3
Position	Base address +1	3136 + 1 = 3137	0C41h	1,000
Speed	Base address +2	3136 + 2 = 3138	0C42h	1,000

5 Operation I/O event R/W commands

If a specified event (ON/OFF of I/O) is generated during operation of the motor, another operation can be started. This is called operation I/O event. This chapter explains the address to execute the operation I/O event.

5-1 Base address of operation I/O event

Base address		Operation I/O event number
Dec	Hex	
2560	0A00h	0
2568	0A08h	1
2576	0A10h	2
2584	0A18h	3
2592	0A20h	4
2600	0A28h	5
2608	0A30h	6
2616	0A38h	7
2624	0A40h	8
2632	0A48h	9
2640	0A50h	10

Base address		Operation I/O event number
Dec	Hex	
2648	0A58h	11
2656	0A60h	12
2664	0A68h	13
2672	0A70h	14
2680	0A78h	15
2688	0A80h	16
2696	0A88h	17
2704	0A90h	18
2712	0A98h	19
2720	0AA0h	20
2728	0AA8h	21

Base address		Operation I/O event number
Dec	Hex	
2736	0AB0h	22
2744	0AB8h	23
2752	0AC0h	24
2760	0AC8h	25
2768	0AD0h	26
2776	0AD8h	27
2784	0AE0h	28
2792	0AE8h	29
2800	0AF0h	30
2808	0AF8h	31

5-2 Parameter IDs for operation I/O event R/W commands

The setting item of operation I/O event is set with the operation I/O event R/W command.
The parameter ID for the setting item is arranged based on the base address of the operation I/O event.
For example, in the case of the setting item "Dwell," 2 is added to the base address.

Parameter ID	Name	Setting range*	Initial value	Update
Base address +0	Link	0: No link 1: Manual sequential 2: Automatic sequential 3: Continuous sequential operation	0	B
Base address +1	Next data number	−256: No link [Stop] −2: Operation data number after next one [↓↓(+2)] −1: Next operation data number [↓(+1)] 0 to 255: Operation data number	−256	B
Base address +2	Dwell	0 to 65,535 (1 = 0.001 s)	0	B
Base address +3	Event trigger I/O	Input signal list ⇨ p.239 Output signal list ⇨ p.240	0: No function	B
Base address +4	Event trigger type	0: No setting [non] 1: ON (calculated cumulative msec) 2: ON (msec) 3: OFF (calculated cumulative msec) 4: OFF (msec) 5: ON edge 6: OFF edge 7: ON (cumulative msec) 8: OFF (cumulative msec)	0	B
Base address +5	Event trigger counter	0 to 65,535 (1 = 1 ms or 1 = once)	0	B

* A value in the brackets [ ] is shown on the screen of the **MEXE02** software.

6 Protect release commands

The key codes to read/write the data from/to the backup area and those to release the function limitation by the HMI input are set.

Parameter ID		Name	Description	Key code	Initial value
Dec	Hex				
32	0020h	Backup DATA access key	Inputs the key code to access the backup area. Data can be written and read.	20519253 (01391955h)	0
33	0021h	Backup DATA write key	Inputs the key code to write the data to the backup area.	1977326743 (75DB9C97h)	0
34	0022h	HMI release key	Inputs the key code to release the limitation by the HMI input.	864617234 (33890312h)	0

7 Extended operation data setting R/W commands

Parameters for extended operation data setting can be set.

Parameter ID		Name	Description	Setting range	Initial value	Update
Dec	Hex					
320	0140h	Common acceleration rate or time	Sets the starting/changing rate or the starting/changing time in common setting.	1 to 1,000,000,000 (1 = 0.001)*	1,000,000	A
321	0141h	Common stopping deceleration	Sets the stopping deceleration or the stop time in common setting.			
326	0146h	Rate selection	Sets whether to use the common acceleration/ deceleration or the acceleration/ deceleration specified in the operation data.	0: The common rate is used (common setting) 1: The rate of each operation data is used (separate setting)	1	A
2048	0800h	Repeat start operation data number	Sets to the operation data number in which extended loop operation is started.	–1: Disable 0 to 255: Operation data number	–1	A
2049	0801h	Repeat end operation data number	Sets the operation data number in which extended loop operation is completed.			
2050	0802h	Repeat time	Sets the number of repeat times of extended loop operation.	–1: Disable 0 to 100,000,000 times	–1	A

* The setting unit is followed the "Acceleration/deceleration unit" parameter.

Note Rewrite the parameters of the extended operation data setting R/W command while operation is stopped.

8 Parameter R/W commands

These commands are used to write or read parameters.

8-1 (p4) Base setting parameters

Parameters that "–" is described in the parameter ID cannot be set via EtherNet/IP. Set them using the **MEXE02** software.

Parameter ID		Name	Description	Setting range	Initial value	Update
Dec	Hex					
272	0110h	Direct data operation zero speed command action	Sets the command when 0 is written to the "Speed" for direct data operation.	0: Deceleration stop command 1: Speed zero command	0	B
322	0142h	Starting speed	Sets the starting speed for stored data operation, continuous macro operation, or direct data operation.	0 to 4,000,000 Hz	500	B
327	0147h	Acceleration/ deceleration unit	Sets the acceleration/ deceleration unit.	0: kHz/s 1: s 2: ms/kHz	0	C
328	0148h	Permission of absolute positioning without setting absolute coordinates	Permits absolute positioning operation in a state where coordinates are not set.	0: Disable 1: Enable	0	B
330	014Ah	Torque limit setting at motor standstill	Selects how to limit the operating torque when the motor stops. When "0: Follow the selection number" is selected, the torque limiting value selected when the motor stops is applied. When "1: Maintain the previous operating torque limit" is selected, the torque limiting value having been executed before the motor stops is applied. If the motor puts into a non-excitation state, the torque limiting value being selected in the operation data is applied.	0: Follow the selection number 1: Maintain the previous operating torque limit (reset by excitation OFF)	1	A
451	01C3h	Software overtravel	Sets the operation when the software overtravel is detected.	–1: Disable 0: Immediate stop 1: Deceleration stop 2: Immediate stop with alarm 3: Deceleration stop with alarm	3	A
452	01C4h	Positive software limit	Sets the value of software limit in the forward direction.	–2,147,483,648 to 2,147,483,647 steps	2147483647	A
453	01C5h	Negative software limit	Sets the value of software limit in the reverse direction.		–2,147,483,648	A

Parameter ID		Name	Description	Setting range	Initial value	Update
Dec	Hex					
454	01C6h	Preset position	Sets the preset position.	–2,147,483,648 to 2,147,483,647 steps	0	A
511	01FFh	Driver simulation mode	Situation for coordinates or I/O can be simulated using a virtual motor without connecting a motor.	0: Use real motor 1: Virtual motor (when ABZO not connected = no ABZO information) 2: Virtual motor (when ABZO not connected = 1,800 rev wrap enable) 3: Virtual motor (when ABZO not connected = 900 rev wrap enable)	0	D
2540	09ECh	Driver control mode*	Sets the control mode of the driver.	0: Position control mode 1: Speed control mode	0	C
24852	6114h	Direct data operation trigger setting	Sets the trigger to execute direct data operation. The trigger setting is enabled only when the TRIG-MODE is set to "1: Start at ON level."	–6: Operation type –5: Position –4: Speed –3: Starting/changing rate –2: Stopping deceleration –1: Torque limiting value 0: Disable 1: Apply all data	1	A
–	–	Motor user name	The desired name can be given to the motor used.	–	0	A
–	–	Driver user name	The desired name can be given to the driver used.		0	A

* It is effective for drivers of version 2.00 or later.

8-2 (p5) Motor & Mechanism (Coordinates/JOG/Home operation) setting parameters

Parameter ID		Name	Description	Setting range	Initial value	Update
Dec	Hex					
336	0150h	(JOG) Travel amount	Sets the travel amount for inching operation.	1 to 8,388,607 steps	1	B
337	0151h	(JOG) Operating speed	Sets the operating speed for JOG operation and inching operation.	1 to 4,000,000 Hz	1,000	B
338	0152h	(JOG) Acceleration/ deceleration	Sets the acceleration/ deceleration rate or the acceleration/deceleration time for JOG macro operation.	1 to 1,000,000,000 (1 = 0.001)*1	1,000,000	B
339	0153h	(JOG) Starting speed	Sets the starting speed for JOG macro operation.	0 to 4,000,000 Hz	500	B
340	0154h	(JOG) Operating speed (high)	Sets the operating speed for high-speed JOG operation.	1 to 4,000,000 Hz	5,000	B
344	0158h	(ZHOME) Operating speed	Sets the operating speed for high-speed return-to-home operation.		5,000	B
345	0159h	(ZHOME) Acceleration/ deceleration	Sets the acceleration/ deceleration rate or the acceleration/deceleration time for high-speed return-to-home operation.	1 to 1,000,000,000 (1 = 0.001)*1	1,000,000	B

Parameter ID		Name	Description	Setting range	Initial value	Update
Dec	Hex					
346	015Ah	(ZHOME) Starting speed	Sets the starting speed for high-speed return-to-home operation.	0 to 4,000,000 Hz	500	B
350	015Eh	JOG/HOME/ZHOME command filter time constant	Sets the time constant for the command filter.	1 to 200 ms	1	B
351	015Fh	JOG/HOME/ZHOME torque limit value	Sets the torque limiting value.	0 to 10,000 (1 = 0.1 %)	1,000	B
352	0160h	(HOME) Home-seeking mode	Sets the return-to-home method.	0: 2-sensor 1: 3-sensor 2: One-way rotation	1	B
353	0161h	(HOME) Starting direction	Sets the starting direction for detecting the home.	0: Negative side 1: Positive side	1	B
354	0162h	(HOME) Acceleration/ deceleration	Sets the acceleration/ deceleration rate or the acceleration/deceleration time for return-to-home operation.	1 to 1,000,000,000 (1 = 0.001)*1	1,000,000	B
355	0163h	(HOME) Starting speed	Sets the starting speed for return-to-home operation.	1 to 4,000,000 Hz	500	B
356	0164h	(HOME) Operating speed	Sets the operating speed for return-to-home operation.		1,000	B
357	0165h	(HOME) Last speed	Sets the operating speed when finally positioning with the home.	1 to 10,000 Hz	500	B
358	0166h	(HOME) SLIT detection	Sets whether to use the SLIT input together when returning to the home.	0: Disable 1: Enable	0	B
359	0167h	(HOME) ZSG signal detection	Sets whether to use the ZSG output together when returning to the home.	0: Disable 2: ZSG output	0	B
360	0168h	(HOME) Position offset	Sets the amount of offset from the home.	–2,147,483,647 to 2,147,483,647 steps	0	B
361	0169h	(HOME) Backward steps in 2 sensor home-seeking	Sets the amount of backward steps after return-to-home operation in 2-sensor mode.	0 to 8,388,607 steps	500	B
362	016Ah	(HOME) Operating amount in uni-directional home-seeking	Sets the operating amount after return-to-home operation in one-way rotation mode.		500	B
448	01C0h	Electronic gear A	Sets the denominator of the electronic gear.	1 to 65,535	1	C
449	01C1h	Electronic gear B	Sets the numerator of the electronic gear.		1	C
450	01C2h	Motor rotation direction	Sets the rotation direction of the motor output shaft.	0: Positive side = Counterclockwise 1: Positive side = Clockwise 2: Positive side = Counterclockwise (the driver parameter is applied)*2 3: Positive side = Clockwise (the driver parameter is applied)*2	1	C
455	01C7h	Wrap setting	Sets the wrap function.	0: Disable 1: Enable	1	C

Parameter ID		Name	Description	Setting range	Initial value	Update
Dec	Hex					
457	01C9h	Initial coordinate generation & wrap setting range	Sets the wrap range.	Refer to p.222. (1 = 0.1 rev)	10	C
459	01CBh	Initial coordinate generation & wrap range offset ratio	Sets the offset ratio of the wrap range.	0 to 10,000 (1=0.01 %)	5,000	C
460	01CCh	Initial coordinate generation & wrap range offset value	Sets the offset amount of the wrap range.	−536,870,912 to 536,870,911 steps	0	C
461	01CDh	The number of the RND-ZERO output in wrap range	Sets the number of times to turn the RND-ZERO output ON in the wrap range.	1 to 536,870,911 divisions	1	C
2017	07E1h	Mechanism lead	Sets the lead of the ball screw.	1 to 32,767	1	C
2032	07F0h	Mechanism settings	To change the mechanism settings parameter, select "Manual setting."	0: Prioritize ABZO setting 1: Manual setting	0	D
2033	07F1h	Gear ratio setting	Sets the gear ratio for geared motor. When "0: Gear ratio setting disable" is set, the gear ratio is considered as "1."	0: Gear ratio setting disable 1 to 32,767: Gear ratio (1 = 0.01)	0	C
2034	07F2h	Initial coordinate generation & wrap coordinate setting	To change the initial coordinate generation & wrap coordinate parameter, select "Manual setting."	0: Prioritize ABZO setting 1: Manual setting	0	D
2035	07F3h	Mechanism limit parameter setting	Disables the ABZO setting of the mechanism limit parameter.	0: Follow ABZO setting 1: Disable	0	D
2036	07F4h	Mechanism protection parameter setting	Disables the ABZO setting of the mechanism protection parameter.	0: Follow ABZO setting 1: Disable	0	D
2037	07F5h	JOG/HOME/ZHOME operation setting	To change the parameter for JOG operation, return-to-home operation, and high-speed return-to-home operation, select "Manual setting."	0: Prioritize ABZO setting 1: Manual setting	0	D
2553	09F9h	Mechanism lead decimal digit setting	Sets the number of decimal places when the lead of the ball screw contains a decimal point.	0: × 1 mm 1: × 0.1 mm 2: × 0.01 mm 3: × 0.001 mm	0	C

*1 The setting unit is followed the "Acceleration/deceleration unit" parameter.

*2 Selecting "2: Positive side = Counterclockwise (the driver parameter is applied) or "3: Positive side = Clockwise (the driver parameter is applied)" prioritizes the fixed value of the ABZO sensor for parameters other than the "Motor rotation direction."

- **Value that can be set in the "Initial coordinate generation & wrap setting range" parameter**

Wrap setting range [rev]						
0.5	1.8	4.8	12.0	25.0	72.0	200.0
0.6	2.0	5.0	12.5	30.0	75.0	225.0
0.8	2.4	6.0	14.4	36.0	90.0	300.0
0.9	2.5	7.2	15.0	37.5	100.0	360.0
1.0	3.0	7.5	18.0	40.0	112.5	450.0
1.2	3.6	8.0	20.0	45.0	120.0	600.0
1.5	4.0	9.0	22.5	50.0	150.0	900.0
1.6	4.5	10.0	24.0	60.0	180.0	1,800.0

memo The table shows the values when setting with the **MEXE02** software. When setting via EtherNet/IP, multiply the values in the table by 10.

8-3 (p6) Alarm & Information setting parameters

Parameter ID		Name	Description	Setting range	Initial value	Update
Dec	Hex					
385	0181h	Excessive position deviation alarm	Sets the condition in which the alarm is generated.	1 to 30,000 (1 = 0.01 rev)	300	A
400	0190h	HWTO mode selection	Generates an alarm when the HWTO1 input or the HWTO2 input is turned OFF.	0: Alarm is not present 1: Alarm is present	0	A
401	0191h	HWTO delay time of checking dual system	Sets a threshold after either the HWTO1 input or the HWTO2 input is turned OFF until the other input is turned OFF. If the other input is not turned OFF even when the threshold is exceeded, an alarm will be generated.	0 to 10 (disable), 11 to 100 ms	0	A
408	0198h	ETO reset ineffective period	Sets a time to disable the ETO-CLR input if the motor is excited by the ETO-CLR input after both the HWTO1 and HWTO2 inputs are turned ON. The motor cannot be excited until the time set in this parameter is exceeded even if the ETO-CLR input is turned ON.	0 to 100 ms	0	A
409	0199h	ETO reset action (ETO-CLR)	Sets the judgment criterion of the signal when the motor is excited by the ETO-CLR input.	1: ON-Edge 2: ON-Level	1	A
410	019Ah	ETO reset action (ALM-RST)	Excites the motor by the ALM-RST input after the HWTO1 and HWTO2 inputs are turned ON.	0: Disable 1: Excitation at ON edge	0	A
411	019Bh	ETO reset action (S-ON)	Excites the motor by the S-ON input after the HWTO1 and HWTO2 inputs are turned ON.		1	A
412	019Ch	ETO reset action (STOP)	Excites the motor by the STOP input after the HWTO1 and HWTO2 inputs are turned ON.		1	A

Parameter ID		Name	Description	Setting range	Initial value	Update
Dec	Hex					
416	01A0h	Driver temperature information (INFO-DRVTMP)	Sets the condition in which the information is generated.	40 to 85 °C	85	A
417	01A1h	Torque limiting time information (INFO-TLC-TIME)		0: Disable 1 to 10,000 ms	0	A
418	01A2h	Speed information (INFO-SPD)		0: Disable 1 to 12,000 r/min	0	A
421	01A5h	Position deviation information (INFO-POSERR)		1 to 30,000 (1 = 0.01 rev)	300	A
422	01A6h	Load factor information (INFO-LOAD)		0: Disable 1 to 10,000 (1 = 0.1 %)	0	A
423	01A7h	Torque information (INFO-TRQ)		0: Disable 1 to 10,000 (1 = 0.1 %)	0	A
424	01A8h	Motor temperature information (INFO-MTRTMP)		40 to 120 °C	85	A
425	01A9h	Overvoltage information (INFO-OVOLT)		120 to 450 V	400	A
426	01AAh	Undervoltage information (INFO-UVOLT)		120 to 280 V	120	A
431	01AFh	Tripmeter information (INFO-TRIP)		0: Disable 1 to 2,147,483,647 (1=0.1 kRev)	0	A
432	01B0h	Odometer information (INFO-ODO)			0	A
433	01B1h	Cumulative load 0 information (INFO-CULD0)		0 to 2,147,483,647	0	A
434	01B2h	Cumulative load 1 information (INFO-CULD1)			0	A
435	01B3h	Cumulative load value auto clear	Clears the cumulative load when operation is started (at the ON edge of the MOVE output).	0: Disable 1: Enable	1	A
436	01B4h	Cumulative load value count divisor	Sets the divisor of the cumulative load.	1 to 32,767	1	A
437	01B5h	Settling time information (INFO-STLTIME)	Sets the condition in which the settling time information (INFO-STLTIME) is generated.	0: Disable 1 to 10,000 ms	0	A
444	01BCh	INFO-USRIO output selection	Selects the output signal to be checked by the INFO-USRIO output.	Output signals list ⇨p.240	128: CONST-OFF	A
445	01BDh	INFO-USRIO output inversion	Sets ON-OFF setting of the INFO-USRIO output.	0: Non invert 1: Invert	0	A
446	01BEh	Information LED condition	Sets the LED status when information is generated.	0: LED does not blink 1: LED blinks	1	A
447	01BFh	Information auto clear	When the cause of information is eliminated, the INFO output and the bit output of the corresponding information are turned OFF automatically.	0: Disabled (not turned OFF automatically) 1: Enabled (turned OFF automatically)	1	A

Parameter ID		Name	Description	Setting range	Initial value	Update
Dec	Hex					
1952	07A0h	INFO action (Assigned I/O status information (INFO-USRIO))	Sets the bit output, the INFO output, and the LED status when information is generated.	0: Only the bit output is ON 1: The bit output and the INFO output are ON and the LED blinks	1	A
1953	07A1h	INFO action (Position deviation information (INFO-POSERR))			1	A
1954	07A2h	INFO action (Driver temperature information (INFO-DRVTMP))			1	A
1955	07A3h	INFO action (Motor temperature information (INFO-MTRTMP))			1	A
1956	07A4h	INFO action (Overvoltage information (INFO-OVOLT))			1	A
1957	07A5h	INFO action (Undervoltage information (INFO-UVOLT))			1	A
1958	07A6h	INFO action (Torque limiting time information (INFO-TLC-TIME))			1	A
1959	07A7h	INFO action (Load factor information (INFO-LOAD))			1	A
1960	07A8h	INFO action (Speed information (INFO-SPD))			1	A
1961	07A9h	INFO action (Start operation error information (INFO-START))			1	A
1962	07AAh	INFO action (Start ZHOME error information (INFO-ZHOME))			1	A
1963	07ABh	INFO action (PRESET request information (INFO-PR-REQ))			1	A
1965	07ADh	INFO action (Electronic gear setting error information (INFO-EGR-E))			1	A
1966	07AEh	INFO action (Wrap setting error information (INFO-RND-E))			1	A
1968	07B0h	INFO action (Forward operation prohibition information (INFO-FW-OT))			1	A

