



Stepping Motor and Driver Package

αSTEP **AZ Series/** **Motorized actuator** **equipped the AZ Series**

Function Edition

Before starting operation

Operation

I/O signals

Parameter

Method of control via
Modbus RTU
(RS-485 communication)

Method of control via
industrial network

Address list

Measures for various
cases

Alarm and information

Extended setting for
pulse-input operation

Appendix

Thank you for purchasing an Oriental Motor product.

This 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.

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11 Appendix

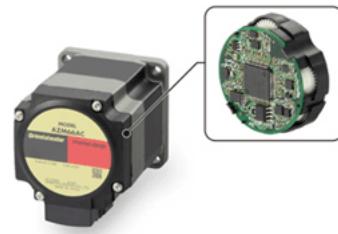
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1 Characteristics of the AZ Series

Built-in ABZO sensor

The ABZO sensor is a small-sized low-cost mechanical multi-rotation absolute sensor that does not require a battery. It can detect the absolute positions for 1800 revolutions of the motor shaft from the reference home position, so the position is never missed.

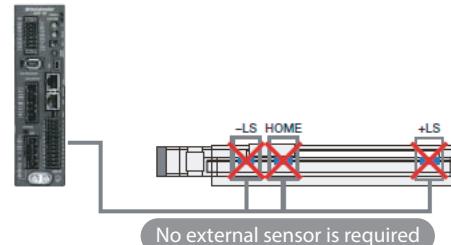
* The motors of frame size 20 mm (0.79 in.) or 28 mm (1.10 in.) are for 900 revolutions.



■ No external sensor is required

Return-to-home operation can be executed without using external sensors such as the home position sensor and limit sensors.

- Saving of wiring
- Cost-cutting for the system
- Not influenced by malfunction of the sensor



■ Return-to-home time has been shortened

● No return-to-home operation is required

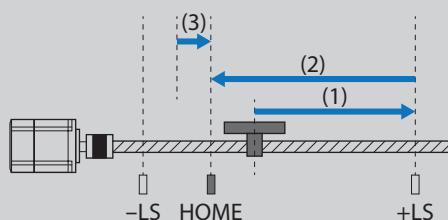
Since the position information is maintained even if the power is interrupted, positioning operation can be continued without return-to-home operation after emergency stop or power failure.

● High-speed return-to-home

Since the ABZO sensor stores the home position, the motor can return to the home position at a high speed.

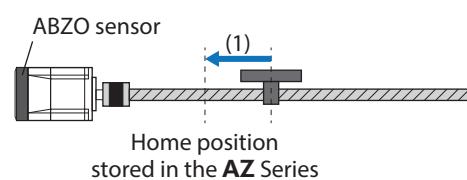
Home position detection of traditional position-control motors

The home position is detected at a low speed by sensing the limit sensor and the home position sensor.



Home position detection of the AZ Series

The motor directly returns to the home position stored in the ABZO sensor at a high speed.



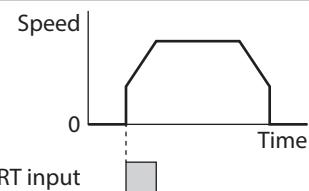
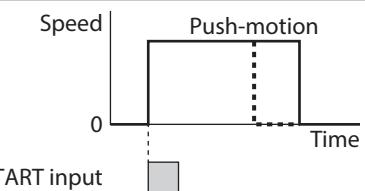
■ No battery is required

No battery is required because the position information is maintained by the ABZO sensor.

- Reduction of maintenance frequency
- Replacing a battery is not required
- The position information is maintained for a long transportation period of equipment

2 Operations possible with the AZ Series

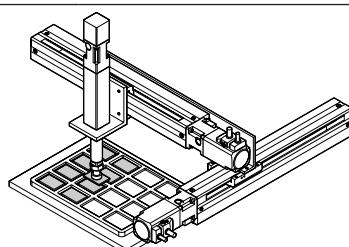
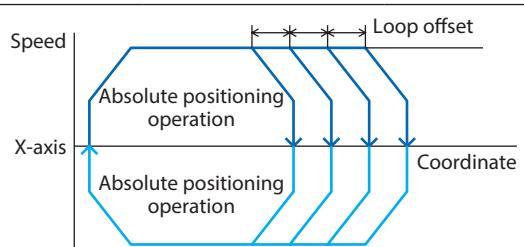
■ Execute operation by setting the motor operating speed, position (travel amount) and other items as operation data

| Stored data (SD) operation | | p.55 | | | | | | | | | | | | | | |
|--|--|---|--|--|----------------|--|------|----------------|----|----------------------|----|---|----|--|----|---------------------------|
| Positioning operation is performed. | | Push-motion operation is performed. | | | | | | | | | | | | | | |
|  START input | |  START input | | | | | | | | | | | | | | |
| Positioning SD operation | p.66 | Positioning push-motion SD operation | p.75 | | | | | | | | | | | | | |
| The command position of the rotating mechanism is returned to "0" for every rotation. | | | The position and the speed can be set easily with the MEXE02. <table border="1"> <thead> <tr> <th colspan="2">Operation data</th> </tr> <tr> <th>Name</th> <th>Operation type</th> </tr> </thead> <tbody> <tr> <td>#0</td> <td>Absolute positioning</td> </tr> <tr> <td>#1</td> <td>Incremental positioning (based on command position)</td> </tr> <tr> <td>#2</td> <td>Incremental positioning (based on feedback position)</td> </tr> <tr> <td>#3</td> <td>Wrap absolute positioning</td> </tr> </tbody> </table> | | Operation data | | Name | Operation type | #0 | Absolute positioning | #1 | Incremental positioning (based on command position) | #2 | Incremental positioning (based on feedback position) | #3 | Wrap absolute positioning |
| Operation data | | | | | | | | | | | | | | | | |
| Name | Operation type | | | | | | | | | | | | | | | |
| #0 | Absolute positioning | | | | | | | | | | | | | | | |
| #1 | Incremental positioning (based on command position) | | | | | | | | | | | | | | | |
| #2 | Incremental positioning (based on feedback position) | | | | | | | | | | | | | | | |
| #3 | Wrap absolute positioning | | | | | | | | | | | | | | | |
| Wrap function | p.142 | | | | | | | | | | | | | | | |

Use of sequence function

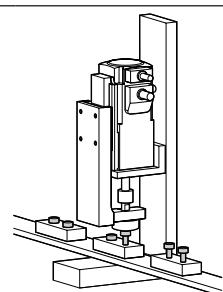
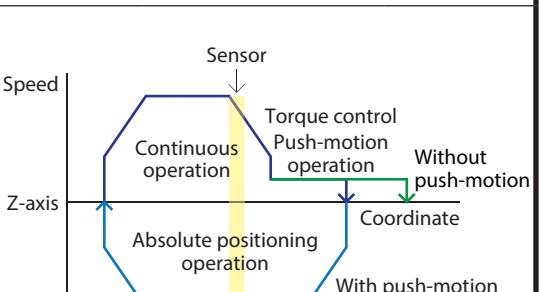
Linked operations are repeated for the number of times specified.

When you use the loop offset function, you can increase or decrease the travel amount every time the operation is repeated.

| | |
|---|--|
|  |  |
| Loop function | p.93 |

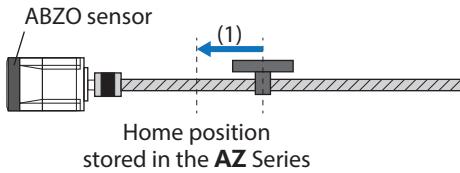
Operation is transited by setting an arbitrary I/O signal as a trigger.

The motor can transit to a different operation depending on whether or not the trigger signal has been detected.

| | |
|---|--|
|  |  |
| Event jump function | p.95 |

■ Return to the home position

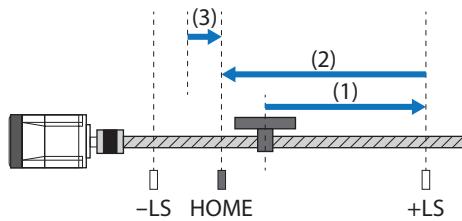
The motor returns to the home position at the speed same as normal positioning operation without using an external sensor.



High-speed return-to-home operation

p.105

The motor returns to the home position by using external sensors or the stopper on the machine.



Return-to-home operation

p.107

■ Perform test operation and operation check

- Macro operation (⇒ p.121)

A specific input signal is turned ON to execute the operation corresponding to the signal. The operating speed, travel amount, acceleration/deceleration rate are set with parameters.

■ Start operation at the same time as writing of operation data (Modbus RTU)

- Direct data operation (⇒ p.299)

You can use this operation to change the setting of operation data frequently, to change the speed and travel amount according to the load, for example.

When the data of the trigger set to be reflected is input by using the touch panel, etc., it is reflected to the operation at the same time as input.

■ Perform operation by inputting pulses

- Pulse-input operation (⇒ p.479)

Operation data are set to the master controller to execute operation. The operation data to be executed are selected in the master controller.



Pulse input operation cannot be executed with the built-in controller type driver.

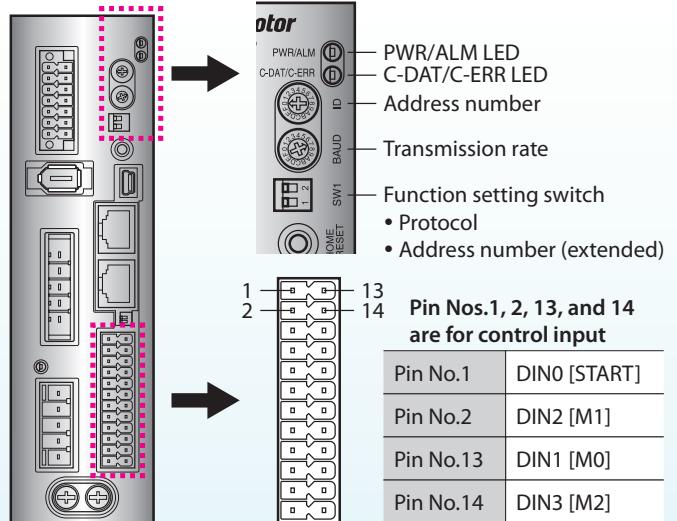
3 Types and overview of driver

There are 3 types of drivers in the **AZ Series** as shown below. I/O signals, setting items, and LEDs vary depending on the driver type.

■ AC power input type

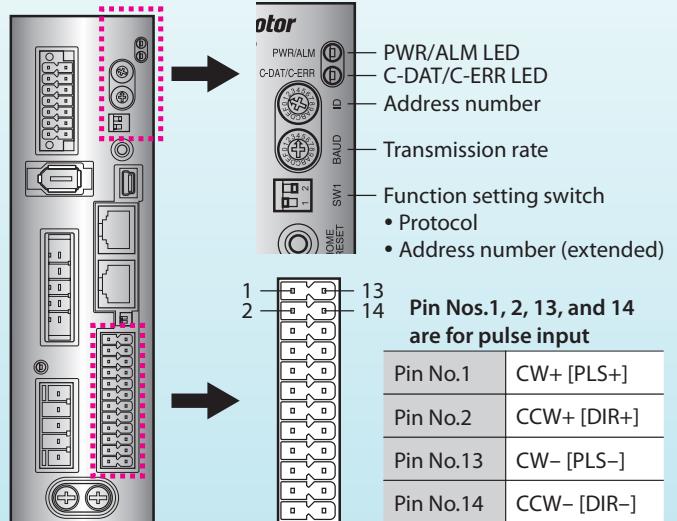
■ Built-in controller type

- Operates via industrial network
- Monitors the motor information via a programmable controller or touchscreen
- Operates via RS-485 communication
- Operates via I/O control



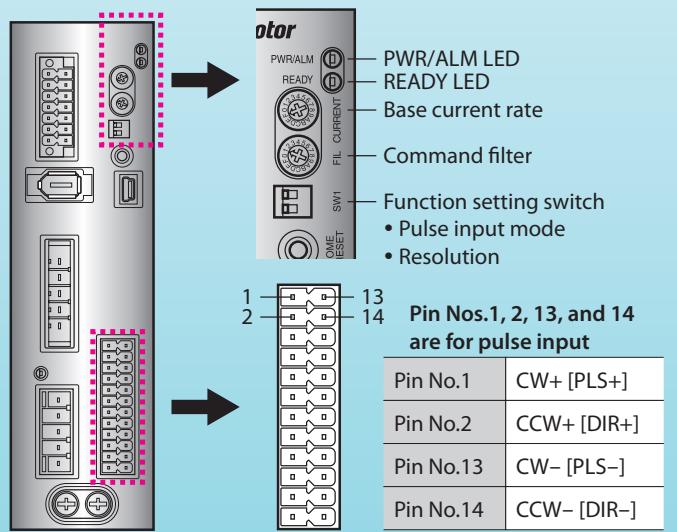
■ Pulse input type with RS-485 communication interface

- Operates via industrial network
- Monitors the motor information via a programmable controller or touchscreen
- Operates via RS-485 communication
- Operates via I/O control
- Operates by pulse input



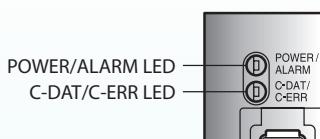
■ Pulse input type

- Operates by pulse input

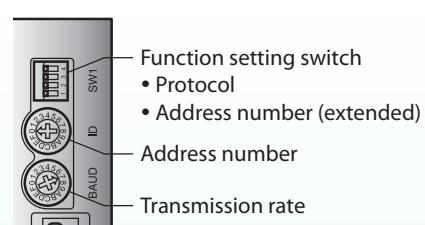
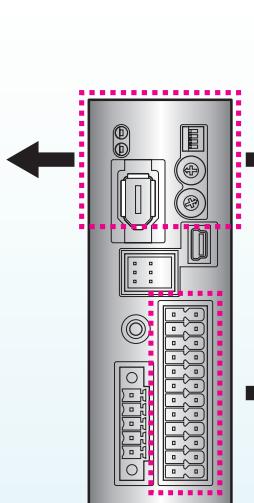


■ DC power input type

■ Built-in controller type



- Operates via industrial network
- Monitors the motor information via a programmable controller or touchscreen
- Operates via RS-485 communication
- Operates via I/O control

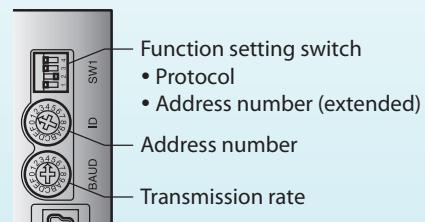
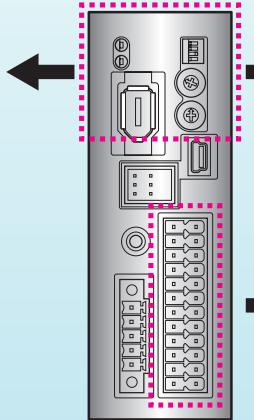


| | | |
|---|----|--|
| 1 | 13 | Pin Nos.1, 2, 13, and 14 are for control input |
| 2 | 14 | |
| | | Pin No.1 DIN0 [START] |
| | | Pin No.2 DIN2 [M1] |
| | | Pin No.13 DIN1 [M0] |
| | | Pin No.14 DIN3 [M2] |

■ Pulse input type with RS-485 communication interface



- Operates via industrial network
- Monitors the motor information via a programmable controller or touchscreen
- Operates via RS-485 communication
- Operates via I/O control
- Operates by pulse input

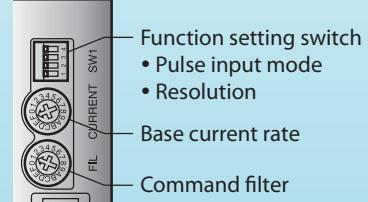
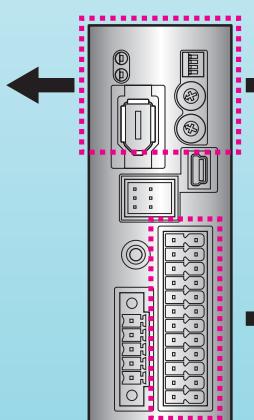


| | | |
|---|----|--|
| 1 | 13 | Pin Nos.1, 2, 13, and 14 are for pulse input |
| 2 | 14 | |
| | | Pin No.1 CW+ [PLS+] |
| | | Pin No.2 CCW+ [DIR+] |
| | | Pin No.13 CW- [PLS-] |
| | | Pin No.14 CCW- [DIR-] |

■ Pulse input type



- Operates by pulse input



| | | |
|---|----|--|
| 1 | 13 | Pin Nos.1, 2, 13, and 14 are for pulse input |
| 2 | 14 | |
| | | Pin No.1 CW+ [PLS+] |
| | | Pin No.2 CCW+ [DIR+] |
| | | Pin No.13 CW- [PLS-] |
| | | Pin No.14 CCW- [DIR-] |

■ When "PULSE-I/F" is described in this manual or the MEXE02

When "PULSE-I/F" is described in this manual or the **MEXE02**, the contents are applied to the following drivers.

- Pulse input type with RS-485 communication interface.
- Pulse input type

4 How to use OPERATING MANUALS for product

OPERATING MANUALS for the **AZ** Series are listed below.

The OPERATING MANUAL Function Edition (this manual) does not come with the product.
Always keep the manual where it is readily available.

Type and description of OPERATING MANUAL

Read these manuals first

AZ Series AC Power Input/DC Power Input

- Motor Edition (supplied with the motor)
- Driver Edition (supplied with the driver)

These manuals explain items from preparation to basic operations, etc.

AZ Series AC Power Input/DC Power Input

- Function Edition (this manual)

This manual explains more detailed operations, functions, etc. that are not described in OPERATING MANUAL supplied with the product.

- Before starting operation
- Operation
- I/O signals
- Parameter
- Method of control via Modbus RTU (RS-485 communication)
- Method of control via industrial network
- Address list
- Measures for various cases
- Alarm and information
- Extended setting for pulse input operation



- The setting unit may vary depending on the application such as the **MEXE02**.

Note that when you set the operation data and parameters.

This manual use a setting unit "step" for explanation.

- This manual describes the contents of the driver Ver.4.00 and later.

Note that some functions can not be used in a driver older than Ver.4.00.

You can check the driver version on the unit information monitor of the **MEXE02**. (⇒ p.440)

AZ Series UL APPENDIX

- APPENDIX UL Standards for the **AZ** Series
- * Attached to the UL Standard qualified product.

This appendix includes information required for certification of the UL Standards.

Type and description of OPERATING MANUAL

Motorized actuator

- Actuator Edition (supplied with the actuator)
- Function Setting Edition

The Actuator Edition explains setting methods and maintenance for actuators.

The Function Setting Edition explains settings of parameters required for when an actuator is combined with a driver.

Network Converter

- USER MANUAL

This manual explains functions, installation/connection methods, operating methods and others about the network converter.

■ About terms and units

Terms and units to be used vary depending on a motor or motorized actuator. This manual explains by using the terms of the motor.

When the motorized actuator is used, read this manual by replacing the terms.

| | Motor | Motorized actuator |
|------|-------------------|-----------------------|
| Term | Torque | Thrust force |
| | Moment of inertia | Mass |
| | Rotation | Movement |
| | CW direction | Forward direction |
| | CCW direction | Reverse direction |
| | Rotation speed | Speed |
| | Resolution | Minimum travel amount |
| Unit | N·m | N |
| | kHz/s | m/s ² |

1

Before starting operation

This chapter explains contents to be performed before starting operation.

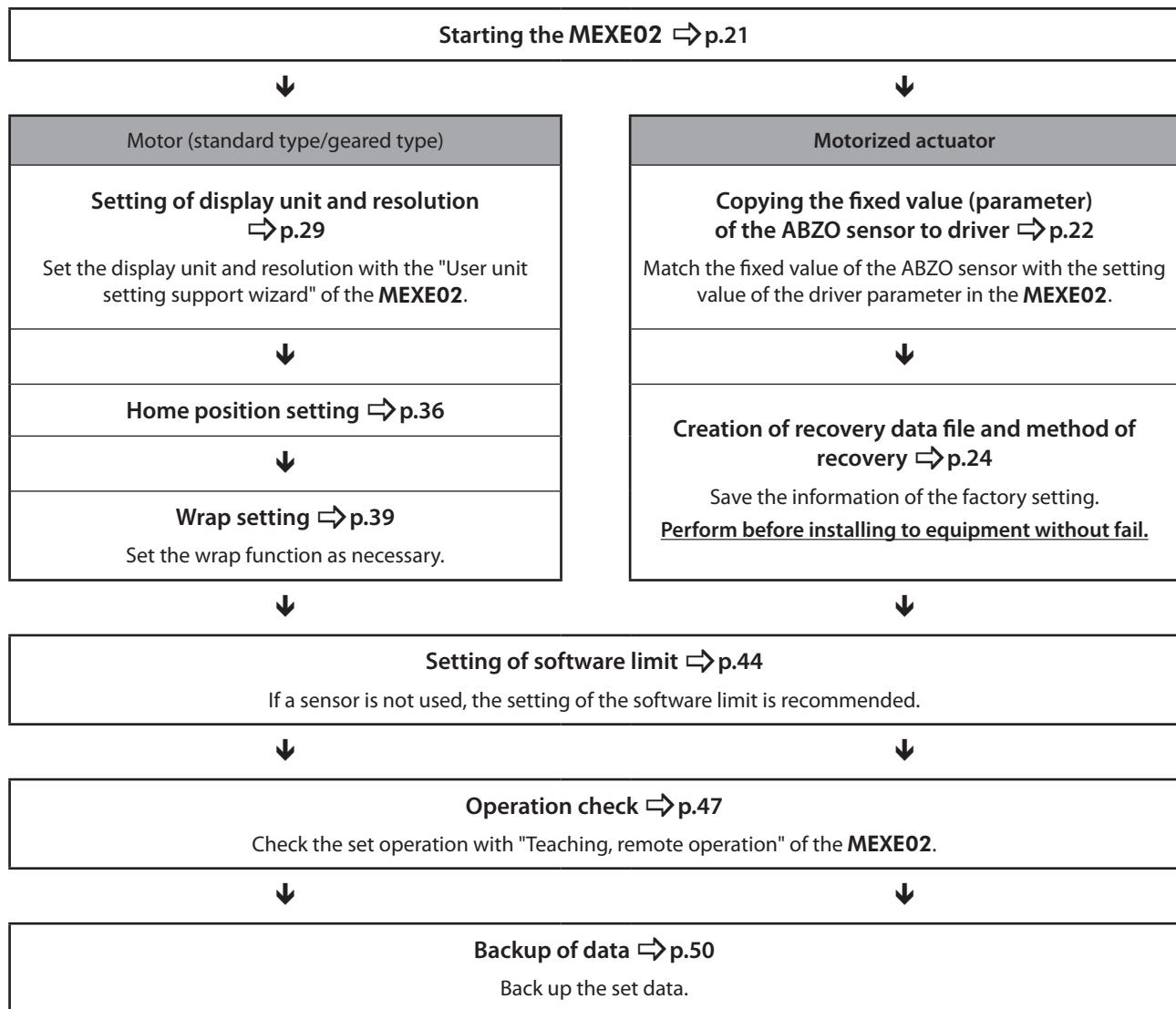
Table of contents

| | | |
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| 1 | Steps of preparation for operation..... | 20 |
| 2 | Starting the MEXE02 | 21 |
| 3 | Copying the fixed value (parameter) of the ABZO sensor to driver | 22 |
| 4 | Creation of recovery data file and method of recovery..... | 24 |
| 5 | Setting of display unit and resolution..... | 29 |
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| 7 | Wrap setting | 39 |
| 8 | Setting of software limit..... | 44 |
| 9 | Operation check..... | 47 |
| 10 | Backup of data..... | 50 |

1 Steps of preparation for operation

To prepare for operation, use the **MEXE02**.

Since the procedure is different in motors and motorized actuators, perform the preparation for operation according to the product used.



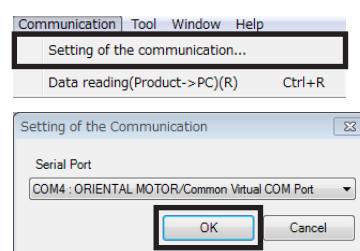
2 Starting the MEXE02

1. Connect the PC on which the **MEXE02** has been installed and a driver.

- 1) Start the **MEXE02**.
- 2) Connect the driver and PC with a USB cable.
- 3) Turn on the power to the driver.

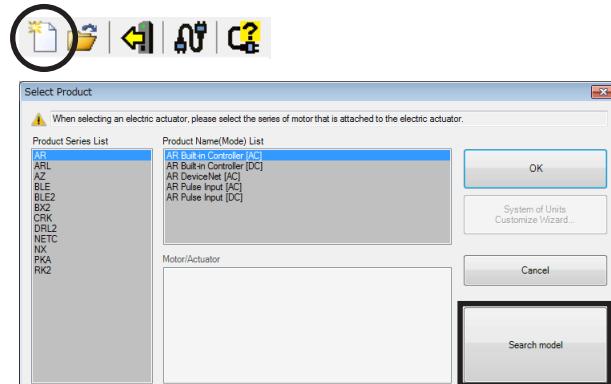
2. Set the communication port.

- 1) Click [Setting of the Communication] from the [Communication] menu.
- 2) Select the "ORIENTAL MOTOR/Common Virtual COM Port", and click [OK].

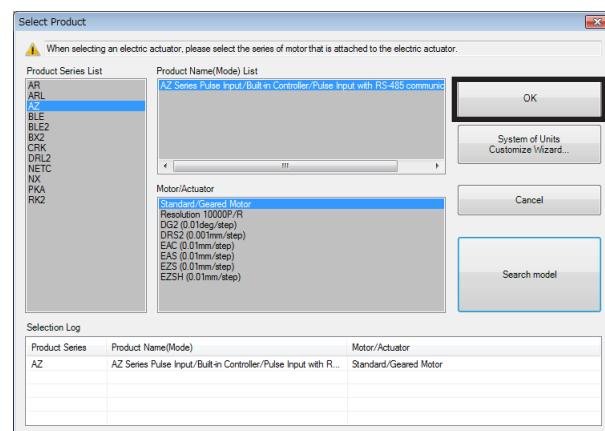


3. Select the product.

- 1) Click the [New] icon in the toolbar.
- 2) Click [Search model] on the Select Product window.



- 3) Check the connected product is selected and click [OK].



For the pulse input type driver, if No.1 of the function setting switch (SW1) is set to ON (10,000 P/R), "Resolution 10,000 P/R" is selected in the "Motor/Actuator" field on the "Select Product" window. If "Resolution 10,000 P/R" is selected, the setting by the user unit setting support wizard cannot be performed. When the resolution is set with the parameter, set the No.1 of the SW1 to OFF. The new settings of SW1 will become effective after the power is cycled.

After this, the procedure varies based on the product used. Refer to the corresponding page.

- Customers who use the standard type and geared type motors → p.29
- Customers who use motorized actuators → p.22

3 Copying the fixed value (parameter) of the ABZO sensor to driver

For parameters of the **AZ** Series, the different values are stored in the ABZO sensor and driver.

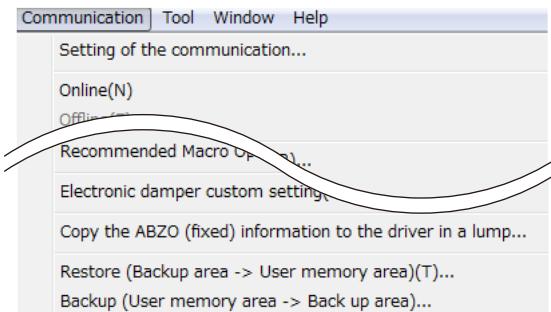
The values based on the product specifications such as recommended macro operation and position coordinate information are stored in the ABZO sensor. The values stored in the ABZO sensor cannot be changed because of the fixed value.

Meantime, the values for the standard type (motor only) are stored in the driver parameters.

In a state of the factory shipment, parameters stored in the ABZO sensor are used preferentially. However, if parameters are changed with the **MEXE02** or other methods, all parameters including the changed parameters will be changed to the values set in the driver parameters. Therefore, an unexpected movement may cause when an operation is executed. In order to prevent such troubles, copy the fixed value in the ABZO sensor to the driver parameter, and match the setting value of the driver parameter and the fixed value of the ABZO sensor.

■ Changing procedure

1. Click the [Communication] menu of the **MEXE02**, and select the [Copy the ABZO (fixed) information to the driver in a lump].
2. Cycle the driver power after the copy was complete.
The copied value is applied.
3. Check whether the copied value is applied on the unit information monitor window.



| | Active | Driver parameter | ABZO (fixed) |
|---|-------------------------|-------------------------|-------------------------|
| Mechanism settings | Driver parameter | Prioritize ABZO setting | |
| Electronic gear A | 1 | 1 | 1 |
| Electronic gear B | 1 | 1 | 1 |
| Motor rotation direction | Positive side=Clockwise | Positive side=Clockwise | Positive side=Clockwise |
| Mechanism type | Step | Step | No setting |
| Mechanism lead | 1 [mm] | 1 [mm] | 1 [mm] |
| Mechanism stroke | 0 [mm] | | 1 [mm] |
| Magnetic brake | None | | None |
| Setting of gear ratio | ABZO | Prioritize ABZO setting | |
| Gear ratio | 1.00 | 1.00 | 1.00 |
| Initial coordinate generation & wrap coordinate | ABZO | Prioritize ABZO setting | Setting exists |
| Initial coordinate generation & wrap setting range | 1800.0 [rev] | 1.0 [rev] | 1800.0 [rev] |
| Initial coordinate generation & wrap range offset ratio | 50.00 [%] | 50.00 [%] | 50.00 [%] |
| Initial coordinate generation & wrap range offset value | 0 [step] | 0 [step] | 0 [step] |
| Wrap setting | Enable | Enable | Enable |
| The number of the RND-ZERO output in wrap range | 1800 | 1 | 1800 |
| Mechanism limit parameter | Disable | Follow ABZO setting | No setting |
| Mechanism limit (distance from F home position) positive direction | Disable | | Disable |
| Mechanism limit (distance from F home position) negative direction | Disable | | Disable |
| Mechanism protection parameter | Disable | Follow ABZO setting | No setting |
| Maximum starting speed | 0 [r/min] | | 8000 [r/min] |
| Maximum Operating speed | 0 [r/min] | | 8000 [r/min] |
| Maximum pushing speed | 0 [r/min] | | 8000 [r/min] |
| Maximum pushing return-to-home speed | 0 [r/min] | | 8000 [r/min] |
| Maximum push current | Pushing not possible | | 100.0 [%] |
| JOG/HOME/ZHOME operation setting | Driver parameter | Prioritize ABZO setting | No setting |
| (JOG/HOME/ZHOME)Command filter time | 1 [ms] | 1 [ms] | 1 [ms] |
| (JOG/HOME/ZHOME)Operating RUN current | 100.0 [%] | 100.0 [%] | 100.0 [%] |
| (JOG) Travel amount | 1 [step] | 1 [step] | 1 [step] |
| (JOG) Operating speed | 1000 [Hz] | 1000 [Hz] | 60 [r/min] |
| (JOG) Acceleration/deceleration | 1000.000 [kHz/s] | 1000.000 [kHz/s] | 1.000 [s] |
| (JOG) Starting speed | 500 [Hz] | 500 [Hz] | 30 [r/min] |
| (JOG) Operating speed (high) | 5000 [Hz] | 5000 [Hz] | 300 [r/min] |
| (ZHOME) Operation speed | 5000 [Hz] | 5000 [Hz] | 300 [r/min] |
| (ZHOME) Acceleration/deceleration | 1000.000 [kHz/s] | 1000.000 [kHz/s] | 1.000 [s] |
| (ZHOME) Starting speed | 500 [Hz] | 500 [Hz] | 30 [r/min] |
| (HOME) Home-seeking mode | 3-sensor | 3-sensor | 3-sensor |
| (HOME) Starting direction | Positive side | Positive side | Positive side |
| (HOME) Acceleration/deceleration | 1000.000 [kHz/s] | 1000.000 [kHz/s] | 1.000 [s] |
| (HOME) Starting speed | 500 [Hz] | 500 [Hz] | 30 [r/min] |
| (HOME) Operating speed | 1000 [Hz] | 1000 [Hz] | 60 [r/min] |
| (HOME) Last speed | 500 [Hz] | 500 [Hz] | 30 [r/min] |
| (HOME) SLIT detection | Disable | Disable | Disable |
| (HOME) TIM/ZSG signal detection | Disable | Disable | Disable |
| (HOME) Position offset | 0 [step] | 0 [step] | 0.000 [rev] |
| (HOME) Backward steps in 2 sensor home-seeking | 500 [step] | 500 [step] | 0.500 [rev] |
| (HOME) Operating amount in uni-directional home-seeking | 500 [step] | 500 [step] | 0.500 [rev] |
| (HOME) Operating current for push motion home-seeking | 100.0 [%] | 100.0 [%] | 100.0 [%] |
| (HOME) Backward steps after first entry in push motion home-seeking | 0 [step] | 0 [step] | 0.000 [rev] |
| (HOME) Pushing time in push motion home-seeking | 200 [ms] | 200 [ms] | 200 [ms] |
| (HOME) Backward steps in push motion home-seeking | 500 [step] | 500 [step] | 0.500 [rev] |

- Description of each item

| Item | Description |
|------------------|---|
| Active | Parameter value presently used is shown. |
| Driver parameter | Parameter value set in the driver using the MEXE02 or communication is shown. |
| ABZO (fixed) | The values of parameters stored in the ABZO sensor are shown. They cannot be changed because of the fixed value. |

4 Creation of recovery data file and method of recovery

4-1 Creating the recovery data file

The recovery data file is a file that information of the factory setting is stored.

At the beginning, create the recovery data file for when the product is replaced with maintenance or the product is malfunctioned.

Save the recovery data file in a PC as a data file.

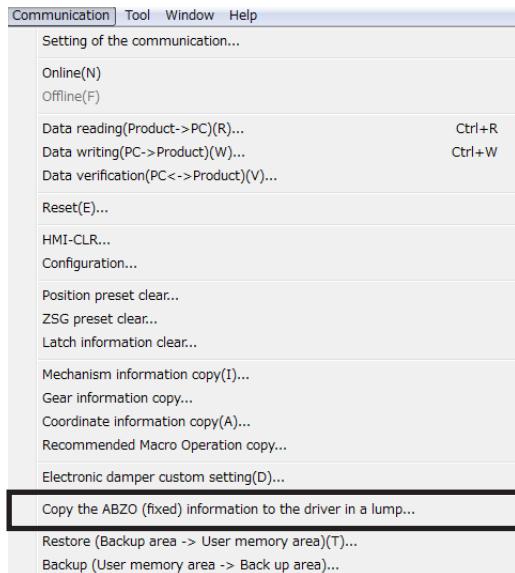


- If you are the customer to use a motorized actuator, create the recovery data file without fail.
- Be sure to create the recovery data file before installing the motorized actuator to equipment.

■ Creating procedure for recovery data file

1. Start the **MEXE02** in the steps of "2 Starting the **MEXE02**" on p.21.
Check the connected product is selected.

2. Copy the ABZO information (fixed value).
 - 1) Click [Copy the ABZO (fixed) information to the driver in a lump] from the [Communication] menu.



- 2) Click [Yes].
The ABZO information (fixed value) is copied in the driver.



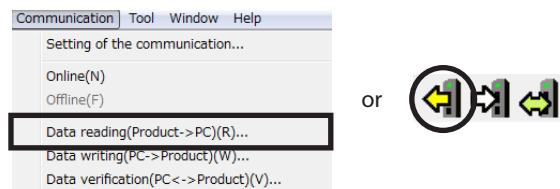
- 3) After it is completed, click [OK].



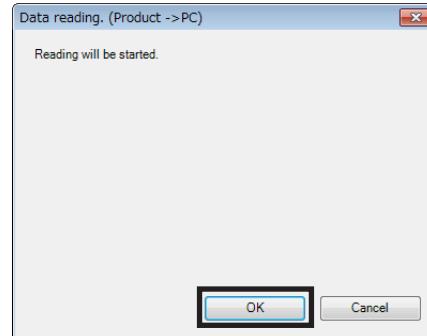
- 4) Cycle the driver power.

3. Read the ABZO information stored in the driver.

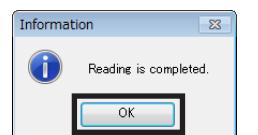
- 1) Click the [Data reading (Product → PC)] from the [Communication] menu or click the [Data reading (Product → PC)] icon in the toolbar.



- 2) Click [Yes].
Data reading is started.

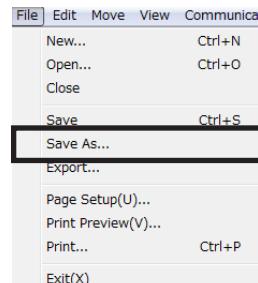


- 3) After it is completed, click [OK].
The read data is shown on the screen.



4. Create the recovery data file.

Click [Save As] from the [File] menu.
A desired file name and storage destination can be used.



The factory setting of the motorized actuator is saved as the recovery data file.



For the recovery, create two files that are the recovery data file stored the factory setting and the final backup file (⇒ p.50) applied the operation data and others. If the recovery data file and backup file have been created in advance, the equipment can be restored smoothly.

4-2 Method of recovery

The recovery can be performed under the precondition of having created the recovery data file according to the "4-1 Creating the recovery data file" on p.24.

! Warning

When the motor or driver was replaced, be sure to perform the recovery and the home position resetting. Unless the recovery and the home position resetting are performed, the followings may happen.

- The moving part may cause unexpected operations, resulting in injury or damage to equipment.
- The moving part of the motorized linear slide or motorized cylinder may collide with the mechanical stopper.
- A load may collide with other equipment.



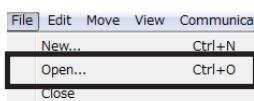
- If "Search model" is performed with the **MEXE02** after the motor is replaced, the product is identified as the **AZ Series "Standard/Geared motor."**
- Refer to the [OPERATING MANUAL Actuator Edition](#) for how to replace the motor.

■ When the motor and driver were malfunctioned

1. Replace the motor and driver, and turn on the power.

2. Open the recovery data file in the **MEXE02**.

- 1) Click the [Open] from the [File] menu or click the [Open] icon in the toolbar.
Select the recovery data file, and click [Open].

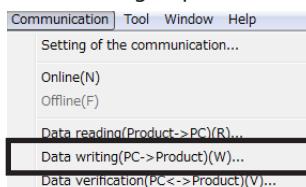


or



3. Check the data is correct, and write to the driver in the following steps.

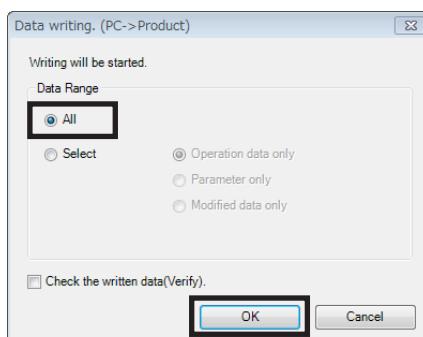
- 1) Click the [Data writing (PC → Product)] from the [Communication] menu or click the [Data writing (PC → Product)] icon in the toolbar.



or

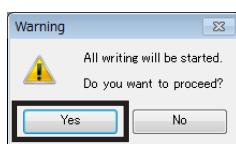


- 2) Select the [All], and click [OK].

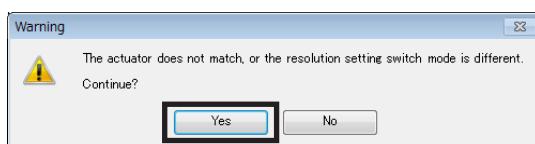


- 3) Click [Yes].

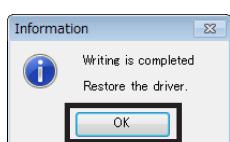
Writing data is started.



If the following message appears, click [Yes].



- 4) After it is completed, click [OK].



- 5) Cycle the driver power.

4. Read the information of the factory setting written to the driver.

When the motor is replaced, set the home position again after reading the driver information.

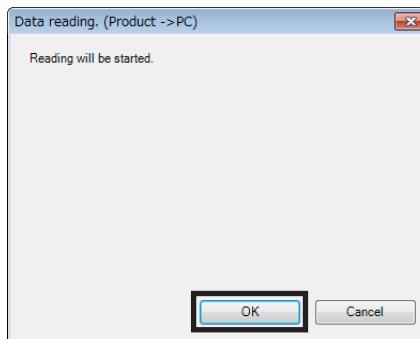
The communication function of the **MEXE02** cannot be used without reading the driver information.

- 1) Click the [Data reading (Product → PC)] from the [Communication] menu or click the [Data reading (Product → PC)] icon in the toolbar.

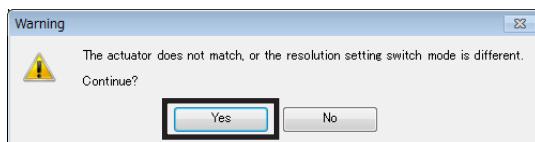


- 2) Click [OK].

Data reading is started.

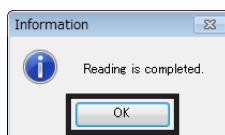


If the following message appears, click [Yes].



- 3) After it is completed, click [OK].

The read data is shown on the screen.



All data and parameters in the driver including the ABZO information were read in the **MEXE02**.

5. Refer to p.36 and set the home position again.

6. Refer to p.24 and create the recovery data file for the product after replacement.



Save the read driver information as the new recovery data file.



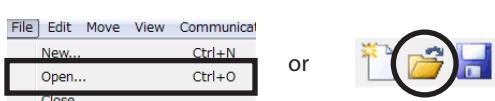
The details of the written parameters can be checked with the "unit information monitor."

■ When the driver was malfunctioned

1. Replace the driver, and turn on the power.

2. Open the recovery data file in the **MEXE02**.

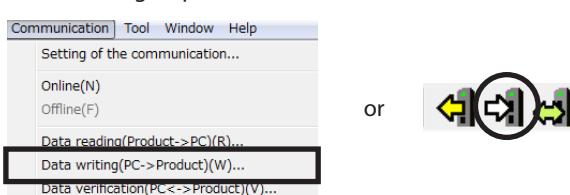
- 1) Click the [Open] from the [File] menu or click the [Open] icon in the toolbar.
Select the recovery data file, and click [Open].



or

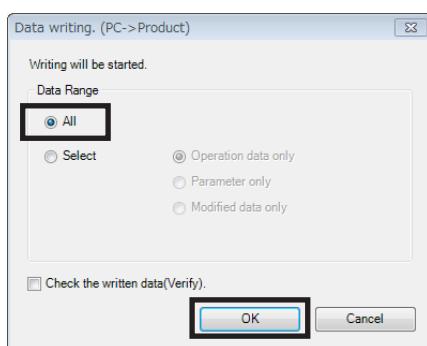
3. Check the data is correct, and write to the driver in the following steps.

- 1) Click the [Data writing (PC → Product)] from the [Communication] menu or click the [Data writing (PC → Product)] icon in the toolbar.



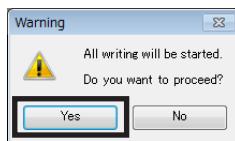
or

- 2) Select the [All], and click [OK].



- 3) Click [Yes].

Writing data is started.



- 4) Click [OK].



- 5) Cycle the driver power.



The details of the written parameters can be checked with the "unit information monitor".

■ When the motor was malfunctioned

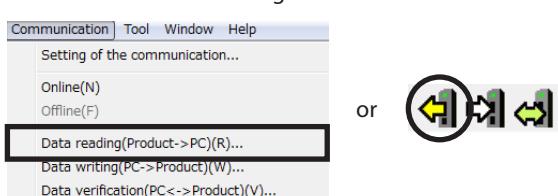
1. Replace the motor, and turn on the power.

2. Read the driver information to the PC.

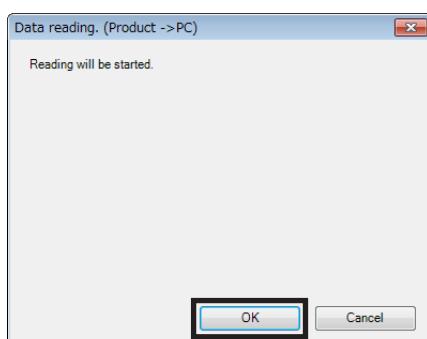
When the motor is replaced, set the home position again after reading the driver information.

The communication function of the **MEXE02** cannot be used without reading the driver information.

- 1) Click the [Data reading (Product → PC)] from the [Communication] menu or click the [Data reading (Product → PC)] icon in the toolbar.

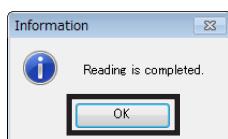


- 2) Click [OK].



- 3) After it is completed, click [OK].

The read data is shown on the screen.



All data and parameters in the driver including the ABZO information were read in the **MEXE02**.

3. Refer to p.36 and set the home position again.

4. Refer to p.24 and create the recovery data file for the product after replacement.



Save the read driver information as the new recovery data file.

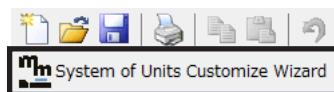
5 Setting of display unit and resolution

The display unit and resolution can be set using the "User unit setting support wizard" of the **MEXE02**. The travel amount, speed and others can be displayed or input by a desired unit.

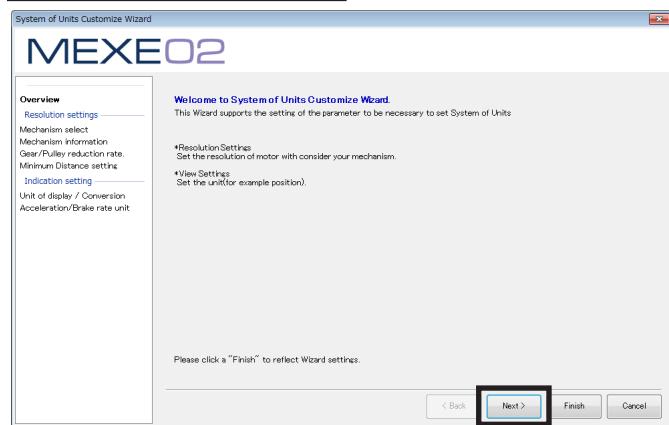
5-1 Setting example for when an index table is used

1. The display unit and resolution can be set using the "User unit setting support wizard."

- 1) Click [System of Units Customize Wizard].
The window of the user unit setting support wizard is shown.

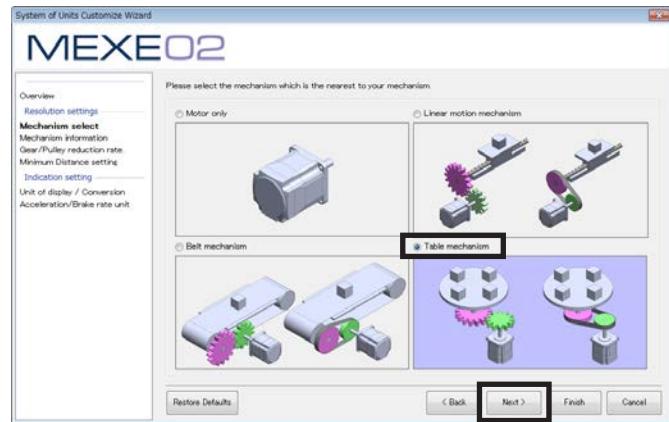


- 2) Click [Next].



- 3) Select the mechanism used.

Select the [Table mechanism], and click [Next].



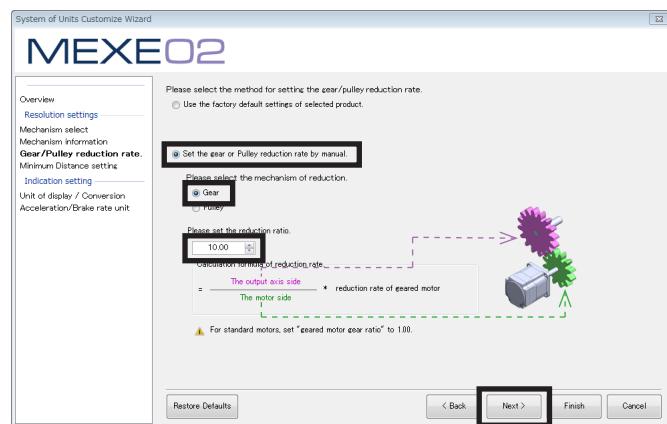
- 4) Set the mechanism information.

When the "table" is selected, the setting of the mechanism information is not required. Click [Next].



5) Set the speed reduction ratio of the gears.

This is an example for when the geared motor of the gear ratio 10 is used.
Set as shown in the figure, and click [Next].



When gears or pulleys are not used externally, select "Use the factory default settings of selected product," and click [Next].

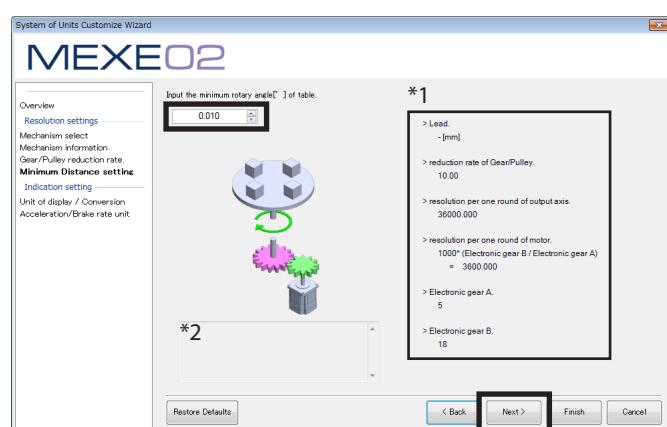
6) Set the minimum step angle of the table.

This example is set as "0.01°". Input "0.01", and click [Next].

*1 The set contents are shown.

Since the wrong setting is indicated in red color, set it again.

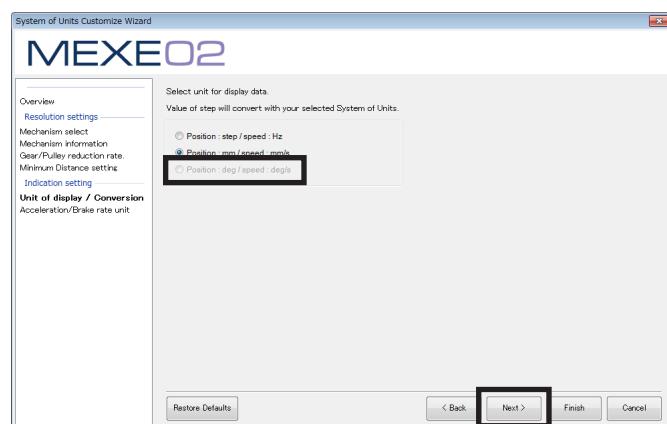
*2 If there is a wrong setting, the wrong content and remedial actions are indicated.



When the wrap function (⇒ p.39) is used, set so that the resolution per revolution of the motor output shaft is an integral number.

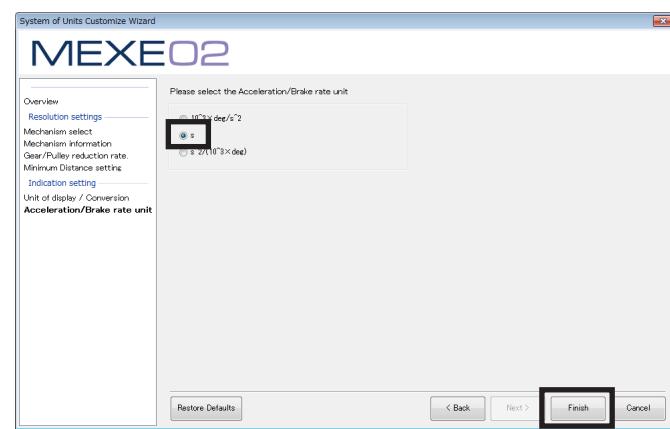
7) Set the display unit.

Select "deg" here, and click [Next].



The unit for when operating via network is "step".

- 8) Set the acceleration/deceleration unit.
Select "s" here, and click [Complete].

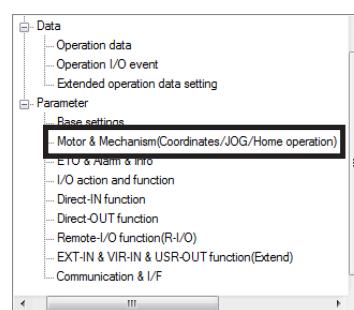


If "s" is selected in the acceleration/deceleration unit, the initial value of the "Starting/changing rate" and "Stopping deceleration" is "1000 s." After the setting was complete, change the value according to the operating condition.

2. Since the parameters set in the driver is prioritized, set the mechanism settings parameter to "Manual setting."

- 1) Click "Motor and Mechanism (Coordinates/JOG/Home Operation)" under "Parameter" in the tree view.

The motor and mechanism parameter is shown.

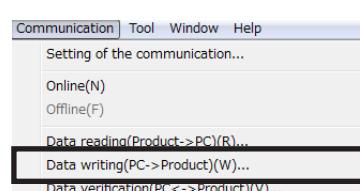


- 2) Change the "Mechanism settings" parameter to "Manual setting."

| Operation data Motor & Mechanism(Coordinates/JOG/Home operation) | | |
|--|---|---------------------------------------|
| | Mechanism settings | Manual setting (use driver parameter) |
| 1 | Electronic gear A | 5 |
| 2 | Electronic gear B | 18 |
| 4 | Motor rotation direction | Positive direction=CW |
| 5 | Mechanism type | step(Rotary) |
| 6 | Mechanism lead pitch [mm] | 1 |
| 8 | Gear ratio setting (prioritize 0.00 ABZO setting) | 10.00 |

3. Write the parameters to the driver.

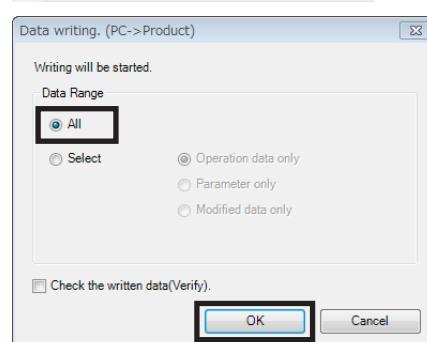
- 1) Click the [Data writing (PC → Product)] from the [Communication] menu or click the [Data writing (PC → Product)] icon in the toolbar.



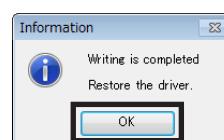
or



- 2) Select "All" in the data range, and click [OK].



- 3) Click [Yes].
Writing parameters is started.



- 4) Click [OK].



4. Cycle the driver power.
Parameters are applied.

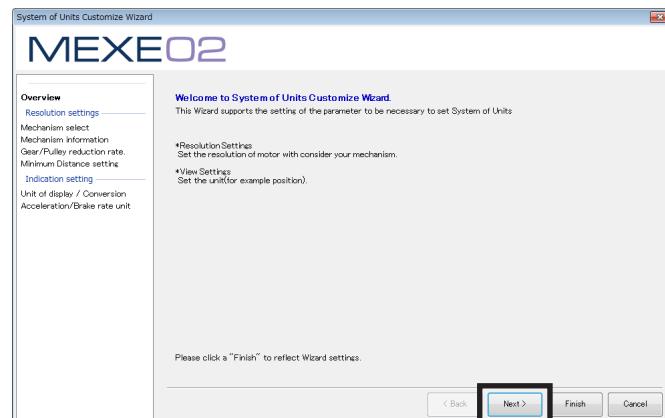
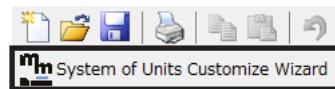
5-2 Setting example for when a linear mechanism is assembled

1. The display unit and resolution can be set using the "User unit setting support wizard."

- 1) Click [System of Units Customize Wizard].

The window of the user unit setting support wizard is shown.

- 2) Click [Next].



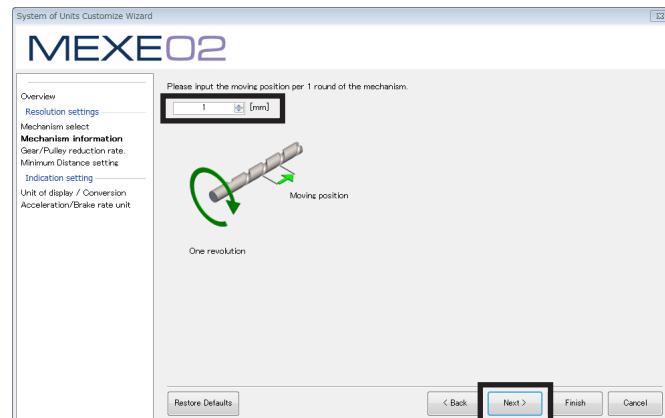
- 3) Select the mechanism used.

Select the [Linear motion mechanism], and click [Next].

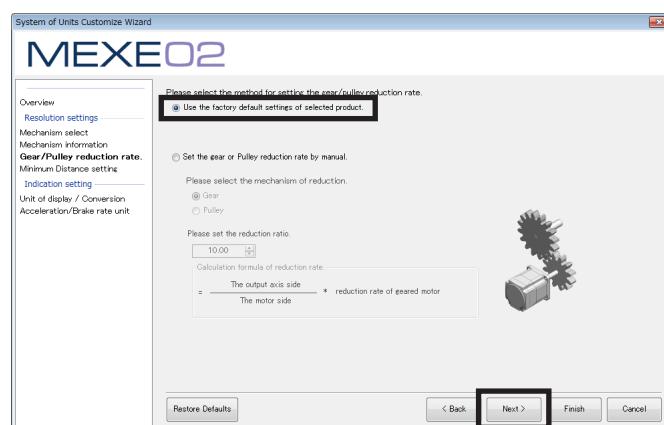


- 4) Set the travel amount per a revolution.

This example is set as "1 mm." Input "1," and click [Next].

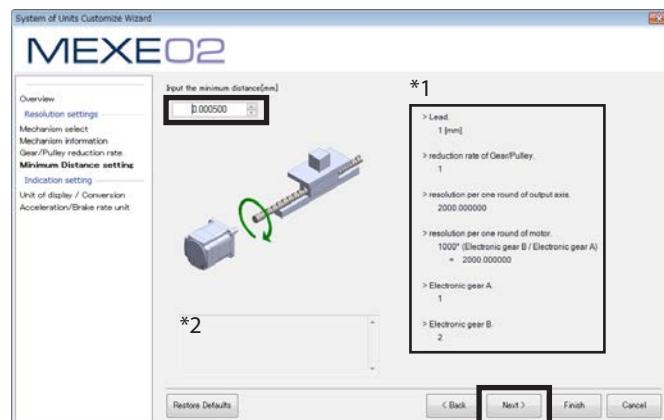


- 5) Set the speed reduction ratio of the gears.
The factory setting is used here.
Select "Use the factory default settings of selected product," and click [Next].



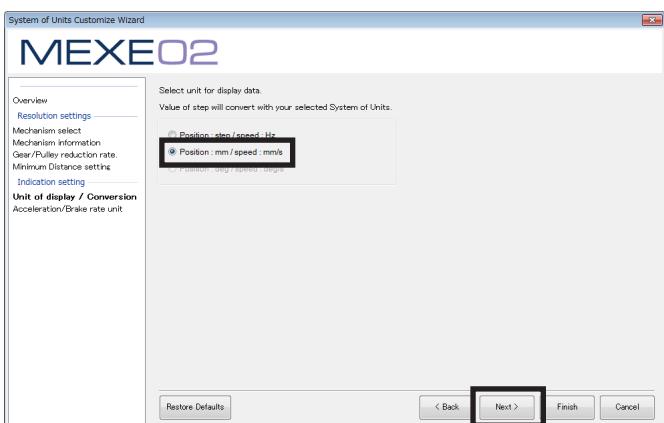
- 6) Set the minimum step angle of the table.
This example is set as "0.0005°". Input "0.0005", and click [Next].

- *1 The set contents are shown.
Since the wrong setting is indicated in red color, set it again.
- *2 If there is a wrong setting, the wrong content and remedial actions are indicated.



When the wrap function (⇒ p.39) is used, set so that the resolution per revolution of the motor output shaft is an integral number.

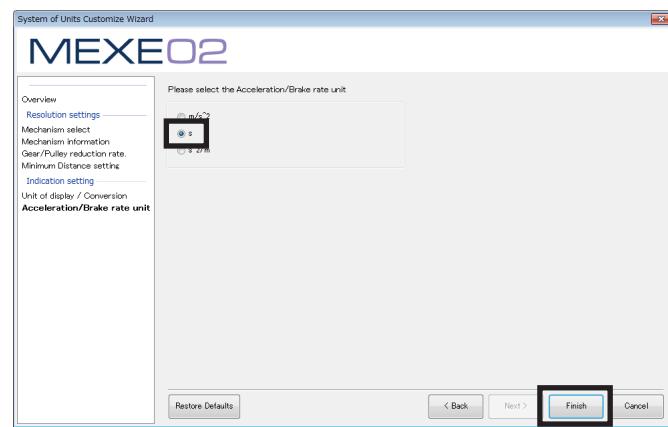
- 7) Set the display unit.
Select "mm" here, and click [Next].



The unit for when operating via network is "step."

Setting of display unit and resolution

- 8) Set the acceleration/deceleration unit.
Select "s" here, and click [Complete].

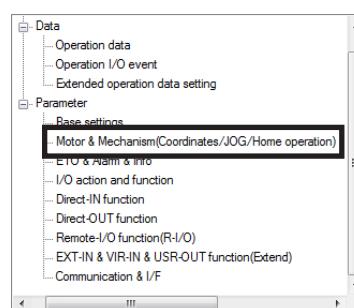


If "s" is selected in the acceleration/deceleration unit, the initial value of the "Starting/changing rate" and "Stopping deceleration" is "1000 s." After the setting was complete, change the value according to the operating condition.

2. Since the parameters set in the driver is prioritized, set the mechanism settings parameter to "Manual setting."

- 1) Click "Motor and Mechanism (Coordinates/JOG/Home Operation)" under "Parameter" in the tree view.

The motor and mechanism parameter is shown.

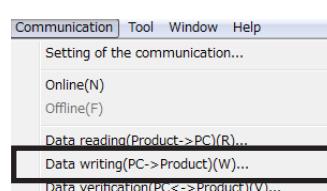


- 2) Change the "Mechanism settings" parameter to "Manual setting."

| Operation data Motor & Mechanism(Coordinates/JOG/Home operation) | | |
|--|---|---------------------------------------|
| | Mechanism settings | Manual setting (use driver parameter) |
| 1 | Electronic gear A | 1 |
| 2 | Electronic gear B | 2 |
| 4 | Motor rotation direction | Positive direction=CW |
| 5 | Mechanism type | step(Rotary) |
| 6 | Mechanism lead pitch [mm] | 1 |
| 8 | Gear ratio setting (prioritize 0.00:ABZO setting) | 0.00 |

3. Write the parameters to the driver.

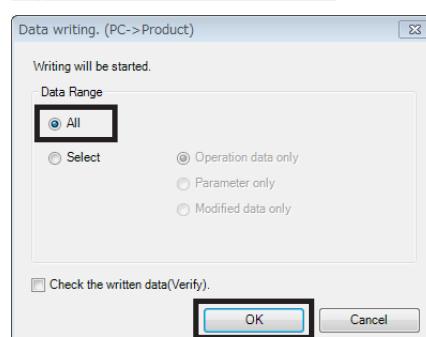
- 1) Click the [Data writing (PC → Product)] from the [Communication] menu or click the [Data writing (PC → Product)] icon in the toolbar.



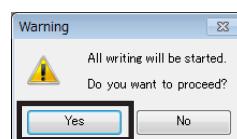
or



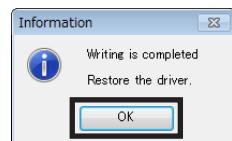
- 2) Select "All" in the data range, and click [OK].



- 3) Click [Yes].
Writing parameters is started.



4) Click [OK].



4. Cycle the driver power.
Parameters are applied.

6 Home position setting

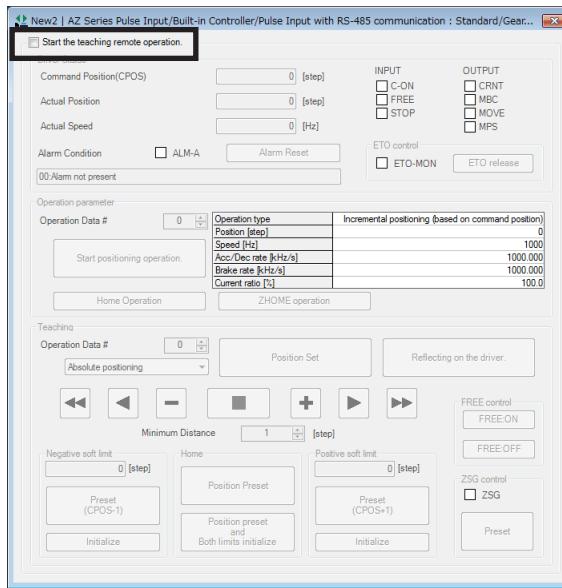
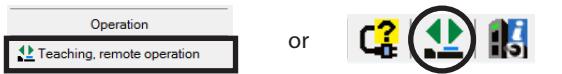
The home position has not set at the time of shipment. Before starting an operation, be sure to set the home position. Perform the home position setting only once initially. Once the home position is set, the driver keeps the home information even if the power supply is shut down.



- Refer to the [OPERATING MANUAL Driver](#) for how to set the home position with the HOME PRESET switch.
- The home position is written to the non-volatile memory. The non-volatile memory can be rewritten approximately 100,000 times.

■ When a sensor is not used in return-to-home operation

1. Click the [Teaching, remote operation] shortcut button or click the [Teaching, remote operation] icon in the toolbar.
2. Click "Start the teaching remote operation."

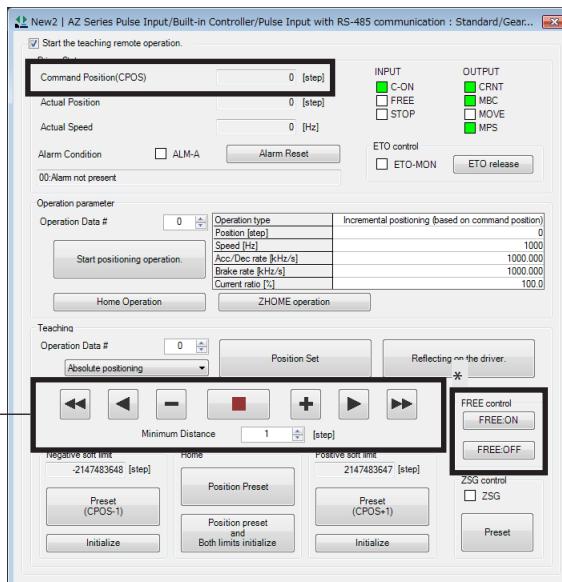


3. Operate the motor till the home position using the JOG operation buttons.

Adjust the position while checking the "command position (CPOS)" in the "Driver Status" field.

* Use the FREE operation buttons to adjust the home position manually.
If the [FREE: ON] is clicked, the motor becomes a non-excitation state, and the motor output shaft can be rotated by an external force.

JOG operation buttons



Descriptions of JOG operation buttons

| Button | Assigned input signal name | Relationship between the input signal and parameter |
|--------|----------------------------|---|
| ◀◀ | RV-JOG-H | This is used to perform continuous operation at the operating speed set in the "(JOG) Operating speed (high)" parameter |
| ◀ | RV-JOG | This is used to perform continuous operation at the operating speed set in the "(JOG) Operating speed" parameter |
| ▬ | RV-JOG-P | This is used to perform positioning operation in the travel amount set in the "minimum travel amount" of the JOG operation buttons. |
| ■ | STOP | This is used to stop the motor immediately. |
| + | FW-JOG-P | This is used to perform positioning operation in the travel amount set in the "minimum travel amount" of the JOG operation buttons. |
| ▶ | FW-JOG | This is used to perform continuous operation at the operating speed set in the "(JOG) Operating speed" parameter |
| ▶▶ | FW-JOG-H | This is used to perform continuous operation at the operating speed set in the "(JOG) Operating speed (high)" parameter |

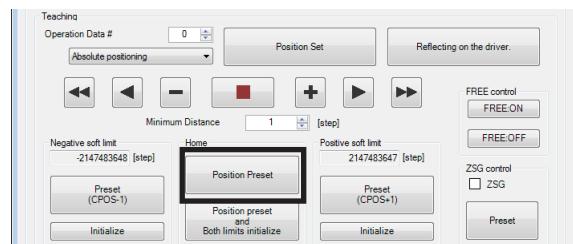


If the JOG travel amount is changed, the "(HOME) Operating current for push motion homeseeking [%]" parameter is automatically changed to 100%. When the JOG travel amount is changed, set the "(HOME) Operating current for push motion homeseeking [%]" parameter to 70% or less.



When the operating condition is changed, set the "JOG/HOME/ZHOME operation setting" to "Manual setting".

4. Click [Position Preset].
The home position is set.

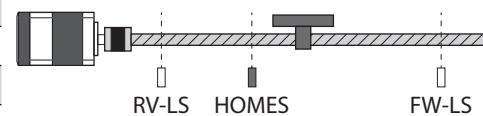


When a sensor input is used in return-to-home operation

Input signals, which are used in return-to-home operation, are assigned with the **MEXE02**. Assign the input signals according to external sensors used. This represents an example for when return-to-home operation is executed in the 3-sensor mode.

Input signals required in return-to-home operation

| Input signal name | Description |
|-------------------|---|
| HOMES | Home sensor |
| FW-LS | Limit sensors (+) |
| RV-LS | Limit sensors (-) |
| HOME | Signal to start return-to-home operation. |



● Built-in controller type

Input signals (HOMES, FW-LS, RV-LS) from sensors and signals (M0, M1, START, STOP) related in positioning operation are assigned to direct I/O. And the alarm reset signal (ALM-RST) is remained. The HOME is assigned to both direct I/O and remote I/O so that return-to-home operation can be performed even in both of them.

Assignment example of direct I/O

| | Input function selection |
|----------------------------------|--------------------------|
| DIN0 (except for PULSE-I/F type) | START |
| DIN1 (except for PULSE-I/F type) | M0 |
| DIN2 (except for PULSE-I/F type) | M1 |
| DIN3 (except for PULSE-I/F type) | * HOME |
| DIN4 | ALM-RST |
| DIN5 | FREE |
| DIN6 | STOP |
| DIN7 | * HOMES |
| DIN8 | FW-LS |
| DIN9 | RV-LS |

* In the case of 2-sensor mode, assign the "M2" or "ZHOME."

Assignment example of remote I/O

| | R-IN input function selection |
|------------|-------------------------------|
| R-IN/OUT0 | M0 |
| R-IN/OUT1 | M1 |
| R-IN/OUT2 | M2 |
| R-IN/OUT3 | START |
| R-IN/OUT4 | * HOME |
| R-IN/OUT5 | STOP |
| R-IN/OUT6 | FREE |
| R-IN/OUT7 | ALM-RST |
| R-IN/OUT8 | D-SEL0 |
| R-IN/OUT9 | D-SEL1 |
| R-IN/OUT10 | D-SEL2 |
| R-IN/OUT11 | SSTART |
| R-IN/OUT12 | FW-JOG-P |
| R-IN/OUT13 | RV-JOG-P |
| R-IN/OUT14 | FW-POS |
| R-IN/OUT15 | RV-POS |

* In the case of 2-sensor mode, assign the "ZHOME."



- Assign the input signals according to external sensors used.
- When return-to-home operation is performed using remote I/O, assign the sensor input to direct I/O.

● Pulse input type with RS-485 communication interface, pulse input type

Input signals (HOMES, FW-LS, RV-LS) from sensors and the alarm reset signal (ALM-RST) are assigned. And the HOME is assigned so that return-to-home operation can be performed.

| | Input function selection |
|----------------------------------|--------------------------|
| DIN0 (except for PULSE-I/F type) | No function |
| DIN1 (except for PULSE-I/F type) | No function |
| DIN2 (except for PULSE-I/F type) | No function |
| DIN3 (except for PULSE-I/F type) | No function |
| DIN4 | * HOME |
| DIN5 | FREE |
| DIN6 | ALM-RST |
| DIN7 | * HOMES |
| DIN8 | FW-LS |
| DIN9 | RV-LS |

* In the case of 2-sensor mode, assign the "ZHOME," "PLS-DIS," or others.



- Assign the input signals according to external sensors used.
- In the case of the pulse input type with RS-485 communication interface and pulse input type, the DIN0 to DIN3 are exclusively used for pulse input. Since other signals cannot be assigned, set to "Not used."

7 Wrap setting

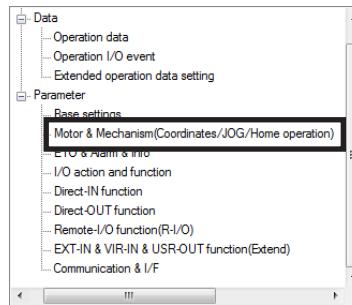
The wrap function is a function to automatically preset the position information of the present position when the number of revolutions of the motor output shaft exceeds the set range. Setting of wrap offset allows you to limit the operation area of the equipment and control the index table with coordinates on the positive and negative sides. (⇒p.42)

■ When the wrap function is not used

● Setting the wrap function

Disable the "Wrap setting" parameter. (Initial value: Enable)

1. Click "Motor and Mechanism (Coordinates/JOG/Home Operation)" under "Parameter" in the tree view.
The motor and mechanism parameter is shown.