Parameter ID		Name	Description	Setting range	Initial value	Update
Dec	Hex					
1969	07B1h	INFO action (Reverse operation prohibition information (INFO-RV-OT))	Sets the bit output, the INFO output, and the LED status when information is generated.	0: Only the bit output is ON 1: The bit output and the INFO output are ON and the LED blinks	1	A
1970	07B2h	INFO action (Cumulative load 0 information (INFO-CULD0))			1	A
1971	07B3h	INFO action (Cumulative load 1 information (INFO-CULD1))			1	A
1972	07B4h	INFO action (Tripmeter information (INFO-TRIP))			1	A
1973	07B5h	INFO action (Odometer information (INFO-ODO))			1	A
1975	07B7h	INFO action (Torque information (INFO-TRQ))			1	A
1976	07B8h	INFO action (Settling time information (INFO-STLTIME))			1	A
1980	07BCh	INFO action (Start operation restricted mode information (INFO-DSLMTD))			1	A
1981	07BDh	INFO action (I/O test mode information (INFO-IOTEST))			1	A
1982	07BEh	INFO action (Configuration request information (INFO-CFG))			1	A
1983	07BFh	INFO action (Reboot request information (INFO-RBT))			1	A
24968	6188h	Network bus error alarm	Sets the condition in which the alarm is generated.	0: Disable 1: Enable	1	A

8-4 (p7) I/O action and function parameters

Parameter ID		Name	Description	Setting range	Initial value	Update
Dec	Hex					
1792	0700h	STOP/STOP-SOFF input action	Sets how to stop the motor when the STOP input or the STOP-SOFF input is turned ON.	0: Immediate stop for both STOP and STOP-SOFF inputs 1: Deceleration stop for STOP input, immediate stop for STOP-SOFF input 2: Immediate stop for STOP input, deceleration stop for STOP-SOFF input 3: Deceleration stop for both STOP and STOP-SOFF inputs	3	A
1793	0701h	FW-LS/RV-LS input action	Sets how to stop the motor when the FW-LS input or the RV-LS input is turned ON.	–1: Use as the sensor for return-to-home 0: Immediate stop 1: Deceleration stop 2: Immediate stop with alarm 3: Deceleration stop with alarm	2	A
1794	0702h	FW-BLK/RV-BLK input action	Sets how to stop the motor when the FW-BLK input or the RV-BLK input is turned ON.	0: Immediate stop 1: Deceleration stop	1	A
1795	0703h	IN-POS positioning completion signal range	Sets the output range of the IN-POS output (angle range in which the motor is converged) with the target position as a center.	0 to 180 (1 = 0.1 °)	18	A
1796	0704h	IN-POS positioning completion signal offset	Sets the amount of offset from the target position.	–18 to 18 (1 = 0.1°)	0	A
1797	0705h	D-SEL drive start function	Sets how to start operation when the D-SEL input is turned ON.	0: Only operation data number selection 1: Operation data number selection with START function	1	A
1798	0706h	TEACH operation type setting	Selects the operation type when "Position" is set by the teaching function.	–1: Not set 1: Absolute positioning 8: Wrap absolute positioning	1	A
1799	0707h	ZSG signal width	Sets the output range of the ZSG output.	1 to 1,800 (1 = 0.1°)	18	A
1800	0708h	RND-ZERO signal width	Sets the output width of the RND-ZERO output.	1 to 10,000 steps	10	A
1801	0709h	RND-ZERO signal source	Sets the criterion of the RND-ZERO output.	0: Based on feedback position 1: Based on command position	0	A
1802	070Ah	MOVE minimum ON time	Sets the minimum time during which the MOVE output remains ON.	0 to 255 ms	0	A
1806	070Eh	SPD-LMT speed limit type selection	Selects the setting method of the speed limit value.	0: Ratio 1: Value	0	A
1807	070Fh	SPD-LMT speed limit ratio	Sets the percentage of the speed limit based on "Speed" of the operation data being 100 %. This is enabled when the "SPD-LMT speed limit type selection" parameter is set to "0: Ratio."	1 to 100 %	50	A

Parameter ID		Name	Description	Setting range	Initial value	Update
Dec	Hex					
1808	0710h	SPD-LMT speed limit value	Sets the speed limit value as "Value." This is enabled when the "SPD-LMT speed limit type selection" parameter is set to "1: Value."	1 to 4,000,000 Hz	1,000	A
1809	0711h	JOG-C time from JOG-P to JOG	Sets the timing to transit from inching operation to JOG operation in combined JOG operation.	1 to 5,000 (1 = 0.001 s)	500	B
1810	0712h	JOG-C time from JOG to JOG-H	Sets the timing to transit from JOG operation to high-speed JOG operation in combined JOG operation.		1,000	B
1812	0714h	MON-REQ0 output data selection	Selects information to be output by the I/O position output function when the MON-REQ input is turned ON.	1: Feedback position 2: Feedback position (32-bit counter) 3: Command position 4: Command position (32-bit counter) 8: Alarm code (8 bits) 9: Feedback position and alarm code 10: Feedback position (32-bit counter) and alarm code 11: Command position and alarm code 12: Command position (32-bit counter) and alarm code	1	B
1813	0715h	MON-REQ1 output data selection			8	B
1814	0716h	PLS-OUT output data selection	Selects the information to be output by the pulse request function.	0: Command position 1: Command position (32-bit counter) 2: Feedback position 3: Feedback position (32-bit counter)	0	B
1815	0717h	PLS-OUT maximum frequency	Sets the frequency of the output pulse used with the pulse request function.	1 to 10,000 (1 = 0.1 kHz)	100	B
1816	0718h	VA mode selection	Selects the judgment criterion of the VA output.	0: Feedback speed attainment (speed at feedback position) 1: Speed at command position (only internal profile) 2: Speed at feedback position & command position (only internal profile)	0	B
1817	0719h	VA detection speed range	Sets the allowable range of the judgment criterion for the feedback speed when the "VA mode selection" parameter is set to "0: Feedback speed attainment (speed at feedback position)" or "2: Speed at feedback position & command position (only internal profile)."	1 to 200 r/min	30	B

Parameter ID		Name	Description	Setting range	Initial value	Update
Dec	Hex					
1818	071Ah	MAREA output source	Sets the criterion to turn the MAREA output ON and the status of the MAREA output after operation.	0: Feedback position (ON after operation) 1: Command position (ON after operation) 2: Feedback position (MAREA output OFF at completion) 3: Command position (MAREA output OFF at completion)	0	A
1821	071Dh	ZV detection speed range	Sets the output range (one side) of the ZV output with the operating speed 0 r/min as a center.	0 to 200 r/min	15	A
1841	0731h	STOP input stopping torque limit value	Sets the torque limiting value when the STOP input is turned ON. When "0: Use profile torque limit continuously" is set, the torque limiting value of the operation data being executed is applied.	0: Use profile torque limit continuously 1 to 10,000 (1 = 0.1 %)	0	A
1856	0740h	AREA0 positive direction position/ offset	• AREA positive direction position/offset Sets the positive direction position or offset from the target position for the AREA output. • AREA negative direction position/offset Sets the negative direction position or distance from the offset position for the AREA output.	−2,147,483,648 to 2,147,483,647 steps	0	A
1857	0741h	AREA0 negative direction position/ detection range			0	A
1858	0742h	AREA1 positive direction position/ offset			0	A
1859	0743h	AREA1 negative direction position/ detection range			0	A
1860	0744h	AREA2 positive direction position/ offset			0	A
1861	0745h	AREA2 negative direction position/ detection range			0	A
1862	0746h	AREA3 positive direction position/ offset			0	A
1863	0747h	AREA3 negative direction position/ detection range			0	A
1864	0748h	AREA4 positive direction position/ offset			0	A
1865	0749h	AREA4 negative direction position/ detection range			0	A
1866	074Ah	AREA5 positive direction position/ offset			0	A
1867	074Bh	AREA5 negative direction position/ detection range			0	A

Parameter ID		Name	Description	Setting range	Initial value	Update
Dec	Hex					
1868	074Ch	AREA6 positive direction position/ offset	• AREA positive direction position/offset Sets the positive direction position or offset from the target position for the AREA output. • AREA negative direction position/offset Sets the negative direction position or distance from the offset position for the AREA output.	–2,147,483,648 to 2,147,483,647 steps	0	A
1869	074Dh	AREA6 negative direction position/ detection range			0	A
1870	074Eh	AREA7 positive direction position/ offset			0	A
1871	074Fh	AREA7 negative direction position/ detection range			0	A
1872	0750h	AREA0 range setting mode	Sets the range setting mode for the AREA output.	0: Range setting with absolute value 1: Offset/width setting from the target position	0	A
1873	0751h	AREA1 range setting mode			0	A
1874	0752h	AREA2 range setting mode			0	A
1875	0753h	AREA3 range setting mode			0	A
1876	0754h	AREA4 range setting mode			0	A
1877	0755h	AREA5 range setting mode			0	A
1878	0756h	AREA6 range setting mode			0	A
1879	0757h	AREA7 range setting mode			0	A
1880	0758h	AREA0 positioning standard	Sets the judgment criterion of the position for AREA output.	0: Based on feedback position 1: Based on command position	0	A
1881	0759h	AREA1 positioning standard			0	A
1882	075Ah	AREA2 positioning standard			0	A
1883	075Bh	AREA3 positioning standard			0	A
1884	075Ch	AREA4 positioning standard			0	A
1885	075Dh	AREA5 positioning standard			0	A
1886	075Eh	AREA6 positioning standard			0	A
1887	075Fh	AREA7 positioning standard			0	A
1888	0760h	D-SEL0 operation number selection	Sets the operation data number corresponding to the D-SEL input.	0 to 255: Operation data number	0	A
1889	0761h	D-SEL1 operation number selection			1	A
1890	0762h	D-SEL2 operation number selection			2	A
1891	0763h	D-SEL3 operation number selection			3	A
1892	0764h	D-SEL4 operation number selection			4	A

Parameter ID		Name	Description	Setting range	Initial value	Update
Dec	Hex					
1893	0765h	D-SEL5 operation number selection	Sets the operation data number corresponding to the D-SEL input.	0 to 255: Operation data number	5	A
1894	0766h	D-SEL6 operation number selection			6	A
1895	0767h	D-SEL7 operation number selection			7	A
1896	0768h	D-END0 operation number selection	Sets the operation data number corresponding to the D-END output.	0 to 255: Operation data number	0	A
1897	0769h	D-END1 operation number selection			1	A
1898	076Ah	D-END2 operation number selection			2	A
1899	076Bh	D-END3 operation number selection			3	A
1900	076Ch	D-END4 operation number selection			4	A
1901	076Dh	D-END5 operation number selection			5	A
1902	076Eh	D-END6 operation number selection			6	A
1903	076Fh	D-END7 operation number selection			7	A

8-5 (p8) Direct-IN function selection (DIN) parameters

Parameter ID		Name	Description	Setting range	Initial value	Update
Dec	Hex					
2112	0840h	DIN0 input function	Selects an input signal to be assigned to DIN.	Input signals list ⇨p.239	37: ZHOME	C
2113	0841h	DIN1 input function			1: FREE	C
2114	0842h	DIN2 input function			5: STOP	C
2115	0843h	DIN3 input function			8: ALM-RST	C
2116	0844h	DIN4 input function			48: FW-JOG	C
2117	0845h	DIN5 input function			49: RV-JOG	C
2128	0850h	DIN0 inverting mode	Changes ON-OFF setting of DIN.	0: Non invert 1: Invert	0	C
2129	0851h	DIN1 inverting mode			0	C
2130	0852h	DIN2 inverting mode			0	C
2131	0853h	DIN3 inverting mode			0	C
2132	0854h	DIN4 inverting mode			0	C
2133	0855h	DIN5 inverting mode			0	C
2176	0880h	DIN0 composite input function	Selects an input signal to be assigned to DIN as the composite input function.	Input signals list ⇨p.239	0: No function	C
2177	0881h	DIN1 composite input function			0: No function	C
2178	0882h	DIN2 composite input function			0: No function	C
2179	0883h	DIN3 composite input function			0: No function	C
2180	0884h	DIN4 composite input function			0: No function	C
2181	0885h	DIN5 composite input function			0: No function	C

Parameter ID		Name	Description	Setting range	Initial value	Update
Dec	Hex					
2240	08C0h	DIN0 ON signal dead-time	Sets the ON signal dead-time of DIN.	0 to 250 ms	0	C
2241	08C1h	DIN1 ON signal dead-time			0	C
2242	08C2h	DIN2 ON signal dead-time			0	C
2243	08C3h	DIN3 ON signal dead-time			0	C
2244	08C4h	DIN4 ON signal dead-time			0	C
2245	08C5h	DIN5 ON signal dead-time			0	C
2256	08D0h	DIN0 1 shot signal	Sets the 1-shot signal function of DIN.	0: 1-shot signal function is disabled 1: 1-shot signal function is enabled	0	C
2257	08D1h	DIN1 1 shot signal			0	C
2258	08D2h	DIN2 1 shot signal			0	C
2259	08D3h	DIN3 1 shot signal			0	C
2260	08D4h	DIN4 1 shot signal			0	C
2261	08D5h	DIN5 1 shot signal			0	C

8-6 (p9) Direct-OUT function selection (DOUT) parameters

Parameter ID		Name	Description	Setting range	Initial value	Update
Dec	Hex					
2144	0860h	DOUT0 (Normal) output function	Selects an output signal to be assigned to DOUT.	Output signals list ⇨p.240	144: HOME-END	C
2145	0861h	DOUT1 (Normal) output function			138: IN-POS	C
2146	0862h	DOUT2 (Normal) output function			0: No function	C
2147	0863h	DOUT3 (Normal) output function			132: READY	C
2148	0864h	DOUT4 (Normal) output function			134: MOVE	C
2149	0865h	DOUT5 (Normal) output function			130: ALM-B	C
2160	0870h	DOUT0 inverting mode	Changes ON-OFF setting of DOUT.	0: Non invert 1: Invert	0	C
2161	0871h	DOUT1 inverting mode			0	C
2162	0872h	DOUT2 inverting mode			0	C
2163	0873h	DOUT3 inverting mode			0	C
2164	0874h	DOUT4 inverting mode			0	C
2165	0875h	DOUT5 inverting mode			0	C
2192	0890h	DOUT0 composite output function	Selects an output signal for logical operation with the signal of DOUT.	Output signals list ⇨p.240	128: CONST-OFF	C
2193	0891h	DOUT1 composite output function			128: CONST-OFF	C
2194	0892h	DOUT2 composite output function			128: CONST-OFF	C
2195	0893h	DOUT3 composite output function			128: CONST-OFF	C
2196	0894h	DOUT4 composite output function			128: CONST-OFF	C
2197	0895h	DOUT5 composite output function			128: CONST-OFF	C

Parameter ID		Name	Description	Setting range	Initial value	Update
Dec	Hex					
2208	08A0h	DOUT0 composite inverting mode	Changes ON-OFF setting of the composite output function of DOUT.	0: Non invert 1: Invert	0	C
2209	08A1h	DOUT1 composite inverting mode			0	C
2210	08A2h	DOUT2 composite inverting mode			0	C
2211	08A3h	DOUT3 composite inverting mode			0	C
2212	08A4h	DOUT4 composite inverting mode			0	C
2213	08A5h	DOUT5 composite inverting mode			0	C
2224	08B0h	DOUT0 composite logical combination	Sets the composite logical combination of DOUT.	0: AND 1: OR	1	C
2225	08B1h	DOUT1 composite logical combination			1	C
2226	08B2h	DOUT2 composite logical combination			1	C
2227	08B3h	DOUT3 composite logical combination			1	C
2228	08B4h	DOUT4 composite logical combination			1	C
2229	08B5h	DOUT5 composite logical combination			1	C
2272	08E0h	DOUT0 OFF delay time	Sets the OFF delay time of DOUT.	0 to 250 ms	0	C
2273	08E1h	DOUT1 OFF delay time			0	C
2274	08E2h	DOUT2 OFF delay time			0	C
2275	08E3h	DOUT3 OFF delay time			0	C
2276	08E4h	DOUT4 OFF delay time			0	C
2277	08E5h	DOUT5 OFF delay time			0	C

8-7 (p10) Remote-I/O function selection (R-I/O) parameters

Parameter ID		Name	Description	Setting range	Initial value	Update
Dec	Hex					
2304	0900h	R-IN0 input function	Selects an input signal to be assigned to R-IN.	Input signals list ⇨p.239	0: No function	C
2305	0901h	R-IN1 input function			0: No function	C
2306	0902h	R-IN2 input function			0: No function	C
2307	0903h	R-IN3 input function			0: No function	C
2308	0904h	R-IN4 input function			0: No function	C
2309	0905h	R-IN5 input function			0: No function	C
2310	0906h	R-IN6 input function			0: No function	C
2311	0907h	R-IN7 input function			0: No function	C
2312	0908h	R-IN8 input function			0: No function	C
2313	0909h	R-IN9 input function			0: No function	C
2314	090Ah	R-IN10 input function			0: No function	C
2315	090Bh	R-IN11 input function			0: No function	C
2316	090Ch	R-IN12 input function			0: No function	C
2317	090Dh	R-IN13 input function			0: No function	C

Parameter ID		Name	Description	Setting range	Initial value	Update
Dec	Hex					
2318	090Eh	R-IN14 input function	Selects an input signal to be assigned to R-IN.	Input signals list ⇨p.239	0: No function	C
2319	090Fh	R-IN15 input function			0: No function	C
2320	0910h	R-OUT0 output function	Selects an output signal to be assigned to R-OUT.	Output signals list ⇨p.240	64: M0_R	C
2321	0911h	R-OUT1 output function			65: M1_R	C
2322	0912h	R-OUT2 output function			66: M2_R	C
2323	0913h	R-OUT3 output function			32: START_R	C
2324	0914h	R-OUT4 output function			144: HOME-END	C
2325	0915h	R-OUT5 output function			132: READY	C
2326	0916h	R-OUT6 output function			135: INFO	C
2327	0917h	R-OUT7 output function			129: ALM-A	C
2328	0918h	R-OUT8 output function			136: SYS-BSY	C
2329	0919h	R-OUT9 output function			160: AREA0	C
2330	091Ah	R-OUT10 output function			161: AREA1	C
2331	091Bh	R-OUT11 output function			162: AREA2	C
2332	091Ch	R-OUT12 output function			155: ZSG	C
2333	091Dh	R-OUT13 output function			134: MOVE	C
2334	091Eh	R-OUT14 output function			138: IN-POS	C
2335	091Fh	R-OUT15 output function			140: TLC	C
2352	0930h	R-OUT0 OFF delay time	Sets the OFF delay time of R-OUT.	0 to 250 ms	0	C
2353	0931h	R-OUT1 OFF delay time			0	C
2354	0932h	R-OUT2 OFF delay time			0	C
2355	0933h	R-OUT3 OFF delay time			0	C
2356	0934h	R-OUT4 OFF delay time			0	C
2357	0935h	R-OUT5 OFF delay time			0	C
2358	0936h	R-OUT6 OFF delay time			0	C
2359	0937h	R-OUT7 OFF delay time			0	C
2360	0938h	R-OUT8 OFF delay time			0	C
2361	0939h	R-OUT9 OFF delay time			0	C
2362	093Ah	R-OUT10 OFF delay time			0	C
2363	093Bh	R-OUT11 OFF delay time			0	C
2364	093Ch	R-OUT12 OFF delay time			0	C
2365	093Dh	R-OUT13 OFF delay time			0	C
2366	093Eh	R-OUT14 OFF delay time			0	C
2367	093Fh	R-OUT15 OFF delay time			0	C

8-8 (p11) EXT-IN & VIR-IN & USR-OUT function selection (Extend) parameters

Parameter ID		Name	Description	Setting range	Initial value	Update
Dec	Hex					
2368	0940h	Virtual input (VIR-IN0) function	Selects an input signal to be assigned to VIR-IN.	Input signals list ⇨p.239	0: No function	C
2369	0941h	Virtual input (VIR-IN1) function			0: No function	C
2370	0942h	Virtual input (VIR-IN2) function			0: No function	C
2371	0943h	Virtual input (VIR-IN3) function			0: No function	C
2372	0944h	Virtual input (VIR-IN0) source selection	Selects an output signal to be the trigger of VIR-IN.	Output signals list ⇨p.240	128: CONST-OFF	C
2373	0945h	Virtual input (VIR-IN1) source selection			128: CONST-OFF	C
2374	0946h	Virtual input (VIR-IN2) source selection			128: CONST-OFF	C
2375	0947h	Virtual input (VIR-IN3) source selection			128: CONST-OFF	C
2376	0948h	Virtual input (VIR-IN0) inverting mode	Changes ON-OFF setting of VIR-IN.	0: Non invert 1: Invert	0	C
2377	0949h	Virtual input (VIR-IN1) inverting mode			0	C
2378	094Ah	Virtual input (VIR-IN2) inverting mode			0	C
2379	094Bh	Virtual input (VIR-IN3) inverting mode			0	C
2380	094Ch	Virtual input (VIR-IN0) ON signal dead time	Sets the ON signal dead-time of VIR-IN.	0 to 250 ms	0	C
2381	094Dh	Virtual input (VIR-IN1) ON signal dead time			0	C
2382	094Eh	Virtual input (VIR-IN2) ON signal dead time			0	C
2383	094Fh	Virtual input (VIR-IN3) ON signal dead time			0	C
2384	0950h	Virtual input (VIR-IN0) 1 shot signal mode	Enables the 1-shot signal function of VIR-IN.	0: 1-shot signal function is disabled 1: 1-shot signal function is enabled	0	C
2385	0951h	Virtual input (VIR-IN1) 1 shot signal mode			0	C
2386	0952h	Virtual input (VIR-IN2) 1 shot signal mode			0	C
2387	0953h	Virtual input (VIR-IN3) 1 shot signal mode			0	C
2400	0960h	User output (USR-OUT0) source A function	Sets the output source A of USR-OUT.	Output signals list ⇨p.240	128: CONST-OFF	C
2401	0961h	User output (USR-OUT1) source A function			128: CONST-OFF	C
2402	0962h	User output (USR-OUT0) source A inverting mode	Changes ON/OFF setting of the output source A of USR-OUT.	0: Non invert 1: Invert	0	C
2403	0963h	User output (USR-OUT1) source A inverting mode			0	C

Parameter ID		Name	Description	Setting range	Initial value	Update
Dec	Hex					
2404	0964h	User output (USR-OUT0) source B function	Sets the output source B of USR-OUT.	Output signals list ⇨p.240	128: CONST-OFF	C
2405	0965h	User output (USR-OUT1) source B function			128: CONST-OFF	C
2406	0966h	User output (USR-OUT0) source B inverting mode	Changes ON/OFF setting of the output source B of USR-OUT.	0: Non invert 1: Invert	0	C
2407	0967h	User output (USR-OUT1) source B inverting mode			0	C
2408	0968h	User output (USR-OUT0) logical operation	Sets the logical combination of the user output sources A and B of USR-OUT.	0: AND 1: OR	1	C
2409	0969h	User output (USR-OUT1) logical operation			1	C
2416	0970h	Extended input (EXT-IN) function	Selects an input signal to be assigned to the HOME PRESET switch.	Input signals list ⇨p.239	9: P-PRESET	C
2417	0971h	Extended input (EXT-IN) inverting mode	Changes ON-OFF setting of the input signal to be assigned to the HOME PRESET switch.	0: Non invert 1: Invert	0	C
2418	0972h	Extended input (EXT-IN) interlock releasing time	Normally, the HOME PRESET switch is interlocked. By holding down the switch for a certain time period, interlock is released and the assigned function is enabled. This parameter is used to set the time period during which the switch is held down in order to release the interlock.	0: Interlock disabled 1 to 50 (1 = 0.1 s)	10	A
2419	0973h	Extended input (EXT-IN) interlock releasing duration	Sets the time period during which the state releasing the interlock is retained.	0 to 50 (1 = 0.1 s)	30	A
2420	0974h	Extended input (EXT-IN) ON monitor time	When a signal assigned to the switch is input, the LED is lit. This parameter is used to set the time period during which the LED is lit.	0 to 50 (1 = 0.1 s)	10	A
2424	0978h	Differential output mode selection	Selects the type of signal output from the differential output.	−1: Not output 0: Phase A/Phase B output 8: I/O status output	0	C
2426	097Ah	Differential output (EXT-OUTA) function selection on I/O mode	This function is enabled when the "Differential output function selection" parameter is set to "8: IO-OUT." Selects an output signal to be assigned to the differential output.	Output signals list ⇨p.240	128: CONST-OFF	C
2427	097Bh	Differential output (EXT-OUTB) function selection on I/O mode			128: CONST-OFF	C
2428	097Ch	Differential output (EXT-OUTA) inverting mode on I/O mode	This function is enabled when the "Differential output function selection" parameter is set to "8: IO-OUT." Changes ON-OFF setting of the differential output.	0: Non invert 1: Invert	0	C
2429	097Dh	Differential output (EXT-OUTB) inverting mode on I/O mode			0	C

Parameter ID		Name	Description	Setting range	Initial value	Update
Dec	Hex					
2430	097Eh	Differential output (EXT-OUTA) OFF delay time on I/O mode	This function is enabled when the "Differential output function selection" parameter is set to "8: IO-OUT." Sets the OFF delay time for the output signal.	0 to 250 ms	0	C
2431	097Fh	Differential output (EXT-OUTB) OFF delay time on I/O mode			0	C

8-9 (p12) Communication & I/O function parameters

Set parameters that "-" is described in the parameter ID using the **MEXE02** software. They cannot be read or written via Implicit communication.

Parameter ID		Name	Description	Setting range	Initial value	Update
Dec	Hex					
498	01F2h	USB-ID enable	The COM port can be fixed.	0: Disable 1: Enable	1	D
499	01F3h	USB-ID	This can be set when the "USB-ID enable" parameter is set to "1: Enable." Sets the ID to the COM port.	0 to 999,999,999	0	D
2555	09FBh	USB-PID	Sets the product ID to be displayed in the COM port.	0 to 31	0	D
25600	6400h	Assignable monitor address 0	Sets the parameter ID to show on the assignable monitor.	Set from items of "6 Parameter list".	124: Driver temperature	A
25601	6401h	Assignable monitor address 1			125: Motor temperature	A
25602	6402h	Assignable monitor address 2			109: Cumulative load monitor	A
25603	6403h	Assignable monitor address 3			127: Tripmeter	A
–	–	Configuration Control	Sets how to obtain the IP address.	0: Parameter 2: DHCP server	2	D
–	–	IP Address 1	Sets the IP address.	0 to 255	192	D
–	–	IP Address 2			168	D
–	–	IP Address 3			1	D
–	–	IP Address 4			1	D
–	–	Network Mask 1	Sets the subnet mask.	0 to 255	255	D
–	–	Network Mask 2			255	D
–	–	Network Mask 3			255	D
–	–	Network Mask 4			0	D
–	–	Gateway Address 1	Sets the default gateway.	0 to 255	0	D
–	–	Gateway Address 2			0	D
–	–	Gateway Address 3			0	D
–	–	Gateway Address 4			0	D

8-10 (p13) Adjustment & Function parameters

Parameter ID		Name	Description	Setting range	Initial value	Update
Dec	Hex					
288	0120h	Load inertia setting mode selection	Selects the setting method of the load inertia.	0: "Load inertia setting" parameter is used 1: Automatic	1	A
289	0121h	Load inertia setting	Sets the ratio of the load inertia to the motor rotor inertia. When the rotor inertia is equal to the load inertia, the ratio is 100 %.	0 to 10,000 %	0	A
292	0124h	Mechanical rigidity setting	Sets the rigidity of equipment. The motor response improves as the setting value increases. An excessively high value may cause the motor to vibrate or to generate noise.	0 to 15	6	A
297	0129h	Command filter setting	Sets the filter function to adjust the motor response.	1: LPF (speed filter) is selected 2: The moving average filter is selected	1	B
298	012Ah	Command filter time constant	Adjusts the motor response.	0 to 200 ms	1	B
302	012Eh	Motor response setting	Selects the setting method of the motor response in reaction to the command.	Setting of motor response⇨p.266	6	A
303	012Fh	Position loop gain	Adjusts the motor response in reaction to the position deviation. Increasing the value will make the deviation between the command position and the actual position smaller. An excessively large value may increase the motor overshoot or cause the motor vibration.	1 to 50 Hz	8	A
304	0130h	Speed loop gain	Adjusts the motor response in reaction to the speed deviation. Increasing the value will make the deviation between the command speed and the actual speed smaller. An excessively large value may increase the motor overshoot or cause the motor vibration.	1 to 500 Hz	82	A
305	0131h	Speed loop integral time constant	Reduces the deviation that cannot be adjusted with the speed loop gain. An excessively long value may slow the motor response. Too short value may cause the motor vibration.	1 to 10,000 (1 = 0.1 ms)	1,940	A
310	0136h	Electronic damper function	Sets the vibration suppression function.	0: Disable 1: Enable	1	A
314	013Ah	Torque filter (LPF)	Changes the motor response at high frequencies.	0 to 4,700 Hz	820	A
315	013Bh	Speed feed-forward	When the speed is constant, the deviation between the command position and the actual position can be reduced to shorten the settling time. If it is set to 100 %, the deviation will be approximately 0 %. However, an excessively high value may increase the motor overshoot or cause the motor vibration.	0 to 100 %	80	A

Parameter ID		Name	Description	Setting range	Initial value	Update
Dec	Hex					
2064	0810h	Damping control frequency	Sets the frequency of vibration to be suppressed.	700 to 20,000 (1=0.01 Hz)	10,000	A
2065	0811h	Damping control gain	Sets the gain for damping control (vibration suppression control).	0 to 100 %	0	A
2067	0813h	Resonance suppression control A frequency	Sets the frequency of vibration to be suppressed.	100 to 3,200 Hz	1,000	A
2068	0814h	Resonance suppression control A gain	Sets the gain to suppress the vibration. Increasing the value causes the motor response to the deviation to lower.	0 to 100 %	0	A
2069	0815h	Resonance suppression control A width	Sets the width of vibration to be suppressed.	30 to 120	30	A
2070	0816h	Resonance suppression control B frequency	Sets the frequency of vibration to be suppressed.	100 to 3,200 Hz	1,000	A
2071	0817h	Resonance suppression control B gain	Sets the gain to suppress the vibration. Increasing the value causes the motor response to the deviation to lower.	0 to 100 %	0	A
2072	0818h	Resonance suppression control B width	Sets the width of vibration to be suppressed.	30 to 120	30	A
2073	0819h	Resonance suppression control C frequency	Sets the frequency of vibration to be suppressed.	100 to 3,200 Hz	1,000	A
2074	081Ah	Resonance suppression control C gain	Sets the gain to suppress the vibration. Increasing the value causes the motor response to the deviation to lower.	0 to 100 %	0	A
2075	081Bh	Resonance suppression control C width	Sets the width of vibration to be suppressed.	30 to 120	30	A
2076	081Ch	Resonance suppression control D frequency	Sets the frequency of vibration to be suppressed.	100 to 3,200 Hz	1,000	A
2077	081Dh	Resonance suppression control D gain	Sets the gain to suppress the vibration. Increasing the value causes the motor response to the deviation to lower.	0 to 100 %	0	A
2078	081Eh	Resonance suppression control D width	Sets the width of vibration to be suppressed.	30 to 120	30	A
2530	09E2h	FFT target	Selects the target to be analyzed by the fast Fourier transform (FFT).	0: Torque 1: Speed	0	A

9 I/O signals assignment list

9-1 Input signals

To assign signals via industrial network, use the "Assignment number" in the table instead of the signal name.

Assignment number	Signal name
0	No function
1	FREE
2	S-ON
3	CLR
4	STOP-SOFF
5	STOP
7	BREAK-ATSQ
8	ALM-RST
9	P-PRESET
10	EL-PRST
12	ETO-CLR
13	LAT-CLR
14	INFO-CLR
16	HMI
22	TRQ-LMT
23	SPD-LMT
26	FW-BLK
27	RV-BLK
28	FW-LS
29	RV-LS
30	HOMES
31	SLIT
32	START
33	SSTART
35	NEXT

Assignment number	Signal name
36	HOME
37	ZHOME
40	D-SEL0
41	D-SEL1
42	D-SEL2
43	D-SEL3
44	D-SEL4
45	D-SEL5
46	D-SEL6
47	D-SEL7
48	FW-JOG
49	RV-JOG
50	FW-JOG-H
51	RV-JOG-H
52	FW-JOG-P
53	RV-JOG-P
54	FW-JOG-C
55	RV-JOG-C
56	FW-POS
57	RV-POS
64	M0
65	M1
66	M2
67	M3
68	M4

Assignment number	Signal name
69	M5
70	M6
71	M7
75	TEACH
76	MON-REQ0
77	MON-REQ1
78	MON-CLK
79	PLSM-REQ
80	R0
81	R1
82	R2
83	R3
84	R4
85	R5
86	R6
87	R7
88	R8
89	R9
90	R10
91	R11
92	R12
93	R13
94	R14
95	R15

9-2 Output signals

To assign signals via industrial network, use the "Assignment number" in the table instead of the signal name.

Assignment number	Signal name
0	No function
1	FREE_R
2	S-ON_R
3	CLR_R
4	STOP-SOFF_R
5	STOP_R
7	BREAK-ATSQ_R
8	ALM-RST_R
9	P-PRESET_R
10	EL-PRST_R
12	ETO-CLR_R
13	LAT-CLR_R
14	INFO-CLR_R
16	HMI_R
22	TRQ-LMT_R
23	SPD-LMT_R
26	FW-BLK_R
27	RV-BLK_R
28	FW-LS_R
29	RV-LS_R
30	HOMES_R
31	SLIT_R
32	START_R
33	SSTART_R
35	NEXT_R
36	HOME_R
37	ZHOME_R
40	D-SEL0_R
41	D-SEL1_R
42	D-SEL2_R
43	D-SEL3_R
44	D-SEL4_R
45	D-SEL5_R
46	D-SEL6_R
47	D-SEL7_R
48	FW-JOG_R
49	RV-JOG_R
50	FW-JOG-H_R
51	RV-JOG-H_R
52	FW-JOG-P_R
53	RV-JOG-P_R
54	FW-JOG-C_R
55	RV-JOG-C_R
56	FW-POS_R

Assignment number	Signal name
57	RV-POS_R
64	M0_R
65	M1_R
66	M2_R
67	M3_R
68	M4_R
69	M5_R
70	M6_R
71	M7_R
75	TEACH_R
76	MON-REQ0_R
77	MON-REQ1_R
78	MON-CLK_R
79	PLSM-REQ_R
80	R0_R
81	R1_R
82	R2_R
83	R3_R
84	R4_R
85	R5_R
86	R6_R
87	R7_R
88	R8_R
89	R9_R
90	R10_R
91	R11_R
92	R12_R
93	R13_R
94	R14_R
95	R15_R
128	CONST-OFF
129	ALM-A
130	ALM-B
131	SYS-RDY
132	READY
134	MOVE
135	INFO
136	SYS-BSY
137	ETO-MON
138	IN-POS
139	ZV
140	TLC
141	VA
142	SON-MON

Assignment number	Signal name
144	HOME-END
145	ABSPEN
146	ELPRST-MON
149	PRST-DIS
150	PRST-STLD
151	ORGN-STLD
152	RND-OVF
153	FW-SLS
154	RV-SLS
155	ZSG
156	RND-ZERO
159	MAREA
160	AREA0
161	AREA1
162	AREA2
163	AREA3
164	AREA4
165	AREA5
166	AREA6
167	AREA7
168	MPS
169	MBC
170	RG
172	EDM-MON
173	HWTOIN-MON
176	MON-OUT
177	PLS-OUTR
180	USR-OUT0
181	USR-OUT1
192	TRQ-LMTD
193	SPD-LMTD
195	SLIP
196	OPE-BSY
198	SEQ-BSY
199	DELAY-BSY
200	JUMP0-LAT
201	JUMP1-LAT
202	NEXT-LAT
204	DCMD-RDY
205	DCMD-FULL
206	OL-DTCT
207	M-CHG
208	M-ACT0
209	M-ACT1

Assignment number	Signal name
210	M-ACT2
211	M-ACT3
212	M-ACT4
213	M-ACT5
214	M-ACT6
215	M-ACT7
216	D-END0
217	D-END1
218	D-END2
219	D-END3
220	D-END4
221	D-END5
222	D-END6
223	D-END7
224	INFO-USRIO
225	INFO-POSERR
226	INFO-DRVTMP
227	INFO-MTRTMP
228	INFO-OVOLT
229	INFO-UVOLT
230	INFO-TLCTIME
231	INFO-LOAD
232	INFO-SPD
233	INFO-START
234	INFO-ZHOME
235	INFO-PR-REQ
237	INFO-EGR-E
238	INFO-RND-E
240	INFO-FW-OT
241	INFO-RV-OT
242	INFO-CULD0
243	INFO-CULD1
244	INFO-TRIP
245	INFO-ODO
247	INFO-TRQ
248	INFO-STLTIME
252	INFO-DSLMTD
253	INFO-IOTEST
254	INFO-CFG
255	INFO-RBT

7 Troubleshooting

This part explains alarm and information functions.

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1 Detection of communication errors

This chapter explains a function to detect that an error occurred in EtherNet/IP.

1-1 Communication timeout

If Implicit communication is interrupted due to disconnection of the EtherNet/IP cable or other reasons, the communication timeout is detected.
When the communication timeout is detected, the NS LED on the driver blinks in red.
When connection with the scanner is established again, the communication timeout is automatically cleared, and the NS LED on the driver returns to be lit in green.
If the communication timeout is detected, check the following points.

- Is the EtherNet/IP cable disconnected?
- Is the power supply for the scanner is turned on?

1-2 IP address conflict

If an IP address of the EtherNet/IP compatible products is duplicated in the same system, the IP address conflict is detected.
When the IP address conflict is detected, the NS LED on the driver is lit in red.
If the IP address conflict is detected, change the setting so that an IP address of the EtherNet/IP compatible products is not duplicated.
Check the IP address is not duplicated, and then turn on the control power supply again.

2 Alarms

This driver has the alarm function to protect from temperature rise, poor connection, error in operation, and the like. If an alarm is generated, the ALM-A output is turned ON and the ALM-B output is turned OFF to stop the motor. At the same time, the PWR/ALM LED blinks in red.
Details of the alarm being generated can be checked via EtherNet/IP or using the **MEXE02** software.
Refer to the OPERATING MANUAL Hardware Edition for the indication of the LEDs.

2-1 Alarm reset

Before resetting an alarm, always remove the cause of the alarm and ensure safety, and perform one of the reset operations specified below.

- Turn the ALM-RST input ON. (It is enabled at the ON edge of the input.)
- Execute the alarm reset with the maintenance command via EtherNet/IP.
- Execute the alarm reset using the **MEXE02** software.
- Turn on the control power supply again.

Note

- Some alarms cannot be reset by other methods than turning on the control power supply again. Check with "2-4 Alarm list" on p.247.
- An alarm of Absolute position error can be reset if the position preset or return-to-home operation is performed. If it cannot be reset by these methods, the ABZO sensor may be damaged.

2-2 Alarm history

Up to 10 generated alarm items are stored in the non-volatile memory in order of the latest to the oldest. The alarm history stored in the non-volatile memory can be read or cleared if one of the following is performed.

- Read the alarm history by the monitor command via EtherNet/IP.
- Clear the alarm history by the maintenance command via EtherNet/IP.
- Read or clear the alarm history using the **MEXE02** software.