2. Set the "Initial coordinate generation/wrap coordinate setting" parameter to "Manual setting."

| | Initial coordinate generation/wrap coordinate setting | Manual setting (use driver parameter) |
|----|--|---------------------------------------|
| 10 | | 1.0 |
| 11 | Initial coordinate generation & wrap setting range [rev] | 50.00 |
| 12 | Initial coordinate generation & wrap range offset ratio [%] | 0 |
| 13 | Initial coordinate generation & round coordinate offset value [step] | |
| 14 | Wrap setting | Effective |
| 15 | The number of the RND-ZERO output in wrap range | 1 |

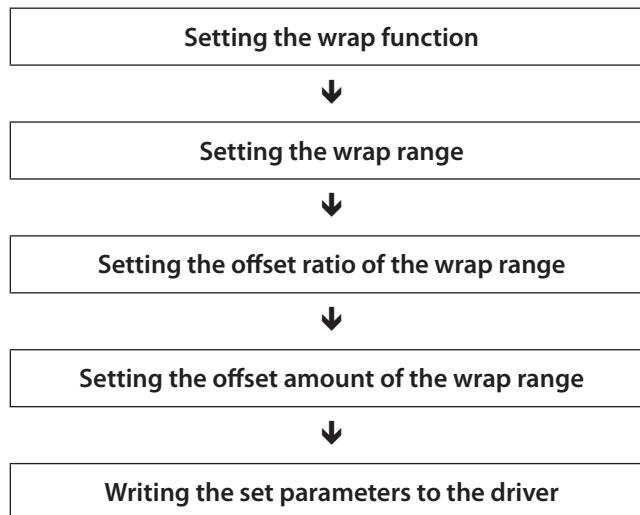
3. Set the "Wrap setting" parameter to "Disable."

| | Initial coordinate generation/wrap coordinate setting | Manual setting (use driver parameter) |
|----|--|---------------------------------------|
| 10 | | 1.0 |
| 11 | Initial coordinate generation & wrap setting range [rev] | 50.00 |
| 12 | Initial coordinate generation & wrap range offset ratio [%] | 0 |
| 13 | Initial coordinate generation & round coordinate offset value [step] | |
| 14 | Wrap setting | Disable |
| 15 | The number of the RND-ZERO output in wrap range | 1 |

■ When the wrap function is used

● Setting example: When the motor output shaft rotates 18 revolutions, the index table rotates one revolution.

Set the parameters in the following steps.



Related parameters

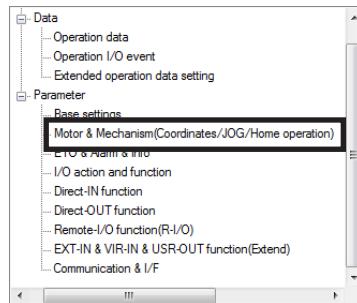
| MEXE02 tree view | Parameter name | Description | Initial value |
|---------------------|---|---|---------------|
| Motor and mechanism | Wrap setting | Set the wrap function. Setting range 0: Disable 1: Enable | 1 |
| | Initial coordinate generation & wrap setting range | Set the wrap range. The position information of the present position is automatically preset when the motor has rotated for the number of times set here. Setting range Refer to the next table. | 10 |
| | Initial coordinate generation & wrap range offset ratio | Set the offset ratio of the wrap range. Setting range 0 to 10,000 (1=0.01%) | 5,000 |
| | Initial coordinate generation & wrap range offset value | Set the amount of offset of the wrap range. Setting range -536,870,912 to 536,870,911 steps | 0 |

STEP 1 Set the wrap function

Set the "wrap setting" parameter.

- Click "Motor and Mechanism (Coordinates/JOG/Home Operation)" under "Parameter" in the tree view.

The motor and mechanism parameter is shown.



- Set the "Wrap setting" parameter to "Enable".

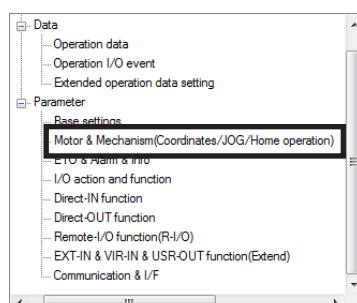
| | | |
|----|--|-------------------------|
| 10 | Initial coordinate generation/wrap coordinate setting | Prioritize ABZO setting |
| 11 | Initial coordinate generation & wrap setting range [rev] | 1.0 |
| 12 | Initial coordinate generation & wrap range offset ratio [%] | 50.00 |
| 13 | Initial coordinate generation & round coordinate offset value [step] | 0 |
| 14 | Wrap setting | Effective |
| 15 | The number of the RND-ZERO output in wrap range | 1 |

STEP 2 Set the wrap range

Set the "Initial coordinate generation & wrap setting range" parameter. When the motor rotates the number of revolutions that was set, the position information of the present position is automatically preset. Set when unidirectional operation or proximity operation is performed using a rotating mechanism.

- Click "Motor and Mechanism (Coordinates/JOG/Home Operation)" under "Parameter" in the tree view.

The motor and mechanism parameter is shown.



2. Set the "Initial coordinate generation & wrap setting range" parameter.
 The internal coordinate of the ABZO sensor is 900 rev or 1,800 rev.
 This example is set to "18" so that the position information is preset when the motor output shaft rotates 18 revolutions.

| | | Manual setting (use driver parameter) |
|----|--|---------------------------------------|
| 10 | Initial coordinate generation/wrap coordinate setting | |
| 11 | Initial coordinate generation & wrap setting range [rev] | 18.0 |
| 12 | Initial coordinate generation & wrap range offset ratio [%] | 50.00 |
| 13 | Initial coordinate generation & round coordinate offset value [step] | 0 |
| 14 | Wrap setting | Effective |
| 15 | The number of the RND-ZERO output in wrap range | 1 |

Internal coordinate of the ABZO sensor

| Frame size [mm (in.)] | Internal coordinate of the ABZO sensor | Initial value |
|---|--|-----------------------------|
| 20 (0.79 in.), 28 (1.10 in.) | 900 rev | ±450 rev (offset ratio 50%) |
| 40 (1.57 in.), 42 (1.65 in.), 60 (2.36 in.), 85 (3.35 in.), 90 (3.54 in.) | 1,800 rev | ±900 rev (offset ratio 50%) |



Select a value from the table below, and set in the "Initial coordinate generation & wrap setting range" parameter.

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

In the table below, the values which are surrounded with thick box border cannot be set in 900 rev.

| 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 condition of the "Initial coordinate generation & wrap setting range" parameter

When the wrap range meets the following condition, continuous rotation in the same direction becomes possible with the home position maintained.

$$\text{Condition (1)} \quad \frac{1,800^*}{\text{Wrap setting range}} = \text{An integer} \quad * \text{The motors of frame size 20 (0.79 in.) and 28 (1.10 in.) are 900.}$$

$$\text{Condition (2)} \quad \text{Wrap setting range} \times \text{Resolution} = \text{Wrap setting range} \times \frac{\text{Electronic gear B}}{\text{Electronic gear A}} \times 1,000 = \text{An integer}$$

● Setting example 1

- Internal coordinate of the ABZO sensor: 1,800 rev
- Wrap setting range: 100 rev
- Resolution: 1,000 P/R (Electronic gear A=1, Electronic gear B=1)
- Motor: Standard motor (gear ratio 1)

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

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

Both Condition (1) and (2) are integers and this meets the setting condition. Wrap is possible.

● Setting example 2

- Internal coordinate of the ABZO sensor: 1,800 rev
- Wrap setting range: 14.4 rev
- Resolution: 333.333... P/R (Electronic gear A=1, Electronic gear B=1)
- Motor: TH geared motor (gear ratio 3.6)

$$\text{Condition (1)} \quad \frac{1,800}{\text{Wrap setting range}} = \frac{1,800}{14.4} = 125$$

$$\text{Condition (2)} \quad \text{Wrap setting range} \times \frac{\text{Electronic gear B}}{\text{Electronic gear A}} \times 1,000 = 14.4 \times \frac{1}{3} \times 1,000 = 4,800$$

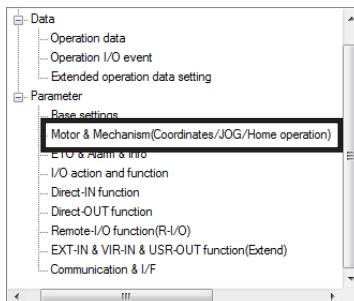
Both Condition (1) and (2) are integers and this meets the setting condition. Wrap is possible.

STEP 3 Set the offset ratio of the wrap range

Set the "Initial coordinate generation & wrap range offset ratio" parameter. The wrap range can be offset in the negative direction by the set ratio.

- Click "Motor and Mechanism (Coordinates/JOG/Home Operation)" under "Parameter" in the tree view.

The motor and mechanism parameter is shown.

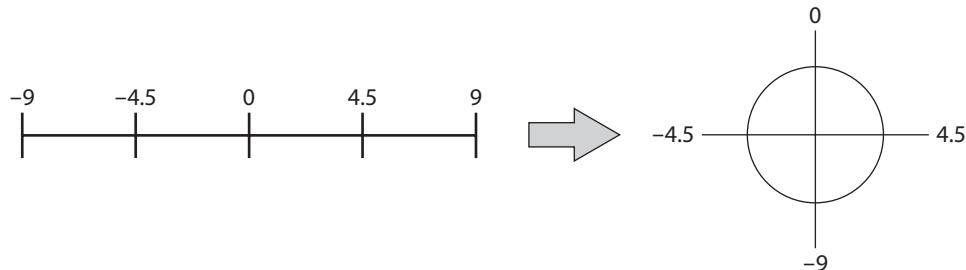


- Set the "Initial coordinate generation & wrap range offset ratio" parameter.

Here, 18 revolutions is divided into 50% each in positive side and negative side so that the index table can be rotated in both directions.

| | | |
|----|--|---------------------------------------|
| 10 | Initial coordinate generation/wrap coordinate setting | Manual setting (use driver parameter) |
| 11 | Initial coordinate generation & wrap setting range [rev] | 18.0 |
| 12 | Initial coordinate generation & wrap range offset ratio [%] | 50.00 |
| 13 | Initial coordinate generation & round coordinate offset value [step] | 0 |
| 14 | Wrap setting | Effective |
| 15 | The number of the RND-ZERO output in wrap range | 1 |

When the "wrap setting range" is 18 rev and the wrap offset ratio is 50%



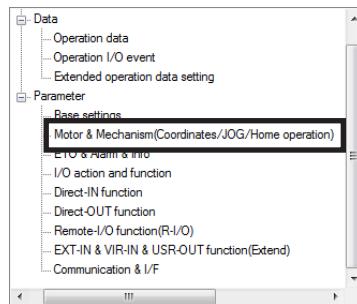
If the "Wrap setting" parameter or "Initial coordinate generation & wrap setting range" parameter is changed, the absolute position may be moved. When the parameter is changed, perform high-speed return-to-home operation or return-to-home operation.

STEP 4 Set the amount of offset of the wrap range

After setting the offset ratio of the wrap range, use when adjusting the home position in increments of a step.

- Click "Motor and Mechanism (Coordinates/JOG/Home Operation)" under "Parameter" in the tree view.

The motor and mechanism parameter is shown.

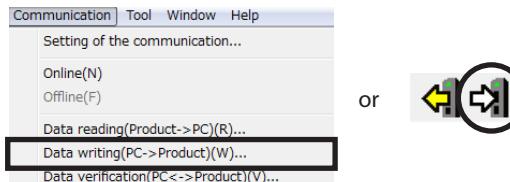


- Set the "Initial coordinate generation & wrap range offset value" parameter.
Set "0" if the setting is not required.

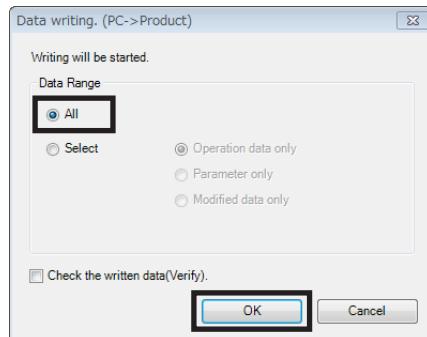
| | | |
|----|--|---------------------------------------|
| 10 | Initial coordinate generation/wrap coordinate setting | Manual setting (use driver parameter) |
| 11 | Initial coordinate generation & wrap setting range [rev] | 18.0 |
| 12 | Initial coordinate generation & wrap range offset ratio [%] | 50.00 |
| 13 | Initial coordinate generation & round coordinate offset value [step] | 0 |
| 14 | Wrap setting | Effective |
| 15 | The number of the RND-ZERO output in wrap range | 1 |

STEP 5 Write the set parameters to the driver

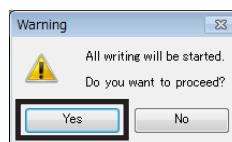
- Click the [Data writing (PC → Product)] from the [Communication] menu or click the [Data writing (PC → Product)] icon in the toolbar.



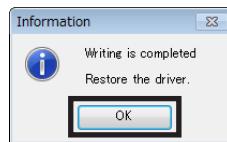
- Select "All" in the data range, and click [OK].



- Click [Yes].
Writing parameters is started.



- Click [OK].



- Cycle the driver power.
Parameters are applied.



If information or alarm of the wrap setting error is generated, the wrap setting condition may not be satisfied. Review the setting of the "User unit setting support wizard" or parameters.

8 Setting of software limit

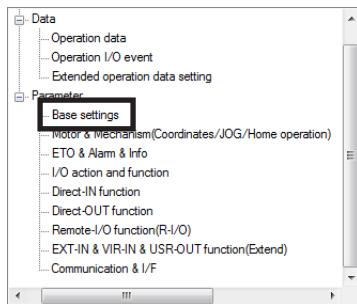
When no sensor is used, the setting of the software limit is recommended.

Set the software limits of the positive and negative sides as well as the stopping method for when the software limit is detected.

■ Setting the motor stopping method

Set the stopping method for when the motor reached the software limit.

- Click the "Base settings" under "Parameter" in the tree view.
The base setting parameters are shown.



- Set the motor stopping method in the "Software overtravel" parameter.

| | | |
|----|--------------------------------|------------------------------|
| 27 | Software overtravel | Deceleration stop with alarm |
| 28 | Positive software limit [step] | 2147483647 |
| 29 | Negative software limit [step] | -2147483648 |
| 30 | Preset position [step] | 0 |



When the "Deceleration stop" is selected, take account the distance till the motor stops after starting deceleration. If the load may contact with the mechanism during deceleration, change the setting to "Immediate stop" or shorten the brake deceleration in the operation data.

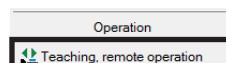
■ Setting of software limit

Set the software limits in the positive side (forward direction) and negative side (reverse direction).



The set values are saved in the non-volatile memory. The non-volatile memory can be rewritten approximately 100,000 times.

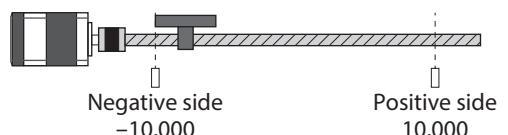
- Click the [Teaching, remote operation] shortcut button or click the [Teaching, remote operation] icon in the toolbar.
- Click "Start the teaching remote operation."



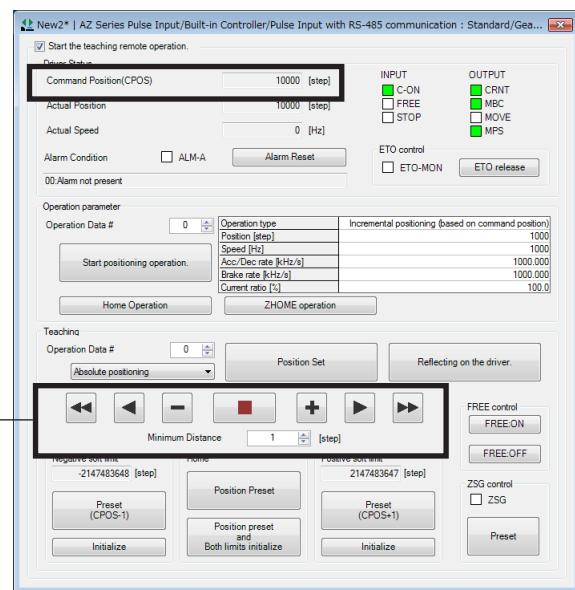
or



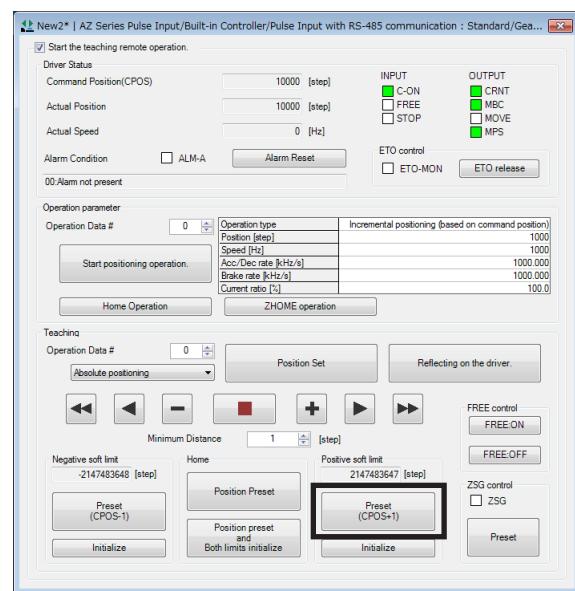
- Set the software limits of the positive and negative sides in the following steps.
This explains as an example for when the moving range is set as shown in the figure.



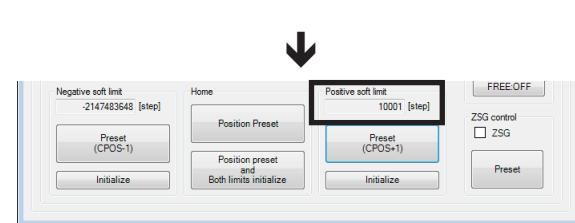
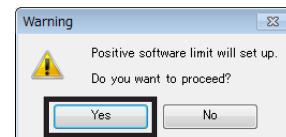
- Using the JOG operation buttons, operate the motor to the moving range 10,000 of the positive side.
Adjust the position while checking the "command position (CPOS)" in the "Driver Status" field.



- Click the [Preset (CPOS+1)] button in the "Positive software limit" field.



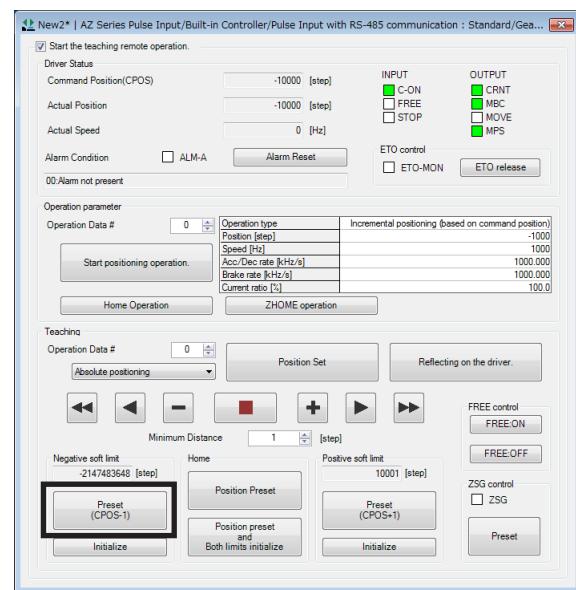
- Click [Yes].
The value that was added 1 to the present command position is set in the software limit.



- Operate the motor to the moving range -10,000 of the negative side using the same method as 1).

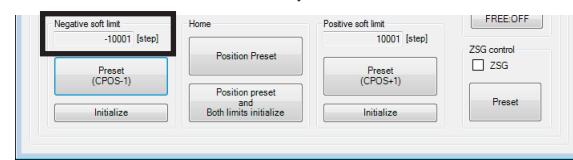
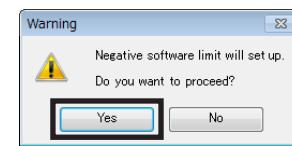
Setting of software limit

- 5) Click the [Preset (CPOS-1)] button in the "Negative software limit" field.



- 6) Click [Yes].

The value that was added -1 to the present command position is set in the software limit.



9 Operation check

Perform an operation check for the items set before this section.



Before operating the motor, check the condition of the surrounding area to ensure safety.

■ Steps for checking

Operation check for return-to-home operation → p.47

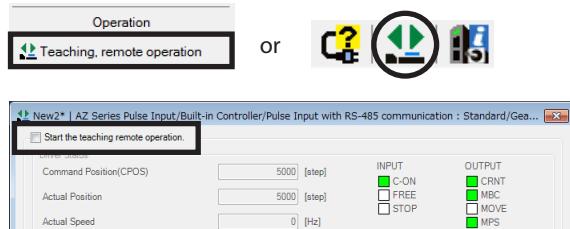


Operation check for software limit → p.48

STEP 1 Check the operating status of return-to-home operation

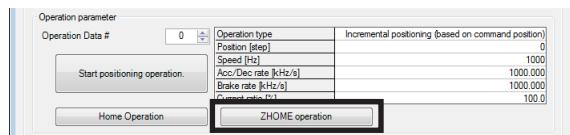
■ When no sensor is used

1. Click the [Teaching, remote operation] shortcut button or click the [Teaching, remote operation] icon in the toolbar.
2. Click "Start the teaching remote operation."



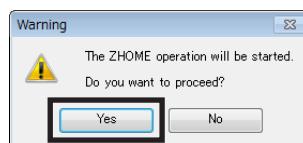
3. Execute the following high-speed return-to-home operation, and check the command position (CPOS) is being "0."

- 1) Click "ZHOME operation."

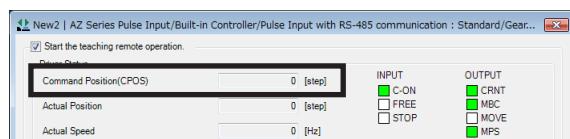


- 2) Click [Yes].

High-speed return-to-home operation is started.



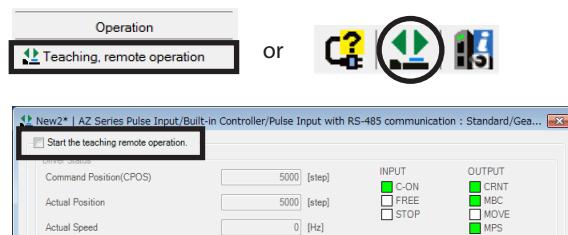
- 3) After the motor stopped, check the command position (CPOS) is being "0."



If information of ZHOME start error is generated, check the setting of the home position. (→ p.36)

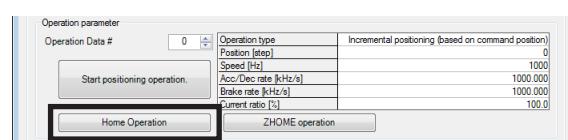
■ When sensors are used

1. Click the [Teaching, remote operation] shortcut button or click the [Teaching, remote operation] icon in the toolbar.
2. Click "Start the teaching remote operation."



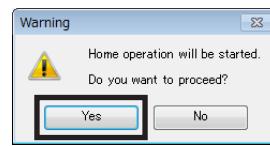
3. Execute the following return-to-home operation, and check the command position (CPOS) is being "0."

- 1) Click "Home operation."

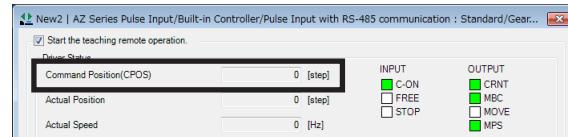


- 2) Click [Yes].

Return-to-home operation is started.



- 3) After the motor stopped, check the command position (CPOS) is being "0".



When return-to-home operation is executed using the input signal, turn the HOME ON.

STEP 2 Check the operation of the software limit

Operate till the software limit with JOG operation, and check an alarm is generated.

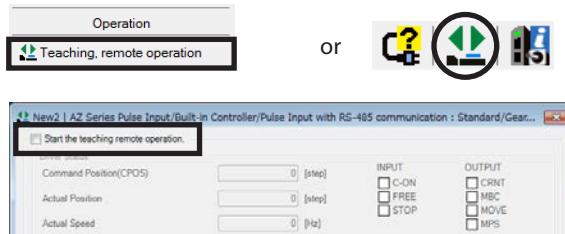
■ Setting of related parameters

Set the parameters related in JOG operation so that the load may not contact with the mechanism when JOG operation is performed.

| MEXE02 tree view | Parameter name | Key point for setting |
|---------------------|--------------------------------------|---|
| Motor and mechanism | JOG/HOME/ZHOME operation setting | If the related parameter is changed, set to "Manual setting." |
| | JOG/HOME/ZHOME operating current | If you want to suppress the torque, set the lower current. |
| | (JOG) Acceleration/deceleration rate | The acceleration/deceleration time and rotation amount vary depending on the setting unit. Set according to the unit. |
| | (JOG) Operating speed | Set according to the equipment you have used. |
| | (JOG) Starting speed | |
| | (JOG) Operating speed (high) | |
| Base settings | Software overtravel | The stopping method set in p.44 is applied. |

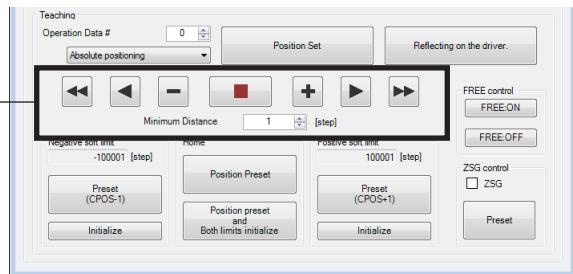
■ Operation check

1. Click the [Teaching, remote operation] shortcut button or click the [Teaching, remote operation] icon in the toolbar.
2. Click "Start the teaching remote operation."

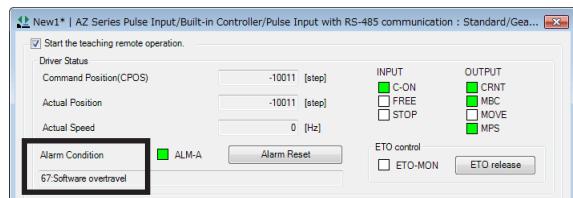


3. Operate the motor using the JOG operation buttons.

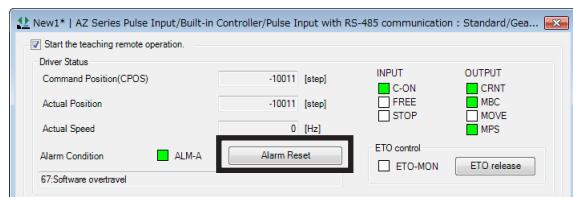
JOG operation buttons



4. If the set software limit is detected, an alarm is generated.
"67: Software overtravel" is shown on the "Alarm Condition" in the "Driver Status" field.



5. Click the [Alarm Reset] button to release the alarm status.
After releasing the alarm, escape from the software limit using the [ZHOME operation] button or JOG operation buttons.



10 Backup of data

There are the following two methods to backup the contents set in the **MEXE02**.

- **Create to save the data file**

The data edited in the **MEXE02** or the data read from the driver can be saved as a file.

Data files can be saved in the **MEXE02** format (.mx2), **MEXE02** extended format (.mx2a), or CSV format (.csv).

Data files saved in the **MEXE02** format and **MEXE02** extended format cannot be opened in other applications. Data saved in the CSV format can be edited in applications other than the **MEXE02**.

- **Save in the backup area of the driver**

The data opened in the **MEXE02** can be saved in the backup area of the driver.

The data stored by the backup function can be read using the restore function.

Refer to p.439 for details.

2

Operation

This part explains the operation functions and parameters.

Table of contents

| | | |
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| 1 | Flow of setting required for positioning operation | 52 |
| 2 | Setting of resolution..... | 53 |
| 3 | Stored data (SD) operation | 55 |
| 4 | Return-to-home operation | 105 |
| 5 | Macro operation | 121 |
| 6 | Relationship between operation type and operation data and parameter | 136 |
| 7 | Position coordinate management..... | 140 |

1 Flow of setting required for positioning operation

OPERATING MANUAL Driver

The contents of  are explained in this manual.

- Install the motor and the driver and arrange wiring.
- Set the home position.

Part Three

Assign I/O.

Assignment of I/O, Input and output conditions, output of the current value, functions to help saving of wiring, etc. are introduced.

Set the coordinate and the resolution.

The method to generate the coordinate of the driver according to your system and the wrap function are introduced. \Rightarrow p.140
In addition, if an electronic gear is used, the resolution can be set. \Rightarrow p.53

Select the operation method and set data.

Stored data operation + Sequence function

The motor is operated by setting the operation data.
Simple sequence functions such as jump and loop can be also executed.

Part Four

Set parameters.

Macro operation

In JOG operation, continuous operation, etc., the motor is operated by inputting a specific signal.

Part Nine

Make settings concerning information and alarms.

High-speed return-to-home
Return-to-home operation

The motor is returned to the home position.

Completion of setting

2 Setting of resolution

Set the resolution for combined use with the mechanism such as the geared motor and actuator.

When 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:

Resolution setting range: 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 tree view | Parameter name | Description | Initial value |
|---------------------|--------------------|---|---------------|
| Motor and mechanism | Mechanism settings | To change the resolution, select manual setting. Setting range 0: ABZO setting is prioritized 1: Manual setting | 0 |
| | Electronic gear A | Sets the denominator of electronic gear. Setting range 1 to 65,535 | |
| | Electronic gear B | Sets the numerator of electronic gear. Setting range 1 to 65,535 | 1 |



- When the "Mechanism settings" parameter is changed, cycle the power of the driver.
- If the value out of the setting range is set, the information of electronic gear setting error is generated. If the power is cycled or configuration is executed while the information of electronic gear setting error is present, an alarm of electronic gear setting error is generated.
- If the resolution was changed after executing preset with the "Preset position" parameter other than "0," execute preset again. When the "Preset position" parameter is "0," the present position is recalculated automatically even if the resolution is changed.



- The initial value of resolution may vary depending on the product connected.
- If you use the pulse-input type, refer to p.485. (⇒ p.485)

■ Calculation of electronic gears A and B

Calculation of electronic gears A and B is explained 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)

$$\text{Mechanical resolution} = 1000 \times \frac{\text{Electronic gear B}}{\text{Electronic gear A}} = \frac{\text{Lead of ball screw}}{\text{Minimum travel amount}} \times \frac{1}{\text{Gear ratio}}$$

$$\text{In this example, } 1000 \times \frac{\text{Electronic gear B}}{\text{Electronic gear A}} = \frac{12 \text{ mm}}{0.01 \text{ mm}} \times \frac{1}{1}$$

$$\text{Therefore, } \frac{\text{Electronic gear B}}{\text{Electronic gear A}} = \frac{12}{10} = \frac{6}{5}$$

Therefore, electronic gear A is 5 and electronic gear B is 6, 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)

$$\text{Mechanical resolution} = 1000 \times \frac{\text{Electronic gear B}}{\text{Electronic gear A}} = \frac{\text{Travel amount per revolution}}{\text{Minimum travel amount}} \times \frac{1}{\text{Gear ratio}}$$

$$\text{In this example } 1000 \times \frac{\text{Electronic gear B}}{\text{Electronic gear A}} = \frac{360^\circ}{0.01^\circ} \times \frac{1}{10}$$

$$\text{Therefore, } \frac{\text{Electronic gear B}}{\text{Electronic gear A}} = \frac{36}{10} = \frac{18}{5}$$

Therefore, electronic gear A is 5 and electronic gear B is 18, and the resolution is 3600 P/R.

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

The A-phase output and B-phase output are pulse signals output from the ABZO sensor. Since pulses are output from the A-phase and B-phase outputs in response to the motor operation, the motor position can be monitored by counting the number of pulses.

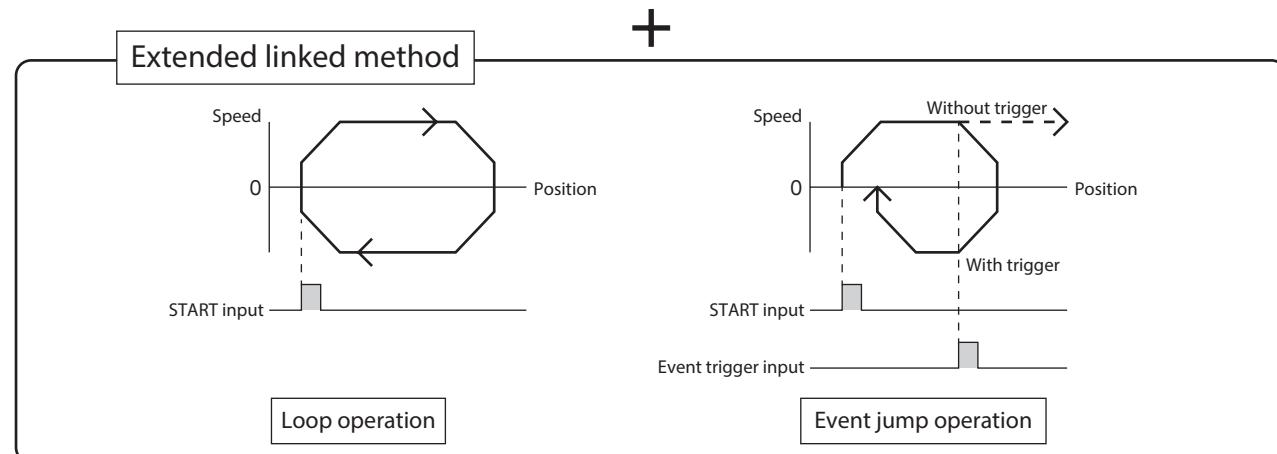
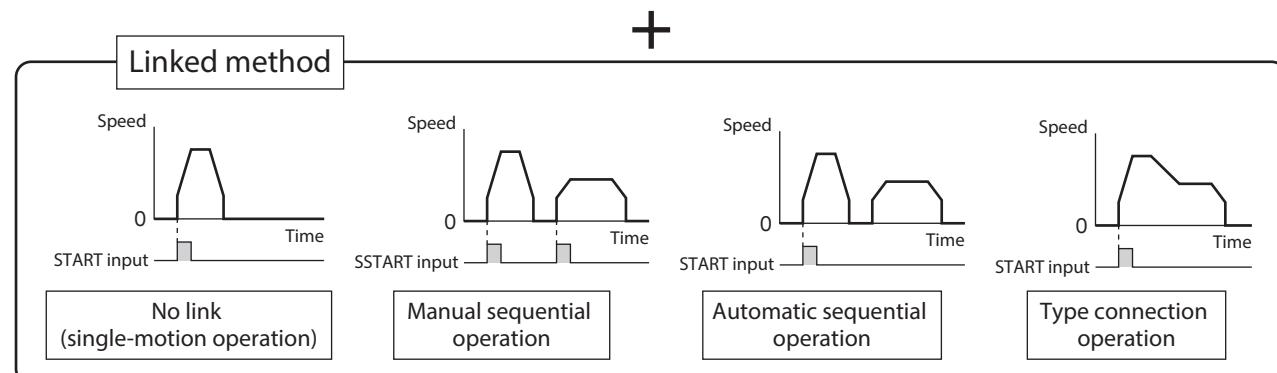
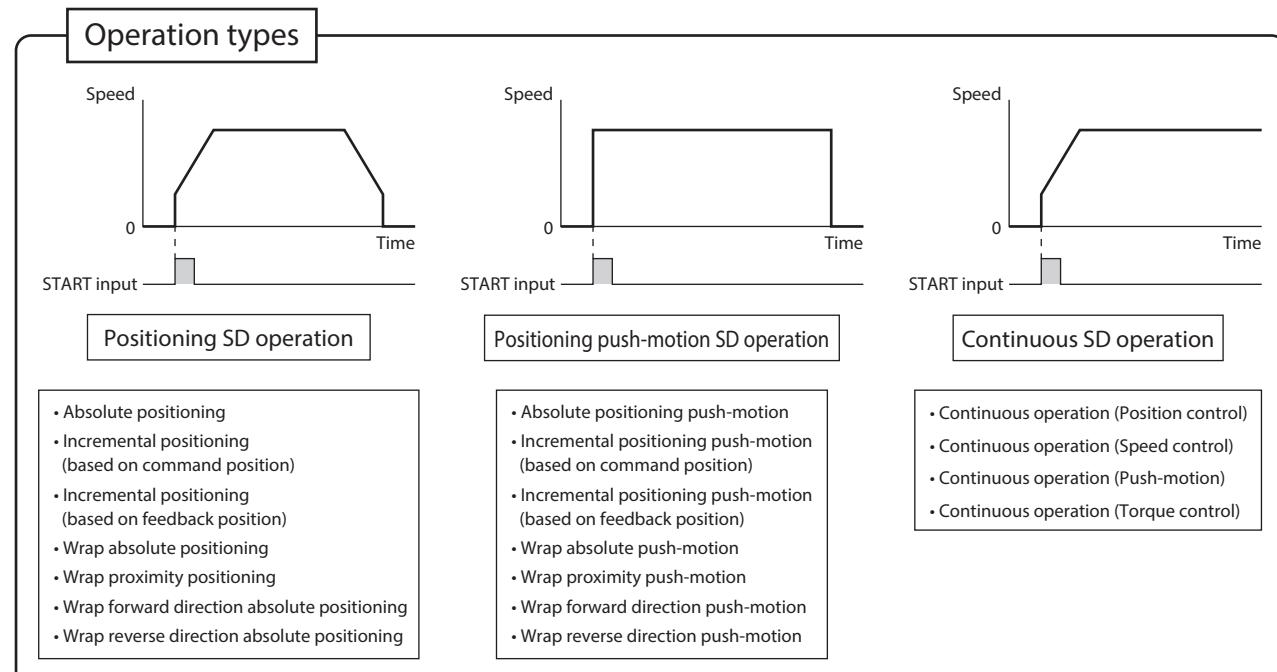
The resolution for the A-phase output and B-phase output is the same as the motor resolution at power-on. If the motor resolution is changed, the resolution for the A-phase and B-phase outputs is also changed.

3 Stored data (SD) operation

Stored data operation is an operation executed by setting the motor operating speed, position (travel amount) and other items as operation data.

* Be sure to set the home position before starting an operation.

3-1 Types of stored data (SD) operation



■ Operation types

| Operation types | Description | |
|--|---|---|
| Positioning stored data (SD) operation | By setting the motor operating speed, position (travel amount) and other items as operation data, trapezoidal operation is performed from the present position to the target position. The motor is started at the starting speed and accelerates until the operating speed is reached. Once the operating speed is reached, that speed is maintained. Then the motor decelerates when the stopping position approaches, and finally comes to a stop. | |
| How to set target position | Operation mode | 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 of the set travel amount is performed from the present command position. |
| | Incremental positioning (based on feedback position) | Positioning operation of 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. |
| Positioning push-motion stored data (SD) operation | By setting the motor operating speed, position (travel amount) and other items as operation data, rectangular operation (drive without acceleration/deceleration time) is performed from the present position to the target position. If you use the TLC output as a completion signal of push-motion operation, you can judge whether or not push-motion against the load occurred during operation. | |
| How to set target position | Operation mode | Description |
| Absolute positioning | Absolute positioning push-motion | Positioning push-motion operation is performed from the present position to the set target position. |
| Incremental positioning | Incremental positioning push-motion (based on command position) | Positioning push-motion operation of the set travel amount is performed from the present command position. |
| | Incremental positioning push-motion (based on feedback position) | Positioning push-motion operation of the set travel amount is performed from the present feedback position. |
| Wrap absolute positioning | Wrap absolute push-motion | Positioning push-motion operation is performed to the target position within the wrap range. |
| | Wrap proximity push-motion | Positioning push-motion operation in the shortest distance is performed to the target position within the wrap range. |
| | Wrap forward direction push-motion | Positioning push-motion operation in the forward direction is performed to the target position within the wrap range. |
| | Wrap reverse direction push-motion | Positioning push-motion operation in the reverse direction is performed to the target position within the wrap range. |

| Operation types | Description | |
|---------------------------------------|--|---|
| Continuous stored data (SD) operation | Operation mode | Description |
| | Continuous operation (Position control) | The motor is started running at the starting speed and accelerates until the operating speed is reached. When the operating speed is reached, operation is continued with the speed maintained while monitoring the position deviation. |
| | Continuous operation (Speed control) | The motor is started running at the starting speed and accelerates until the operating speed is reached. When the operating speed is reached, operation is continued with the speed maintained. |
| | Continuous operation (Push-motion) | The motor is started running at the starting speed and accelerates until the operating speed is reached. When the operating speed is reached, operation is continued with the speed maintained. When a mechanism installed to the motor presses against a load, pressure is continuously applied to the load. |
| | Continuous operation (Torque control) | Rectangular operation (drive without acceleration/ deceleration time) of the motor is executed at the operating speed, and operation is continued with the speed maintained. When a mechanism installed to the motor presses against a load, pressure is continuously applied to the load. |

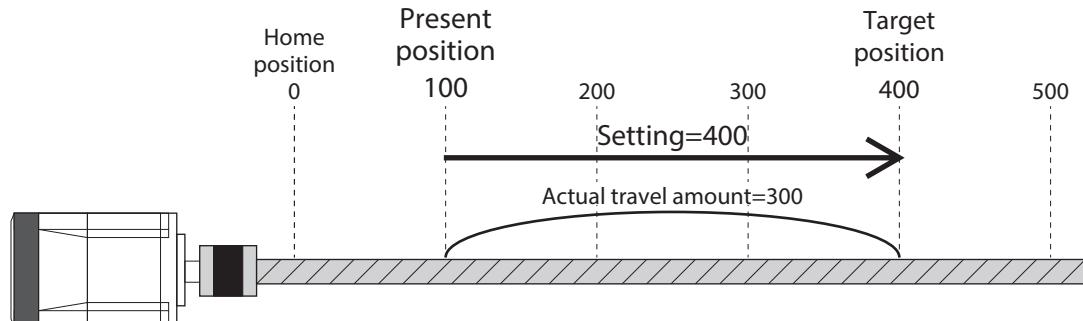
■ How to set target position

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

● Absolute positioning

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

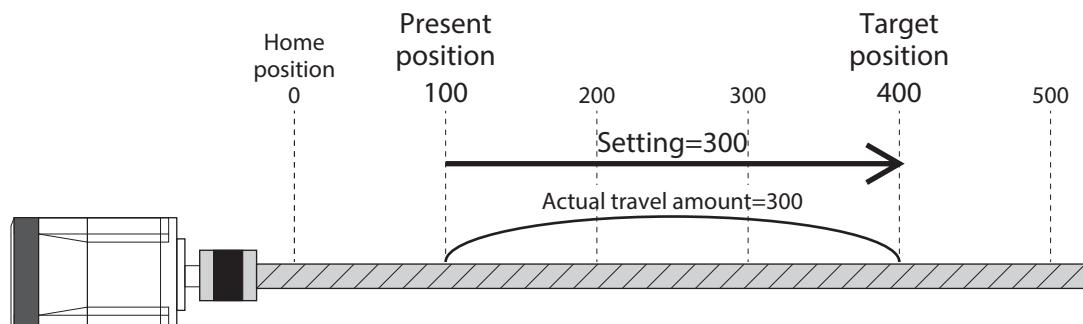
Example: Setting to move from the present position "100" to the target position "400"



● Incremental positioning

Set the target position by using the position to which the motor has moved as a start point of the next movement. It is suitable for operation in which the same travel amount is repeatedly used.

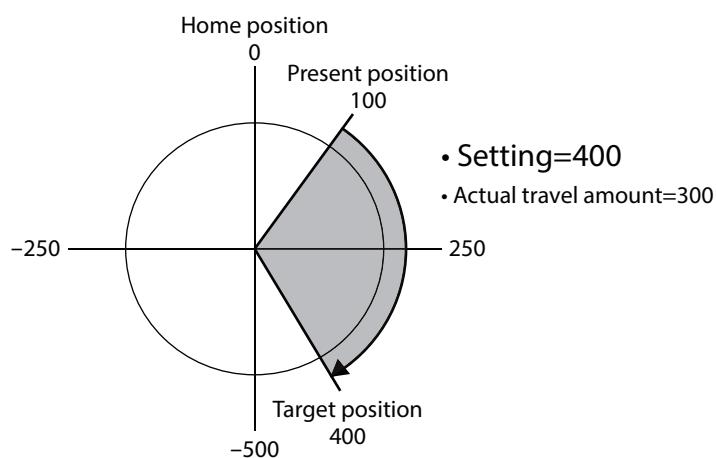
Example: Setting to move from the present position "100" to the target position "400"



● Wrap absolute positioning

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

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



3-2 Setting of data

There are three types of settings concerning stored data operation as shown below.

● Operation data

The operation type, target position, operating speed, acceleration/deceleration rate, operating current, etc. required for stored data operation are set.

● Operation I/O event

The condition to generate an event required for the event jump function, the next data and linked method of the operation when an event is generated are set. Utilize this setting when you use the event jump function.

● Extended operation data setting

The loop start position, loop end position, number of times of loop required for the extended loop function are set. Utilize this setting to execute loop operation with number of times that cannot be set in operation data (256 or more).

■ Operation data

The following operation data are required for the stored data operation. Up to 256 operation data pieces (No.0 to 255) can be set.

| MEXE02 tree view | Item | Description | Initial value |
|------------------|------------------------|---|---------------|
| Operation data | Type | <p>Selects the operation type.</p> <p>Setting range</p> <p>1: Absolute positioning 2: Incremental positioning (based on command position) 3: Incremental positioning (based on feedback position) 7: Continuous operation (Position control) 8: Wrap absolute positioning 9: Wrap proximity positioning 10: Wrap forward direction absolute positioning 11: Wrap reverse direction absolute positioning 12: Wrap absolute push-motion 13: Wrap proximity push-motion 14: Wrap forward direction push-motion 15: Wrap reverse direction push-motion 16: Continuous operation (Speed control) 17: Continuous operation (Push-motion) 18: Continuous operation (Torque control) 20: Absolute positioning push-motion 21: Incremental positioning push-motion (based on command position) 22: Incremental positioning push-motion (based on feedback position)</p> | 2 |
| | Position | <p>Sets the target position (travel amount). It is not used for continuous SD operation.</p> <p>Setting range</p> <p>-2,147,483,648 to 2,147,483,647 steps</p> | |
| | Operating speed | <p>Sets the operating speed.</p> <p>Positioning operation and push-motion operation are performed at an absolute operating speed. For continuous operation, when a positive value is set, the motor rotates in the forward direction. When a negative value is set, it rotates in the reverse direction.</p> <p>Setting range</p> <p>-4,000,000 to 4,000,000 Hz</p> | 1,000 |
| | Starting/changing rate | <p>Sets the acceleration/deceleration rate (acceleration/deceleration time) for start and change of the speed.</p> <p>Setting range</p> <p>1 to 1,000,000,000 (1=0.001 kHz/s, 1=0.001 s, or 1=0.001 ms/kHz)</p> | 1,000,000 |

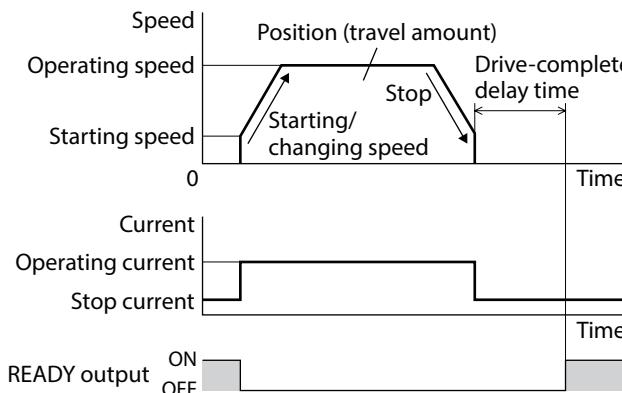
| MEXE02 tree view | Item | Description | Initial value |
|------------------|---------------------------|--|---------------|
| Operation data | Stopping deceleration | Sets the deceleration rate (deceleration time) for stop. Setting range 1 to 1,000,000,000 (1=0.001 kHz/s, 1=0.001 s, or 1=0.001 ms/kHz) | 1,000,000 |
| | Operating current | Sets the motor operating current based on the base current being 100%. It is a push-motion current when push-motion operation is performed. Setting range 0 to 1,000 (1=0.1%) | 1,000 |
| | Drive-complete delay time | Sets the waiting time generated after operation is completed. Setting range 0 to 65,535 (1=0.001 s) | 0 |
| | Link | Sets the mode for link operation. Setting range 0: No link 1: Manual sequential 2: Automatic sequential 3: Continuous form connection | 0 |
| | Next data No. | Sets the next data. Setting range –256: Stop –2: ↓↓(+2) –1: ↓(+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 the positioning operation. Sets the distance to the operation start position in the case of continuous operation. Setting range –2,147,483,648 to 2,147,483,647 steps | 0 |
| | Area width | Sets the range in which the MAREA output is turned ON. Setting range –1: Disable 0 to 4,194,303 steps | –1 |
| | Loop count | Sets the number of times of loop. Setting range 0: –(No loop) 2 to 255: loop 2{to loop 255{ (number of times of loop) | 0 |
| | Loop offset | Offsets the position (travel amount) every time loop is executed. Setting range –4,194,304 to 4,194,303 steps | 0 |
| | Loop end No. | Sets to the operation data number in which loop is completed. Setting range 0: –(not the loop end point) 1: }L-End (loop end point) | 0 |
| | (Low) I/O event No. | Sets the number of the operation I/O event to generate a low event. The condition to generate the event is set in Operation I/O event. Setting range –1:–(Disable) 0 to 31: Operation I/O event number | –1 |

| MEXE02 tree view | Item | Description | Initial value |
|------------------|----------------------|---|---------------|
| Operation data | (High) I/O event No. | 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 Operation I/O event. Setting range -1:-(Disable) 0 to 31: Operation I/O event No. | -1 |

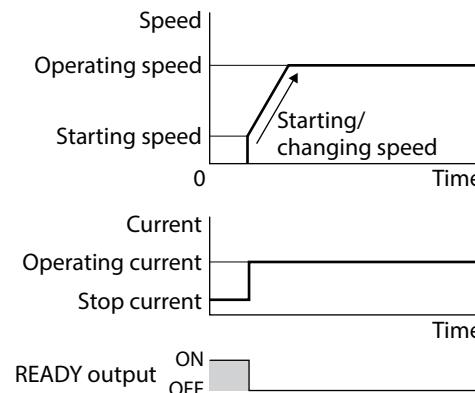
● Position, Speed, Starting/changing rate, Stopping deceleration, Operating current, Drive-complete delay time

Sets the target position, operating speed, acceleration/deceleration rate (acceleration/deceleration time), and operating current required for stored data operation.

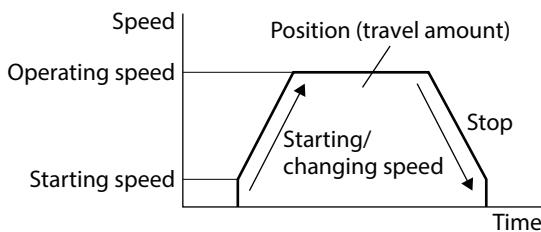
• Positioning operation



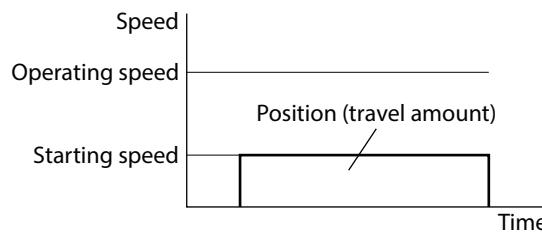
• Continuous operation



• When starting speed < operating speed



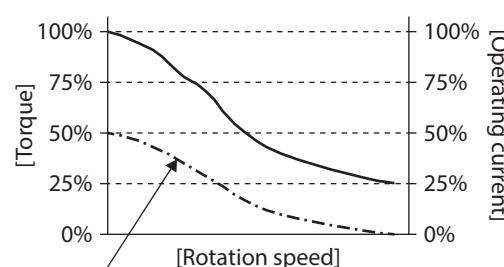
• When operating speed ≤ starting speed



For torque limiting in push-motion operation, set with "Operating current" in operation data. Set with the maximum holding torque as 100%.

Example) If you want to limit the torque value to 50%, set the operating current to 50%.

| | Stopping deceleration [kHz/s] | Operating current [%] | Drive-complete delay time [s] |
|----|-------------------------------|-----------------------|-------------------------------|
| #0 | 1000.000 | 100.0 | 0.000 |
| #1 | 1000.000 | 100.0 | 0.000 |



Torque characteristics when the torque value of the push-motion operation is limited to 50%

- **Link, Next data No.**

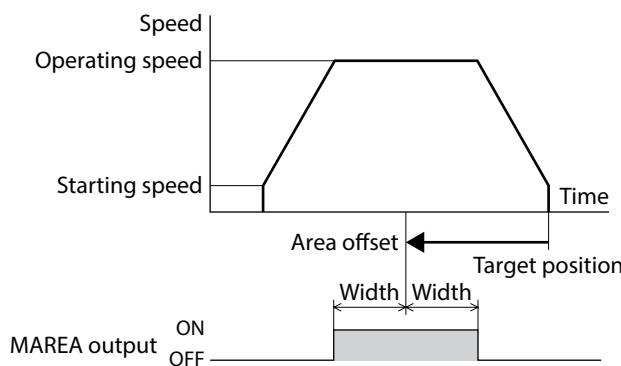
- No Link
Executes operation once with one operation data number. (Single-motion operation)
- Manual sequential
Executes operation of the operation data number set in "Next data No." every time the SSTART input is input. The SSTART input is enabled when the READY output is turned ON.
- Automatic sequential
Starts operation of the operation data number set in "Next data No." automatically after stop for the time set in "Drive-complete delay time."
- Continuous form connection
Executes operation of the operation data number set in "Next data No." continuously without stopping the motor.

- **Area offset, Area width**

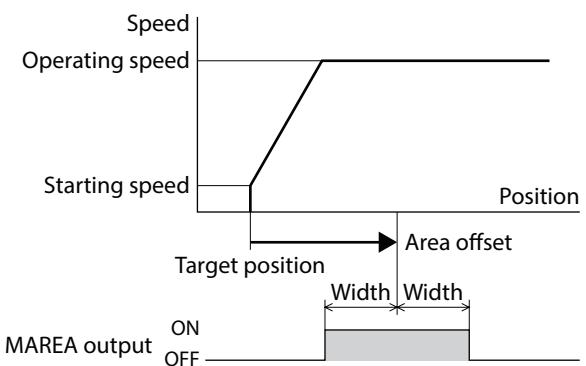
You can set the range of the MAREA output for each operation data by setting Area offset and Area width.

When the operation direction is forward direction

- Positioning operation



- Positioning operation



- **Loop count, Loop offset, Loop end No.**

When you set Loop count, Loop offset, Loop end No., the loop function is enabled.
(⇒ "Loop function" on p.93)

- **(Low) I/O event No., (High) I/O event No.**

When you set (Low) I/O event No. and (High) I/O event No., 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.95)

■ Operation I/O event

Operation I/O event is required for setting of (Low) I/O event No. and (High) I/O event No. of Operation data.

| MEXE02 tree view | Item | Description | Initial value |
|---------------------|---------------------|--|---------------|
| Operation I/O event | Link | Sets the linked method after event trigger detection. Setting range 0: No link 1: Manual sequential 2: Automatic sequential 3: Continuous form connection | 0 |
| | Next data No. | Sets the next data. Setting range -256: Stop -2: ↓↓(+2) -1: ↓(+1) 0 to 255: Operation data number | -256 |
| | Dwell | Sets the waiting time generated after event trigger detection. Setting range 0 to 65535 (1=0.001 s) | 0 |
| | Event trigger I/O | Sets I/O to be used as an event trigger. Setting range "1 Overview of I/O signals" on p.158 | 0: Not used |
| | Event trigger type | Sets the timing to detect the event trigger. Setting range 0: Non (Disable) 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 or number of times of detection to detect the event trigger. Setting range 0 to 65535 (1=1 msec or 1=Once) | 0 |

● Link, Next data No.

Set the linked method and next data when the event trigger is detected. There are four types of link as shown below.

- No link
Ignores the event.
- Manual sequential
Decelerates and stops the present operation. After that, when the time set in "Dwell" has passed, the READY output is turned ON. Operation of the operation data number set in "Next data No." is started when the SSTART input is turned ON.
- Automatic sequential
Decelerates and stops the present operation. After that, when the time set in "Dwell" has passed, operation of the operation data number set in "Next data No." is automatically started.
- Continuous form connection
Starts operation of the operation data number set in "Next data No." without stopping the operation.

■ Selection of operation data number

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

- Selection by NET selection number
- Direct selection (D-SEL0 to D-SEL7)
- Selection using the M0 to M7 inputs

The order of the priority is: NET selection number, direct selection , M0 to M7 inputs.

● NET selection number

The NET selection number is used to set the operation data number via the remote I/O.

If an operation data number other than 0 to 255 is set, the NET selection number is disabled, and direct selection or selection using the M0 to M7 inputs is enabled.

● Direct selection

The direct selection is a method in which the operation data number is set with the parameter and the operation data number is selected by D-SEL0 to D-SEL7 input.

If all the D-SLE0 to D-SEL7 inputs are turned OFF or more than one input are turned ON, the direct selection is disabled, and selection using the M0 to M7 inputs is enabled.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|-------------------------|-----------------------------------|--|---------------|
| I/O action and function | D-SEL drive start function | Sets how to start the motor when the D-SEL input has been turned ON. Setting range 0: Only operation data number selection 1: Operation data number selection+START function | 1 |
| | D-SEL0 operation number selection | Sets the operation data number that is started when each D-SEL input is turned ON. Setting range 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 |

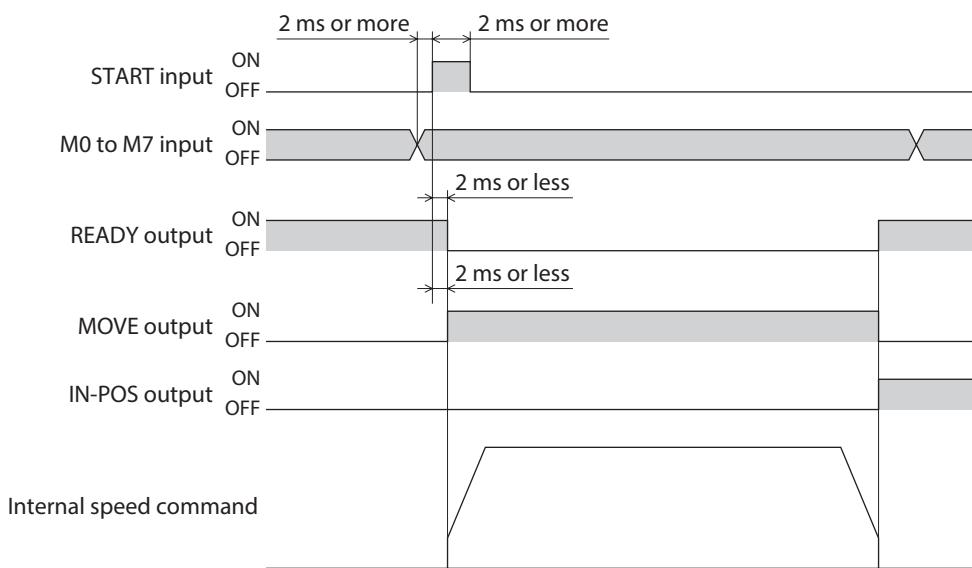
● Selection using the M0 to M7 inputs

This is a method in which the operation data number is selected by combining ON/OFF of the M0 to M7 inputs.

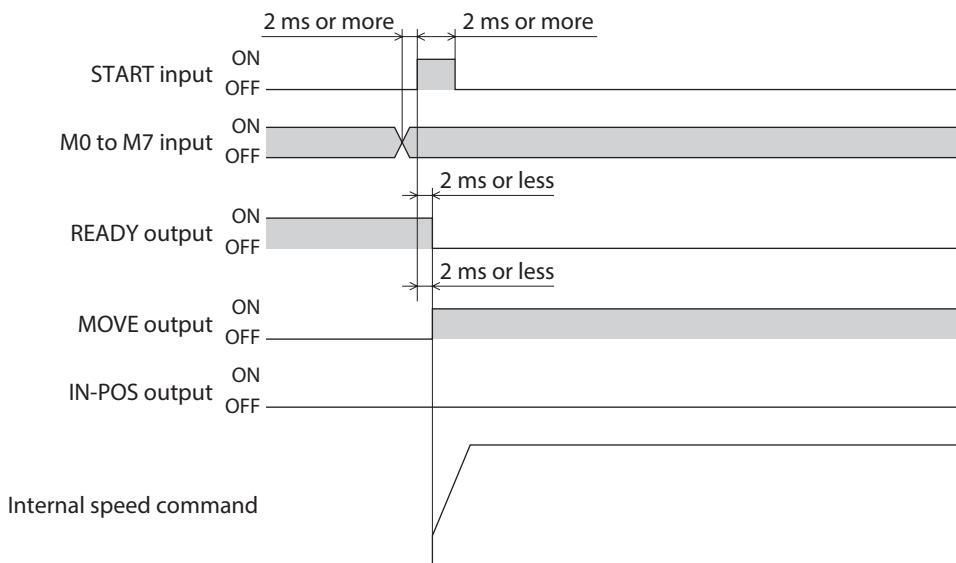
| Operation data number | M7 | M6 | M5 | M4 | M3 | M2 | M1 | M0 |
|-----------------------|-----|-----|-----|-----|-----|-----|-----|-----|
| 0 | OFF |
| 1 | OFF | ON |
| 2 | OFF | OFF | OFF | OFF | OFF | OFF | ON | OFF |
| .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 253 | ON | ON | ON | ON | ON | ON | OFF | ON |
| 254 | ON | OFF |
| 255 | ON |

■ Timing charts

● Positioning operation



● Continuous operation

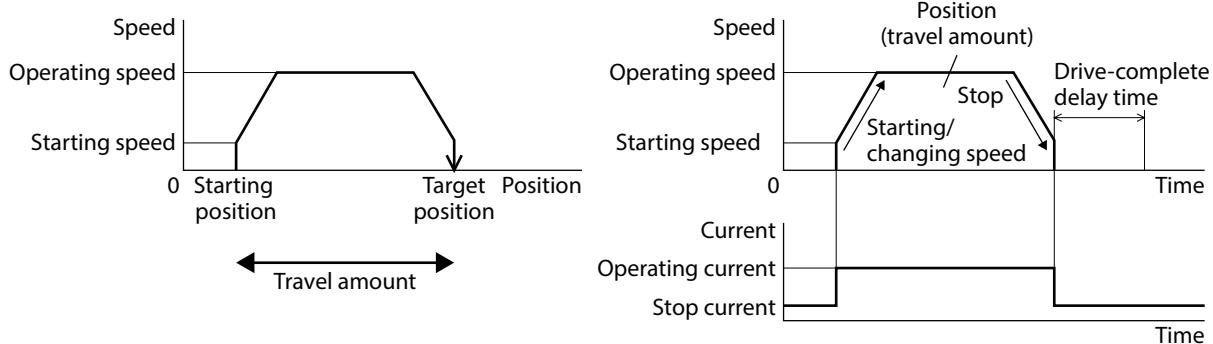


3-3 Positioning SD operation

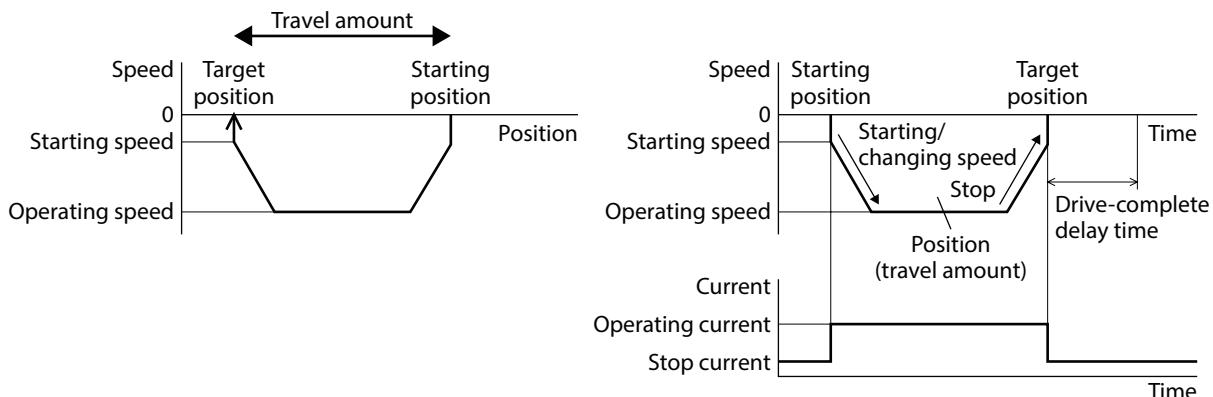
Positioning SD operation is an operation executed by setting the motor operating speed, position (travel amount) and other items as operation data. When positioning SD operation is executed, the motor is started running at the starting speed and accelerates until the operating speed is reached. Once the operating speed is reached, that speed is maintained. Then the motor decelerates when the target position approaches, and finally comes to a stop.

● Operation

When start position < target position (operation in forward direction)



When start position > target position (operation in reverse direction)



Note

The travel amount of positioning SD operation is +2,147,483,647 steps. When the travel amount of the motor exceeds the maximum travel amount of the upper limit or lower limit, an alarm of operation data error is generated.

memo

- The rotation direction (forward/reverse) of positioning SD operation depends on the setting of "Position" of operation data.
When a positive value is set, the motor rotates in the forward direction. When a negative value is set, it rotates in the reverse direction.
- When a negative value is set to "Operating speed" of operation data, it is considered to be a speed of absolute value.

■ Absolute positioning

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

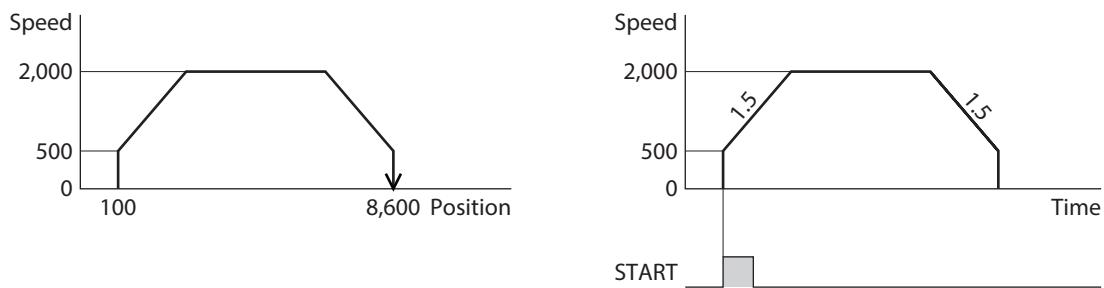
● Usage example

When the motor is operated from the command position 100 to the target position 8,600

Setting of operation data

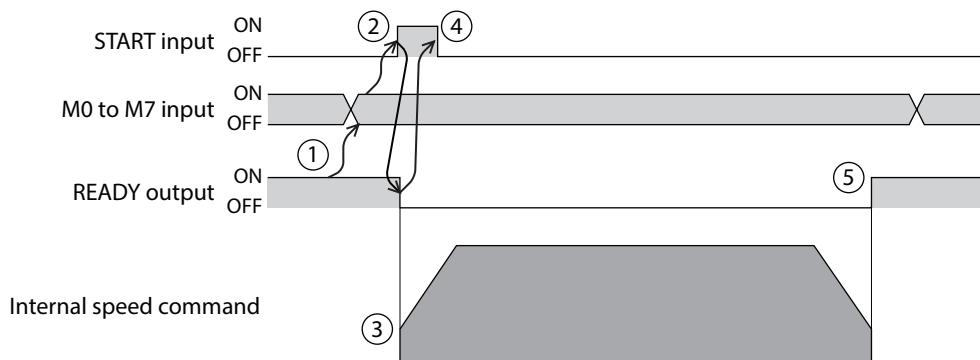
| | Name | Operation type | Position [step] | Operating speed [Hz] | Acceleration [kHz/s] | Stopping deceleration [kHz/s] |
|----|----------------------|----------------|-----------------|----------------------|----------------------|-------------------------------|
| #0 | Absolute positioning | | 8600 | 2000 | 1.500 | 1.500 |

Operation image



Operation method

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



■ Incremental positioning (based on command position)

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

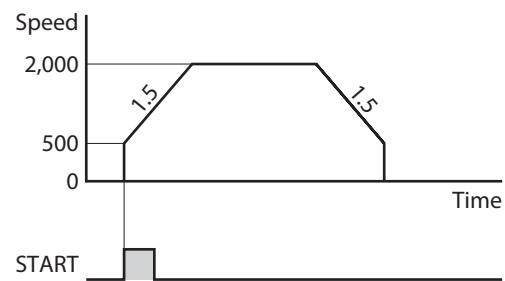
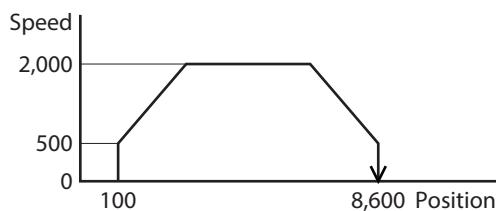
● Usage example

When the motor is operated from the command position 100 to the target position 8,600

Setting of operation data

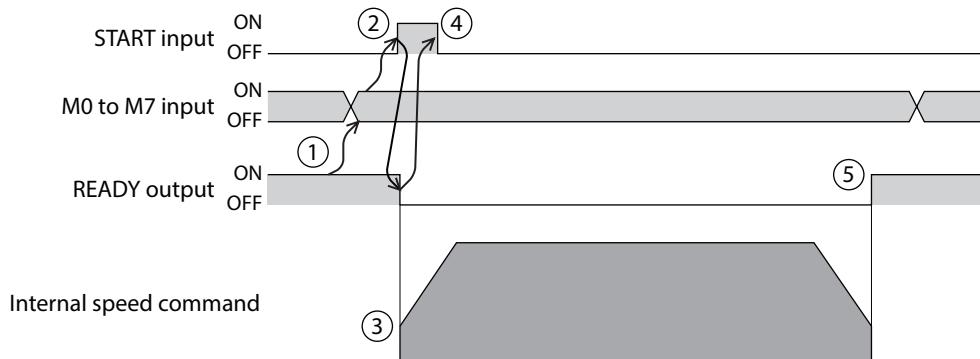
| | Name | Operation type | Position [step] | Operating speed [Hz] | Acceleration [kHz/s] | Stopping deceleration [kHz/s] |
|----|---|----------------|-----------------|----------------------|----------------------|-------------------------------|
| #0 | Incremental positioning (based on command position) | | 8500 | 2000 | 1.500 | 1.500 |

Operation image



Operation method

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



■ Incremental positioning (based on feedback position)

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

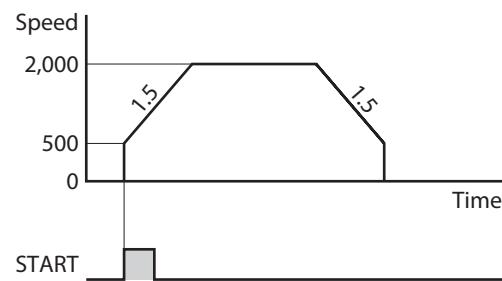
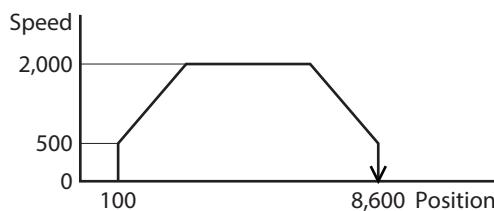
● Usage example

When the motor is operated from the feedback position 100 to the target position 8,600

Setting of operation data

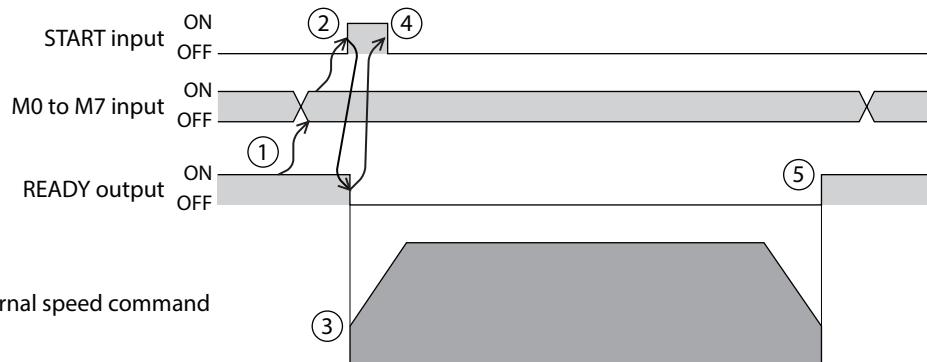
| | Name | Operation type | Position [step] | Operating speed [Hz] | Acceleration [kHz/s] | Stopping deceleration [kHz/s] |
|----|--|----------------|-----------------|----------------------|----------------------|-------------------------------|
| #0 | Incremental positioning (based on feedback position) | | 8500 | 2000 | 1.500 | 1.500 |

Operation image



Operation method

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



The reference position of the operation based on the feedback position varies depending on the load. It is a convenient method to start the next operation from a status in which the command position and the feedback position are different as in the case of positioning push-motion SD operation.