■ Items that can be checked in the alarm history

Item	Description
Code	This is an alarm code.
Alarm message	This is the description of the alarm. Details of the alarm cannot be checked via EtherNet/IP. Check with the alarm monitor of the **MEXE02** software.
Sub code	This is the code for checking by Oriental Motor. However, when the operation data error (alarm code 70h) occurs, the cause of the alarm can be checked by a customer if the sub code is used. (⇨ Refer to the next section.)
Driver temperature	This is the driver temperature when an alarm was generated.
Motor temperature	This is the motor temperature when an alarm was generated.
Inverter voltage	This is the inverter voltage when an alarm was generated.
Physical I/O input	Indicates the status of direct I/O in 16 bits when an alarm was generated.
R-I/O output	Indicates the status of R-OUT in 8 bits when an alarm was generated.
Operation information 0	This is the operation data number that was being executed when an alarm was generated. (⇨ p.247)
Operation information 1	Indicates the operation that was being executed in a number when an alarm was generated. (⇨ p.247)
Feedback position	This is the feedback position of the motor when an alarm was generated.
Elapsed time from BOOT	This is the elapsed time from when the control power supply is turned on until an alarm is generated.
Elapsed time from starting operation	This is the elapsed time from when the operation is started until an alarm is generated.

Item	Description
Main power supply time	This is the elapsed time from when the main power is turned on until an alarm is generated.

memo The R-I/O output is monitored internally even if industrial network is not used. If an output signal that is desired to monitor is assigned to the R-OUT output, the number of monitors when an alarm is generated can be increased.

- **Sub code of operation data error (alarm code 70h)**

Sub code	Cause of alarm
01h	Positioning operation was executed in a state of setting the travel amount to a value less than –2,147,483,647 steps or more than 2,147,483,647 steps.
02h	Operation using the wrap function was executed in a state where the wrap function was disabled.
03h	Positioning operation was executed with the speed of 0 Hz while the travel amount was set to a value other than 0 step.
04h	The operating speed exceeded the maximum operating speed set in the ABZO sensor when the "Mechanism protection parameter setting" parameter was set to "0: Follow ABZO setting."
05h	The starting speed exceeded the maximum starting speed set in the ABZO sensor when the "Mechanism protection parameter setting" parameter was set to "0: Follow ABZO setting."
08h	The parameter related to return-to-home exceeded the value set in the ABZO sensor when the "Mechanism protection parameter setting" parameter was set to "0: Follow ABZO setting."

Related parameter

MEXE02 code	Name	Description	Setting range	Initial value
p5	Mechanism protection parameter setting	Disables the ABZO setting of the mechanism protection parameter.	0: Follow ABZO setting 1: Disable	0

- **Details of bits for physical I/O input**

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
VIR-IN3	VIR-IN2	VIR-IN1	VIR-IN0	–	EXT-IN	–	–
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
–	–	DIN5	DIN4	DIN3	DIN2	DIN1	DIN0

- **Details of bits for R-IN output**

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
R-OUT15	R-OUT14	R-OUT13	R-OUT12	R-OUT11	R-OUT10	R-OUT9	R-OUT8

- **Information indicated in "Operation Information 0" and "Operation Information 1"**

Operation information 0	–1: Operation data not used (*1) or immediately after turning on the control power supply 0 to 255: Operation data number in operation*2
Operation information 1	0: No internal oscillation (being stopped) 1: Stored data operation 2: Direct data operation 3: Return-to-home operation 4: High-speed return-to-home operation 5: JOG operation 6: High-speed JOG operation 7: Combined JOG operation 8: Inching operation 9: Continuous operation 13: Teaching, remote operation

*1 Operation other than stored data operation or continuous macro operation is being executed.
*2 The operation data number operated just before stopping is indicated while the operation is stopped.

2-3 Generation condition of alarms

Alarms shown in the table will be generated if the generation condition is exceeded.

Alarm code	Alarm name	Generation condition
21h	Main circuit overheat	85 °C (185 °F)
22h	Overvoltage	400 V
26h	Motor overheat	85 °C (185 °F)
31h	Overspeed	**AZXM1075**, **AZXM1175**: 5,000 r/min Other than the above motors: 6,000 r/min
34h	Command position error	15,000 r/min

2-4 Alarm list

The motor excitation state when an alarm is generated is as follows.
Excitation off: If an alarm is generated, the motor current is cut off and the motor holding force is lost.
When an electromagnetic brake motor is used, the electromagnetic brake is in a state of holding the motor shaft.
Excitation: Even if an alarm is generated, the motor current is not cut off and the motor position is held.

Alarm code	Number of times LED blinks	Alarm type	Cause	Remedial action	How to reset	Motor excitation
10h	4	Excessive position deviation	• When the motor was in an excitation state, the deviation between the command position and the feedback position exceeded the value set in the "Excessive position deviation alarm" parameter in the motor output shaft. • A load is large, or the acceleration/deceleration time or the acceleration/deceleration rate is too short against the load.	• Reduce a load. • Increase the acceleration/deceleration time or slow the acceleration/deceleration rate. • Reconsider the torque limiting value. • Reconsider the operation data.	Any of reset operations	Non-excitation

Alarm code	Number of times LED blinks	Alarm type	Cause	Remedial action	How to reset	Motor excitation
20h	5	Overcurrent	The motor, the cable, and the driver output circuit were short-circuited.	Turn off the main power supply and the control power supply first, and check that the motor, the cable, and the driver are not damaged. After that, turn on the main power supply and the control power supply again. If the alarm is still not reset, the motor, the cable, or the driver may be damaged. Contact your nearest Oriental Motor sales office.	Turn on the control power supply again	Non-excitation
21h	2	Main circuit overheat	The internal temperature of the driver reached the upper limit of the specification value.	Reconsider the ventilation condition.	Any of reset operations	Non-excitation
22h	3	Overvoltage	• The main power supply voltage exceeded the permissible value. • A large load inertia was suddenly stopped. • Vertical operation (elevating operation) was performed.	• Check the input voltage of the main power supply. • Reduce a load. • Increase the acceleration/deceleration time or slow the acceleration/deceleration rate. • Connect the Oriental Motor's regeneration resistor **RGB200**.	Turn on the control power supply again	Non-excitation
23h	3	Main power supply OFF	The main power supply was shut off during operation.	Check if the main power supply is properly supplied.	Any of reset operations	Non-excitation
25h	3	Undervoltage	The main power supply was shut off momentarily or a voltage was insufficient.	Check the input voltage of the main power supply.	Any of reset operations	Non-excitation
26h	8	Motor overheat	The detection temperature of the ABZO sensor reached the upper limit of the specification value.	• Check the heat radiation condition of the motor. • Reconsider the ventilation condition.	Any of reset operations	Non-excitation
28h	8	Sensor error	An error of the ABZO sensor was detected during operation.	Turn off the main power supply and the control power supply, and check the connection of the motor. After that, turn on the main power supply and the control power supply again.	Turn on the control power supply again	Non-excitation
2Ah	8	ABZO sensor communication error	An error occurred between the driver and the ABZO sensor.	Turn off the main power supply and the control power supply, and check the connection of the ABZO sensor. After that, turn on the main power supply and the control power supply again.	Turn on the control power supply again	Non-excitation

Alarm code	Number of times LED blinks	Alarm type	Cause	Remedial action	How to reset	Motor excitation
30h	2	Overload	The motor output power reached the load factor to detect the overload alarm. Refer to p.253 for details.	• Reduce a load. • Increase the acceleration/ deceleration time or slow the acceleration/ deceleration rate. • Check if the motor power line is disconnected.	Any of reset operations	Non-excitation
31h	2	Overspeed	The feedback speed of the motor output shaft exceeded the specification value.	• Reconsider the "Electronic gear A" parameter and the "Electronic gear B" parameter, and set the speed of the motor output shaft to less than the specification value. • If an overshoot is occurred at the time of accelerating, increase the acceleration time or slow the acceleration rate.	Any of reset operations	Non-excitation
33h	7	Absolute position error	The home information of the ABZO sensor was damaged.	Execute the position preset before setting the home again.	Turn on the control power supply again	Non-excitation
34h	2	Command position error	The operating speed exceeded the permissible value of the driver.	Reduce the operating speed.	Any of reset operations	Non-excitation
41h	9	EEPROM error	The data stored in the driver was damaged.	Initialize all parameters.	Turn on the control power supply again	Non-excitation
42h	8	Sensor error at power-on	An error of the ABZO sensor was detected when the control power supply was turned on.	Turn off the main power supply and the control power supply, and check the connection of the ABZO sensor. After that, turn on the main power supply and the control power supply again.	Turn on the control power supply again	Non-excitation
43h	8	Rotation error at power on	The motor was being rotated when the control power supply was turned on.	Reconsider the load conditions so that the output shaft does not rotate by an external force when the control power supply is turned on.	Turn on the control power supply again	Non-excitation
44h	8	Encoder EEPROM error	The data stored in the ABZO sensor was damaged.	Execute either of the following operations. If the same alarm is still generated, the ABZO sensor has been damaged. Contact your nearest Oriental Motor sales office. • Set phase Z again with the "ZSG-PRESET" of the maintenance command. • Execute the "Clear tripmeter" of the maintenance command or the "Clear tripmeter" with the status monitor of the **MEXE02** software.	Turn on the control power supply again	Non-excitation

Alarm code	Number of times LED blinks	Alarm type	Cause	Remedial action	How to reset	Motor excitation
45h	8	Motor combination error	A motor not allowed to combine with the driver was connected.	Check the motor model and the driver model, and connect them in a correct combination.	Turn on the control power supply again	Non-excitation
4Ah	7	Return-to-home incomplete	Absolute positioning operation was started in a state where the coordinates had not been set.	Execute the position preset or return-to-home operation.	Any of reset operations	Excitation
51h	2	Regeneration resistor overheat	• The regeneration resistor **RGB200** is not connected properly. • The regeneration resistor was overheated extraordinarily. • The driver heat sink was overheated abnormally.	• If the regeneration resistor **RGB200** is not used, short the TH1 and TH2 terminals of the CN1 connector. • Connect the regeneration resistor **RGB200** properly. • The allowable regenerative power of the regeneration resistor is exceeded. Reconsider the load and operating conditions. • Check if the operating sound of the fan can be heard from the driver in a state where the control power supply is turned on. The fan may be stopped if the operating sound of the fan cannot be heard. Contact your nearest Oriental Motor sales office.	Turn on the control power supply again	Non-excitation
53h	2	HWTO input circuit error	• The time after either the HWTO1 input or the HWTO2 input is turned OFF until the other input is turned OFF exceeded the value set in the "HWTO delay time of checking dual system" parameter. • An error of the circuit corresponding to the phenomenon above was detected.	• Increase the value set in the "HWTO delay time of checking dual system" parameter. • Check the wiring of the HWTO1 input and the HWTO2 input.	Turn on the control power supply again	Non-excitation
60h	7	±LS both sides active	• When the "FW-LS/RV-LS input action" parameter is set to "2: Immediate stop with alarm" or "3: Deceleration stop with alarm," both the FW-LS input and the RV-LS input were detected. • Return-to-home operation was executed in a state where both the FW-LS input and RV-LS input were detected.	Check the sensor logic installed and the "Inverting mode" parameter.	Any of reset operations	Excitation

Alarm code	Number of times LED blinks	Alarm type	Cause	Remedial action	How to reset	Motor excitation
61h	7	Reverse ±LS connection	The LS input opposite to the operating direction was detected while return-to-home operation in the 2-sensor mode or the 3-sensor mode was performed.	Check the wiring of the sensor.	Any of reset operations	Excitation
62h	7	Return-to-home operation error	• An unanticipated load was applied while return-to-home operation was performed. • The installation positions of the FW-LS and RV-LS sensors and the HOME sensor are near to each other. • Position preset processing upon completion of return-to-home operation was failed. • In return-to-home operation in the one-way rotation mode, the motor position exceeded the HOME sensor while the motor decelerated to a stop.	• Check the load. • Reconsider the sensor installation positions and the starting direction of motor operation. • See that a load exceeding the maximum torque is not applied upon completion of return-to-home operation. • Reconsider the specifications of the HOME sensor and the "(HOME) Acceleration/deceleration" parameter.	Any of reset operations	Excitation
63h	7	No HOMES	The HOMES input was not detected at a position between the FW-LS input and the RV-LS input while return-to-home operation in the 3-sensor mode was performed.	Install the HOME sensor at a position between the FW-LS and RV-LS sensors.	Any of reset operations	Excitation
64h	7	ZSG, SLIT signal error	The ZSG output and the SLIT input could not be detected during return-to-home operation.	• Reconsider the connection status of the load and the position of the HOME sensor so that these signals should be ON while the HOMES input is ON. • When a signal is not used, set the "(HOME) ZSG signal detection" parameter and the "(HOME) SLIT detection" parameter to "0: Disable."	Any of reset operations	Excitation
66h	7	Hardware overtravel	When the "FW-LS/RV-LS input action" parameter is set to "2: Immediate stop with alarm" or "3: Deceleration stop with alarm," the FW-LS input or the RV-LS input was detected.	Reset the alarm and then escape from the sensor by operating the motor or manually.	Any of reset operations	Excitation

Alarm code	Number of times LED blinks	Alarm type	Cause	Remedial action	How to reset	Motor excitation
67h	7	Software overtravel	When the "Software overtravel" parameter is set to "2: Immediate stop with alarm" or "3: Deceleration stop with alarm," the motor position reached the set value of the software limit.	• Reconsider the operation data. • Reset the alarm and then escape from the sensor by operating the motor or manually.	Any of reset operations	Excitation
68h	1	HWTO input detection	When the "HWTO mode selection" parameter is set to "1: Alarm is present," the HWTO1 input or the HWTO2 input was turned OFF.	Turn the HWTO1 input and the HWTO2 input ON.	Any of reset operations	Non-excitation
6Ah	7	Return-to-home operation offset error	When offset movement as part of return-to-home operation was performed, the FW-LS input or the RV-LS input was detected.	Check the offset value.	Any of reset operations	Excitation
6Dh	7	Mechanical overtravel	The product having set the home reached the mechanism limit stored in the ABZO sensor.	• Check the travel amount (position). • Reset the alarm and then escape from the sensor by operating the motor or manually.	Any of reset operations	Excitation
70h	7	Operation data error	• Stored data operation was performed with data whose operating speed was 0. • Wrap operation was executed when the wrap setting was disabled. • Operation was performed at the operating speed exceeding the value set in the Mechanism protection parameter.	• Check the operation data. • Check the wrap setting. • Check the value set in the Mechanism protection parameter using the unit information monitor of the **MEXE02** software.	Any of reset operations	Excitation
71h	7	Electronic gear setting error	The resolution set with the "Electronic gear A" parameter and the "Electronic gear B" parameter was out of the specifications.	Reconsider the "Electronic gear A" parameter and the "Electronic gear B" parameter, and set the resolution in a range of the specifications.	Turn on the control power supply again	Non-excitation
72h	7	Wrap setting error	The control power supply was turned on in a state where a value of the resolution and that of the "Initial coordinate generation & wrap setting range" parameter were inconsistent.	Set the "Initial coordinate generation & wrap setting range" parameter properly, and turn on the control power supply again.	Turn on the control power supply again	Non-excitation
81h	7	Network bus error	Implicit communication of Exclusive Owner connection was cut off during operation.	Check the connection with the scanner and the condition of the power supply of the scanner.	Any of reset operations	Excitation
82h	7	Network module error	An error was detected in the network module.	Turn on the control power supply again.	Turn on the control power supply again	Non-excitation

Alarm code	Number of times LED blinks	Alarm type	Cause	Remedial action	How to reset	Motor excitation
F0h	Light	CPU error	CPU malfunctioned.	Turn on the main power supply and the control power supply again.	–	–

Related parameters

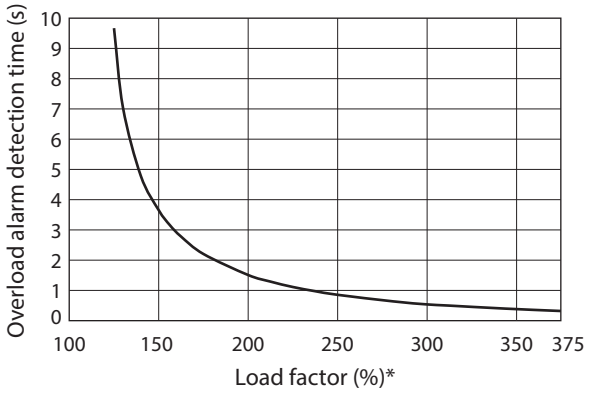
MEXE02 code	Name	Description	Setting range	Initial value
p6	Excessive position deviation alarm	Sets the condition in which the excessive position deviation alarm is generated.	1 to 30,000 (1=0.01 rev)	300
	Network bus error alarm	Sets the function of the network bus error alarm.	0: Disable 1: Enable	1

■ Characteristics of overload alarm

The time when the overload alarm is detected varies depending on the load factor.

Load factor (%)	Overload alarm detection time
100	Not detected
125	About 10 s
150	About 4 s
250	About 1 s
300	About 0.5 s
375	About 0.3 s

• Overload alarm detection time (reference)

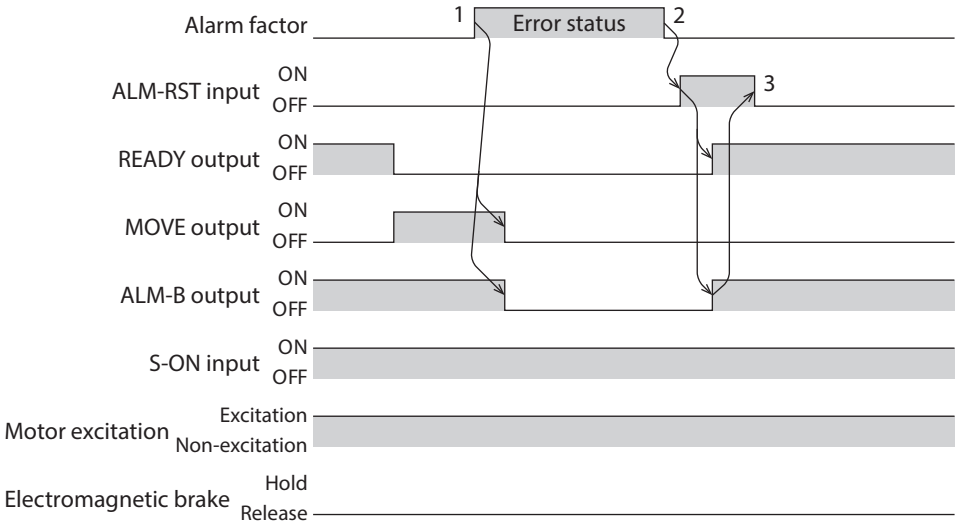


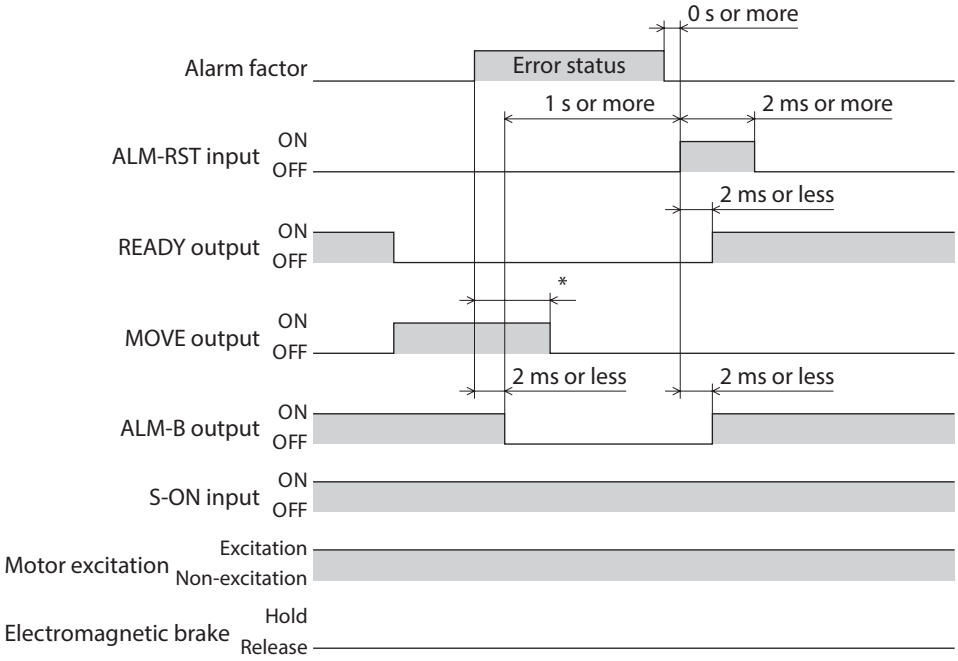
* This indicates the motor output power presently generated as a percentage of the maximum output power in the continuous duty region.