■ Wrap absolute positioning

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

● Usage example

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

Setting of wrap function

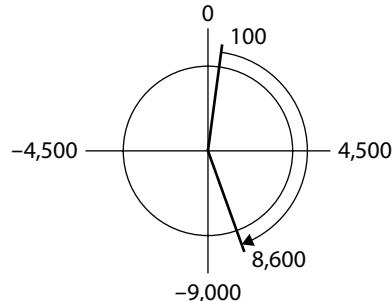
For the details of the wrap function, refer to "Wrap function" on p.147.

| Data | | Operation data Motor & Mechanism(Coordinates/JOG/Home operation) | | Manual setting (use driver parameter) |
|------|--|--|--|---------------------------------------|
| 10 | Initial coordinate generation/wrap coordinate setting | 18.0 | | |
| 11 | Initial coordinate generation & wrap setting range [rev] | 50.0 | | |
| 12 | Initial coordinate generation & wrap range offset ratio [%] | 0 | | |
| 13 | Initial coordinate generation & round coordinate offset value [step] | Effective | | |
| 14 | Wrap setting | 1 | | |
| 15 | The number of the RND-ZERO output in wrap range | | | |

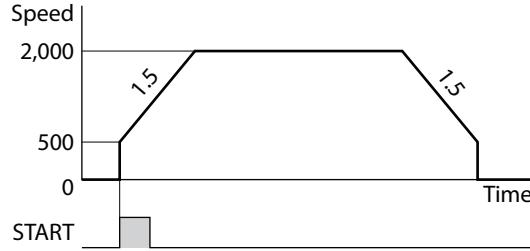
Setting of operation data

| | Name | Operation type | Position [step] | Operating speed [Hz] | Acceleration [kHz/s] | Stopping deceleration [kHz/s] |
|----|---------------------------|----------------|-----------------|----------------------|----------------------|-------------------------------|
| #0 | Wrap absolute positioning | 8600 | 2000 | 1.500 | 1.500 | |

Position coordinate image

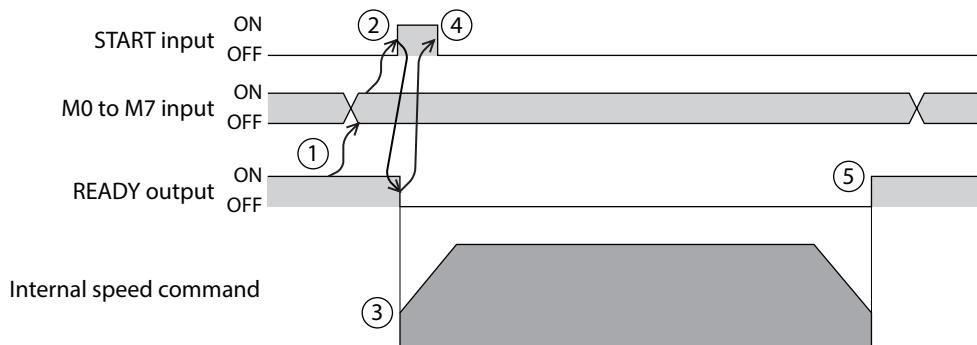


Operation image



Operation method

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



■ Wrap proximity positioning

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

● Usage example

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

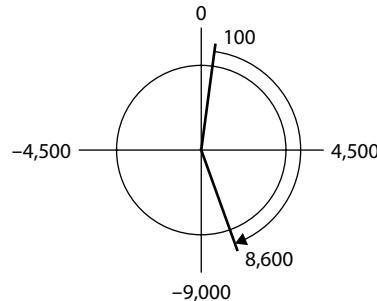
Setting of wrap function

| Data | | Operation data Motor & Mechanism(Coordinates/JOG/Home operation) | | Manual setting (use driver parameter) |
|------|--|--|--|---------------------------------------|
| 10 | Initial coordinate generation/wrap coordinate setting | 18.0 | | |
| 11 | Initial coordinate generation & wrap setting range [rev] | 50.00 | | |
| 12 | Initial coordinate generation & round coordinate offset ratio [%] | 0 | | |
| 13 | Initial coordinate generation & round coordinate offset value [step] | | | |
| 14 | Wrap setting | Effective | | |
| 15 | The number of the RND-ZERO output in wrap range | 1 | | |

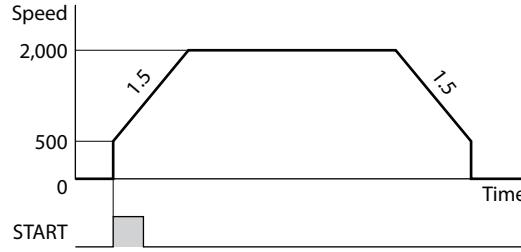
Setting of operation data

| | Name | Operation type | Position [step] | Operating speed [Hz] | Acceleration [kHz/s] | Stopping deceleration [kHz/s] |
|----|----------------------------|----------------|-----------------|----------------------|----------------------|-------------------------------|
| #0 | Wrap proximity positioning | | 8600 | 2000 | 1.500 | 1.500 |

Position coordinate image

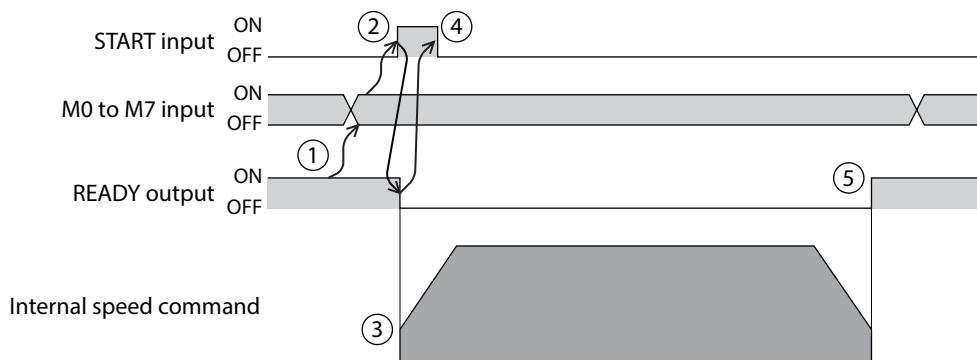


Operation image



Operation method

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



■ Wrap forward direction absolute positioning

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

● Usage example

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

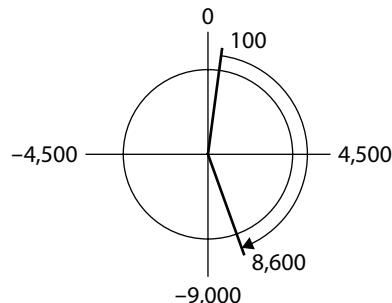
Setting of wrap function

| Data | | Operation data Motor & Mechanism(Coordinates/JOG/Home operation) | | Manual setting (use driver parameter) |
|------|--|--|--|---------------------------------------|
| 10 | Initial coordinate generation/wrap coordinate setting | 18.0 | | |
| 11 | Initial coordinate generation & wrap setting range [rev] | 50.00 | | |
| 12 | Initial coordinate generation & round coordinate offset ratio [%] | 0 | | |
| 13 | Initial coordinate generation & round coordinate offset value [step] | Effective | | |
| 14 | Wrap setting | 1 | | |
| 15 | The number of the RND-ZERO output in wrap range | | | |

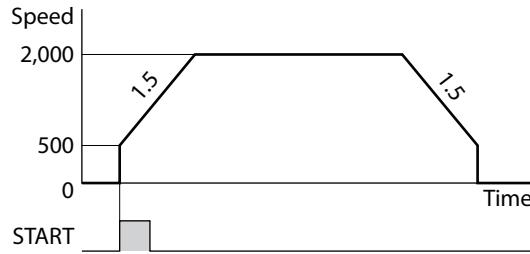
Setting of operation data

| Name | Operation type | Position [step] | Operating speed [Hz] | Acceleration [kHz/s] | Stopping deceleration [kHz/s] |
|------|---------------------------------|-----------------|----------------------|----------------------|-------------------------------|
| #0 | Wrap absolute positioning (FWD) | 8600 | 2000 | 1.500 | 1.500 |

Position coordinate image

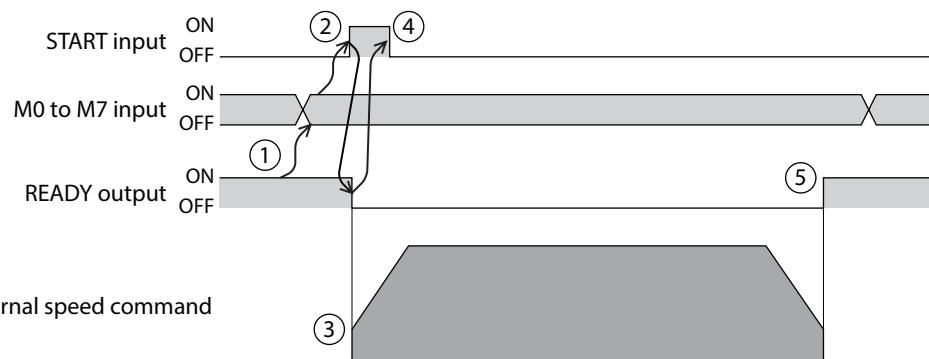


Operation image



Operation method

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



■ Wrap reverse direction absolute positioning

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

● Usage example

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

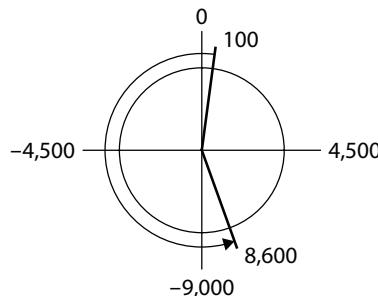
Setting of wrap function

| Data | | Operation data Motor & Mechanism(Coordinates/JOG/Home operation) | | Manual setting (use driver parameter) |
|------|--|--|--|---------------------------------------|
| 10 | Initial coordinate generation/wrap coordinate setting | 18.0 | | |
| 11 | Initial coordinate generation & wrap setting range [rev] | 50.00 | | |
| 12 | Initial coordinate generation & wrap range offset ratio [%] | 0 | | |
| 13 | Initial coordinate generation & round coordinate offset value [step] | | | |
| 14 | Wrap setting | Effective | | |
| 15 | The number of the RND-ZERO output in wrap range | 1 | | |

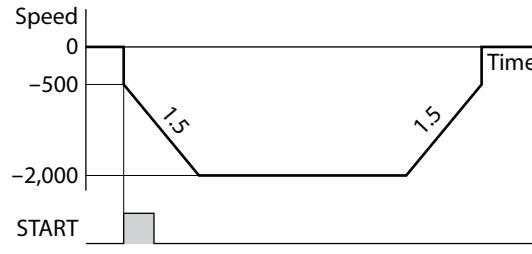
Setting of operation data

| | Name | Operation type | Position [step] | Operating speed [Hz] | Acceleration [kHz/s] | Stopping deceleration [kHz/s] |
|----|---------------------------------|----------------|-----------------|----------------------|----------------------|-------------------------------|
| #0 | Wrap absolute positioning (RVS) | 8600 | 2000 | 1.500 | 1.500 | |

Position coordinate image

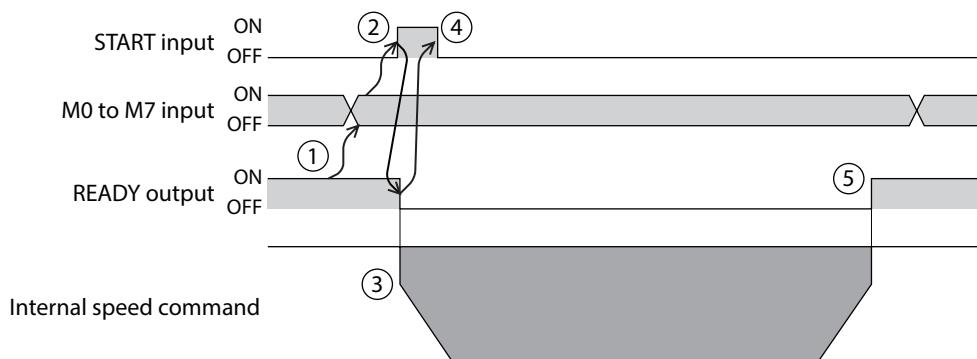


Operation image



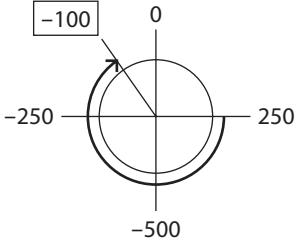
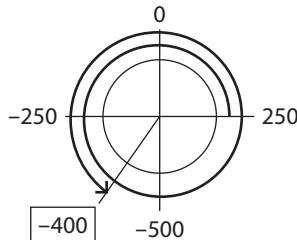
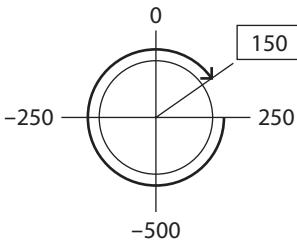
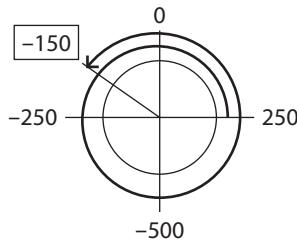
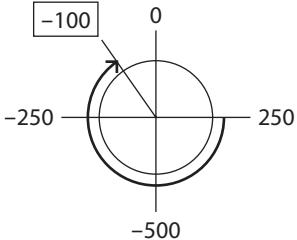
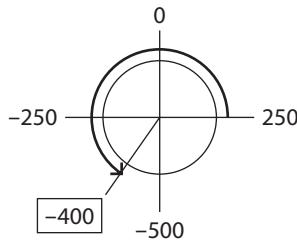
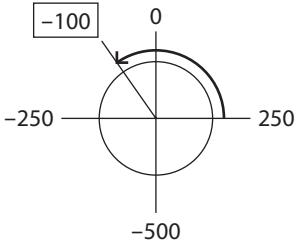
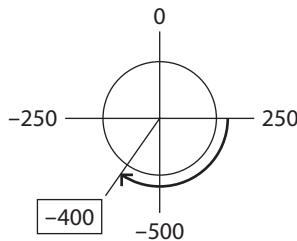
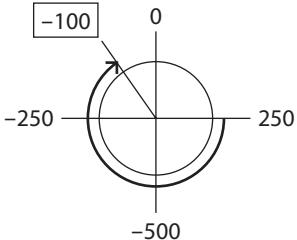
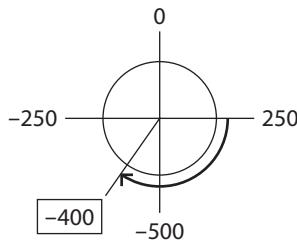
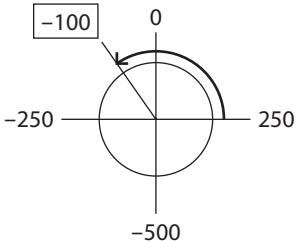
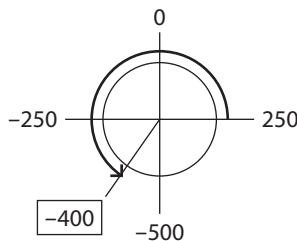
Operation method

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



● Orbit comparison of positioning SD operation

The wrap setting range should be 1 rev, and the wrap offset ratio should be 50%. (⇒ "Wrap function" on p.147)

| Operation mode | Initial value → Value set to "Position" of operation data | |
|---|---|---|
| | 250 → 900 | 250 → -1,400 |
| • Absolute positioning * Sets the coordinate of the target position from the home position |  |  |
| • 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 position as a reference. Operation is performed within the wrap range. |  |  |
| • Wrap proximity positioning * Sets the target position on coordinates with the home position as a reference. Operation in the shortest distance is performed to the target position within the wrap range. |  |  |
| • Wrap forward direction absolute positioning * Sets the target position on coordinates with the home position as a reference. Operation in the forward direction is performed to the target position within the wrap range. |  |  |
| • Wrap reverse direction absolute positioning * Sets the target position on coordinates with the home position as a reference. Operation in the reverse direction is performed to the target position within the wrap range. |  |  |

* The value in the square is the coordinate of the position where the motor stopped.

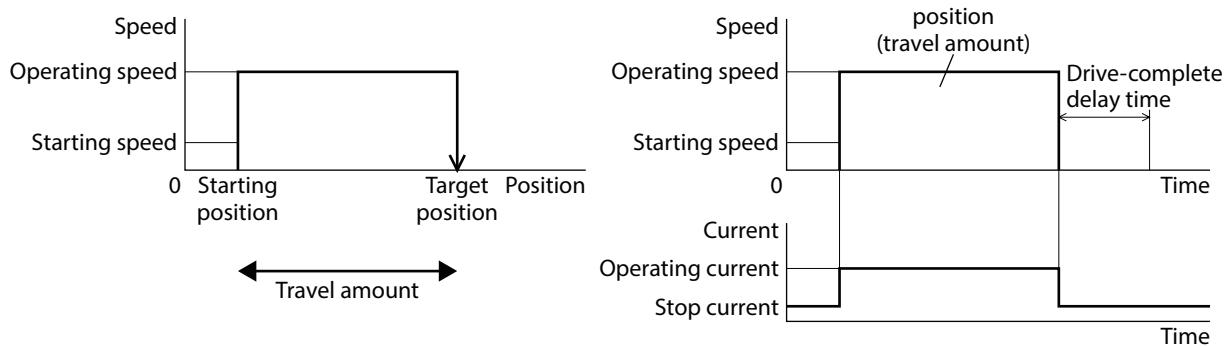
3-4 Positioning push-motion SD operation

Positioning push-motion SD operation is an operation executed by setting the motor operating speed, position (travel amount) and other items as operation data. When positioning push-motion SD operation is executed, rectangular operation (drive without acceleration/deceleration time) is executed at an operating speed set in the operation data. After that, the motor is operated with the speed maintained and stops when it reaches the target position. In addition, if you use the TLC output as a completion signal of push-motion operation, you can judge whether or not push-motion against the load occurred during operation.

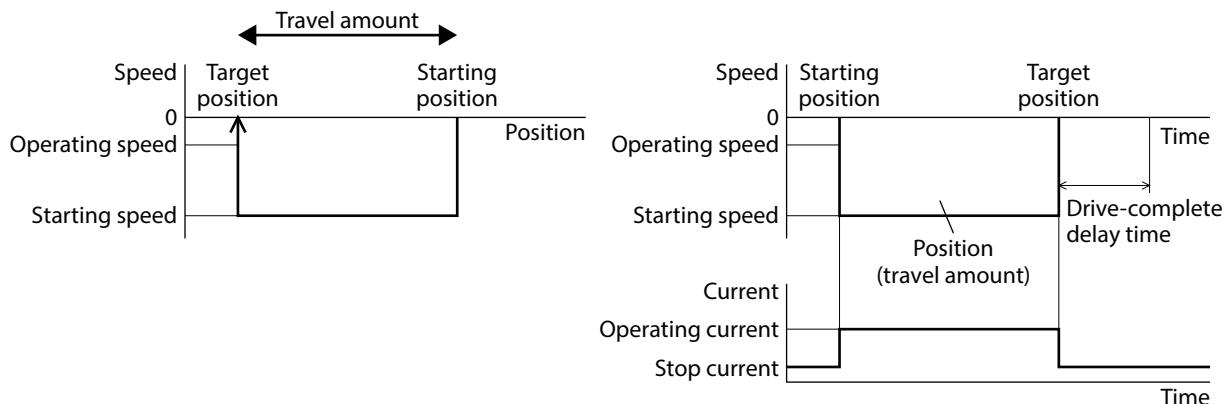
Set the operating current of the next data to the value of the operating current before linking or less. If a value larger than that of the operating current before linking, the push-motion current may become larger when operation transits, and unexpected push-motion force may be applied.

● Operation

When start position < target position (forward direction)

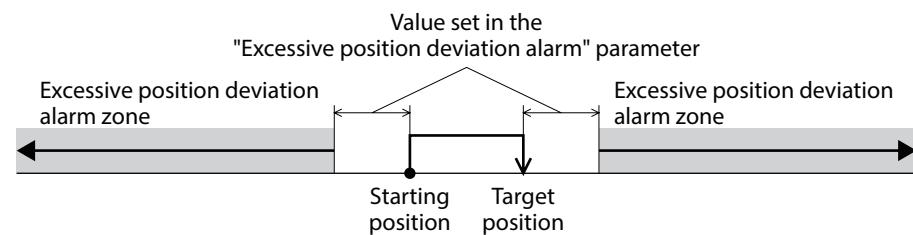


When start position > target position (reverse direction)



Note

- The travel amount of positioning push-motion SD operation is -2,147,483,648 to +2,147,483,647 steps. When the travel amount of the motor exceeds the maximum travel amount of the upper limit or lower limit, an alarm of operation data error is generated.
- Since positioning push-motion SD operation is a rectangular operation (drive without acceleration/deceleration time), the motor may not operate normally if the operating speed is too high.
- When the motor moves to the Excessive position deviation alarm zone due to an external force, an alarm of overflow rotation is generated.





- The rotation direction (forward/reverse) of positioning push-motion SD operation depends on the setting of "Position" of operation data. When a positive value is set, the motor rotates in the forward direction. When a negative value is set, it rotates in the reverse direction.
- When a negative value is set to "Operating speed" of operation data, it is considered to be a speed of absolute value.

■ Absolute positioning push-motion

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

- **Usage example**

When the motor is operated from the present position to the target position 8,600

Setting of operation data

| | Name | Operation type | Position [step] | Operating speed [Hz] |
|----|------|----------------------|-----------------|----------------------|
| #0 | | Absolute push-motion | 8600 | 2000 |

■ Incremental positioning push-motion (based on command position)

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

- **Usage example**

When the motor is operated from the command position 100 to the target position 8,600

Setting of operation data

| | Name | Operation type | Position [step] | Operating speed [Hz] |
|----|------|---|-----------------|----------------------|
| #0 | | Incremental push-motion (based on command position) | 8500 | 2000 |

■ Incremental positioning push-motion (based on feedback position)

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

- **Usage example**

When the motor is operated from the feedback position 100 to the target position 8,600

Setting of operation data

| | Name | Operation type | Position [step] | Operating speed [Hz] |
|----|------|--|-----------------|----------------------|
| #0 | | Incremental push-motion (based on feedback position) | 8500 | 2000 |



The reference position of the operation based on the feedback position varies depending on the load. It is a convenient method to start the next operation from a status in which the command position and the feedback position are different as in the case of positioning push-motion SD operation.

■ Wrap absolute positioning push-motion

Set the target position within the wrap range.

- **Usage example**

When the motor is operated from the present position to the target position 8,600

Setting of operation data

| | Name | Operation type | Position [step] | Operating speed [Hz] |
|----|------|---------------------------|-----------------|----------------------|
| #0 | | Wrap absolute push-motion | 8600 | 2000 |

■ Wrap proximity push-motion

Sets the target position within the wrap range. Positioning push-motion SD operation is executed in the rotation direction near to the target position.

- **Usage example**

When the motor is operated from the present position to the target position 8,600

Setting of operation data

| | Name | Operation type | Position [step] | Operating speed [Hz] |
|----|------|----------------------------|-----------------|----------------------|
| #0 | | Wrap proximity push-motion | 8600 | 2000 |

■ Wrap forward direction push-motion

Sets the target position within the wrap range. Positioning push-motion SD operation is always executed in the forward direction regardless of the target position.

- **Usage example**

When the motor is operated from the present position to the target position 8,600

Setting of operation data

| | Name | Operation type | Position [step] | Operating speed [Hz] |
|----|------|------------------------|-----------------|----------------------|
| #0 | | Wrap push-motion (FWD) | 8600 | 2000 |

■ Wrap reverse direction push-motion

Sets the target position within the wrap range. Positioning push-motion SD operation is always executed in the reverse direction regardless of the target position.

- **Usage example**

When the motor is operated from the present position to the target position 8,600

Setting of operation data

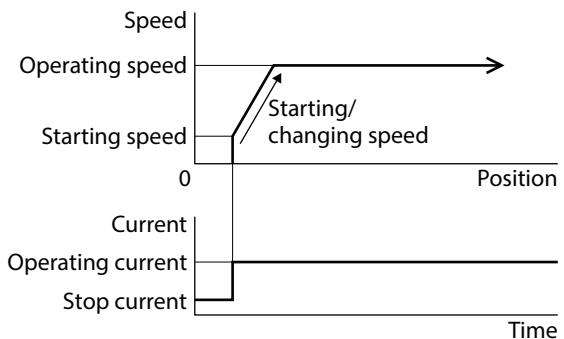
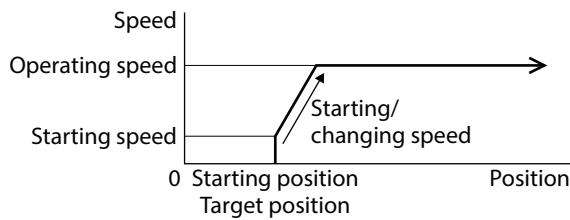
| | Name | Operation type | Position [step] | Operating speed [Hz] |
|----|------|------------------------|-----------------|----------------------|
| #0 | | Wrap push-motion (RVS) | 8600 | 2000 |

3-5 Continuous SD operation

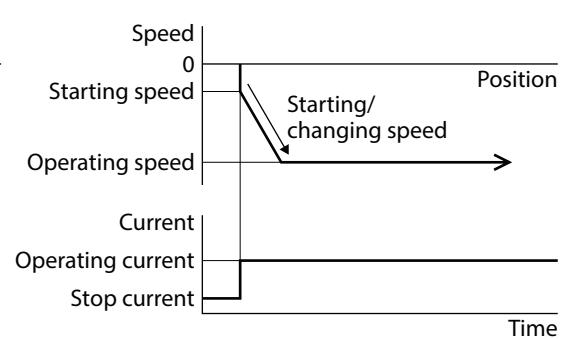
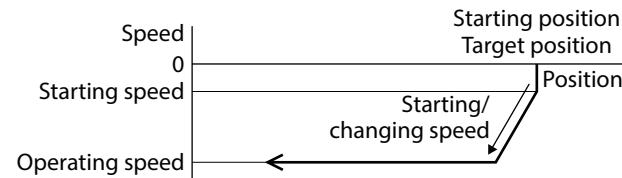
Continuous SD operation is an operation executed by setting the operating speed to the operation data. The motor is continuously operated in the forward direction when a positive operating speed is set, and in the reverse direction when a negative operating speed is set.

● Operation

0 < operating speed (forward direction)



0 > operating speed (reverse direction)



- The target position of continuous SD operation is the start position (command position). The "Position" of operation data is not set.
- When continuous operation (torque) is set, the operation becomes rectangular operation (drive without acceleration/deceleration time).

■ Continuous operation (Position control)

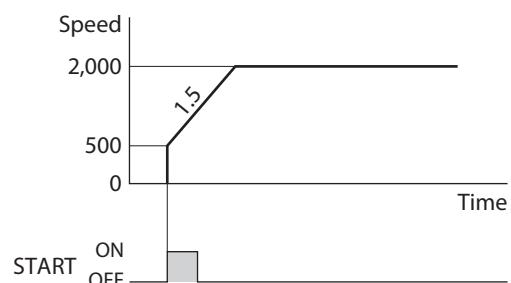
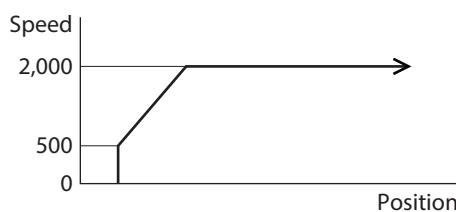
Set the operating speed to the operation data to execute operation. When the operation is executed, the motor is started running at the starting speed and accelerates until the operating speed is reached. When the operating speed is reached, operation is continued with the speed maintained. Operation is executed while the position deviation is monitored, so when a load exceeding the torque of the motor is applied, an alarm of overload or excessive position deviation is generated.

● Usage example

Setting of operation data

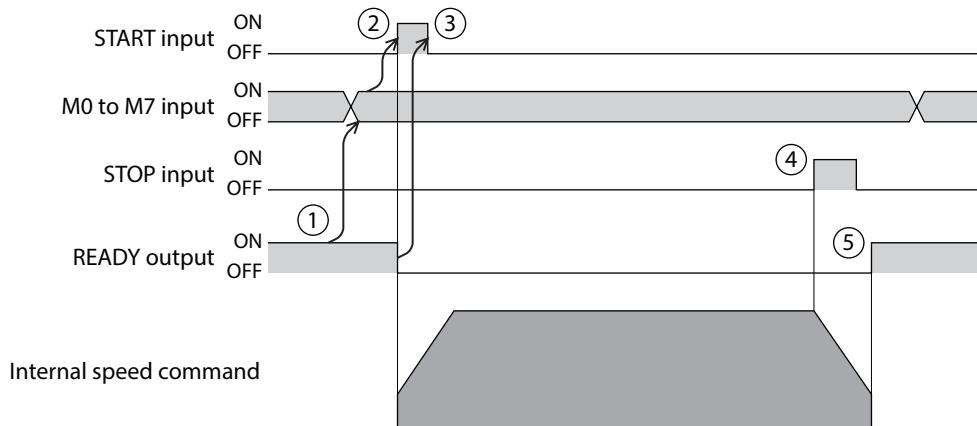
| | Name | Operation type | Position [step] | Operating speed [Hz] | Acceleration [kHz/s] | Stopping deceleration [kHz/s] |
|----|------|-------------------------------|-----------------|----------------------|----------------------|-------------------------------|
| #0 | | Continuous (Position control) | 0 | 2000 | 1.500 | 1.500 |

Operation image



Operation method

1. Check that the READY output is ON.
2. 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.
3. Check that the READY output has been turned OFF and turn the START input OFF.
4. When the STOP input is turned ON, the motor starts deceleration stop.
5. When the motor stops, the READY output is turned ON.



■ Continuous operation (Speed control)

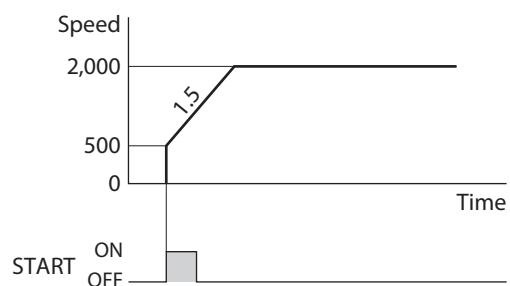
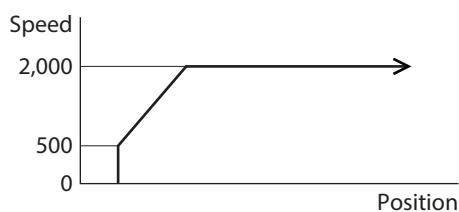
Sets the operating speed to the operation data to execute operation. When the operation is executed, the motor is started running at the starting speed and accelerates until the operating speed is reached. When the operating speed is reached, operation is continued with the speed maintained. When the motor enters an overload status, the position deviation is fixed to a certain value. When a load exceeding the torque of the motor is applied, an alarm of overload is generated.

● Usage example

Setting of operation data

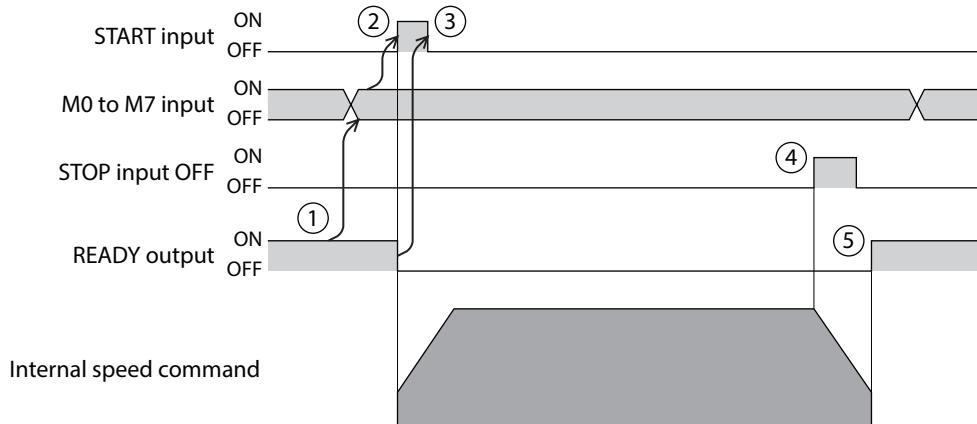
| | Name | Operation type | Position [step] | Operating speed [Hz] | Acceleration [kHz/s] | Stopping deceleration [kHz/s] |
|----|------|----------------------------|-----------------|----------------------|----------------------|-------------------------------|
| #0 | | Continuous (Speed control) | 0 | 2000 | 1.500 | 1.500 |

Operation image



Operation method

1. Check that the READY output is ON.
2. 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.
3. Check that the READY output has been turned OFF and turn the START input OFF.
4. When the STOP input is turned ON, the motor starts deceleration stop.
5. When the motor stops, the READY output is turned ON.



■ Continuous operation (Push-motion)

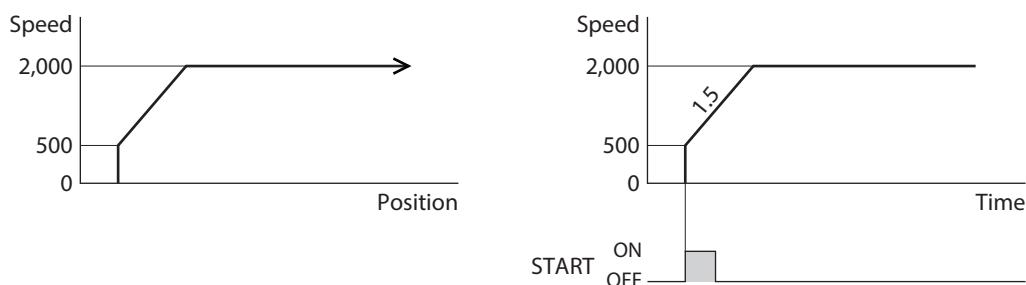
Set the operating speed to the operation data to execute operation. When the operation is executed, the motor is started running at the starting speed and accelerates until the operating speed is reached. When the operating speed is reached, operation is continued with the speed maintained. When a mechanism installed to the motor presses against a load, pressure is continuously applied to the load.

● Usage example

Setting of operation data

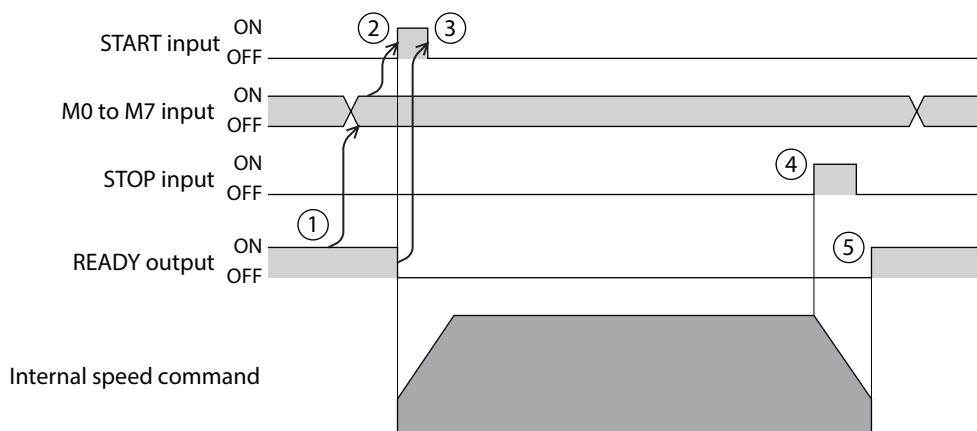
| | Name | Operation type | Position [step] | Operating speed [Hz] | Acceleration [kHz/s] | Stopping deceleration [kHz/s] |
|----|------|--------------------------|-----------------|----------------------|----------------------|-------------------------------|
| #0 | | Continuous (Push motion) | 0 | 2000 | 1.500 | 1.500 |

Operation image



Operation method

1. Check that the READY output is ON.
2. 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.
3. Check that the READY output has been turned OFF and turn the START input OFF.
4. When the STOP input is turned ON, the motor starts deceleration stop.
5. When the motor stops, the READY output is turned ON.