2-5 Timing chart

■ When the motor remains in an excitation state even if an alarm is generated

1. If an error occurs, the ALM-B output and the MOVE output are turned OFF.
   At the same time, the motor stops instantaneously.
2. Remove the cause of the alarm before turning the ALM-RST input ON.
   The alarm is reset, and the ALM-B output and the READY output are turned ON.
3. Check the ALM-B output has been turned ON and then turn the ALM-RST input OFF.

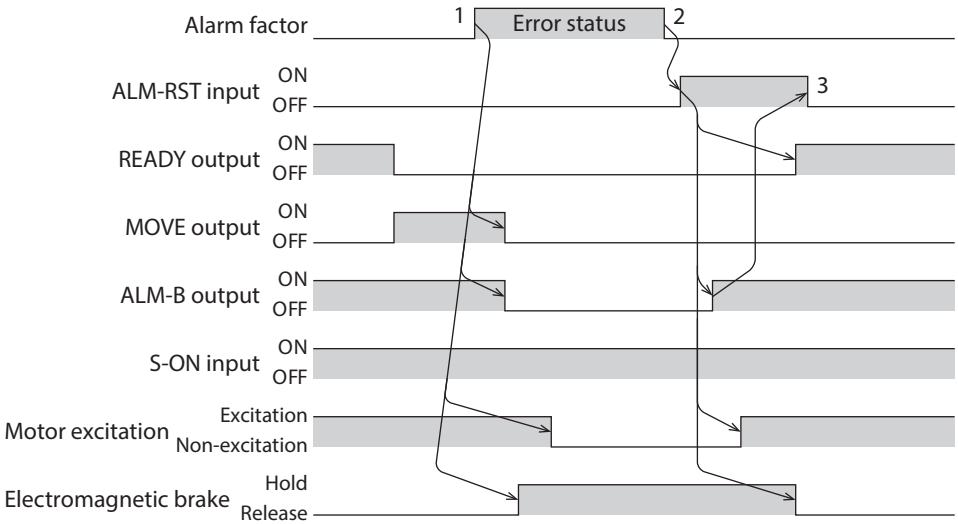


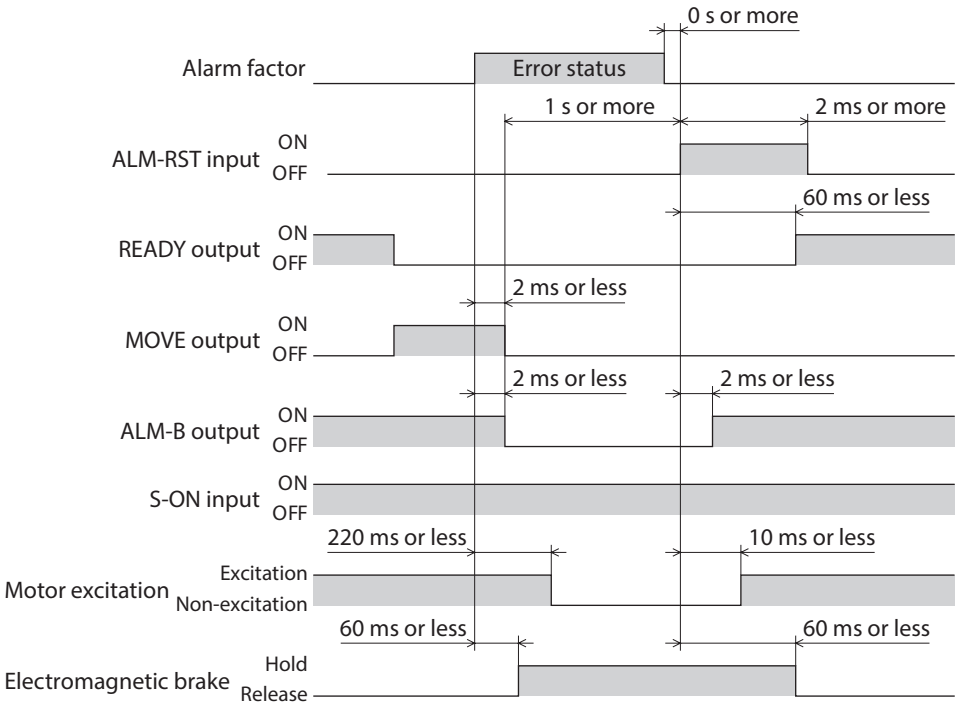


* It varies depending on the driving condition.

■ When the motor puts into a non-excitation state if an alarm is generated

1. If an error occurs, the ALM-B output and the MOVE output are turned OFF.
   At the same time, the motor stops instantaneously.
2. Remove the cause of the alarm before turning the ALM-RST input ON.
   The alarm is reset, and the ALM-B output and the READY output are turned ON.
3. Check the ALM-B output has been turned ON and then turn the ALM-RST input OFF.





3 Information

The driver is equipped with a function to generate information output before an alarm is generated.
This function can be utilized for periodic maintenance of equipment by setting a suitable value in the parameter of each information.
For example, utilizing the "Motor temperature information" parameter can prevent equipment malfunction or production stoppage due to motor overheat. In addition, the "Tripmeter information" parameter can be utilized as a reference to do maintenances every time a certain travel distance is reached.

■ Status when information is generated

- **Information bit output**

  If information is generated, a bit output (INFO-∗∗ output) of the corresponding information is turned ON.
  A desired output signal can be assigned to the INFO-USRIO output among bit outputs and used. If the assigned output signal is turned ON, the INFO-USRIO output is also turned ON. (Details of bit output ⇨p.260)

- **INFO output**

  If information is generated, the INFO output is turned ON.

- **LED indicator**

  If information is generated, the PWR/ALM LED will simultaneously blink in red and green twice. (Red and green colors may overlap and it may be visible to orange.)

- **Motor operation**

  The motor continues to operate during information unlike in the case of an alarm.

- **Parameters**

  Each information has a corresponding "INFO action" parameter. If the parameter is set to "0: Only the bit output is turned ON," only the bit output of information is turned ON, and the INFO output and LED are not changed.

Related parameters

MEXE02 code	Name	Description	Setting range	Initial value
p6	Information auto clear	When the cause of information is eliminated, the INFO output and the bit output of the corresponding information are turned OFF automatically.	0: Disabled (not turned OFF automatically) 1: Enabled (turned OFF automatically)	1
	Information LED condition	Sets the LED status when information is generated.	0: LED does not blink 1: LED blinks	1
	INFO-USRIO output selection	Selects the output signal to be checked by the INFO-USRIO output.	Output signals list⇨p.240	128: CONST-OFF
	INFO-USRIO output inversion	Sets the ON-OFF status of the INFO-USRIO output.	0: Not invert 1: Invert	0
	Position deviation information (INFO-POSERR)	Sets the condition in which the information is generated.	1 to 30,000 (1=0.01 rev)	300
	Driver temperature information (INFO-DRVTMP)		40 to 85 °C	85
	Motor temperature information (INFO-MTRTMP)		40 to 120 °C	85
	Overvoltage information (INFO-OVOLT)		120 to 450 V	400
	Undervoltage information (INFO-UVOLT)		120 to 280 V	120
	Torque limiting time information (INFO-TLC-TIME)		0: Disable 1 to 10,000 ms	0
	Speed information (INFO-SPD)		0: Disable 1 to 12,000 r/min	0

MEXE02 code	Name	Description	Setting range	Initial value
	Load factor information (INFO-LOAD)	Sets the condition in which the information is generated.	0: Disable 1 to 10,000 (1 = 0.1 %)	0
	Torque information (INFO-TRQ)		0: Disable 1 to 10,000 (1 = 0.1 %)	0
	Settling time information (INFO-STLTIME)		0: Disable 1 to 10,000 ms	0
	Cumulative load 0 information (INFO-CULD0)		0 to 2,147,483,647	0
	Cumulative load 1 information (INFO-CULD1)			
	Cumulative load value auto clear	Clears the cumulative load when operation is started (at the ON edge of the MOVE output).	0: Disable 1: Enable	1
	Cumulative load value count divisor	Sets the divisor of the cumulative load.	1 to 32,767	1
	Tripmeter information (INFO-TRIP)	Sets the condition in which the information is generated.	0: Disable 1 to 2,147,483,647 (1 = 0.1 kRev)	0
	Odometer information (INFO-ODO)			
p6	INFO action (assigned I/O status information (INFO-USRIO))	Sets the bit output, the INFO output, and the LED status when information is generated.	0: Only the bit output is ON 1: The bit output and the INFO output are ON and the LED blinks	1
	INFO action (Position deviation information (INFO-POSERR))			1
	INFO action (Driver temperature information (INFO-DRVTMP))			1
	INFO action (Motor temperature information (INFO-MTRTMP))			1
	INFO action (Load factor information (INFO-LOAD))			1
	INFO action (Torque information (INFO-TRQ))			1
	INFO action (Overvoltage information (INFO-OVOLT))			1
	INFO action (Undervoltage information (INFO-UVOLT))			1
	INFO action (Torque limiting time information (INFO-TLC-TIME))			1
	INFO action (Speed information (INFO-SPD))			1
	INFO action (Start operation error information (INFO-START))			1
	INFO action (Start ZHOME error information (INFO-ZHOME))			1
	INFO action (PRESET request information (INFO-PR-REQ))			1
	INFO action (Electronic gear setting error information (INFO-EGR-E))			1
	INFO action (Wrap setting error information (INFO-RND-E))			1

MEXE02 code	Name	Description	Setting range	Initial value
p6	INFO action (Forward operation prohibition information (INFO-FW-OT))	Sets the bit output, the INFO output, and the LED status when information is generated.	0: Only the bit output is ON 1: The bit output and the INFO output are ON and the LED blinks	1
	INFO action (Reverse operation prohibition information (INFO-RV-OT))			1
	INFO action (Cumulative load 0 information (INFO-CULD0))			1
	INFO action (Cumulative load 1 information (INFO-CULD1))			1
	INFO action (Settling time information (INFO-STLTIME))			1
	INFO action (Tripmeter information (INFO-TRIP))			1
	INFO action (Odometer information (INFO-ODO))			1
	INFO action (Start operation restricted mode information (INFO-DSLMTD))			1
	INFO action (I/O test mode information (INFO-IOTEST))			1
	INFO action (Configuration request information (INFO-CFG))			1
	INFO action (Reboot request information (INFO-RBT))			1

3-1 Information history

Up to 16 generated information items are stored in the RAM in order of the latest to the oldest. Information items stored as the information history are the information code, generation time, and contents of information.
The information history stored in the RAM can be read or cleared if one of the following is performed.

- Read the information history by the monitor command via EtherNet/IP.
- Clear the information history by the maintenance command via EtherNet/IP.
- Read or clear the information history using the **MEXE02** software.

memo Information history is stored in the RAM, so they are cleared when the control power supply of the driver is turned OFF.

■ Information code

Information codes are indicated in eight hexadecimal digits. They can also be read in 32 bits.
If multiple information items are generated, the logical sum (OR) of the information codes is indicated.

Example: When information items of the position deviation and the driver temperature are generated

Information code of position deviation: 0000 0002h
Information code of driver temperature: 0000 0004h
OR value of two information codes: 0000 0006h

Information code	32 bits indication	Information item
00000001h	0000 0000 0000 0000 0000 0000 0000 0001	I/O (user setting)
00000002h	0000 0000 0000 0000 0000 0000 0000 0010	Position deviation
00000004h	0000 0000 0000 0000 0000 0000 0000 0100	Driver temperature
00000008h	0000 0000 0000 0000 0000 0000 0000 1000	Motor temperature
00000010h	0000 0000 0000 0000 0000 0000 0001 0000	Overvoltage
00000020h	0000 0000 0000 0000 0000 0000 0010 0000	Undervoltage
00000040h	0000 0000 0000 0000 0000 0000 0100 0000	Torque limiting time
00000080h	0000 0000 0000 0000 0000 0000 1000 0000	Load factor
00000100h	0000 0000 0000 0000 0000 0001 0000 0000	Speed
00000200h	0000 0000 0000 0000 0000 0010 0000 0000	Start operation error
00000400h	0000 0000 0000 0000 0000 0100 0000 0000	Start ZHOME error
00000800h	0000 0000 0000 0000 0000 1000 0000 0000	Preset request
00002000h	0000 0000 0000 0000 0010 0000 0000 0000	Electronic gear setting error
00004000h	0000 0000 0000 0000 0100 0000 0000 0000	Wrap setting error
00010000h	0000 0000 0000 0001 0000 0000 0000 0000	Forward operation prohibition
00020000h	0000 0000 0000 0010 0000 0000 0000 0000	Reverse operation prohibition
00040000h	0000 0000 0000 0100 0000 0000 0000 0000	Cumulative load 0
00080000h	0000 0000 0000 1000 0000 0000 0000 0000	Cumulative load 1
00100000h	0000 0000 0001 0000 0000 0000 0000 0000	Tripmeter
00200000h	0000 0000 0010 0000 0000 0000 0000 0000	Odometer
00800000h	0000 0000 1000 0000 0000 0000 0000 0000	Torque
01000000h	0000 0001 0000 0000 0000 0000 0000 0000	Settling time
10000000h	0001 0000 0000 0000 0000 0000 0000 0000	Start operation restricted mode
20000000h	0010 0000 0000 0000 0000 0000 0000 0000	I/O test mode
40000000h	0100 0000 0000 0000 0000 0000 0000 0000	Configuration request
80000000h	1000 0000 0000 0000 0000 0000 0000 0000	Reboot request

3-2 Information list

Description	Bit output signal	Cause	Clear condition
Assigned I/O status	INFO-USRIO	The output signal set in the "INFO-USRIO output selection" parameter was turned ON.	The output signal set in the "INFO-USRIO output selection" parameter was turned OFF.
Position deviation	INFO-POSERR	The deviation between the command position and the feedback position exceeded the value set in the "Position deviation information" parameter in the motor output shaft.	The deviation between the command position and the feedback position fell below the value set in the "Position deviation information" parameter in the motor output shaft.
Driver temperature	INFO-DRVTMP	The internal temperature of the driver exceeded the value set in the "Driver temperature information" parameter.	The internal temperature of the driver fell below the value set in the "Driver temperature information" parameter.
Motor temperature	INFO-MTRTMP	The detection temperature of the encoder exceeded the value set in the "Motor temperature information" parameter.	The detection temperature of the encoder fell below the value set in the "Motor temperature information" parameter.
Overvoltage	INFO-OVOLT	• The voltage of the main power supply exceeded the value set in the "Overvoltage information" parameter. • A large load inertia was suddenly stopped. • Vertical operation (elevating operation) was performed.	The voltage of the main power supply fell below the value set in the "Overvoltage information" parameter.
Undervoltage	INFO-UVOLT	• The voltage of the main power supply fell below the value set in the "Undervoltage information" parameter. • The main power supply was shut off momentarily or a voltage was insufficient.	The voltage of the main power supply exceeded the value set in the "Undervoltage information" parameter.
Torque limiting time	INFO-TLCTIME	The ON time of the TLC output exceeded the value set in the "Torque limiting time information" parameter.	The TLC input was turned OFF.
Load factor	INFO-LOAD	The load factor of the motor exceeded the value set in the "Load factor information" parameter.	The load factor of the motor fell below the value set in the "Load factor information" parameter.
Speed	INFO-SPD	The feedback speed of the motor exceeded the value set in the "Speed information" parameter.	The feedback speed of the motor fell below the value set in the "Speed information" parameter.
Start operation error	INFO-START	• The operation start signal in the direction having been stopped by the FW-BLK input or RV-BLK input was turned ON. • The operation start signal in the direction having been stopped by the FW-LS input or RV-LS input was turned ON. • The operation start signal in the direction having been stopped by the software limit was turned ON. • When operation could not be executed (example: the READY output was OFF), the operation start signal was turned ON.	Operation was started properly.
ZHOME start error	INFO-ZHOME	• When the coordinates were not set (the ABSPEN output was OFF), the ZHOME input was turned ON. • When the motor was used with the electrical home coordinate system (the EL-PRST input was ON), return-to-home operation was performed.	Operation was started properly.

Description	Bit output signal	Cause	Clear condition
Preset request	INFO-PR-REQ	Preset was executed by the position preset or return-to-home operation.	Preset was completed.
Electronic gear setting error	INFO-EGR-E	The resolution set in the "Electronic gear A" parameter and the "Electronic gear B" parameter was out of the specification.	The resolution was set in the range of the specification.
Wrap setting error	INFO-RND-E	The resolution and the "Initial coordinate generation & wrap setting range" parameter were inconsistent.	The "Initial coordinate generation & wrap setting range" parameter was set in the range of the specifications.
Forward operation prohibition	INFO-FW-OT	• The positive software limit was exceeded. • Either the FW-LS input or the FW-BLK input was turned ON.	The position of the motor was in the range of the positive software limit, and in addition, both the FW-LS input and the FW-BLK input were turned OFF.
Reverse operation prohibition	INFO-RV-OT	• The negative software limit was exceeded. • Either the RV-LS input or the RV-BLK input was turned ON.	The position of the motor was in the range of the negative software limit, and in addition, both the RV-LS input and the RV-BLK input were turned OFF.
Cumulative load 0	INFO-CULD0	The cumulative load exceeded the value set in the "Cumulative load 0 information" parameter.	The cumulative load fell below the value set in the "Cumulative load 0 information" parameter.
Cumulative load 1	INFO-CULD1	The cumulative load exceeded the value set in the "Cumulative load 1 information" parameter.	The cumulative load fell below the value set in the "Cumulative load 1 information" parameter.
Tripmeter	INFO-TRIP	The travel distance of the motor exceeded the value set in the "Tripmeter information" parameter.	After one of the following operations was performed, the travel distance (Tripmeter) of the motor fell below the value set in the "Tripmeter information" parameter. • The "Tripmeter information" parameter was set again. • The "Clear tripmeter" of the maintenance command was executed.
Odometer	INFO-ODO	The cumulative travel distance of the motor exceeded the value set in the "Odometer information" parameter.	After the following operation was performed, the cumulative travel distance (Odometer) of the motor fell below the value set in the "Odometer information" parameter. • The "Odometer information" parameter was set again.
Torque	INFO-TRQ	The detection torque of the motor exceeded the value set in the "Torque information" parameter.	The detection torque of the motor fell below the value set in the "Torque information" parameter.
Settling time	INFO-STLTIME	The settling time exceeded the value set in the "Settling time information" parameter.	• Operation was started. • The settling time fell below the value set in the "Settling time information" parameter.
Start operation restricted mode	INFO-DSLMTD	• "Teaching, remote operation" was executed using the **MEXE02** software. • Configuration was executed. • Data was written to the driver from the **MEXE02** software. • "Reset" was executed with the **MEXE02** software.	• Teaching, remote operation was canceled. • Configuration was completed. • Writing data was completed. • Data was returned to the factory setting.
I/O test mode	INFO-IOTEST	• "I/O test" was executed with the **MEXE02** software. • Configuration was executed.	• The I/O test mode was canceled. • Configuration was completed.

Description	Bit output signal	Cause	Clear condition
Configuration request	INFO-CFG	The parameter that required executing Configuration was changed.	Configuration was executed.
Reboot request	INFO-RBT	The parameter that required rebooting was changed.	Reboot was executed.

memo

If information of "Preset request" was generated for 100 ms or more in a state where the "Information auto clear" parameter was set to "0: Disable (not turned OFF automatically)," the preset may have been failed. There are the following two possible reasons that the preset was failed.