■ Continuous operation (Torque control)

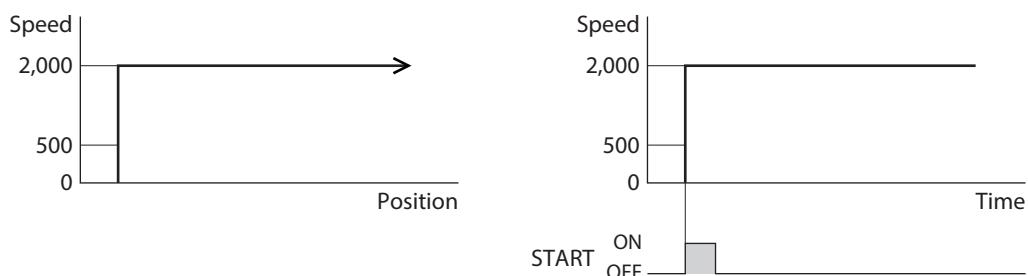
Rectangular operation (drive without acceleration/deceleration time) of the motor is executed at the speed set in the operation data, and operation is continued with the speed maintained. When a mechanism installed to the motor presses against a load, pressure is continuously applied to the load.

● Usage example

Setting of operation data

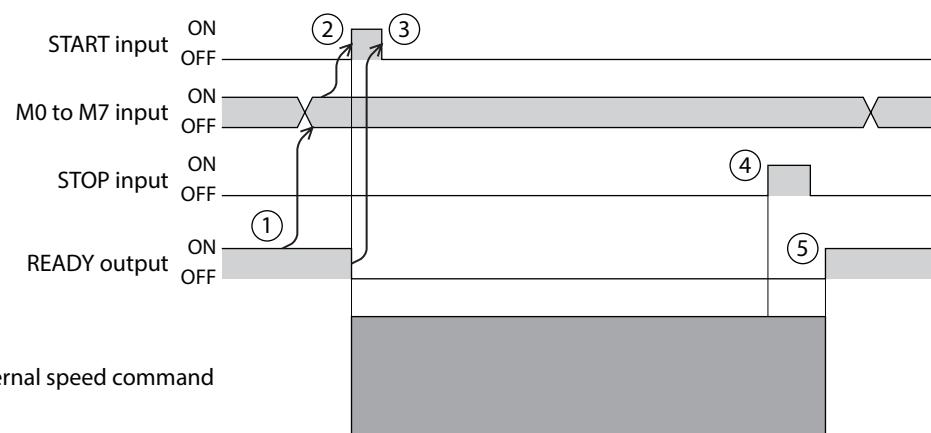
| | Name | Operation type | Position [step] | Operating speed [Hz] | Acceleration [kHz/s] | Stopping deceleration [kHz/s] | Operating current [%] |
|----|-----------------------------|----------------|-----------------|----------------------|----------------------|-------------------------------|-----------------------|
| #0 | Continuous (Torque control) | | 0 | 2000 | 1000.000 | 1000.000 | 20.0 |

Operation image



Operation method

1. Check that the READY output is ON.
2. 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.
3. Check that the READY output has been turned OFF and turn the START input OFF.
4. Turn the STOP input ON. The motor stops immediately.
5. When the motor stops, the READY output is turned ON.



3-6 Mode for link operation of operation data

More than one operation data number are linked. If the base point for the link operation is changed using the M0 to M7 inputs or the D-SEL0 to D-SEL7 inputs, link operation with multiple patterns can be set. It can be used when setting a different operation pattern for each load.

The timing to transit to the operation data number of the next data varies depending on the type of operation.

- **In case of positioning SD operation or positioning push-motion SD operation**

- When the command position has reached the target position
- When the NEXT input has been turned ON
- When the event jump function has been executed (⇒ "Event jump function" on p.95)

- **In case of continuous SD operation**

- When the NEXT input has been turned ON
- When the event jump function has been executed (⇒ "Event jump function" on p.95)

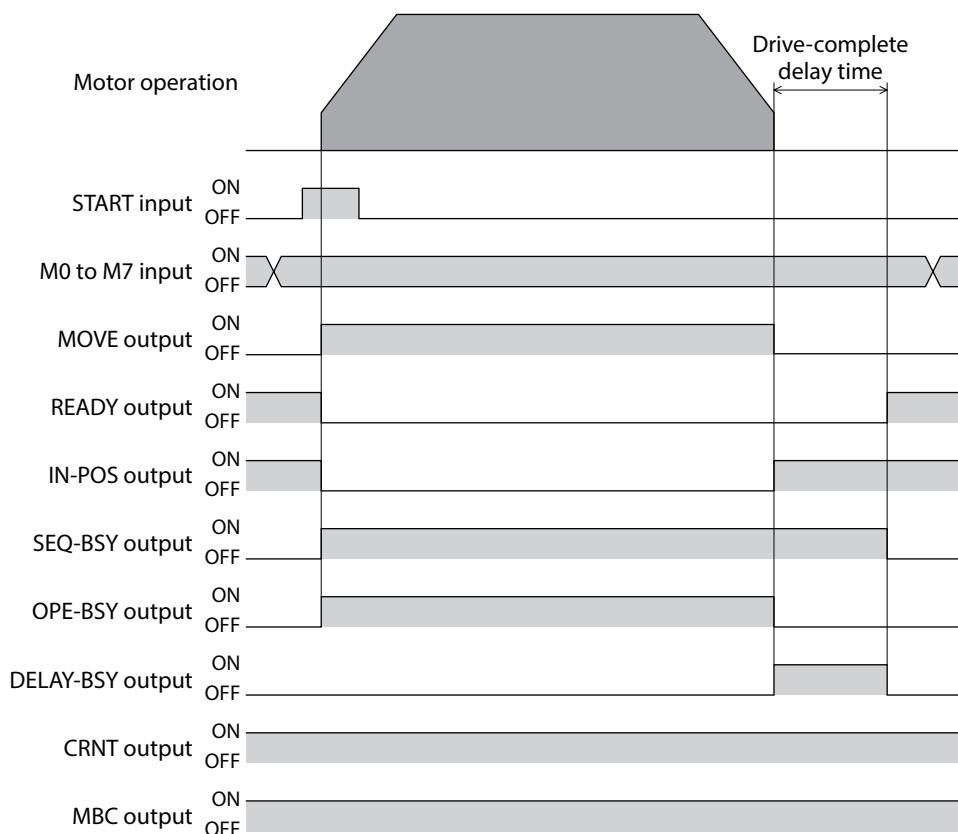
Related operation data

| MEXE02 tree view | Item | Description | Initial value |
|------------------|---------------|---|---------------|
| Operation data | Link | <p>Sets the mode for link operation.</p> <p>Setting range 0: No link 1: Manual sequential 2: Automatic sequential 3: Continuous form connection </p> | 0 |
| | Next data No. | <p>Sets the next data.</p> <p>Setting range -256: Stop -2: ↓↓(+2) -1: ↓(+1) 0 to 255: Operation data number </p> | -1 |

■ No link (single-motion operation)

Operation is executed once with one operation data number.

Related I/O signals



■ Manual sequential operation

Operation of the operation data number set in "Next data No." is executed whenever the SSTART input is turned ON. This method is convenient when multiple positioning operations must be executed sequentially, because there is no need to repeatedly select each operation data number.



- When the operation of the operation data number for which manual sequential operation is set is complete, the SEQ-BSY output is turned ON (manual sequential waiting status). Operation of the operation data number set in "Next data No." is executed when the SSTART input is turned ON in this status.
- Operation of the operation data number currently selected is executed when the SSTART input is turned ON with the SEQ-BSY output OFF.

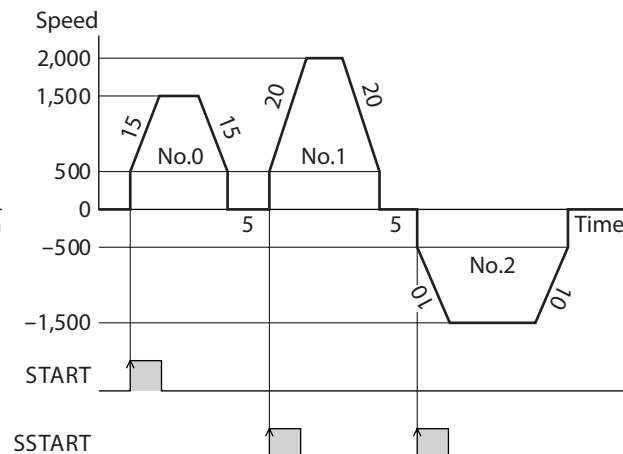
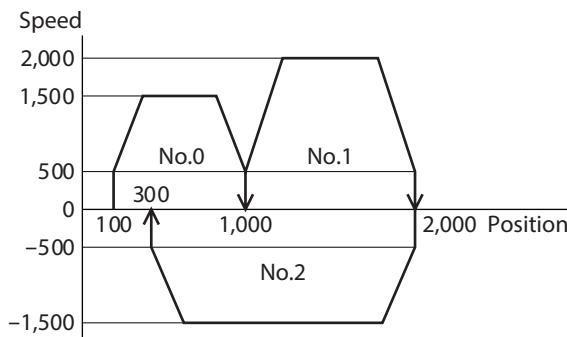
● Usage example

When positioning operation is performed for multiple coordinates at an arbitrary timing

Setting of operation data

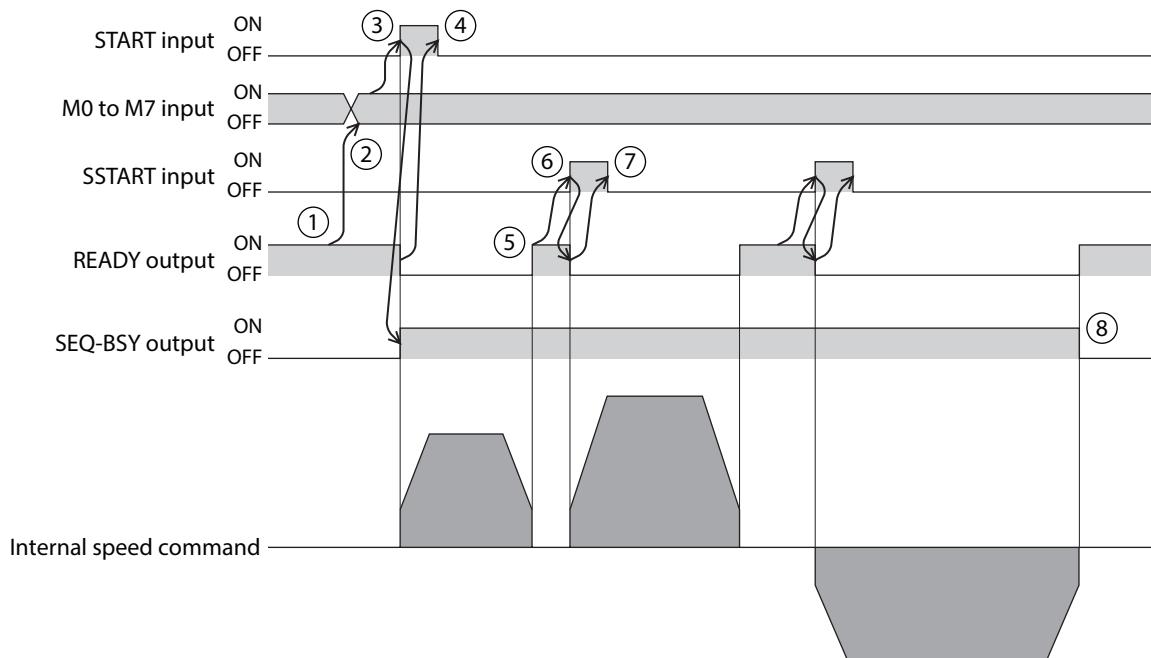
| Name | Operation type | Position [step] | Operating speed [Hz] | Acceleration [kHz/s] | Stopping deceleration [kHz/s] | Operating current [%] | Drive-complete delay time [s] | Link | Next data No. |
|------|----------------------|-----------------|----------------------|----------------------|-------------------------------|-----------------------|-------------------------------|-------------------|---------------|
| #0 | Absolute positioning | 1000 | 1500 | 15.000 | 15.000 | 100.0 | 0.000 | Manual Sequential | +1 |
| #1 | Absolute positioning | 2000 | 2000 | 20.000 | 20.000 | 100.0 | 0.000 | Manual Sequential | +1 |
| #2 | Absolute positioning | 300 | 1500 | 10.000 | 10.000 | 100.0 | 0.000 | No link | Stop |

Operation image

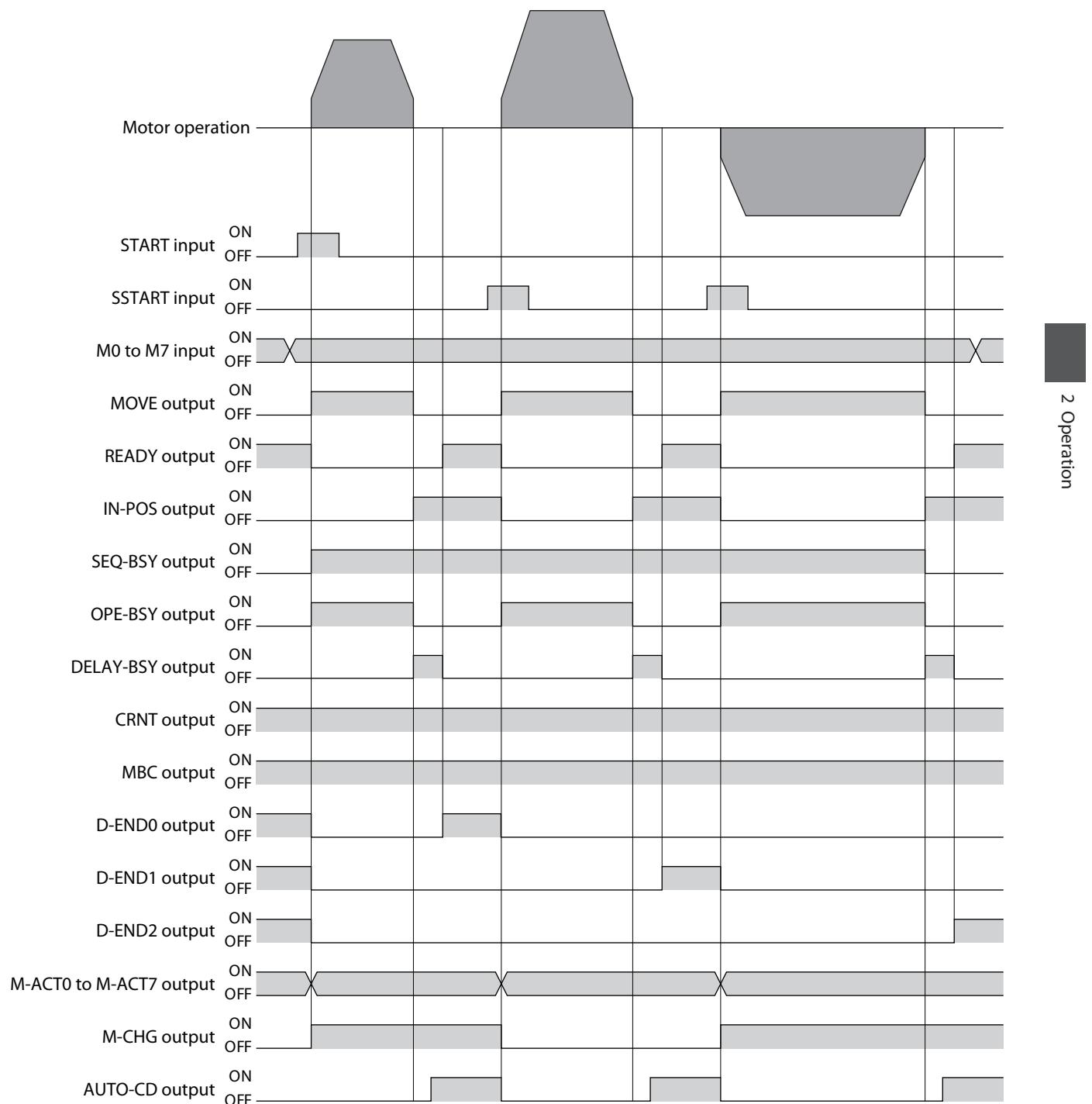


Timing chart

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



Related I/O signals



■ Automatic sequential operation

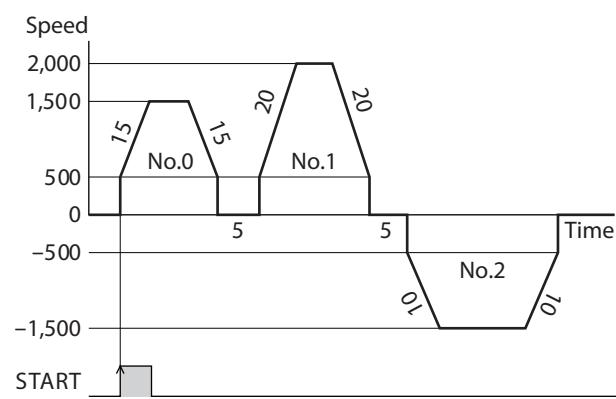
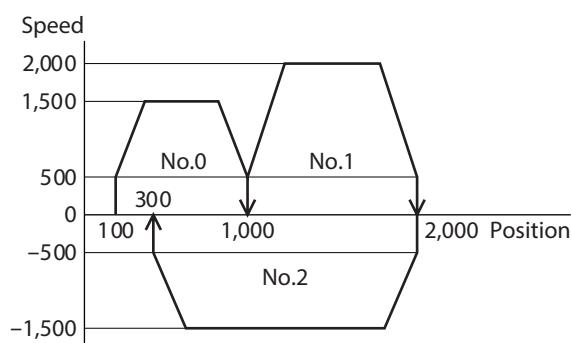
More than one operation are executed automatically and sequentially. After one operation is complete, operation of the operation data number set in "Next data No." is started after stop for the time set in "Drive-complete delay time." If operation data includes data for which "No link" is set, the motor is stopped after the stored data operation with respect to the "no link" operation data is completed.

● Usage example

When positioning operation is performed automatically for multiple coordinates

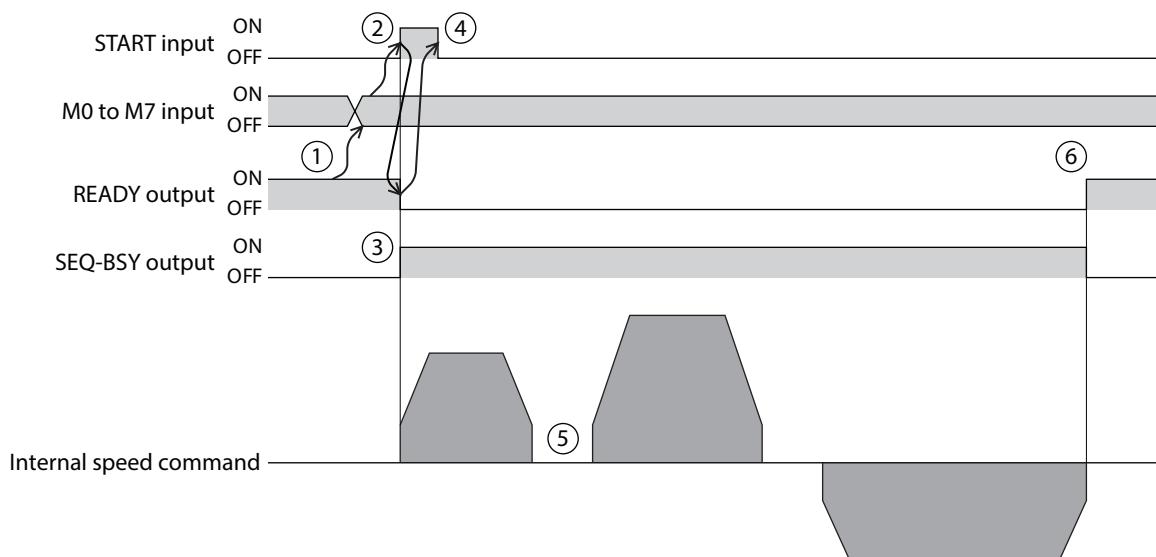
| | Name | Operation type | Position [step] | Operating speed [Hz] | Acceleration [kHz/s] | Stopping deceleration [kHz/s] | Operating current [%] | Drive-complete delay time [s] | Link | Next data No. |
|----|------|----------------------|-----------------|----------------------|----------------------|-------------------------------|-----------------------|-------------------------------|----------------------|---------------|
| #0 | | Absolute positioning | 1000 | 1500 | 15.000 | 15.000 | 100.0 | 5.000 | Automatic Sequential | +1 |
| #1 | | Absolute positioning | 2000 | 2000 | 20.000 | 20.000 | 100.0 | 5.000 | Automatic Sequential | +1 |
| #2 | | Absolute positioning | 300 | 1500 | 10.000 | 10.000 | 100.0 | 0.000 | No link | Stop |

Operation image

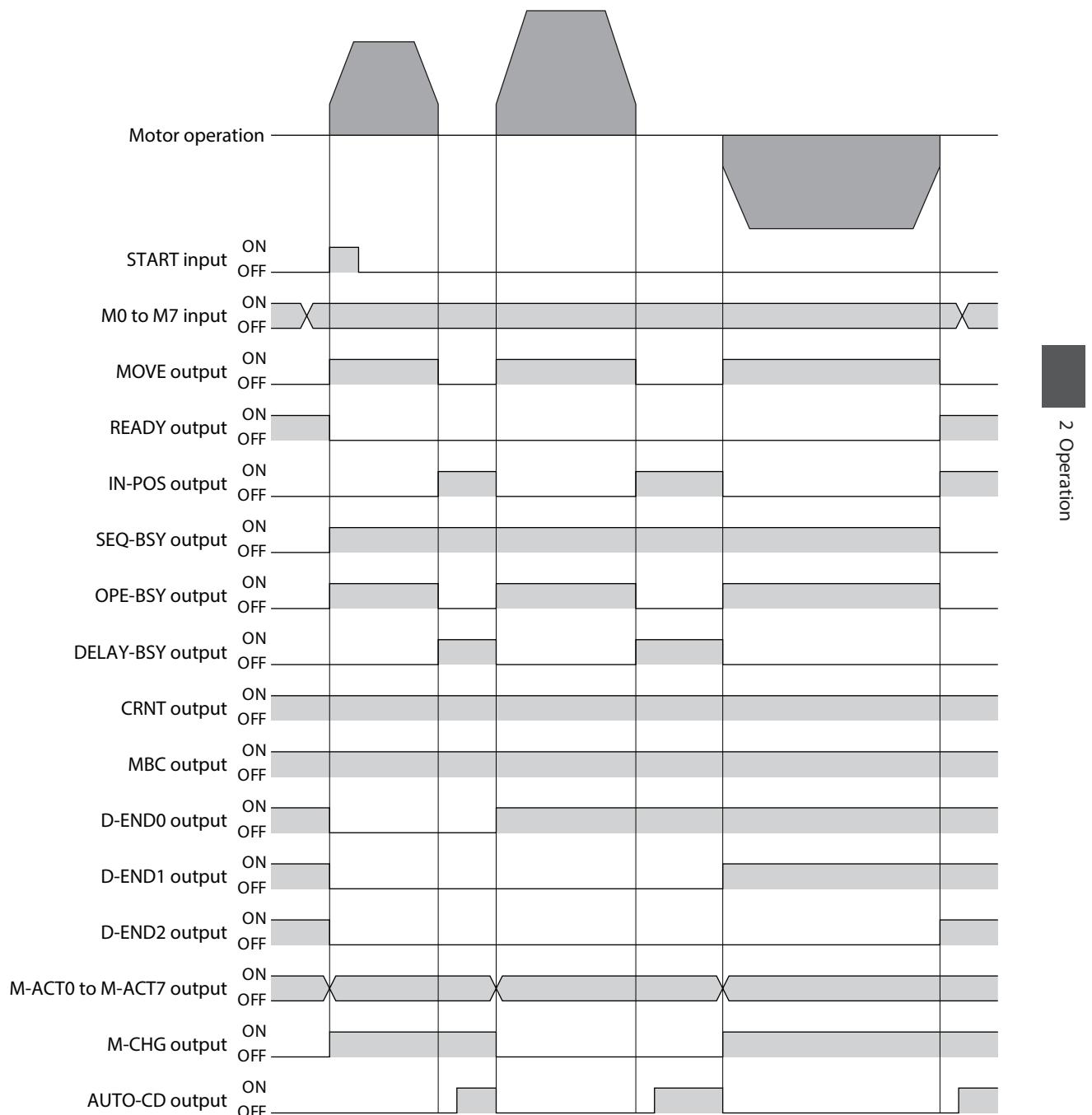


Timing chart

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



Related I/O signals



■ Type connection operation

Operation of the operation data number set in "Next data No." is executed continuously without stopping the motor. If operation data includes data for which "No link" is set, the motor is stopped after the stored data operation with respect to the "no link" operation data is completed.

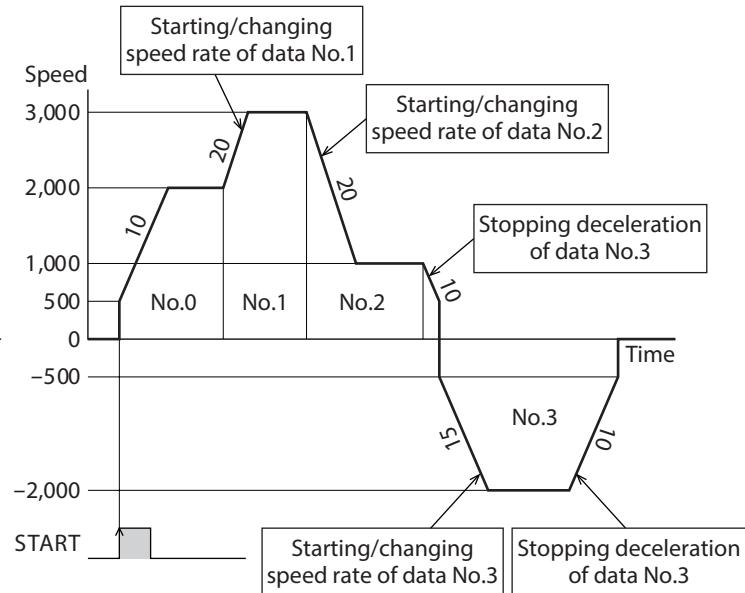
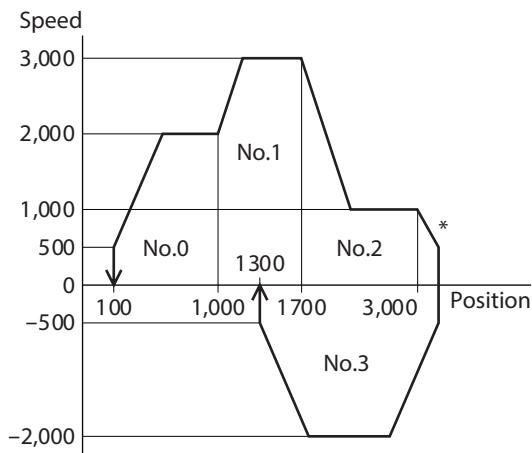
● Usage example

When the speed is changed at a specified position

Setting of operation data

| Name | Operation type | Position [step] | Operating speed [Hz] | Acceleration [kHz/s] | Stopping deceleration [kHz/s] | Operating current [%] | Drive-complete delay time [s] | Link | Next data No. |
|------|----------------------|-----------------|----------------------|----------------------|-------------------------------|-----------------------|-------------------------------|----------------------------|---------------|
| #0 | Absolute positioning | 1000 | 2000 | 10.000 | 15.000 | 100.0 | 0.000 | Continuous form connection | +1 |
| #1 | Absolute positioning | 1700 | 3000 | 20.000 | 20.000 | 100.0 | 0.000 | Continuous form connection | +1 |
| #2 | Absolute positioning | 3000 | 1000 | 20.000 | 20.000 | 100.0 | 0.000 | Continuous form connection | +1 |
| #3 | Absolute positioning | 1300 | 2000 | 15.000 | 10.000 | 100.0 | 0.000 | No link | Stop |

Operation image



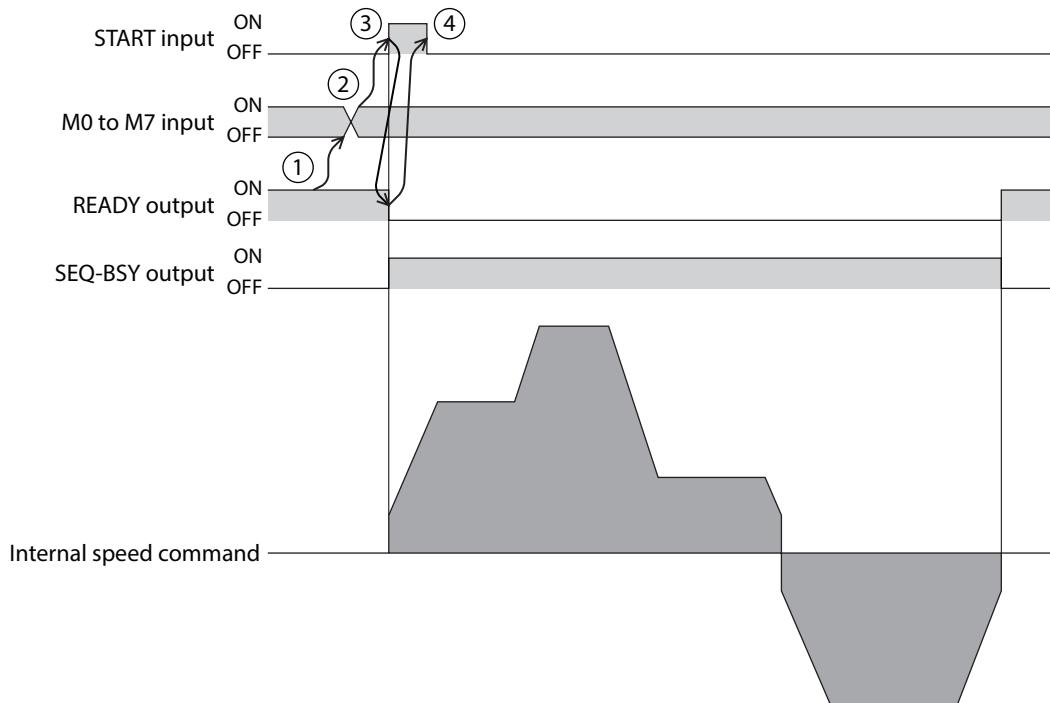
* If the direction of the operation is switched to the opposite direction while the operation is executed, the motor passes by the target position.



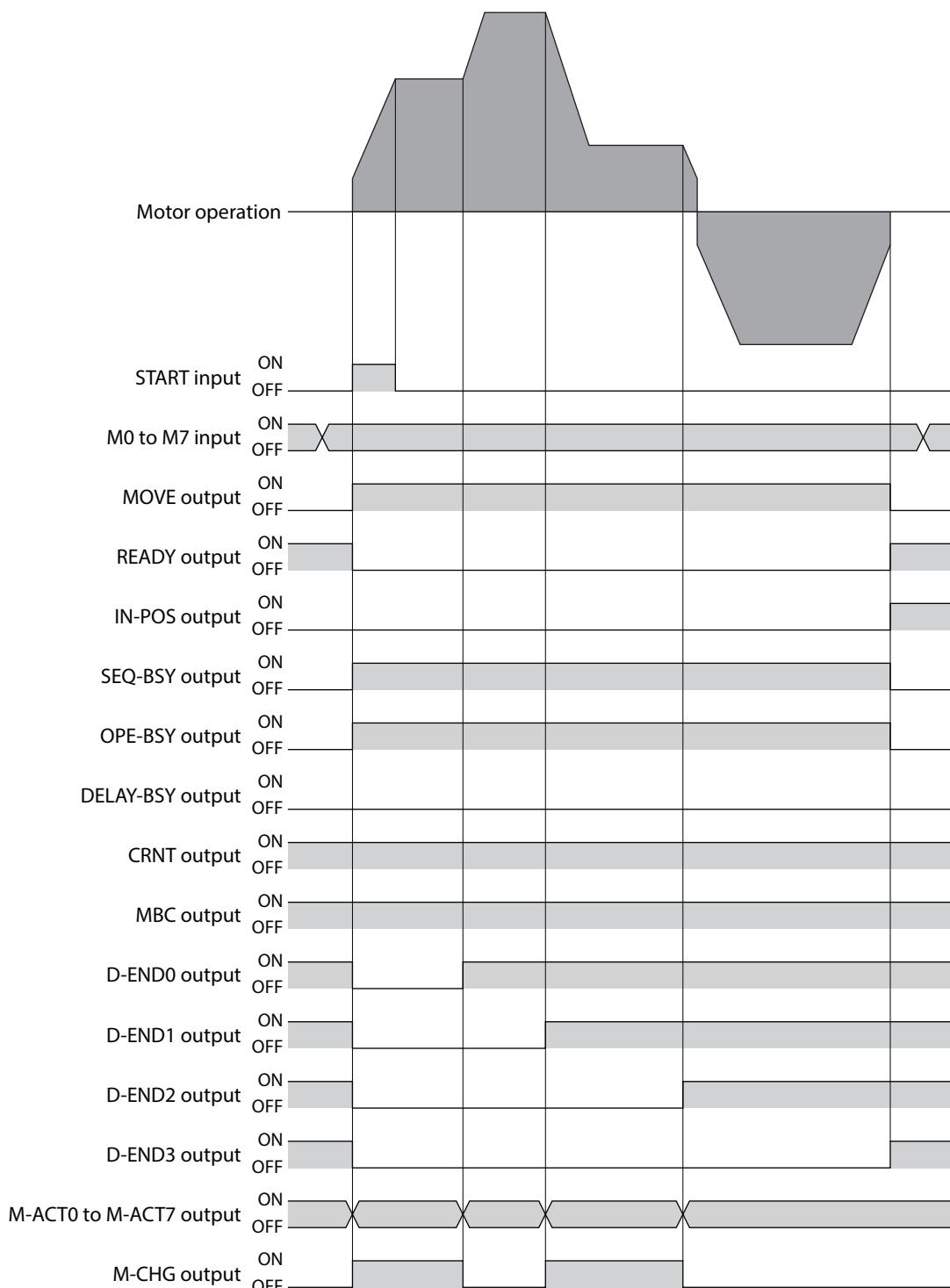
- To link to the next operation data number, the motor accelerates with the starting/changing speed rate of the next data.
- When the motor rotates in the opposite direction in the operation of the next data, it decelerates at the stopping deceleration of the next data.
- To stop, the motor decelerates at the stopping deceleration of the operation data number linked last.

Timing chart

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



Related I/O signals

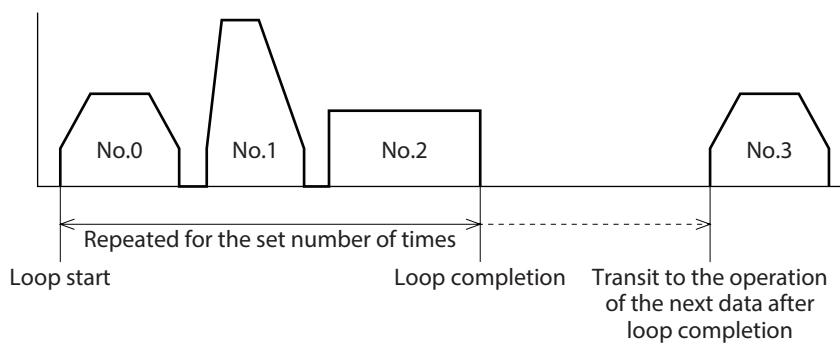


3-7 Sequence function

■ Loop function

The loop function is a function to repeat the operation of the linked operation data number for the number of times set.

Operation is repeated from the operation data number for which "Loop count" is set to the operation data number to which "Loop end No." is set for the number of times set in the "Loop count." When the operation for the number of times set is completed, the operation transits to the operation data number that is set to "Next data No."



Note

If "No link" is included in "Link" of the operation data number to be looped, the operation stops in the operation data number for which "No link" is set. Be sure to link all the operations with "Manual sequential," "Automatic sequential," or "Continuous form connection."

Related operation data

| MEXE02 tree view | Item | Description | Initial value |
|------------------|---------------|---|---------------|
| Operation data | Link | Sets the mode for link operation. Setting range 0: No link 1: Manual sequential 2: Automatic sequential 3: Continuous form connection | 0 |
| | Next data No. | Sets the next data. Setting range -256: Stop -2: ↓↓(+2) -1: ↓(+1) 0 to 255: Operation data number | -1 |
| | Loop count | Sets the number of times of loop. Setting range 0: – (No loop) 2 to 255: loop 2{to loop 255{ (number of times of loop) | None (-) |
| | Loop offset | Offsets the position (travel amount) every time loop is executed. Setting range -4,194,304 to 4,194,303 steps | 0 |
| | Loop end No. | Sets to the operation data number in which loop is completed. Setting range 0: –(Not the loop end point) 1: }L-End (loop end point) | None (-) |

- Usage example

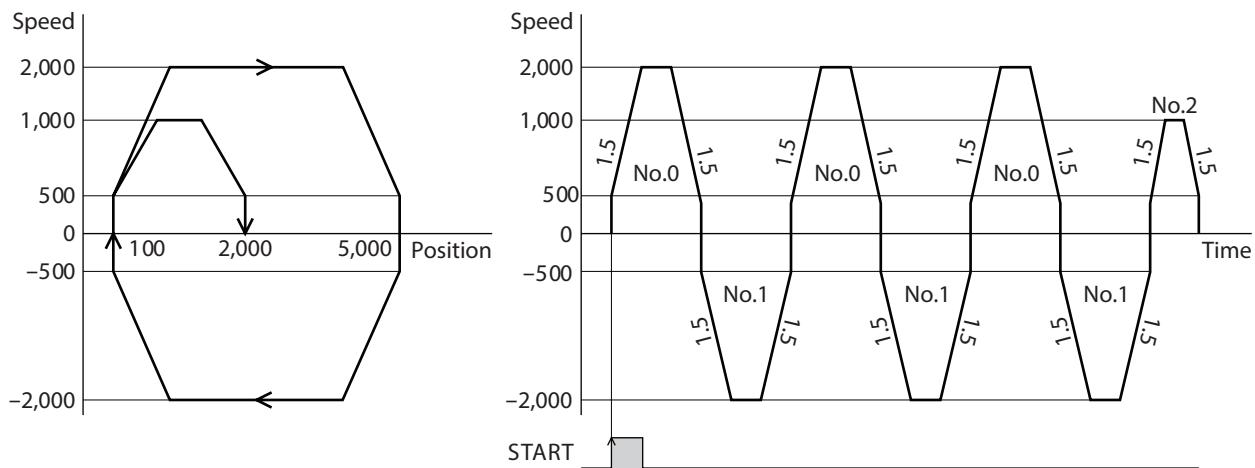
When operation from the operation data No.0 to No.1 is repeated three times

Setting of operation data

| | Name | Operation type | Position [step] | Operating speed [Hz] | Acceleration [kHz/s] | Stopping deceleration [kHz/s] | Operating current [%] | Drive-complete delay time [s] |
|----|------|----------------------|-----------------|----------------------|----------------------|-------------------------------|-----------------------|-------------------------------|
| #0 | | Absolute positioning | 5000 | 2000 | 1.500 | 1.500 | 100.0 | 0.000 |
| #1 | | Absolute positioning | 100 | 2000 | 1.500 | 1.500 | 100.0 | 0.000 |
| #2 | | Absolute positioning | 2000 | 1000 | 1.500 | 1.500 | 100.0 | 0.000 |

| Link | Next data No. | Area offset | Area width | Loop count | Loop offset | Loop end No. |
|----------------------|---------------|-------------|------------|------------|-------------|--------------|
| Automatic Sequential | +1 | 0 | -1 | loop 3{ | 0 | - |
| Automatic Sequential | +1 | 0 | -1 | - | 0 |)L-End |
| No link | Stop | 0 | -1 | - | 0 | - |

Operation image



- Offset of loop

When the offset is set, the target position of positioning can be moved for the amount set in "Loop offset" while repeating loop. Use this function for palletizing operation.

Usage example

When operation from the operation data No.0 to No.1 is repeated three times.

(The target position is increased by 100 steps for each loop)

Setting of operation data

- In case of absolute positioning
The coordinate of the target position is offset.

| | Name | Operation type | Position [step] | Operating speed [Hz] | Acceleration [kHz/s] | Stopping deceleration [kHz/s] | Operating current [%] | Drive-complete delay time [s] |
|----|------|----------------------|-----------------|----------------------|----------------------|-------------------------------|-----------------------|-------------------------------|
| #0 | | Absolute positioning | 1000 | 1200 | 1.500 | 1.500 | 100.0 | 0.000 |
| #1 | | Absolute positioning | 100 | 1200 | 1.500 | 1.500 | 100.0 | 0.000 |

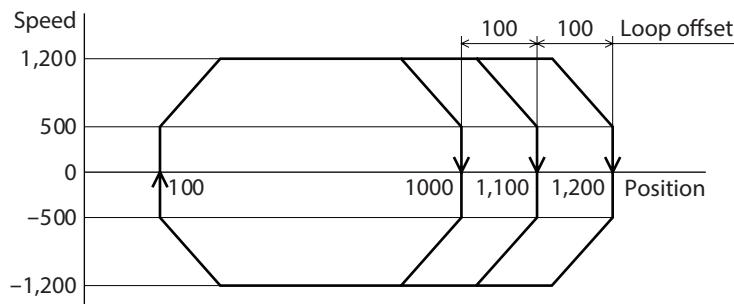
| Link | Next data No. | Area offset | Area width | Loop count | Loop offset | Loop end No. |
|----------------------|---------------|-------------|------------|------------|-------------|--------------|
| Automatic Sequential | +1 | 0 | -1 | loop 3{ | 100 | - |
| Automatic Sequential | Stop | 0 | -1 | - | 0 |)L-End |

- In case of incremental positioning
The travel amount to the target position is offset.

| | Name | Operation type | Position [step] | Operating speed [Hz] | Acceleration [kHz/s] | Stopping deceleration [kHz/s] | Operating current [%] | Drive-complete delay time [s] |
|----|------|---|-----------------|----------------------|----------------------|-------------------------------|-----------------------|-------------------------------|
| #0 | | Incremental positioning (based on command position) | 900 | 1200 | 1.500 | 1.500 | 100.0 | 0.000 |
| #1 | | Incremental positioning (based on command position) | -900 | 1200 | 1.500 | 1.500 | 100.0 | 0.000 |

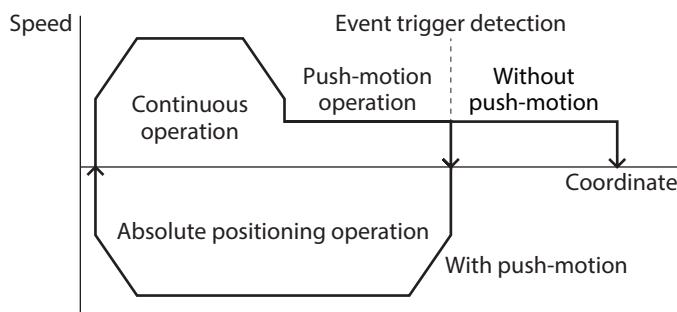
| Link | Next data No. | Area offset | Area width | Loop count | Loop offset | Loop end No. |
|----------------------|---------------|-------------|------------|------------|-------------|--------------|
| Automatic Sequential | +1 | 0 | -1 | loop 3{ | 100 | - |
| Automatic Sequential | Stop | 0 | -1 | - | -100 |)L-End |

Operation image



■ Event jump function

The event jump function is a function to branch operation with ON/OFF of the signal set in "Event trigger I/O" of operation I/O event. When an event trigger I/O is detected during link operation or loop operation, operation is transited to "Next data No." forcibly. For one operation data piece, two types of events "(Low) I/O event No." and "(High) I/O event No." can be set. If the event triggers of "(Low) I/O event No." and "(High) I/O event No." are detected at the same time, the "(High) I/O event No." has priority.



Related operation data

| MEXE02 tree view | Item | Description | Initial value |
|------------------|----------------------|--|---------------|
| Operation data | (Low) I/O event No. | Selects the operation I/O event number. Setting range -1:-(Disable) 0 to 31: Operation I/O event No. | -1 |
| | (High) I/O event No. | | |

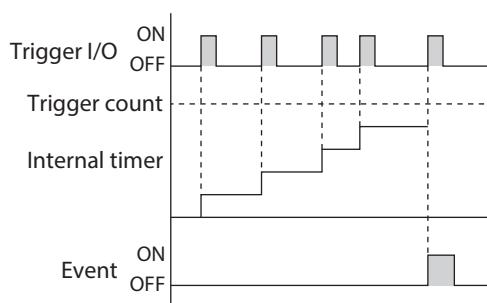
Related I/O event

| MEXE02 tree view | Item | Description | Initial value |
|---------------------|---------------|---|---------------|
| Operation I/O event | Link | Sets the link method after event trigger detection. Setting range 0: No link 1: Manual sequential 2: Automatic sequential 3: Continuous form connection | 0 |
| | Next data No. | Sets the next data. Setting range -256: Stop -2: ↓↓(+2) -1: ↓(+1) 0 to 255: Operation data number | -256 |
| | Dwell | Sets the waiting time generated after event trigger detection. Setting range 0 to 65,535 (1=0.001 s) | 0 |

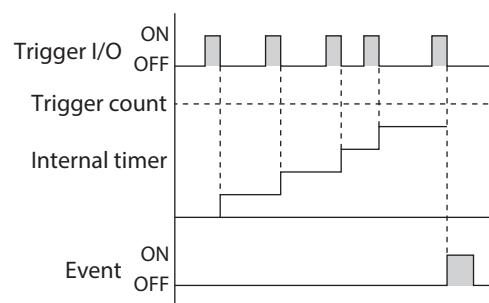
| MEXE02 tree view | Item | Description | Initial value |
|---------------------|---------------------|--|---------------|
| Operation I/O event | Event trigger I/O | Sets I/O to be used as an event trigger. Setting range Refer to "2 Signal list" on p.165. | 0: Not used |
| | Event trigger type | Sets the timing to detect the event trigger. Setting range 0: Non (Disable) 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 or detection times to detect the event trigger. Setting range 0 to 65,535 (1=1 msec or 1=Once) | 0 |

- Event trigger type

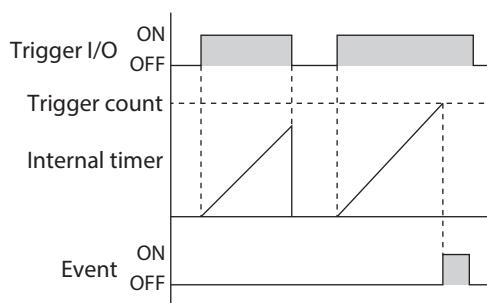
■ ON edge



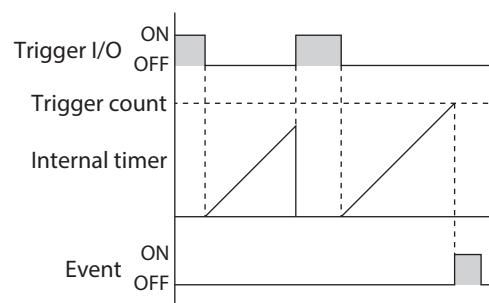
■ OFF edge



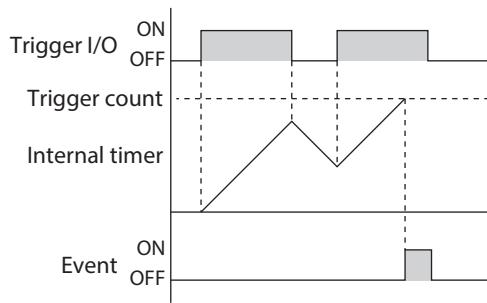
■ ON (msec)



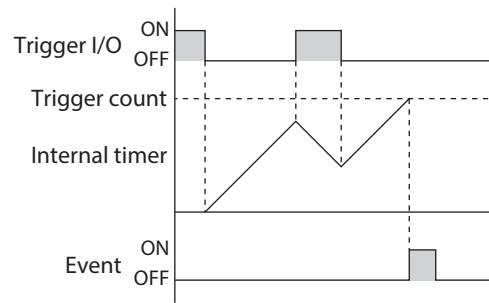
■ OFF (msec)



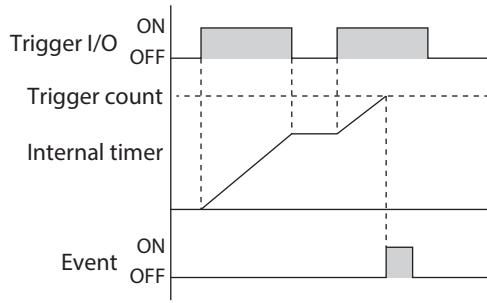
■ ON (calculated cumulative msec)



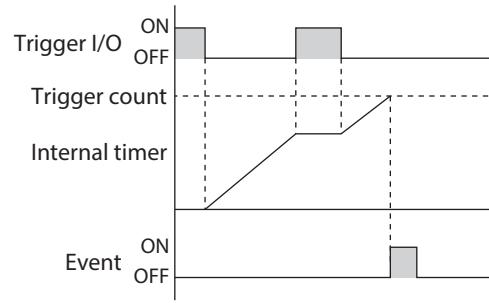
■ OFF (calculated cumulative msec)



■ ON (cumulative msec)



■ ON (cumulative msec)



ON (cumulative) and OFF (cumulative) support the driver Ver. 3.00 or later.

- **Usage example**

When absolute positioning push-motion operation of the operation data No.0 is executed

- Without push-motion: Operation of the operation data No.1 is started after completion of operation of the operation data No.0. (No event generated)
- With push-motion: Operation of the operation data No.2 is started after detection of the ON edge of the TLC output. (Low event generated)

Setting of operation data

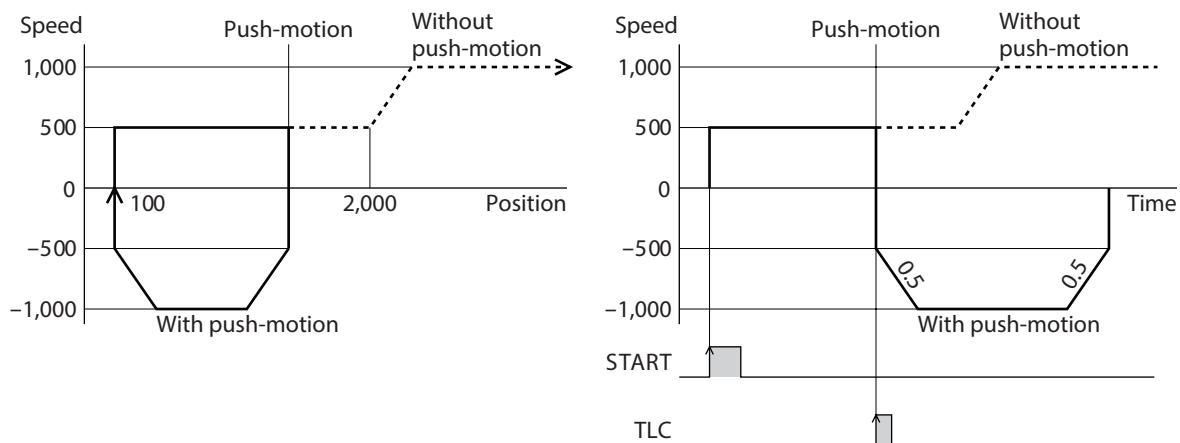
| | Name | Operation type | Position [step] | Operating speed [Hz] | Acceleration [kHz/s] | Stopping deceleration [kHz/s] | Operating current [%] | Drive-complete delay time [s] |
|----|------|-------------------------------|-----------------|----------------------|----------------------|-------------------------------|-----------------------|-------------------------------|
| #0 | | Absolute push-motion | 2000 | 500 | 1000.000 | 1000.000 | 25.0 | 0.000 |
| #1 | | Continuous (Position control) | 0 | 1000 | 0.500 | 0.500 | 25.0 | 0.000 |
| #2 | | Absolute positioning | 100 | 1000 | 0.500 | 0.500 | 25.0 | 0.000 |

| Link | Next data No. | Area offset | Area width | Loop count | Loop offset | Loop end No. | (Low)/I/O event No. |
|----------------------|---------------|-------------|------------|------------|-------------|--------------|---------------------|
| Automatic Sequential | +1 | 0 | -1 | - | 0 | - | 0 |
| No link | +1 | 0 | -1 | - | 0 | - | - |
| No link | +1 | 0 | -1 | - | 0 | - | - |

Operation I/O event setting

| | Name | Link | Next data | Dwell [s] | Event trigger I/O | Event trigger type | Event trigger count |
|----|----------------------|------|-----------|-----------|-------------------|--------------------|---------------------|
| #0 | Automatic Sequential | 2 | | 0.000 | TLC | ON edge | 1 |

Operation image



3-8 Extended operation data setting

The specification of the operation data can be extended.

■ Extended loop function

The extended loop function is a function to execute loop operation for a number of times that cannot be set in operation data (256 or more). You can use this function to repeat simple operation as in an endurance test.

Operation is repeated from the operation data number set in "Repeat start data No." to the operation data number set in "Repeat end data No." for the number of times set in "Repeat time." When the operation for the number of times set is completed, the motor transits to the operation data number that is set to "Next data No."

When the extended loop function is used, the operation data from "Repeat start data No." to "Repeat end data No." is fixed with the following values.

| MEXE02 tree view | Item | Fixed value |
|------------------|----------------------|--|
| Operation data | Next data No. | ↓(+1) |
| | Area offset | 0 |
| | Area width | -1 |
| | Loop count | Repeat start operation number: Number of times of repeat Other: - |
| | Loop offset | 0 |
| | Loop end No. | Repeat end operation number: End Other: - |
| | (Low) I/O event No. | - |
| | (High) I/O event No. | - |



If "No link" is included in "Link" of the operation data number to be looped, the operation stops in the operation data number for which "No link" is set. Be sure to link all the operations with "Manual sequential," "Automatic sequential," or "Continuous form connection."

Related operation data

| MEXE02 tree view | Item | Description | Initial value |
|------------------|---------------|---|---------------|
| Operation data | Link | Sets the mode for link operation. Setting range 0: No link 1: Manual sequential 2: Automatic sequential 3: Continuous form connection | 0 |
| | Next data No. | Sets the next data. Setting range -256: Stop -2: ↓↓(+2) -1: ↓(+1) 0 to 255: Operation data number | -1 |

Related extended operation data setting

| MEXE02 tree view | Item | Description | Initial value |
|---------------------------------|-----------------------|---|---------------|
| Extended operation data setting | Repeat start data No. | Sets the operation data number from which extended loop operation is started. Setting range –1: Disable 0 to 255: Operation data number | –1 |
| | Repeat end data No. | Sets the operation data number in which extended loop operation is completed. Setting range –1: Disable 0 to 255: Operation data number | –1 |
| | Repeat time | Sets the number of repeat times of extended loop operation. Setting range –1: Disable 0 to 100,000,000 times | –1 |

● Usage example

Transition to the operation data No.2 after repeating the operation data No.0 and No.1 500 times.

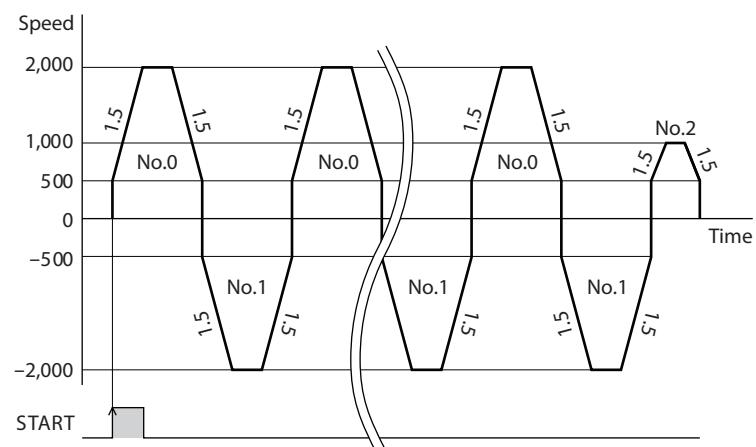
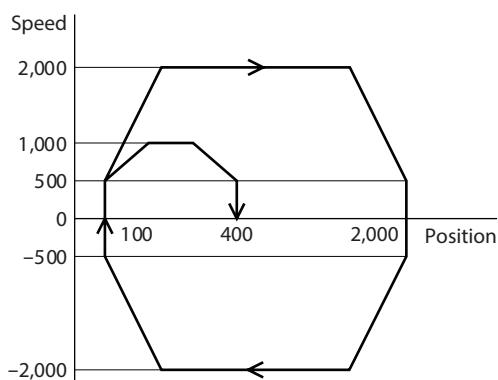
Operation data setting

| Operation type | Position [step] | Speed [Hz] | Acceleration [kHz/s] | Stopping deceleration [kHz/s] | Operating current [%] | Drive-complete delay time [s] | Link | Next data No. |
|----------------|----------------------|------------|----------------------|-------------------------------|-----------------------|-------------------------------|-------|-------------------------|
| #0 | Absolute positioning | 2000 | 2000 | 1.500 | 1.500 | 100.0 | 0.000 | Automatic Sequential +1 |
| #1 | Absolute positioning | 100 | 2000 | 1.500 | 1.500 | 100.0 | 0.000 | Automatic Sequential +1 |
| #2 | Absolute positioning | 400 | 1000 | 1.500 | 1.500 | 100.0 | 0.000 | No link Stop |

Extended operation data setting

| | |
|-----------------------|-----|
| Repeat start data No. | 0 |
| Repeat end data No. | 1 |
| Repeat time | 500 |

Operation image



■ Common setting and separate setting of acceleration/deceleration

In "Rate selection" of extended operation data setting, the acceleration/deceleration in stored data operation and continuous macro operation can be set as follows.

- Common setting: The values set in the "Common acceleration rate or time" and "Common stopping deceleration" parameters are followed.
- Separate setting: The acceleration/deceleration set under the applicable operation data number is followed.

Related extended operation data setting

| MEXE02 tree view | Item | Description | Initial value |
|---------------------------------|----------------------------------|---|---------------|
| Extended operation data setting | Rate selection | Sets whether to use the common acceleration/deceleration or the acceleration/deceleration specified for the operation data. Setting range 0: The common rate is used (common setting) 1: The rate of each operation data is used (separate setting) | 1 |
| | Common acceleration rate or time | Sets the starting/changing speed rate or starting/changing time in common setting. Setting range 1 to 1,000,000,000 (1=0.001 kHz/s, 1=0.001 s, or 1=0.001 ms/kHz) | 1,000,000 |
| | Common stopping deceleration | Sets the stopping deceleration or stop time in common setting. Setting range 1 to 1,000,000,000 (1=0.001 kHz/s, 1=0.001 s, or 1=0.001 ms/kHz) | 1,000,000 |



Parameters set here will be disabled at the pulse-input operation.

3-9 Stop operation

■ Operation stop input

The motor stops when an operation stop signal is input while the motor is operating.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|-------------------------|-----------------------------|--|---------------|
| I/O action and function | STOP/STOP-COFF input action | Sets how to stop the motor when the STOP input or STOP-COFF input has been turned ON. Setting range 0: Immediate stop for both STOP input and STOP-COFF input 1: Deceleration stop for the STOP input and immediate stop for the STOP-COFF input 2: Immediate stop for the STOP input and deceleration stop for the STOP-COFF input 3: Deceleration stop for both STOP input and STOP-COFF input | 3 |
| | FW-BLK, RV-BLK input action | Sets how to stop the motor when the FW-BLK input or RV-BLK input has been turned ON. Setting range 0: Immediate stop 1: Deceleration stop | 1 |



The motor always stops immediately at the pulse-input operation. Parameters set here will be disabled.

■ 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 limit of the moving range. If the "FW-LS, RV-LS input action" parameter is set, the motor can be stopped when detecting the limit sensor.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|-------------------------|---------------------------|---|---------------|
| I/O action and function | FW-LS, RV-LS input action | Sets how to stop the motor when the FW-LS input or RV-LS input has been turned ON. Setting range -1: Used as a return-to-home sensor 0: Immediate stop 1: Deceleration stop 2: Immediate stop with alarm 3: Deceleration stop with alarm | 2 |



The motor always stops immediately at the pulse-input operation. Parameters set here will be disabled.

■ Software overtravel

The software overtravel is a function that limits the range of movement by setting the upper and lower limits of the moving range by the parameter.

If the "Software overtravel" parameter is set to "Immediate stop" or "Deceleration stop," the motor can be stopped according to the setting of the parameter when the software limit is reached. In addition, when the parameter is set to "Immediate stop with alarm" or "Deceleration stop with alarm," an alarm of software overtravel is generated after the motor stops.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|------------------|-------------------------|---|----------------|
| Base setting | Software overtravel | Sets the operation when the software overtravel is detected. Setting range -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. Setting range -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. Setting range -2,147,483,648 to 2,147,483,647 steps | -2,147,483,648 |



The motor always stops immediately at the pulse-input operation. Parameters set here will be disabled.

■ Escape from limit

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

3-10 Base current and stop current

■ Base current

Set the base current rate (%) for the operating current and stop current.

The maximum driver output current can be changed using the "Base current" parameter. If the load is small and there is an ample allowance for torque, the motor temperature rise can be suppressed by setting a lower base current.

- Operating current of motor = Maximum output current × "Base current" parameter set value × "Operating current" value set for each operation data number

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|------------------|---|---|---------------|
| Base setting | Base current | Sets the ratio against the maximum output current of the motor. Setting range 0 to 1,000 (1=0.1%) | 1,000 |
| | Base current setting source (only for pulse input type) | Selects the setting method of the base current. (Only pulse-input type) Setting range 0: The parameter setting is followed 1: Switch setting is followed | 1 |



Excessively low base current may cause a problem in starting the motor or holding the load in position. Do not reduce the current any more than is necessary.

■ Stop current

When the motor stops, the automatic current cutback function is actuated to lower the motor current to the stop current.

- Stop current of motor = Maximum output current × "Base current" parameter set value × "Stop current" parameter value

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|------------------|------------------------------------|---|---------------|
| Base setting | Stop current | Sets the motor stop current as a percentage against the base current, based on the base current being 100%. Setting range 0 to 1,000 (1=0.1%) | 500 |
| | Automatic current cutback function | Sets the automatic current cutback function to switch to the stop current when the motor stops. (⇒ "2-1 Current cutback function" on p.435) Setting range 0: Disable 1: Enable | 1 |

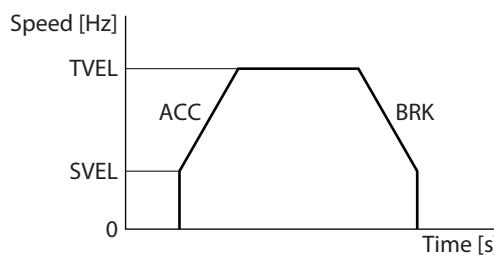
3-11 Acceleration/deceleration unit

Set the acceleration/deceleration unit using the "Acceleration/deceleration unit" parameter. The settable units are the acceleration/deceleration rate (kHz/s, ms/kHz) and the acceleration/deceleration time (s).

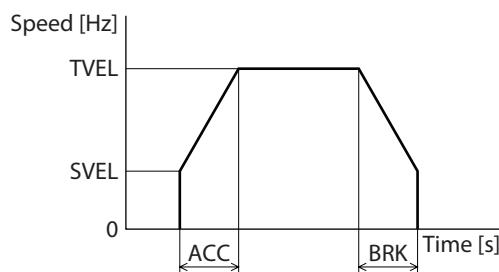
Explanation of labels

- TVEL: Operating speed
- SVEL: Starting speed
- ACC: Starting/changing
- BRK: Stop

In case of [kHz/s] or [ms/kHz] setting



In case of setting with [s]



Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|------------------|------------------------------------|---|---------------|
| Base setting | Acceleration/ deceleration unit | Sets the acceleration/deceleration unit. Setting range 0: kHz/s 1: s 2: ms/kHz | 0 |

Note

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

3-12 Starting speed

Set the operating speed of the motor at the time of operation start. Rectangular operation (drive without acceleration/deceleration time) is executed at the operating speed if the operating speed is below the starting speed.

Related parameters

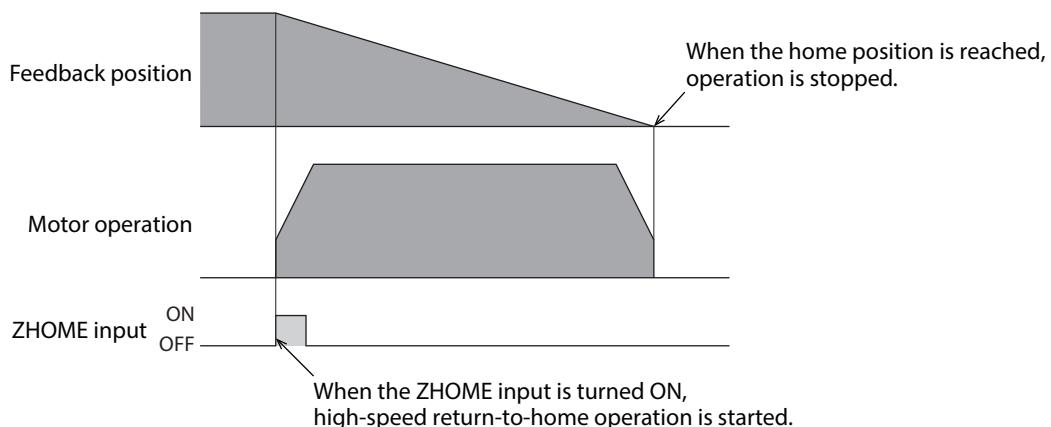
| MEXE02 tree view | Parameter name | Description | Initial value |
|---------------------|------------------------|---|---------------|
| Base setting | Starting speed | Sets the starting speed for stored data operation or continuous macro operation. Setting range 0 to 4,000,000 Hz | 500 |
| Motor and mechanism | (JOG) Starting speed | Sets the starting speed for JOG macro operation. Setting range 0 to 4,000,000 Hz | 500 |
| | (ZHOME) Starting speed | Sets the starting speed for high-speed return-to-home operation. Setting range 0 to 4,000,000 Hz | 500 |
| | (HOME) Starting speed | Sets the starting speed for return-to-home operation. Setting range 1 to 4,000,000 Hz | 500 |

4 Return-to-home operation

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

High-speed return-to-home operation is an operation to return to the mechanical home position on the absolute position coordinate set in advance. Since the home position 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 operation is started. The motor stops when the operation stop signal is turned ON while the motor is operating.



Note

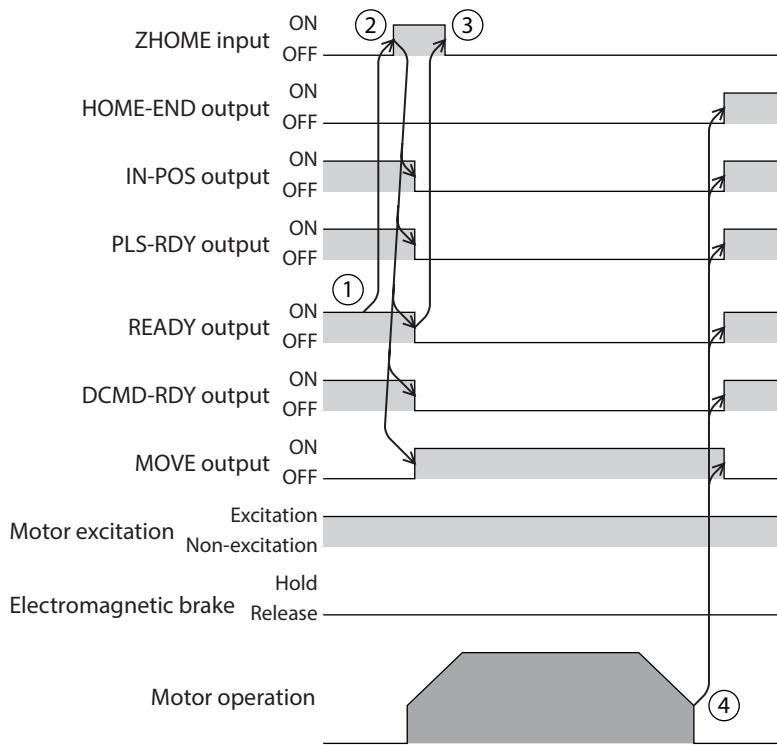
- The home position is not set at the time of factory shipment and immediately after the resolution is changed. If high-speed return-to-home operation is started under the status, information of ZHOME start error is generated, and operation is not performed. Be sure to set the home position before starting high-speed return-to-home operation.
- When the electrical home position coordinate is enabled (the EL-PRST input is ON), high-speed return-to-home operation cannot be executed.

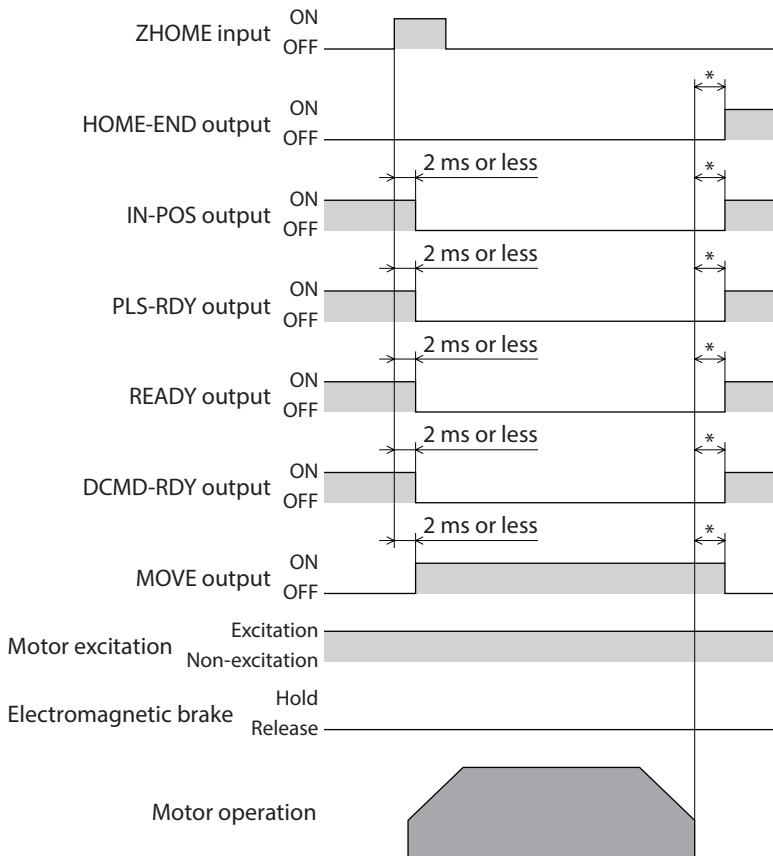
Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|---------------------|---|--|---------------|
| Motor and mechanism | JOG/HOME/ZHOME command filter time constant | Sets the time constant for command filter. Setting range 1 to 200 ms | 1 |
| | JOG/HOME/ZHOME operating current | Sets the operating current. Setting range 0 to 1,000 (1=0.1 %) | 1,000 |
| | (ZHOME) Operation speed | Sets the operating speed. Setting range 1 to 4,000,000 Hz | 5,000 |
| | (ZHOME) Acceleration/deceleration | Sets the acceleration/deceleration rate or acceleration/deceleration time. Setting range 1 to 1,000,000,000 (1=0.001 kHz/s, 1=0.001 s, or 1=0.001 ms/kHz) | 1,000,000 |
| | (ZHOME) Starting speed | Sets the starting speed. Setting range 0 to 4,000,000 Hz | 500 |

■ Timing chart

1. Check that the READY output is ON.
2. Turn the ZHOME input ON.
The IN-POS output, PLS-RDY output, READY output, and DCMD-RDY output are turned OFF, and the MOVE output is turned ON. Then, the motor starts operation.
3. Check that the READY output has been turned OFF and turn the ZHOME input OFF.
4. When the mechanical home position is reached, the HOME-END output, IN-POS output, PLS-RDY output, READY output, and DCMD-RDY output are turned ON, and the MOVE output is turned OFF.





* The specific time varies depending on the load, operating speed, speed filter and other.

4-2 Return-to-home operation

Return-to-home operation is an operation to detect the home position by using an external sensor. It is executed to return from the present position to the home position at the time of power-on and upon completion of positioning operation.