- The ABZO sensor is not connected to the driver.
- The preset was executed in a state where the position deviation between the command position and the feedback position was 1.8° or more.

4 Troubleshooting and remedial actions

In motor operation, the motor or the driver may not operate properly due to an improper setting or wrong connection.
When the motor cannot be operated properly, refer to the contents provided in this chapter and take an appropriate remedial action.
If the problem persists, contact your nearest Oriental Motor sales office.

Phenomenon	Possible cause	Remedial action
• The motor is not excited. • The output shaft can be rotated by hand.	Connection error of the motor cable	Check the motor connection.
	The S-ON input is being OFF.	Turn the S-ON input ON.
	The FREE input is being ON.	Turn the FREE input OFF.
The motor does not rotate.	When an electromagnetic brake motor is used, the electromagnetic brake is in a state of holding the motor shaft.	Check the connection of the electromagnetic brake.
	The STOP input is being ON.	Turn the STOP input OFF.
	The position (travel amount) is not set in the operation data when positioning operation is performed.	Check the operation data.
	When JOG operation, high-speed JOG operation, or continuous macro operation is performed, the input signal in the forward direction and that in the reverse direction are simultaneously ON.	Turn both input signals in the forward direction and the reverse direction OFF, and then turn either one ON.
The motor rotates in the direction opposite to the specified direction.	The "Motor rotation direction" parameter is set wrongly.	Check the setting of the "Motor rotation direction" parameter.
Motor operation is unstable.	Connection error in the motor cable or power supply cable.	Check the connections for the driver, the motor, and the main power supply.
The electromagnetic brake is not put into a state of releasing the motor shaft.	The power is not supplied to the electromagnetic brake.	Check the connection of the electromagnetic brake.

memo When an alarm is being generated, check the alarm message via EtherNet/IP or using the **MEXE02** software.

8 Extended function

◆Table of contents

1 Gain tuning

The motor response in reaction to the command can be adjusted according to the load inertia and the mechanical rigidity.

1-1 Setting of load inertia

Set the load inertia according to the load inertia of equipment.

Related parameters

MEXE02 code	Name	Description	Setting range	Initial value
p13	Load inertia setting mode selection	Selects the setting method of the load inertia.	0: "Load inertia setting" parameter is used 1: Automatic	1
	Load inertia setting	Sets the ratio of the load inertia to the motor rotor inertia. When the rotor inertia is equal to the load inertia, the ratio is 100 %.	0 to 10,000 %	0

1-2 Setting of motor response

Set the motor response in reaction to the command.

Related parameter

MEXE02 code	Name	Description	Setting range	Initial value
p13	Motor response setting	Selects the setting method of the motor response in reaction to the command of the driver.	–1: Manual 0 to 15	6

■ When the "Motor response setting" parameter is set to "–1: Manual"

The related parameters are enabled only when the "Motor response setting" parameter is set to "–1: Manual."

Related parameters

MEXE02 code	Name	Description	Setting range	Initial value
p13	Position loop gain	Adjusts the motor response in reaction to the position deviation. Increasing the value will make the deviation between the command position and the actual position smaller. An excessively large value may increase the motor overshoot or cause the motor vibration.	1 to 50 Hz	8
	Speed loop gain	Adjusts the motor response in reaction to the speed deviation. Increasing the value will make the deviation between the command speed and the actual speed smaller. An excessively large value may increase the motor overshoot or cause the motor vibration.	1 to 500 Hz	82
	Speed loop integral time constant	Adjusts the deviation that cannot be adjusted with the speed loop gain. An excessively long value may slow the motor response. An excessively short value may cause the motor vibration.	1 to 10,000 (1 = 0.1 ms)	1,940
	Torque filter (LPF)	Adjusts the motor response at high frequencies.	0 to 4,700 Hz	820

MEXE02 code	Name	Description	Setting range	Initial value
p13	Speed feed-forward	When the speed is constant, the deviation between the command position and the actual position can be reduced to shorten the settling time. If it is set to 100 %, the deviation will be approximately 0 %. However, an excessively high value may increase the motor overshoot or cause the motor vibration.	0 to 100 %	80
	Mechanical rigidity setting	Sets the rigidity of equipment. Although the motor response improves as the setting value increases, an excessively high value may cause the motor to vibrate or to generate noise.	0 to 15	6

memo Generally speaking, the order of rigidity arranged from low to high is as follows.
Belt and pulley - Rack and pinion - Ball screw - Rigid body (index table, gear, etc.)

■ When the "Motor response setting" parameter is set to "0 to 15"

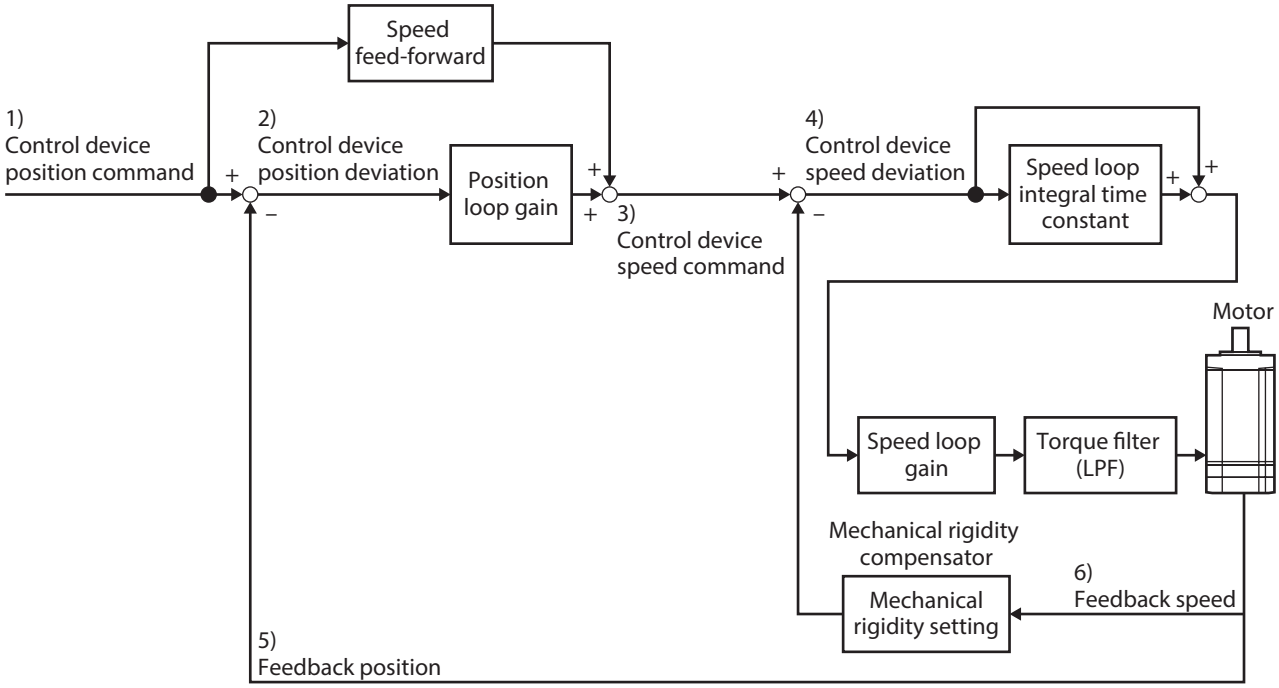
When the "Motor response setting" parameter is set to "0 to 15," the setting values of the related parameters are shown in the table below.

Motor response setting	Position loop gain [Hz]	Speed loop gain [Hz]	Speed loop integral time constant [ms]	Speed feed-forward [%]	Torque filter [Hz]	Mechanical rigidity setting
0	1	14	51.00	80	300	0
1	2	22	51.00	80	300	1
2	3	32	48.20	80	320	2
3	5	46	33.80	80	460	3
4	6	56	28.40	80	560	4
5	7	68	23.40	80	680	5
6	8	82	19.40	80	820	6
7	10	100	15.80	80	1,000	7
8	12	120	13.20	80	1,200	8
9	15	150	10.60	80	1,500	9
10	18	180	8.80	80	1,800	10
11	20	220	7.20	80	2,200	11
12	20	270	5.80	80	2,700	12
13	20	330	4.80	80	3,300	13
14	20	390	4.00	80	3,900	14
15	20	470	3.40	80	4,700	15

■ Control devices block diagram

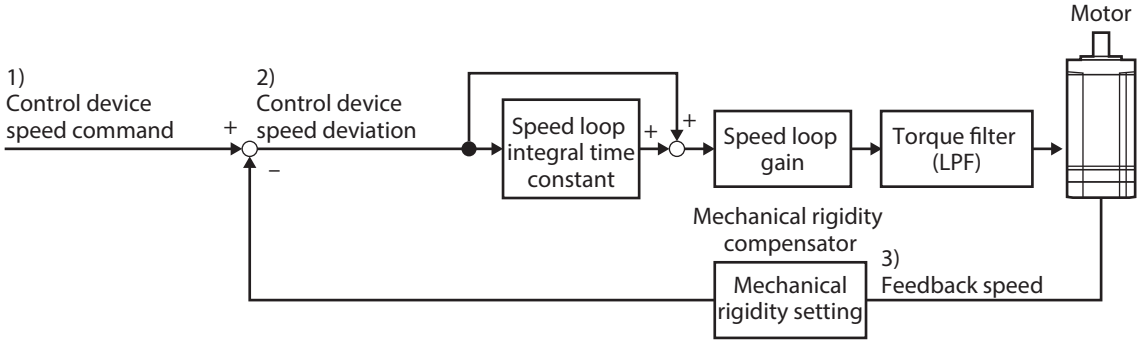
In the figure, "+" indicates addition and "-" indicates subtraction.
The description which is surrounded by a box (□) is the parameter name.

● **Position control**



Name		Description
1)	Control device position command	Indicates the speed command of the control device (after command filter).
2)	Control device position deviation	Indicates the position deviation of the control device (after command filter).
3)	Control device speed demand	Indicates the speed command of the control device (after command filter).
4)	Speed deviation in controller	Indicates the speed deviation of the control device (after command filter).
5)	Feedback position	Indicates the feedback position.
6)	Feedback speed	Indicates the feedback speed.

● **Speed control**



Name		Description
1)	Control device speed command	Indicates the speed command of the control device (after command filter).
2)	Control device speed deviation	Indicates the speed deviation of the control device (after command filter).
3)	Feedback speed	Indicates the feedback speed.

2 Vibration suppression

2-1 Command filter

Using the command filter to adjust the motor response can suppress the motor vibration.
There are two types of command filters, LPF (speed filter) and moving average filter.

Related parameters

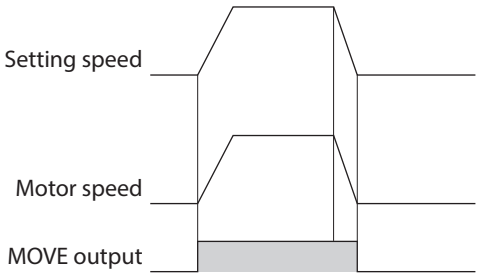
MEXE02 code	Name	Description	Setting range	Initial value
p13	Command filter setting	Sets the filter function to adjust the motor response.	1: LPF (speed filter) is selected 2: The moving average filter is selected	1
	Command filter time constant	Adjusts the motor response.	0 to 200 ms	1

memo The optimal value varies depending on the equipment or operating condition. Check it under the actual conditions of use.

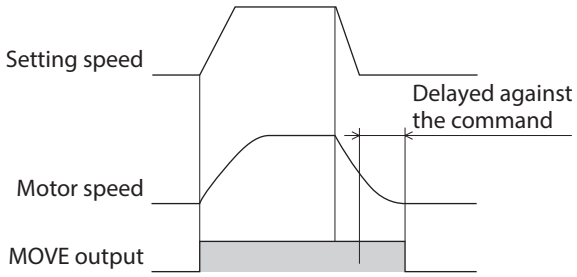
■ LPF (Speed filter)

Select "1: LPF (speed filter) is selected" in the "Command filter setting" parameter, and set the "Command filter time constant" parameter.
Increasing the setting value in the "Command filter time constant" parameter can suppress the motor vibration at low speed operation and make the motor movement at starting/stopping smoother. However, setting an excessively high value reduces the synchronization performance in response to the command. Set an appropriate value according to a load or an application.

● **When the "Command filter time constant" parameter is set to 0 ms**

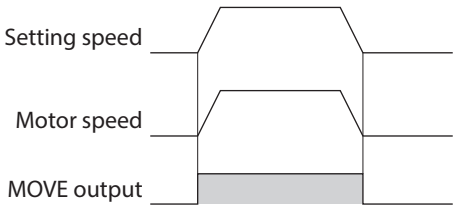
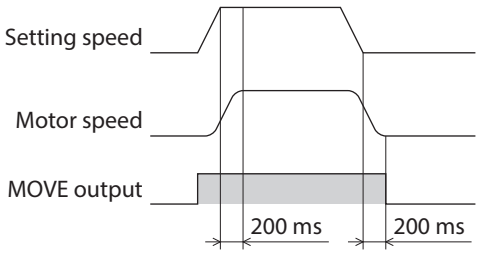
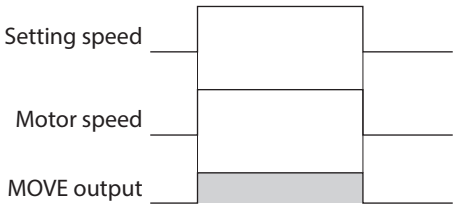
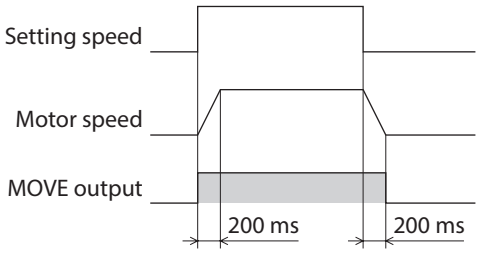


● **When the "Command filter time constant" parameter is set to 200 ms**



■ Moving average filter

Select "2: The moving average filter is selected" in the "Command filter setting" parameter, and set the "Command filter time constant" parameter.
The motor response can be adjusted. In addition, the positioning time can be shortened by suppressing the residual vibration during positioning operation.
The optimal value for the "Command filter time constant" parameter varies depending on a load or operating condition. Set an appropriate value according to a load or operating condition.

	When the "Command filter time constant" parameter is set to 0 ms	When the "Command filter time constant" parameter is set to 200 ms
With acceleration/ deceleration setting		
Without acceleration/ deceleration setting		

2-2 Resonance suppression

Set the filter for suppressing the motor resonance.

Related parameters

MEXE02 code	Name	Description	Setting range	Initial value
p13	Resonance suppression control A frequency	Sets the frequency of vibration to be suppressed.	100 to 3,200 Hz	1,000
	Resonance suppression control A gain	Sets the gain to suppress the vibration. Increasing the value causes the motor response to the deviation to lower.	0 to 100 %	0
	Resonance suppression control A width	Sets the width of vibration to be suppressed.	30 to 120	30
	Resonance suppression control B frequency	Sets the frequency of vibration to be suppressed.	100 to 3,200 Hz	1,000
	Resonance suppression control B gain	Sets the gain to suppress the vibration. Increasing the value causes the motor response to the deviation to lower.	0 to 100 %	0
	Resonance suppression control B width	Sets the width of vibration to be suppressed.	30 to 120	30
	Resonance suppression control C frequency	Sets the frequency of vibration to be suppressed.	100 to 3,200 Hz	1,000
	Resonance suppression control C gain	Sets the gain to suppress the vibration. Increasing the value causes the motor response to the deviation to lower.	0 to 100 %	0
	Resonance suppression control C width	Sets the width of vibration to be suppressed.	30 to 120	30

MEXE02 code	Name	Description	Setting range	Initial value
p13	Resonance suppression control D frequency	Sets the frequency of vibration to be suppressed.	100 to 3,200 Hz	1,000
	Resonance suppression control D gain	Sets the gain to suppress the vibration. Increasing the value causes the motor response to the deviation to lower.	0 to 100 %	0
	Resonance suppression control D width	Sets the width of vibration to be suppressed.	30 to 120	30

memo The optimal value varies depending on the equipment or operating condition. Check it under the actual conditions of use.

2-3 Damping control

Even when the motor is installed in a machine with low rigidity, residual vibration during positioning can be suppressed to shorten the positioning time.

Related parameters

MEXE02 code	Name	Description	Setting range	Initial value
p13	Damping control frequency	Sets the frequency of vibration to be suppressed.	700 to 20,000 (1=0.01 Hz)	10,000
	Damping control gain	Sets the gain for damping control (vibration suppression control).	0 to 100 %	0

memo The optimal value varies depending on the equipment or operating condition. Check it under the actual conditions of use.

2-4 Electronic damper function

Whether to enable or disable the vibration suppression function (electronic damper function) set in the motor can be set.

Related parameter

MEXE02 code	Name	Description	Setting range	Initial value
p13	Electronic damper function	Sets the vibration suppression function.	0: Disable 1: Enable	1

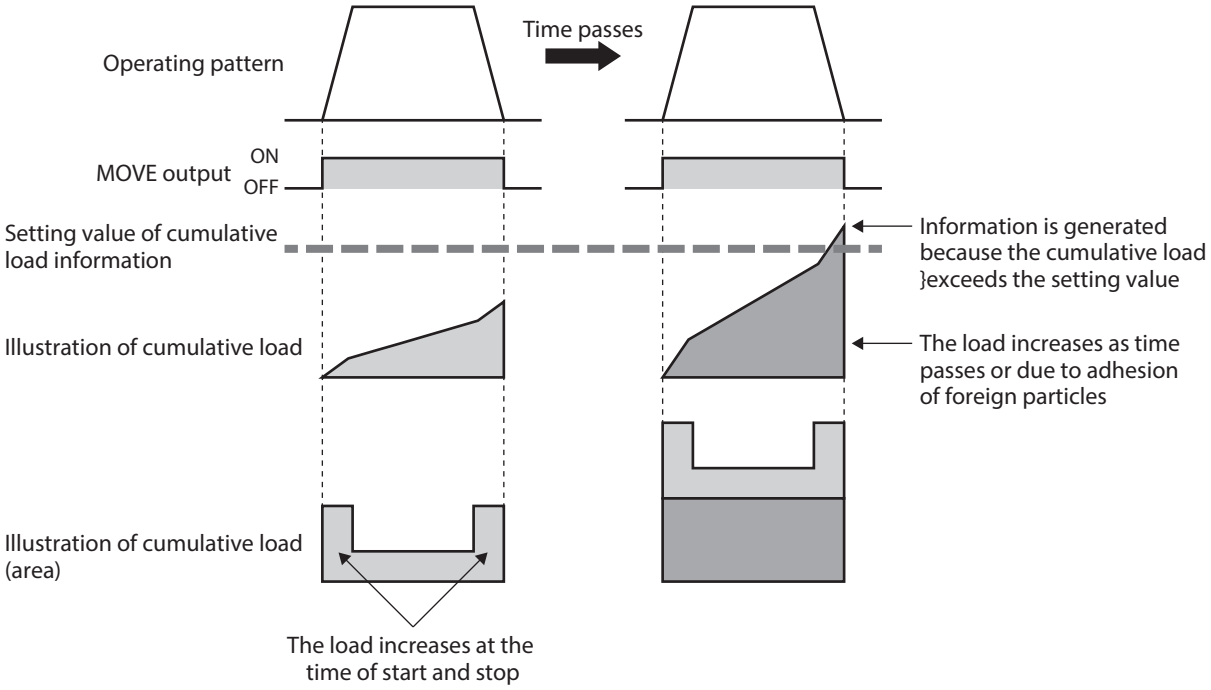
memo Setting to "0: Disable" may be more effective for vibration suppression depending on a coupling and a load, .

3 Cumulative load

The driver obtains the load factor in the motor operation pattern as an area, and it can notify as information if the integrated area (load) exceeds a certain value. This is a useful function that can be used as a guide for the motor life and the aged deterioration of equipment.

■ How to consider the cumulative load

As the operating time of equipment passes, a friction force and load will be increased by adhesion of rusts or foreign particles, deterioration of greases and others.
Estimating this kind of load increase (cumulative load) and setting to the information can prevent the equipment from stopping due to aging problems. Set a value having enough allowance because the load increases at starting or stopping.



■ How to use

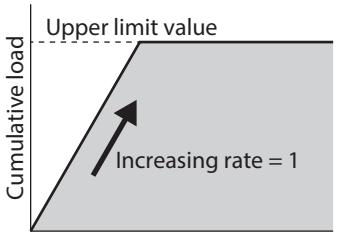
1. Open the status monitor window of the **MEXE02** software during operation to check the cumulative load in the normal operation pattern.
   Use this value having enough allowance and estimate the maximum value of the cumulative load.
2. Set the maximum value determined in the step 1 to the "Cumulative load information" parameter.
3. Equipment starts operating, and when the cumulative load of the motor reaches a value set in the step 2, information is generated.
   Perform maintenance on the equipment.

Note The information is cleared when the main power supply of the driver is turned off because the cumulative load is stored in RAM.

■ “Cumulative load value count divisor” parameter

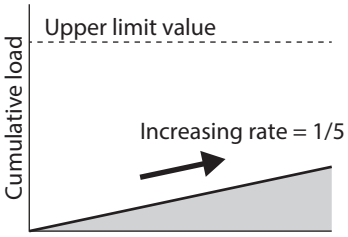
The upper limit to count the cumulative load is 2,147,483,647.
If the operating time is long, the cumulative load may increase, making it difficult to manage or exceeding the upper limit.
In this case, use the "Cumulative load value count divisor" parameter. The “Cumulative load value count divisor” parameter is a divisor used to divide the count value of the cumulative load. Dividing by the cumulative load value count divisor makes it easier to manage the count value.

- When the "Cumulative load value count divisor" parameter is set to "1"



The upper limit value has been reached while operation is continued to perform, and the cumulative load cannot be counted

- When the "Cumulative load value count divisor" parameter is set to "5"

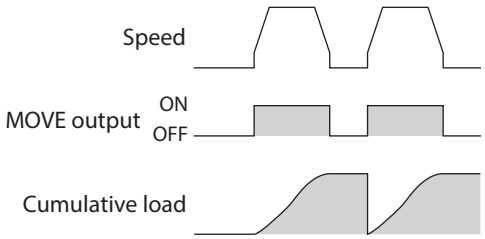


Increase slows down because the count value of the cumulative load is divided by "5"

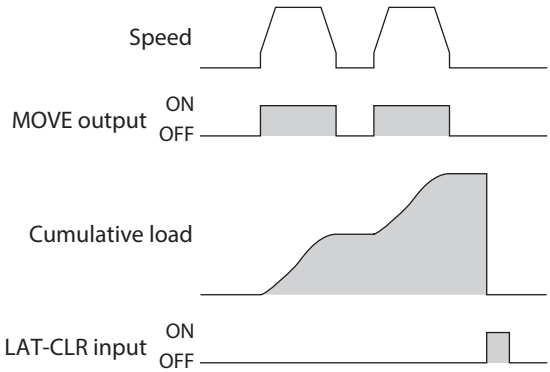
■ “Cumulative load value auto clear” parameter

- If the "Cumulative load value auto clear" parameter is set to "1: Clear" (initial value: Clear), the cumulative load is cleared to 0 each time the MOVE output is turned ON. The cumulative load can be reset for each operation.
- If the "Cumulative load value auto clear" parameter is set to "0: Does not clear," the cumulative load is not reset even if the MOVE output is turned ON, and it is continued to integrate. The cumulative load can be monitored for a certain period of time or under a certain condition. When this parameter is set to "0: Does not clear," reset the cumulative load with the LAT-CLR input.

- When the "Cumulative load value auto clear" parameter is set to “1: Enable”



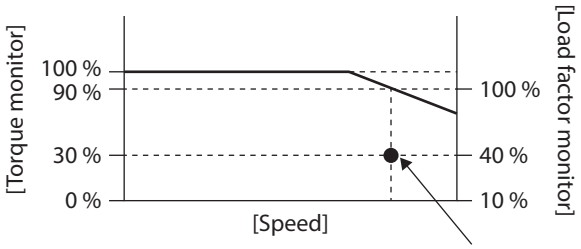
- When the "Cumulative load value auto clear" parameter is set to “0: Disable”



4 Load factor monitor

There are two methods to monitor the load factor of the motor as shown below.

- Torque monitor: This indicates the output torque presently generated as a percentage of the rated torque.
- Load factor monitor: This indicates the motor output power presently generated as a percentage of the maximum output power in the continuous duty region.



This is the load condition when the torque monitor shows 30 % and the load factor monitor shows 40 % at a certain speed.

5 Latch function

The latch function is a function that saves the instantaneous operation information in the driver when the operation is switched by an event jump or the operation is stopped. For example, if operation is switched by the NEXT input during continuous operation, the operation information at the moment of switching is latched. A trigger to generate a latch, such as the event jump or the NEXT input, is called "latch trigger." The operation information saved by the latch function is maintained until it is cleared. The latched operation information can be used for maintenance of the equipment and checking the operation situation.

■ Information to be latched

- Command position: Command position when the latch trigger is generated.
- Feedback position: Feedback position when the latch trigger is generated.
- Target position: Target position of operation for the transition destination when latched by the event jump or the NEXT input.
  Target position of operation having stopped when latched by operation stop.
- Operation data number: Operation data number when latched.
- Number of loop times: When latched while loop operation is executed, the number of loop times when latched is saved.

memo All information having latched is cleared if the control power supply is turned on again.

■ Types of latch trigger

● Event jump [(Low) I/O event number, (High) I/O event number], NEXT input

- During stored data operation, when the event jump [(Low) I/O event number, (High) I/O event number] is generated to switch the operation.
- During stored data operation, when the NEXT input is input to switch the operation.

● Stop of operation

- When operation is stopped by the S-ON input, the FREE input, the CLR input, the STOP-SOFF input, or the STOP input.
- When operation is stopped by software overtravel or hardware overtravel.
- When operation was stopped by alarm generation.
- When operation is stopped by the FW-BLK input while operation in the forward direction is executed.
- When operation is stopped by the RV-BLK input while operation in the reverse direction is executed.

■ Related I/O signals

● LAT-CLR input

When the LAT-CLR input is turned ON, the latch status is cleared.
The next signal is turned OFF when the latch status is cleared.

- NEXT-LAT output
- JUMP0-LAT output
- JUMP1-LAT output

Values of the following monitor commands are also cleared to 0.

- Latch monitor status (NEXT, I/O event - Low event, I/O event - High event, operation stop)
- Event monitor command position (NEXT, JUMP 0 - Low event, JUMP 1 - High event, operation stop)
- Event monitor feedback position (NEXT, JUMP 0 - Low event, JUMP 1 - High event, operation stop)
- Cumulative load monitor(when the "Cumulative load value auto clear" parameter is set to "0: Does not clear"

When the value of the "Latch monitor status" command is cleared to 0, the following operation information stored in the latch monitor can be overwritten.

- Command position
- Feedback position
- Target position
- Operation data number
- Number of loop times

- **JUMP0-LAT output, JUMP1-LAT output**

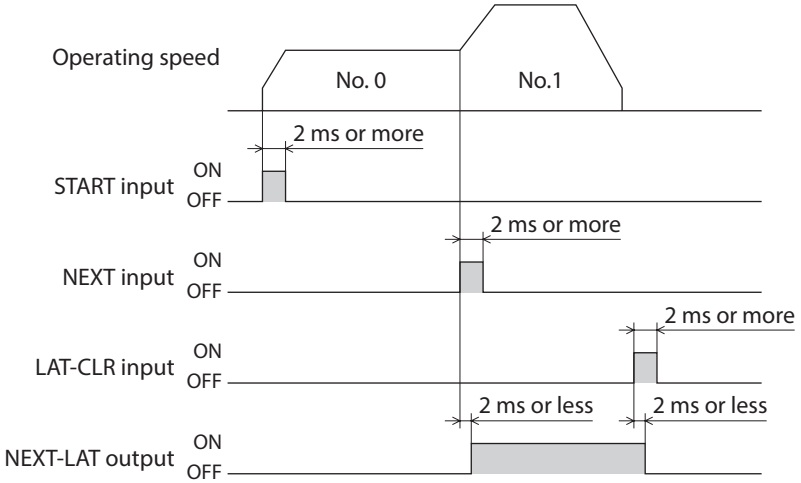
  The JUMP0-LAT output is turned ON when the (Low) I/O event number trigger is detected. The JUMP1-LAT output is turned ON when the (High) I/O event number trigger is detected. When the LAT-CLR input is turned from OFF to ON, the JUMP0-LAT output and the JUMP1-LAT output are turned OFF.

- **NEXT-LAT output**

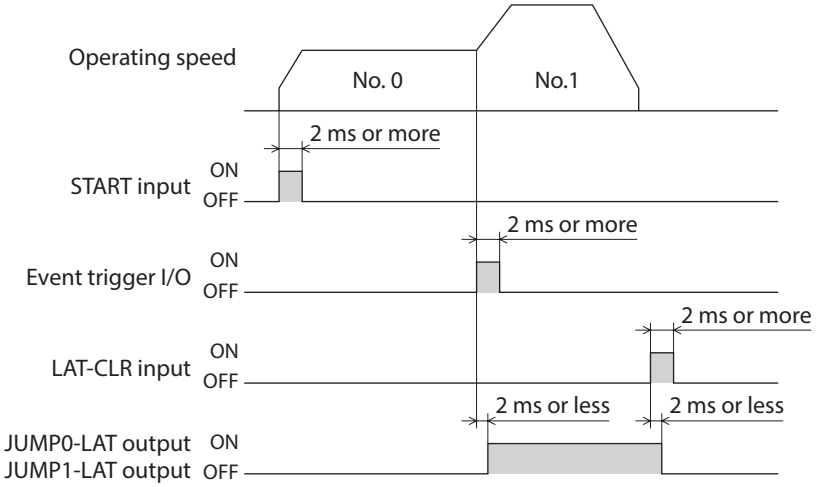
  When the NEXT input is turned from OFF to ON, the NEXT-LAT output is turned ON. When the LAT-CLR input is turned from OFF to ON, the NEXT-LAT output is turned OFF.

■ Example of latch function

- **Latch by NEXT input**



- **Latch by JUMP input**



■ Monitor of operation information

There are two types of monitors for operation information having saved, event monitor and latch monitor.
The monitor value cannot be checked with the **MEXE02** software. Check via EtherNet/IP.

● Event monitor

The command position and feedback position are saved in the event monitor. The value is overwritten each time the latch trigger is generated.
If the LAT-CLR input is turned ON, the value is cleared to 0.

● Latch monitor

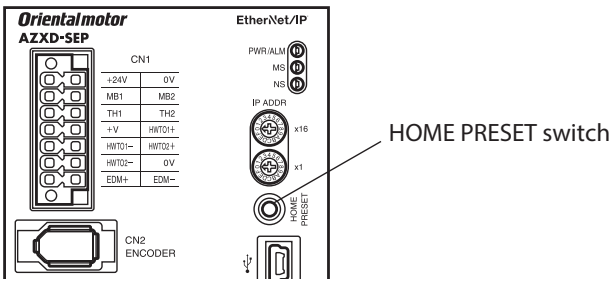
The following operation information is saved in the latch monitor. A value having latched first time is continued to save.
When the LAT-CLR input is turned from OFF to ON, the operation information can be overwritten.

- Status ("1" is stored when in the latched status.)
- Command position
- Feedback position
- Target position
- Operation data number
- Number of loop times

memo When the "status" in the latch monitor is 1 (in latch status), the operation information will not be overwritten even if a latch trigger is generated.

6 Changing the function of the HOME PRESET switch

In the **AZX** Series, the function of the P-PRESET input is assigned to the HOME PRESET switch. Therefore, simply pressing the HOME PRESET switch can set the present position as the home.
However, after setting the home, the function of the HOME PRESET switch can be disabled so that the home is not preset if the HOME PRESET switch is accidentally pressed.
As an alternative use, if the START input is assigned instead of the P-PRESET input, simply pressing the HOME PRESET switch can start operation.

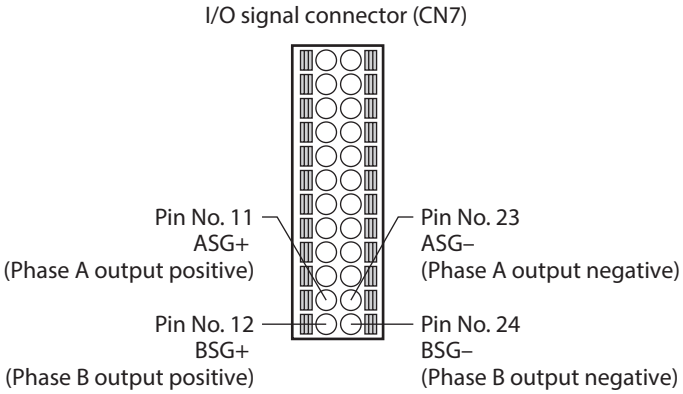


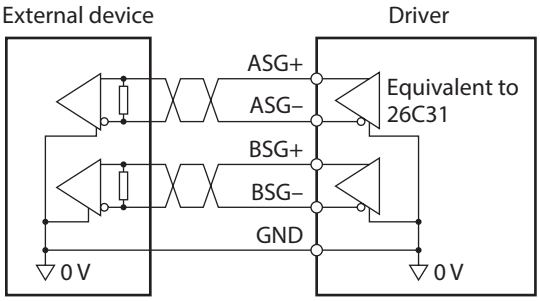
Related parameters

MEXE02 code	Name	Description	Setting range	Initial value
p11	Extended input (EXT-IN) function	Selects an input signal to be assigned to the HOME PRESET switch.	Input signals list ⇨p.239	9: P-PRESET
	Extended input (EXT-IN) inverting mode	Changes ON-OFF setting of the input signal to be assigned to the HOME PRESET switch.	0: Non invert 1: Invert	0
	Extended input (EXT-IN) interlock releasing time	Normally, the HOME PRESET switch is interlocked. By holding down the switch for a certain time period, interlock is released and the assigned function is enabled. This parameter is used to set the time period during which the switch is held down in order to release the interlock.	0: Interlock disabled 1 to 50 (1 = 0.1 s)	10
	Extended input (EXT-IN) interlock releasing duration	Sets the time period during which the state releasing the interlock is retained.	0 to 50 (1 = 0.1 s)	30
	Extended input (EXT-IN) ON monitor time	When a signal assigned to the switch is input, the LED is lit. This parameter is used to set the time period during which the LED is lit.	0 to 50 (1 = 0.1 s)	10

7 Change the assignment of the phase A and phase B outputs

The phase A (ASG) output and the phase B (BSG) output are assigned to the I/O connector of the driver at the time of shipment. The phase A output and the phase B output are pulse signals output from the ABZO sensor. Since pulses are output from the phase A and phase B outputs in response to the motor operation, the present position or the rotation direction of the motor can be monitored by counting the number of pulses. The phase A and phase B outputs can be changed to other output signals using the parameter.





Note The phase A and phase B outputs are differential outputs. Connect an input circuit of an external device that supports the differential output.

Related parameters

MEXE02 code	Name	Description	Setting range	Initial value
p11	Differential output mode selection	Selects the type of signal output from the differential output.	–1: Not output 0: Phase A/Phase B output 8: I/O status output	0
	Differential output (EXT-OUTA) function selection on I/O mode	This function is enabled when the "Differential output function selection" parameter is set to "8: IO-OUT." Selects an output signal to be assigned to the differential output.	Output signals list ⇨p.240	128: CONST-OFF
	Differential output (EXT-OUTB) function selection on I/O mode			128: CONST-OFF
	Differential output (EXT-OUTA) inverting mode on I/O mode	This function is enabled when the "Differential output function selection" parameter is set to "8: IO-OUT." Changes ON-OFF setting of the differential output.	0: Non invert 1: Invert	0
	Differential output (EXT-OUTB) inverting mode on I/O mode			0
	Differential output (EXT-OUTA) OFF delay time on I/O mode	This function is enabled when the "Differential output function selection" parameter is set to "8: IO-OUT." Sets the OFF delay time for the output signal.	0 to 250 ms	0
	Differential output (EXT-OUTB) OFF delay time on I/O mode			0

memo If "0: Phase A/Phase B output" is selected in "Differential output function selection" parameter, the present feedback position is output in the phase difference format. The resolution for the phase A and phase B outputs is the same as the motor resolution when the control power supply is turned on. If the motor resolution is changed, the resolution for the phase A and phase B outputs is also changed.

8 Simulating the driver operation

Using the driver simulation mode can simulate coordinates and I/O status without connecting a motor.
If the motor is connected, the simulation closer to the actual operation can be made using the information of the ABZO sensor.

Note
- In the driver simulation mode, the motor does not operate regardless of whether or not a motor is connected.
- In the driver simulation mode, the driver functions and I/O signals may differ from those in the normal state.
- When simulating a motorized actuator, be sure to connect the actuator to the driver and cause the product-specific information to read. Failure to do so may result in injury or damage to equipment when performing operation actually.

memo Even if a motor and a driver are connected, the motor is in a non-excitation state during the simulation. When an electromagnetic brake motor is used, the output shaft is held by the electromagnetic brake.

Related parameter

MEXE02 code	Name	Description	Setting range	Initial value
p4	Driver simulation mode	Situation for coordinates or I/O can be simulated using a virtual motor without connecting a motor.	0: Use real motor 1: Virtual motor (when ABZO not connected = no ABZO information) 2: Virtual motor (when ABZO not connected = 1,800 rev wrap enable) 3: Virtual motor (when ABZO not connected = 900 rev wrap enable)	0

■ Use this function for the following.

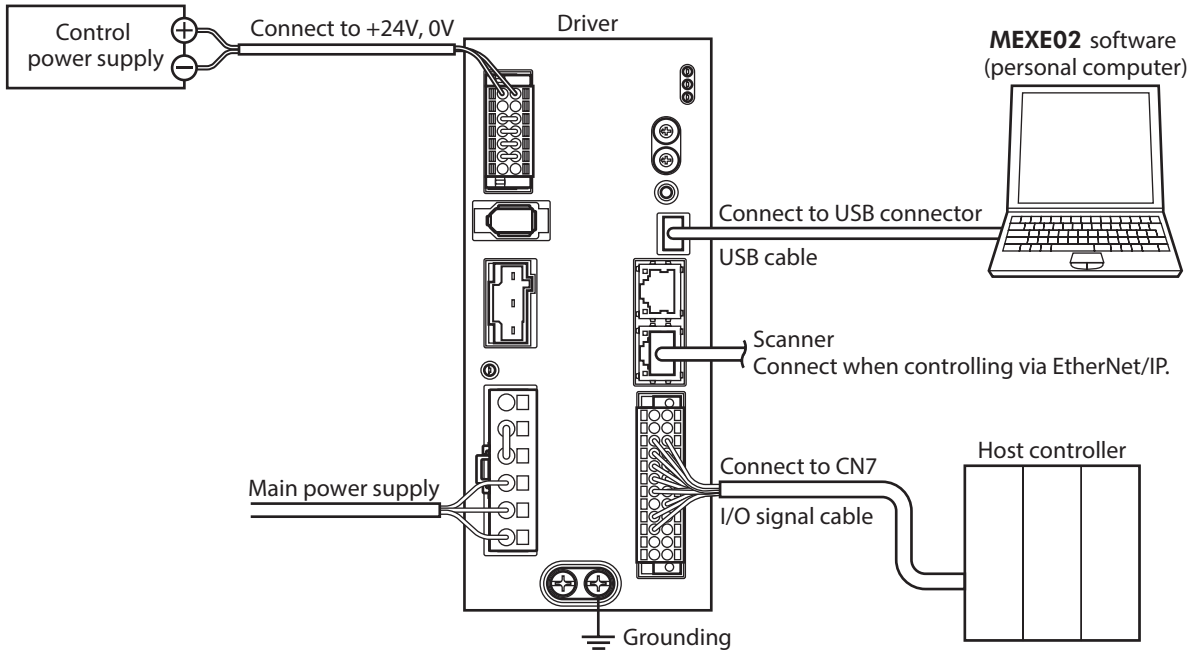
- To check the driver command information
- To check the wiring
- To check the operation data and parameters
- To check the I/O signal status.
- Verification when an error occurs in the system

8-1 Preparation and operating procedure for driver simulation mode

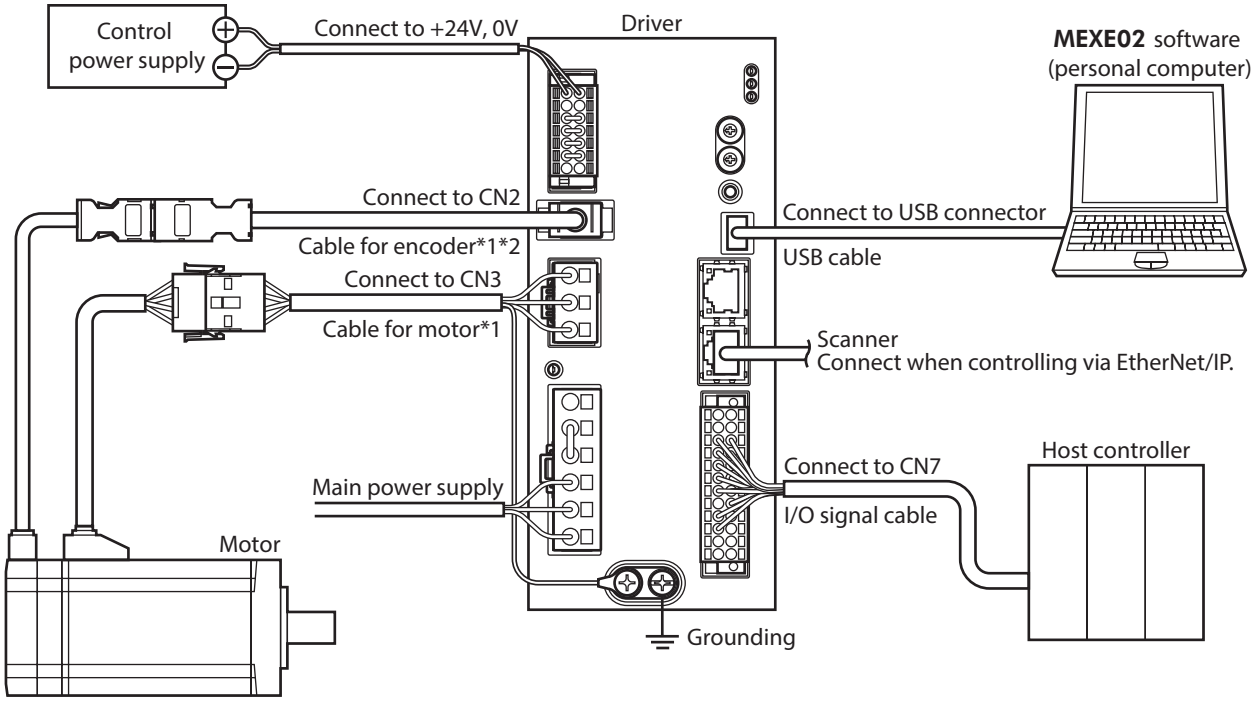
■ Preparation

● When a motor is not connected

Note When simulating a motorized actuator, be sure to connect the actuator to the driver.



● When connecting a motor



*1 Purchase is required separately.
*2 Use the cable for encoder when the length of the encoder cable of motor is not enough.

■ Operating procedure

This section explains how to simulate the driver operation without connecting a motor using the **MEXE02** software.

1. Turn on the control power supply and the main power supply of the driver.
2. Click [Basic settings] under [Parameter] in the tree view of the **MEXE02** software.
3. Set the "Driver simulation mode" parameter to "Virtual motor."
4. Click the [Data writing] icon on the toolbar to write the data to the driver.
5. When writing is completed, turn off the control and main power supplies of the driver and on again.
6. Check if the "Driver simulation mode" parameter is updated.
   Check the PWR/ALM LED of the driver repeats the following blinking.
   • Green light → Red light → Green and red colors are simultaneously lit (red and green colors may overlap and it may be visible to orange.) → No light
7. Execute positioning operation or other operation with "Teaching, remote operation" of the **MEXE02** software.
   Even if a motor is not connected, the command position or the feedback position will increase or decrease.
   Situation for coordinates or I/O can also be checked using the I/O monitor, the status monitor, or the waveform monitor.
8. End the driver simulation mode.
   1) Click [Basic settings] under [Parameter] in the tree view.
   2) Set the "Driver simulation mode" parameter to "0: Use real motor."
   3) Click the [Data writing] icon on the toolbar to write the data to the driver.
   4) Turn off the control power supply and the main power supply of the driver.

8-2 Coordinates

■ Home

In the driver simulation mode, the position when the control power supply is turned on is set as the home regardless of whether or not a motor is connected.
The home can be set again by return-to-home operation or the position preset. However, the home information of the ABZO sensor cannot be rewritten.

■ Coordinate generation (when a motor is not connected)

The method to generate coordinates varies depending on the setting of the "Initial coordinate generation & wrap coordinate setting" parameter.

MEXE02 code	Name	Setting	Coordinate generation method
p5	Initial coordinate generation & wrap coordinate setting	0: Prioritize ABZO setting	Depends on the "Driver simulation mode" parameter.
		1: Manual setting	Uses the user parameter to generate coordinates.

The method to generate coordinates is as follows when the "Initial coordinate generation & wrap coordinate setting" parameter is set to "0: Prioritize ABZO setting."

MEXE02 code	Name	Setting	Coordinate generation method
p4	Driver simulation mode	1: Virtual motor (when ABZO not connected = no ABZO information)	Uses the user parameter to generate coordinates.
		2: Virtual motor (when ABZO not connected = 1,800 rev wrap enable)	The "Initial coordinate generation & wrap coordinate" parameter is set as follows. • Initial coordinate generation & wrap setting range: 1,800 • Initial coordinate generation & wrap range offset ratio: 50 • Initial coordinate generation & wrap range offset value: 0 • Wrap setting: Enable • The number of the RND-ZERO output in wrap range: 1,800
		3: Virtual motor (when ABZO not connected = 900 rev wrap enable)	The "Initial coordinate generation & wrap coordinate" parameter is set as follows. • Initial coordinate generation & wrap setting range: 900 • Initial coordinate generation & wrap range offset ratio: 50 • Initial coordinate generation & wrap range offset value: 0 • Wrap setting: Enable • The number of the RND-ZERO output in wrap range: 900

■ Coordinate generation (when a motor is connected)

The method to generate coordinates varies depending on the settings of the "Mechanism settings" parameter and the "Initial coordinate generation & wrap coordinate setting" parameter.

MEXE02 code	Name	Setting	Coordinate generation method
p5	• Mechanism settings • Initial coordinate generation & wrap coordinate setting	0: Prioritize ABZO setting	Uses the setting of the ABZO sensor.
		1: Manual setting	Uses the user parameter to generate coordinates.

8-3 Monitor

This section explains contents that can be checked with the status monitor of the **MEXE02** software during simulation.
The following describes the displayed items that are different from those at the normal time.

Item	Description
• Feedback position 32-bit counter • Feedback position • Feedback speed	Indicates the coordinate information detected by the ABZO sensor. The coordinate information follows the command regardless of whether a motor is connected or not.
• Cumulative load • Torque • Position deviation • Motor load factor	Indicates the value calculated from the driver command information and the motor detection information. The value is indefinite regardless of whether a motor is connected or not.
• Motor temperature	Indicates the temperature information detected by the ABZO sensor. The value is indefinite when a motor is not connected.
• Odometer • Tripmeter	Indicates the information of the ABZO sensor. The value is not updated during simulation regardless of whether a motor is connected or not.

8-4 Operation

This section explains the operation of the driver simulation mode.

■ Stored data (SD) operation

When the operation start signal is turned ON, the simulation of the set operation data is started.
(Details of stored data operation ⇨p.25)

Operation type	Operation start signal
Absolute positioning operation	START, SSTART, D-SEL0 to D-SEL7
Incremental positioning operation (based on command position)	
Incremental positioning operation (based on feedback position)	
Continuous operation	
Wrap absolute positioning operation	
Wrap proximity positioning operation	
Wrap forward direction absolute positioning operation	
Wrap reverse direction absolute positioning operation	

■ Macro operation

When the operation start signal of macro operation is turned ON, the simulation of operation corresponding the signal is started.
(Details of macro operation ⇨p.84)

Operation mode	Operation start signal
Continuous operation	FW-POS, RV-POS
JOG operation	FW-JOG, RV-JOG
High-speed JOG operation	FW-JOG-H, RV-JOG-H
Inching operation	FW-JOG-P, RV-JOG-P
Combined JOG operation	FW-JOG-C, RV-JOG-C

■ Direct data operation

Operation is performed using data having input from the scanner via EtherNet/IP.
(Details of direct data operation ⇨p.67)

■ Return-to-home operation

- **Return-to-home operation**

  When the HOME input is turned ON, the simulation of return-to-home operation is started.
  However, since a motor does not operate in the driver simulation mode, an external sensor cannot be detected.
  Therefore, to simulate return-to-home operation, it is necessary to turn the sensor input ON intentionally.
  (Details of return-to-home operation ⇨p.74)

  memo The home of the ABZO sensor cannot be rewritten even if operation is completed.

- **High-speed return-to-home operation**

  When the ZHOME input is turned ON, the simulation of high-speed return-to-home operation is started.
  (Details of high-speed return-to-home operation ⇨p.72)

8-5 I/O signals

This section explains I/O signals which specifications and operations in the simulation mode are different from those at the normal time.

memo The following is different between simulation and normal time. Therefore, the ON/OFF status of I/O signals may vary from the normal time.
- Parameters related to I/O signals are disabled even if they are set.
- The motor is in a non-excitation state and the electromagnetic brake is in a state of holding the motor shaft regardless of the status of I/O signals.
  Example: When the FREE input is turned ON, the output signals show a non-excitation state for the motor (the SON-MON output is OFF) and a releasing state for the electromagnetic brake (the MBC output is OFF), but the motor remains a non-excitation state and the electromagnetic brake remains a state of holding the motor shaft.

■ Input signal

Signal name	Driver simulation mode	Normal time
TEACH	Disable	Perform teaching.

■ Output signals

Signal name	Driver simulation mode	Normal time
ABSPEN	Always ON	Output when coordinates are set.
PRST-STLD	Always OFF	Output when the mechanical home is set.
ORGN-STLD	Always OFF	Output when the mechanical home suitable to the product is set at the time of factory shipment.

8-6 Alarms

In the driver simulation mode, an alarm of Sensor error at power-on is not generated.

9 Using general signals

The R0 to R15 inputs are general-purpose signals. Using the R0 to R15 inputs, I/O signals of the external device can be controlled by the host controller via the driver. Direct I/O of the driver can be used as an I/O module.

■ Example of use for general signals

- **When signals are output from the host controller to the external device**

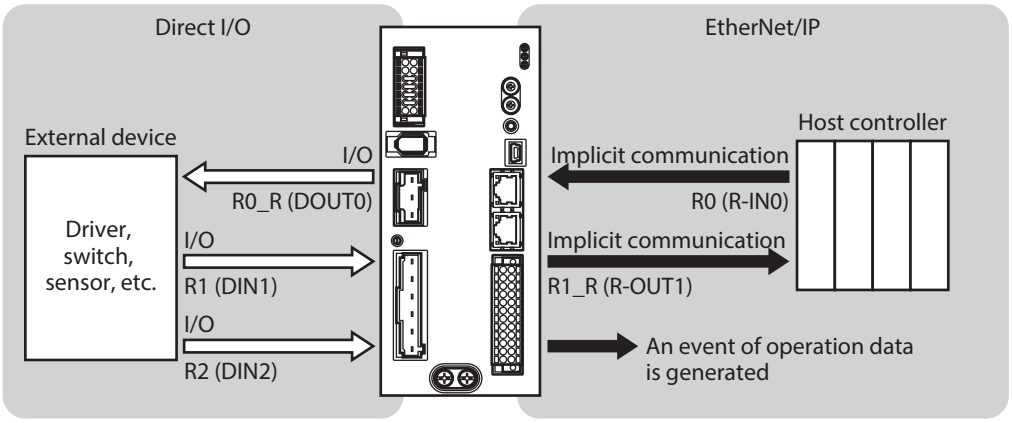
  Assign the R0 input to R-IN0 and the R0_R output to DOUT0.
  DOUT0 is turned ON when R-IN0 is set to 1 by the host controller, and DOUT0 is turned OFF when R-IN0 is set to 0.

- **When outputs of the external device are input to the host controller**

  Assign the R1 input to DIN1 and the R1_R output to R-OUT1.
  R-OUT1 is set to 1 when DIN1 is turned ON by the external device, and R-OUT1 is set to 0 when DIN1 is turned OFF.
  ON-OFF of DIN1 can be set using the "DIN1 inverting mode" parameter.

- **When used as an event trigger I/O that generates an event of operation data**

  Assign the R2 input to DIN2. Also, set the "Event trigger I/O" of the operation I/O event to "R2."
  When DIN2 is turned ON by an external device, an event of the operation data occurs and the operation can be branched.



Related parameters

MEXE02 code	Name	Description	Setting range	Initial value
p8	DIN0 input function	Selects an input signal to be assigned to DIN.	Input signals list ⇨p.239	37: ZHOME
	DIN1 input function			1: FREE
	DIN2 input function			5: STOP
	DIN3 input function			8: ALM-RST
	DIN4 input function			48: FW-JOG
	DIN5 input function			49: RV-JOG
	DIN0 inverting mode	Changes ON-OFF setting of DIN.	0: Non invert 1: Invert	0
	DIN1 inverting mode			0
	DIN2 inverting mode			0
	DIN3 inverting mode			0
	DIN4 inverting mode			0
	DIN5 inverting mode			0

MEXE02 code	Name	Description	Setting range	Initial value
p9	DOUT0 (Normal) output function	Selects an output signal to be assigned to DOUT.	Output signals list ⇨p.240	144: HOME-END
	DOUT1 (Normal) output function			138: IN-POS
	DOUT2 (Normal) output function			0: No function
	DOUT3 (Normal) output function			132: READY
	DOUT4 (Normal) output function			134: MOVE
	DOUT5 (Normal) output function			130: ALM-B
	DOUT0 inverting mode	Changes ON-OFF setting of DOUT.	0: Non invert 1: Invert	0
	DOUT1 inverting mode			0
	DOUT2 inverting mode			0
	DOUT3 inverting mode			0
	DOUT4 inverting mode			0
	DOUT5 inverting mode			0
p10	R-IN0 input function	Selects an input signal to be assigned to R-IN.	Input signals list ⇨p.239	0: No function
	R-IN1 input function			0: No function
	R-IN2 input function			0: No function
	R-IN3 input function			0: No function
	R-IN4 input function			0: No function
	R-IN5 input function			0: No function
	R-IN6 input function			0: No function
	R-IN7 input function			0: No function
	R-IN8 input function			0: No function
	R-IN9 input function			0: No function
	R-IN10 input function			0: No function
	R-IN11 input function			0: No function
	R-IN12 input function			0: No function
	R-IN13 input function			0: No function
	R-IN14 input function			0: No function
	R-IN15 input function			0: No function
	R-OUT0 output function	Selects an output signal to be assigned to R-OUT.	Output signals list ⇨p.240	64: M0_R
	R-OUT1 output function			65: M1_R
	R-OUT2 output function			66: M2_R
	R-OUT3 output function			32: START_R
	R-OUT4 output function			144: HOME-END
	R-OUT5 output function			132: READY
	R-OUT6 output function			135: INFO
	R-OUT7 output function			129: ALM-A
	R-OUT8 output function			136: SYS-BSY
	R-OUT9 output function			160: AREA0
	R-OUT10 output function			161: AREA1
	R-OUT11 output function			162: AREA2
	R-OUT12 output function			155: ZSG
	R-OUT13 output function			134: MOVE
	R-OUT14 output function			138: IN-POS
	R-OUT15 output function			140: TLC

9 Appendix

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1 Relation between operation types and operation data/parameters

MEXE02 code	Name	Stored data operation	Direct data operation	Return-to-home operation		
				2-sensor mode	3-sensor mode	One-way rotation mode
p1	Operation data	✓	–	–	–	–
p2	Operation I/O event	✓	–	–	–	–
p3	Extended operation data setting	✓	–	–	–	–
p4	Starting speed	✓	✓	–	–	–
	Acceleration/deceleration unit	✓	–	✓	✓	✓
	Permission of absolute positioning without setting absolute coordinates	✓	✓	–	–	–
p5	JOG/HOME/ZHOME command filter time constant	–	–	–	–	–
	JOG/HOME/ZHOME torque limit value	–	–	–	–	–
	(JOG) Travel amount	–	–	–	–	–
	(JOG) Operating speed	–	–	–	–	–
	(JOG) Acceleration/deceleration	–	–	–	–	–
	(JOG) Starting speed	–	–	–	–	–
	(JOG) Operating speed (high)	–	–	–	–	–
	(ZHOME) Operating speed	–	–	–	–	–
	(ZHOME) Acceleration/deceleration	–	–	–	–	–
	(ZHOME) Starting speed	–	–	–	–	–
	(HOME) Home-seeking mode	–	–	✓	✓	✓
	(HOME) Starting direction	–	–	✓	✓	✓
	(HOME) Acceleration/deceleration	–	–	✓	✓	✓
	(HOME) Starting speed	–	–	✓	✓	✓
	(HOME) Operating speed	–	–	✓	✓	✓
	(HOME) Last speed	–	–	✓	✓	✓
	(HOME) SLIT detection	–	–	✓	✓	✓
	(HOME) ZSG signal detection	–	–	✓	✓	✓
	(HOME) Position offset	–	–	✓	✓	✓
	(HOME) Backward steps in 2 sensor home-seeking	–	–	✓	–	–
	(HOME) Operating amount in uni-directional home-seeking	–	–	–	–	✓
p13	Command filter setting	✓	✓	✓	✓	✓
	Command filter time constant	✓	✓	–	–	–

MEXE02 code	Name	High-speed return-to-home operation	Macro operation				
			JOG operation	High-speed JOG operation	Inching operation	Combined JOG operation	Continuous operation
p1	Operation data	–	–	–	–	–	✓
p2	Operation I/O event	–	–	–	–	–	✓
p3	Extended operation data setting	–	–	–	–	–	–
p4	Starting speed	–	–	–	–	–	✓
	Acceleration/deceleration unit	✓	✓	✓	✓	✓	✓
	Permission of absolute positioning without setting absolute coordinates	–	–	–	–	–	–
p5	JOG/HOME/ZHOME command filter time constant	✓	✓	✓	✓	✓	–
	JOG/HOME/ZHOME torque limit value	✓	✓	✓	✓	✓	–
	(JOG) Travel amount	–	✓	–	✓	✓	–
	(JOG) Operating speed	–	✓	✓	✓	✓	–
	(JOG) Acceleration/deceleration	–	✓	✓	✓	✓	–
	(JOG) Starting speed	–	✓	✓	✓	✓	–
	(JOG) Operating speed (high)	–	–	✓	–	–	–
	(ZHOME) Operating speed	✓	–	–	–	–	–
	(ZHOME) Acceleration/deceleration	✓	–	–	–	–	–
	(ZHOME) Starting speed	✓	–	–	–	–	–
	(HOME) Home-seeking mode	–	–	–	–	–	–
	(HOME) Starting direction	–	–	–	–	–	–
	(HOME) Acceleration/deceleration	–	–	–	–	–	–
	(HOME) Starting speed	–	–	–	–	–	–
	(HOME) Operating speed	–	–	–	–	–	–
	(HOME) Last speed	–	–	–	–	–	–
	(HOME) SLIT detection	–	–	–	–	–	–
	(HOME) ZSG signal detection	–	–	–	–	–	–
	(HOME) Position offset	–	–	–	–	–	–
	(HOME) Backward steps in 2 sensor home-seeking	–	–	–	–	–	–
	(HOME) Operating amount in uni-directional home-seeking	–	–	–	–	–	–
p13	Command filter setting	✓	✓	✓	✓	✓	✓
	Command filter time constant	–	–	–	–	–	✓

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Published in August 2024

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