Return-to-home operation can be performed in the following four patterns.

| Item | Description | Features |
|-----------------------|---|--|
| 2-sensor mode | When the limit sensor is detected, the motor rotates in the reverse direction and pulls out of the limit sensor. After pulling out of the limit sensor, the motor moves to stop according to the value set in the "(HOME) Backward steps" in 2 sensor home-seeking" parameter. The position at which the motor stopped becomes the home position. | <ul style="list-style-type: none"> • Two external sensors are required • The operating speed is low (return-to-home starting speed) |
| 3-sensor mode | When the limit sensor is detected, the motor rotates in the reverse direction and pulls out of the limit sensor. After that, the motor stops when the ON edge of the HOME sensor is detected. The position at which the motor stopped becomes the home position. | <ul style="list-style-type: none"> • Three external sensors are required *2 • The operating speed is high (return-to-home operation speed) |
| One-way rotation mode | The motor stops when the ON edge of the HOME sensor is detected. After that, the motor pulls out at the speed set in the "(HOME) Last speed" parameter until the OFF edge of the HOME sensor is detected. After pulling out of the limit sensor, the motor moves to stop according to the value set in the "(HOME) Operating amount in unidirectional home-seeking" parameter. The position at which the motor stopped becomes the home position. | <ul style="list-style-type: none"> • One external sensor is required • The operating speed is high (return-to-home operation speed) • Not rotate in the reverse direction |

| Item | Description | Features |
|-----------------|---|--|
| Push mode *1 | The motor rotates in the reverse direction when a mechanism installed to the motor presses against a stopper, etc. on the machine. After that, the motor moves according to the value of "(HOME) Backward steps after first entry in push motion home-seeking," rotates in the reverse direction, and is operated at the home position detection speed. The motor rotates in the reverse direction when a mechanism installed to the motor presses against a stopper, etc. on the machine, moves according to the value of "(HOME) Backward steps in push motion home-seeking," and stops. The position at which the motor stopped becomes the home position. | <ul style="list-style-type: none"> An external sensor is not required The operating speed is high (return-to-home operation speed) |

*1 Do not perform return-to-home operation in push mode with geared motors.

*2 With a rotating mechanism, the home position can be detected even with one external sensor.

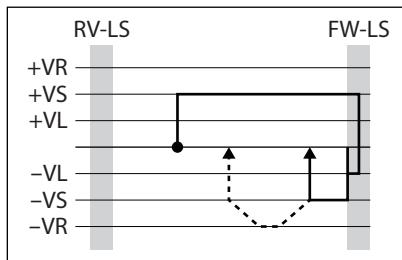


In the initial setting, the signal of the external sensor required for the return-to-home operation is not assigned. Perform return-to-home operation after assigning the signal.

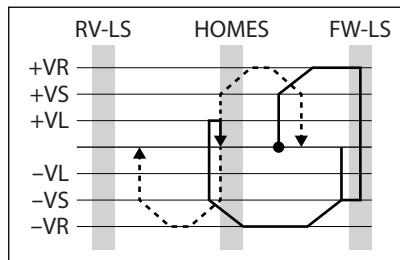
Explanation of labels

- VR: Return-to-home operation speed
- VS: Return-to-home starting speed
- VL: Last speed
- --- : Orbit when a home offset is set

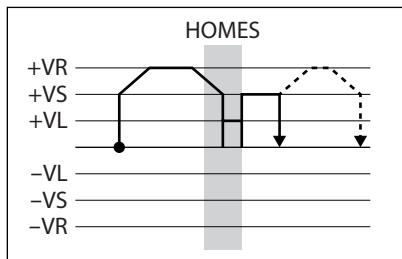
• 2-sensor mode



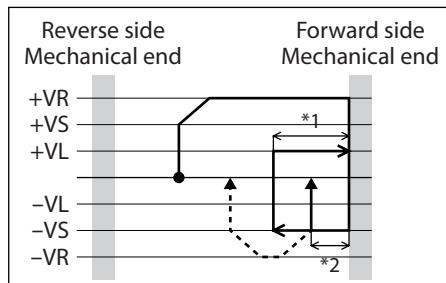
• 3-sensor mode



• One-way rotation mode



• Push mode



*1 Depending on the "(HOME) Backward steps after first entry in push motion home-seeking" parameter

*2 Depending on the "(HOME) Backward steps in push motion home-seeking" parameter

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|---------------------|---|---|---------------|
| Motor and mechanism | (HOME) Home-seeking mode | Sets the mode for return-to-home operation. Setting range 0: 2-sensor 1: 3-sensor 2: One-way rotation 3: Push-motion | 1 |
| | (HOME) Starting direction | Sets the starting direction for home detection. Setting range 0: Negative side 1: Positive side | 1 |
| | (HOME) Acceleration/ deceleration rate | Sets the acceleration/deceleration rate (acceleration/deceleration time). Setting range 1 to 1,000,000,000 (1=0.001 kHz/s, 1=0.001 ms/kHz, or 1=0.001 s) | 1,000,000 |
| | (HOME) Starting speed | Sets the starting speed. Setting range 1 to 4,000,000 Hz | 500 |
| | (HOME) Operating speed | Sets the operating speed. Setting range 1 to 4,000,000 Hz | 1,000 |
| | (HOME) Last speed | Sets the operating speed for final positioning with the home position. Setting range 1 to 10,000 Hz | 500 |
| | JOG/HOME/ZHOME command filter time constant | Sets the time constant for the command filter. Setting range 1 to 200 ms | 1 |
| | JOG/HOME/ZHOME operating current | Sets the operating current. Setting range 0 to 1,000 (1=0.1%) | 1,000 |
| | (HOME) Backward steps in 2 sensor home-seeking | Sets the backward steps after 2 sensor return-to-home operation. Setting range 0 to 8,388,607 steps | 500 |
| | (HOME) Operating amount in uni-directional home-seeking | Sets the operating amount after one-way rotation return-to-home operation. Setting range 0 to 8,388,607 steps | 500 |
| | (HOME) Operating current for push motion home-seeking | Sets the operating current rate for push-motion return-to-home operation based on the base current being 100%. Setting range 0 to 1,000 (1=0.1%) | 1,000 |
| | (HOME) Backward steps after first entry in push motion home-seeking | Sets the backward steps after the mechanical end is detected first in push-motion return-to-home operation. Setting range 0 to 8,388,607 steps | 0 |

| MEXE02 tree view | Parameter name | Description | Initial value |
|---------------------|---|--|---------------|
| Motor and mechanism | (HOME) Pushing time in push motion home-seeking | Sets the generation time of the TLC output to judge push-motion completion. Setting range 1 to 65,535 ms | 200 |
| | (HOME) Backward steps in push motion home-seeking | Sets the backward steps after the position of mechanical end is set in push-motion return-to-home operation. Setting range 0 to 8,388,607 steps | 500 |
| Base setting | Preset position | Sets the preset position. Setting range -2,147,483,648 to 2,147,483,647 steps | 0 |



- Since the position coordinate is not set during return-to-home operation, the ABSPEN output is turned OFF.
- Preset (P-PRESET) is executed after return-to-home operation to set the position coordinate. Therefore, the mechanical coordinate of the home position depends on the "Preset position" parameter.

■ Extended function

● Home offset

Home offset is a function to perform positioning operation according to the amount set in the "(HOME) Position offset" parameter after return-to-home operation and set the position where the motor stopped as the home position.

● Detection of external sensor (signal)

When performing return-to-home operation, use of the SLIT input in addition to the TIM and ZSG signals increases the accuracy of home detection.



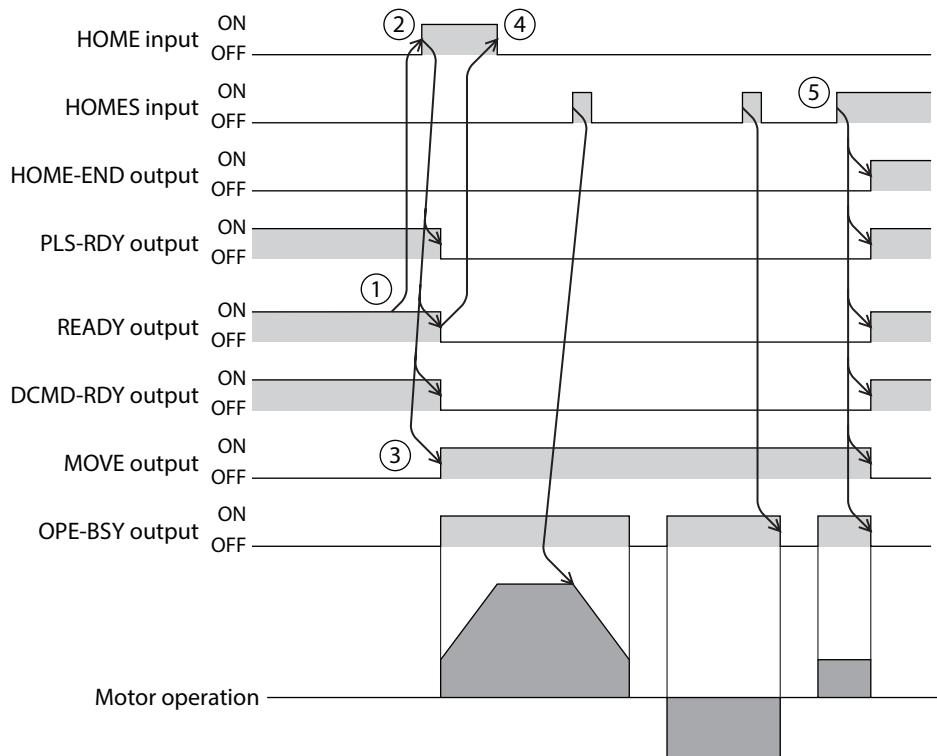
- When the TIM signal is used, set the resolution to be an integral multiple of 50.
- When the "JOG/HOME/ZHOME operation setting" parameter is set to "ABZO setting is prioritized," the parameter suitable for the mechanism is automatically applied. If you want to set the operation information arbitrarily, set the "JOG/HOME/ZHOME operation setting" parameter to "Manual setting."

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|---------------------|---------------------------------|--|---------------|
| Motor and mechanism | (HOME) SLIT detection | Sets whether or not to concurrently use the SLIT input for return-to-home operation. Setting range 0: Disable 1: Enable | 0 |
| | (HOME) TIM/ZSG signal detection | Sets whether or not to concurrently use the TIM signal or ZSG signal for return-to-home operation. Setting range 0: Disable 1: TIM 2: ZSG | 0 |
| | (HOME) Position offset | Sets the amount of offset from the home position. Setting range -2,147,483,647 to 2,147,483,647 steps | 0 |

■ Timing chart (in case of 3-sensor mode)

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



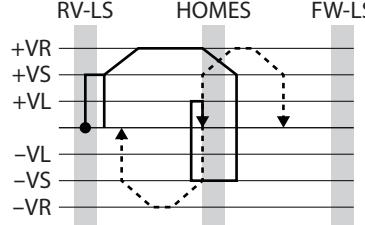
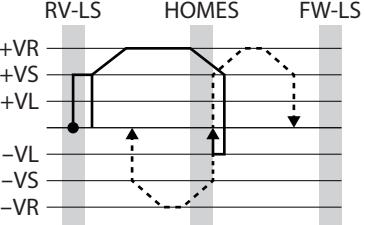
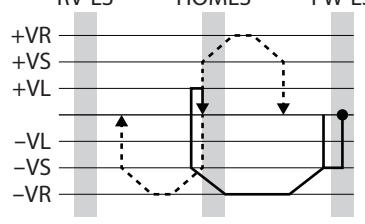
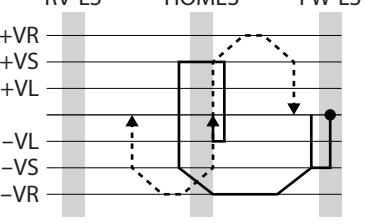
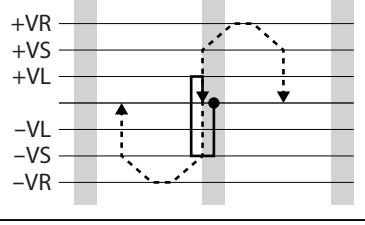
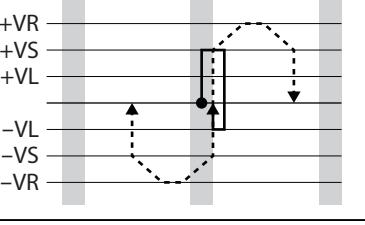
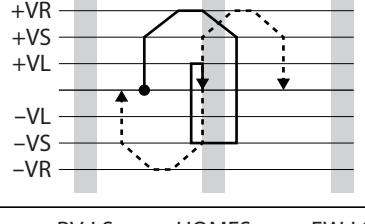
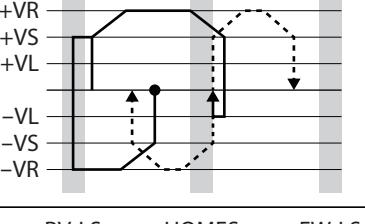
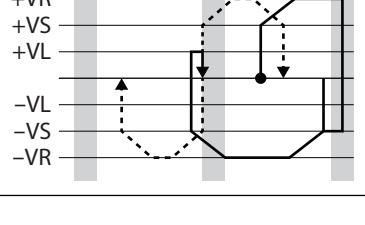
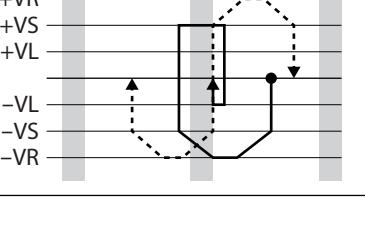
■ Operation sequence

● 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. When operation is performed at the return-to-home operation speed and the ON edge of the HOME sensor is detected, operation is stopped. The position at which the motor stopped becomes the home position.

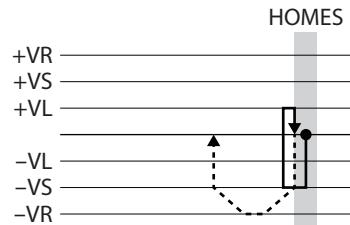
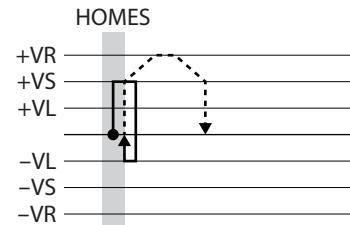
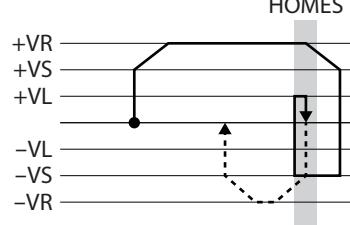
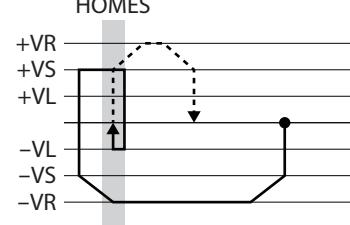
Explanation of labels

- VR: Return-to-home operation speed
- VS: Return-to-home starting speed
- VL: Last speed
- ---: Orbit when a home offset is set

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

When only the HOME sensor is used (rotating mechanism, 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 side | Starting direction of return-to-home operation: Negative side |
|---|--|---|
| HOMES |  <p style="text-align: center;">HOMES</p> <p>+VR +VS +VL -VL -VS -VR</p> |  <p style="text-align: center;">HOMES</p> <p>+VR +VS +VL -VL -VS -VR</p> |
| Other than HOMES |  <p style="text-align: center;">HOMES</p> <p>+VR +VS +VL -VL -VS -VR</p> |  <p style="text-align: center;">HOMES</p> <p>+VR +VS +VL -VL -VS -VR</p> |



The motor may pass by the HOME sensor and decelerate to a stop even after the HOME sensor is detected depending on the value set in the "(HOME) Acceleration/deceleration rate" parameter. Keep an adequate distance between the mechanical end and the HOME sensor because they may touch each other when the distance is too short.

When the SLIT input, TIM signal, and ZSG signal are used concurrently

Even after return-to-home operation is complete, 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 complete.

| Home position detection signal | Starting direction of return-to-home operation: Positive side | Starting direction of return-to-home operation: Negative side |
|--|---|---|
| SLIT input | | |
| TIM signal or ZSG signal | | |
| SLIT input and TIM signal or SLIT input and ZSG signal | | |

● 2-sensor mode

The motor is operated in the starting direction of return-to-home at the starting speed. When the limit sensor is detected, the motor rotates in the reverse direction and pulls out of the limit sensor at the last speed. After pulling out, the motor is operated according to the value of the backward steps in return-to-home at the starting speed and stops. The position at which the motor stopped becomes the home position.

Explanation of labels

- VR: Return-to-home operation speed
- VS: Return-to-home starting speed
- VL: Last speed
- --- : Orbit when a home offset is set

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

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

When the SLIT input and/or TIM signal are used concurrently

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

| Home position detection signal | Starting direction of return-to-home operation: Positive side | Starting direction of return-to-home operation: Negative side |
|--|--|--|
| SLIT input | <p>SLIT input ON OFF</p> | <p>SLIT input ON OFF</p> |
| TIM signal or ZSG signal | <p>TIM output (ZSG output) ON OFF</p> | <p>TIM output (ZSG output) ON OFF</p> |
| SLIT input and TIM signal or SLIT input and ZSG signal | <p>SLIT input ON OFF</p> <p>TIM output (ZSG output) ON OFF</p> | <p>SLIT input ON OFF</p> <p>TIM output (ZSG output) ON OFF</p> |

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

● One-way rotation mode

The motor is operated in the starting direction of return-to-home at the operating speed and decelerates to a stop when the HOME sensor is detected. After that, it pulls out of the range of the HOME sensor at the last speed, operates according to the value of operating amount in return-to-home at the starting speed, and stops. The position at which the motor stopped becomes the home position.

Explanation of labels

- VR: Return-to-home operation speed
- VS: Return-to-home starting speed
- VL: Last speed
- ---: Orbit when a home offset is set

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

* The motor pulls out of the HOME sensor and moves according to the value of "(HOME) Operating amount in unidirectional home-seeking."



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 rate" parameter so that the motor can stop in the range of the HOME sensor.

When SLIT input and/or TIM signal are used concurrently

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

| Home position detection signal | Starting direction of return-to-home operation: Positive side | Starting direction of return-to-home operation: Negative side |
|--|---|---|
| SLIT input | | |
| TIM signal or ZSG signal | | |
| SLIT input and TIM signal or SLIT input and ZSG signal | | |

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

● Push mode

The motor rotates in the reverse direction when it is operated in the starting direction of return-to-home at the operating speed and a mechanism installed to the motor presses against a stopper, etc. mounted at the mechanical end. After that, the motor moves according to the value of "(HOME) Backward steps after first entry in push motion home-seeking," stops, and is operated again toward the stopper at the home position detection speed. When push-motion occurred again, the motor rotates in the reverse direction, moves according to the value of backward steps in push-motion return-to-home, and stops.

Explanation of labels

- VR: Return-to-home operation speed
- VS: Return-to-home starting speed
- VL: Last speed
- --- : Orbit when a home offset is set

| Starting position of return-to-home operation | Starting direction of return-to-home operation: Positive side | Starting direction of return-to-home operation: Negative side |
|---|---|---|
| Between mechanical ends | <p>Reverse side Mechanical end Forward side Mechanical end</p> | <p>Reverse side Mechanical end Forward side Mechanical end</p> |

*1 The motor moves from the mechanical end according to the value of "(HOME) Backward steps after first entry in push motion home-seeking."

*2 The motor moves from the mechanical end according to the value of "(HOME) Backward steps in push motion home-seeking."

When the SLIT input, TIM signal, and ZSG signal are used concurrently

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

| Home position detection signal | Starting direction of return-to-home operation: Positive side | Starting direction of return-to-home operation: Negative side |
|--|--|--|
| SLIT input | <p>Reverse side Mechanical end Forward side Mechanical end</p> <p>SLIT input ON OFF</p> | <p>Reverse side Mechanical end Forward side Mechanical end</p> <p>SLIT input ON OFF</p> |
| TIM signal or ZSG signal | <p>Reverse side Mechanical end Forward side Mechanical end</p> <p>TIM output ON (ZSG output) OFF</p> | <p>Reverse side Mechanical end Forward side Mechanical end</p> <p>TIM output ON (ZSG output) OFF</p> |
| SLIT input and TIM signal or SLIT input and ZSG signal | <p>Reverse side Mechanical end Forward side Mechanical end</p> <p>SLIT input ON OFF</p> <p>TIM output ON (ZSG output) OFF</p> | <p>Reverse side Mechanical end Forward side Mechanical end</p> <p>SLIT input ON OFF</p> <p>TIM output ON (ZSG output) OFF</p> |

* The motor moves from the mechanical end according to the value of "(HOME) Backward steps in push motion home-seeking."

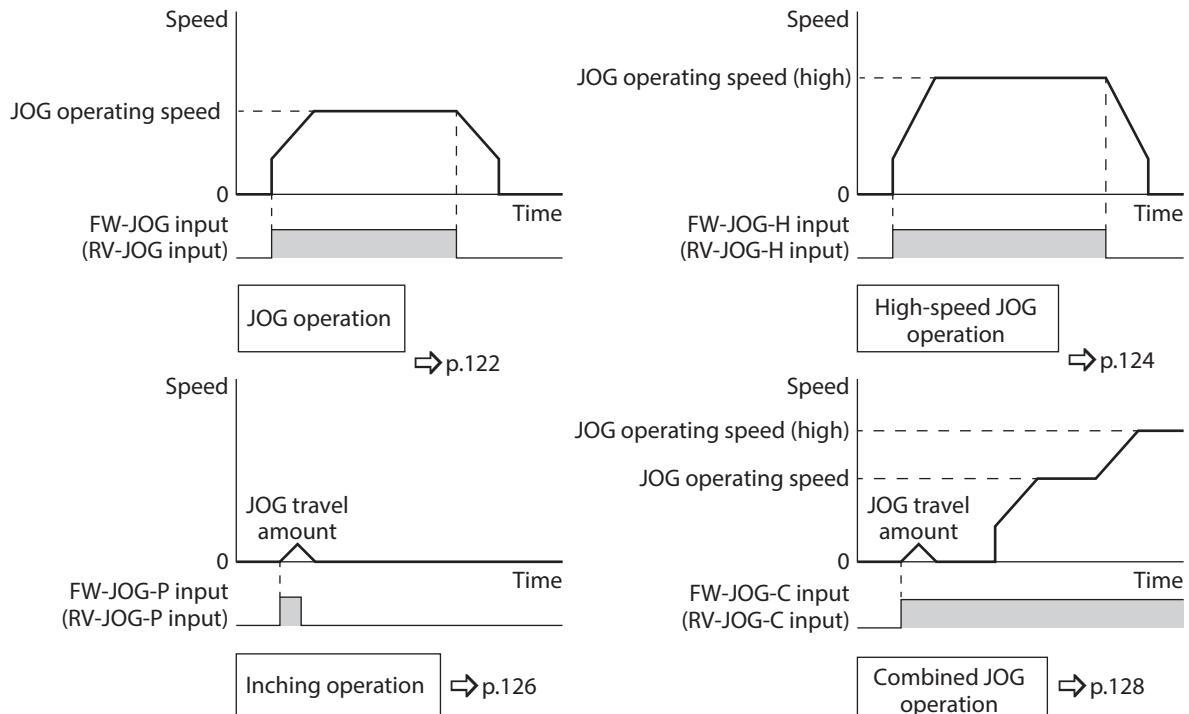
5 Macro operation

Macro operation is an operation type in which a specific input signal is turned ON to automatically perform operation corresponding to the signal. The macro operation includes JOG operation, inching operation, continuous operation, etc. The travel amount, operating speed, acceleration/deceleration and stopping decelerations for each operation are set with parameters.

5-1 Types of macro operation

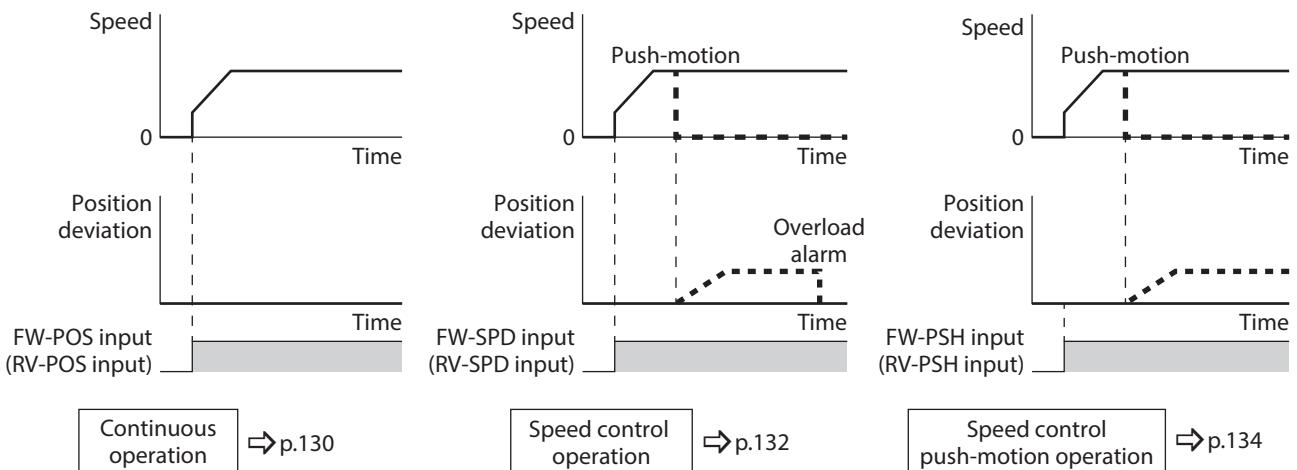
■ JOG macro operation

JOG macro operation is a macro operation in which a parameter exclusive for JOG is used.



■ Continuous macro operation

Continuous macro operation is a macro operation in which "Speed," "Starting/changing rate," "Stopping deceleration," and "Operating current" of operation data are used.



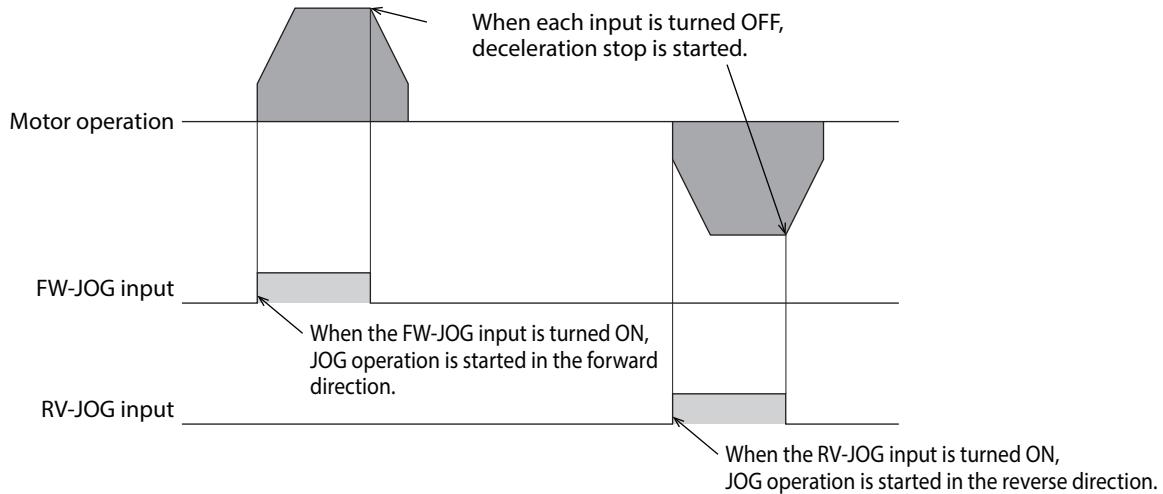
Note

With macro operation, link of operation data, loop function, and event jump function cannot be used. If you want to link operation data, use stored data operation.

5-2 JOG operation

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

■ Operation image

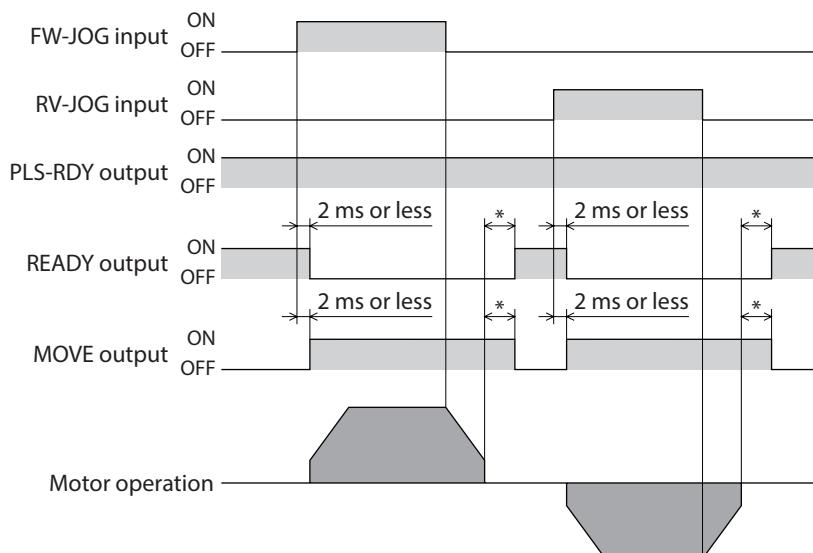
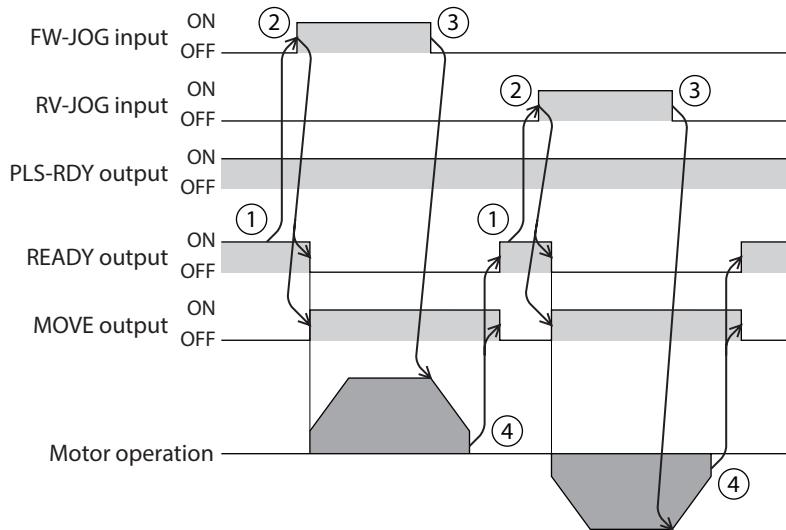


Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|---------------------|---|--|---------------|
| Motor and mechanism | JOG/HOME/ZHOME command filter time constant | Sets the time constant for the command filter. Setting range 1 to 200 ms | 1 |
| | JOG/HOME/ZHOME operating current | Sets the operating current. Setting range 0 to 1,000 (1=0.1%) | 1,000 |
| | (JOG) Operating speed | Sets the operating speed for JOG operation and inching operation. Setting range 1 to 4,000,000 Hz | 1,000 |
| | (JOG) Acceleration/ deceleration rate | Sets the acceleration/deceleration rate or acceleration/deceleration time. Setting range 1 to 1,000,000,000 (1=0.001 kHz/s, 1=0.001 s, or 1=0.001 ms/kHz) | 1,000,000 |
| | (JOG) Starting speed | Sets the starting speed. Setting range 0 to 4,000,000 Hz | 500 |

■ Timing chart

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

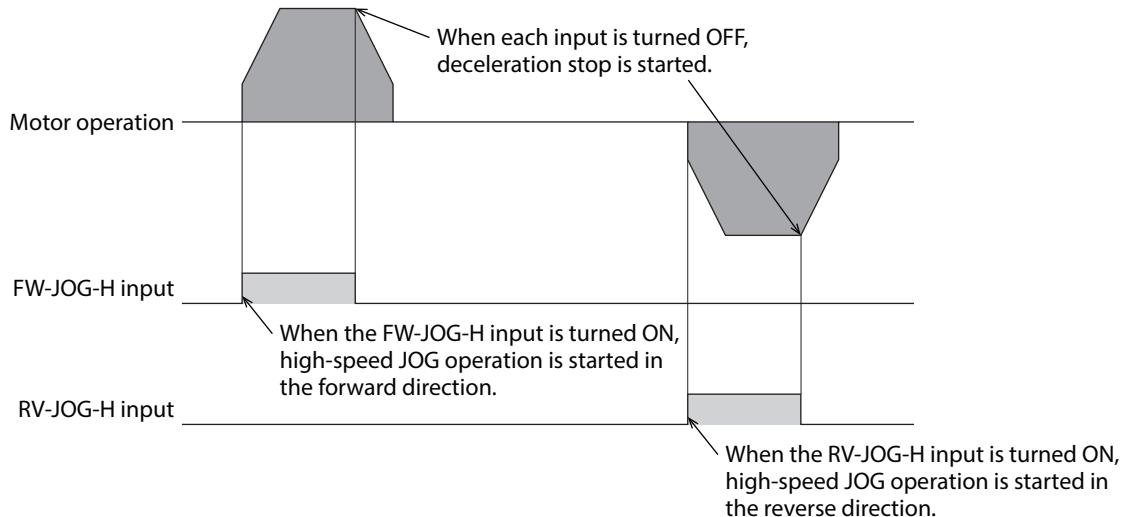


* The specific time varies depending on the load, operating speed, speed filter and other.

5-3 High-speed JOG operation

With high-speed JOG operation, the motor operates continuously in one direction at a high speed while the FW-JOG-H input or RV-JOG-H input is ON. If the input signal is turned OFF, the motor decelerates to a stop. Operation can be stopped also by inputting an operation stop signal.

■ Operation image

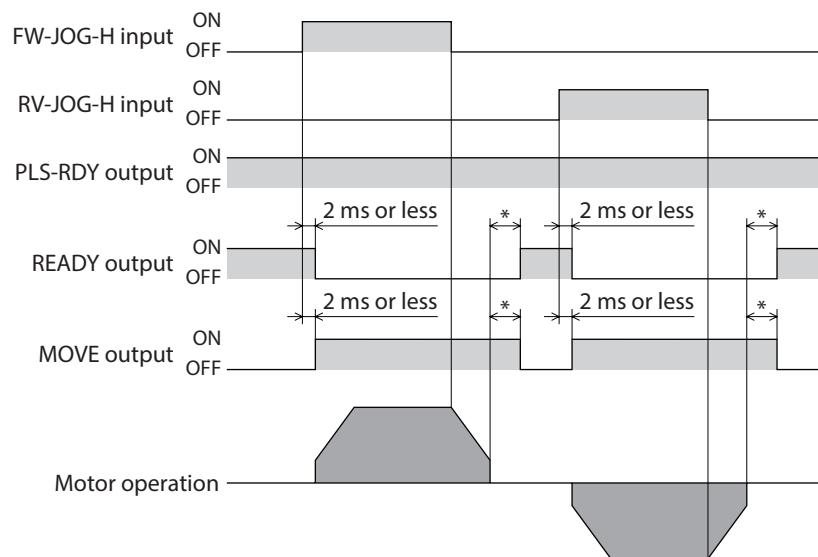
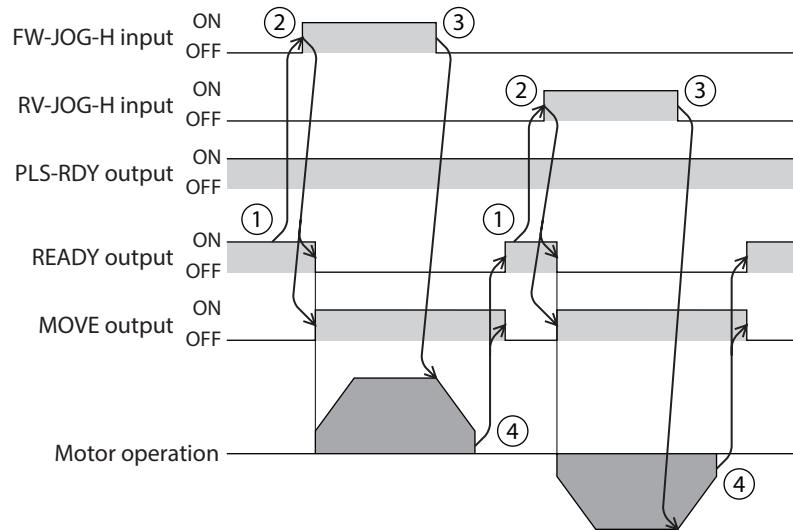


Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|---------------------|---|--|---------------|
| Motor and mechanism | JOG/HOME/ZHOME command filter time constant | Sets the time constant for the command filter. Setting range 1 to 200 ms | 1 |
| | JOG/HOME/ZHOME operating current | Sets the operating current. Setting range 0 to 1,000 (1=0.1%) | 1,000 |
| | (JOG) Acceleration/deceleration rate | Sets the acceleration/deceleration rate or acceleration/deceleration time. Setting range 1 to 1,000,000,000 (1=0.001 kHz/s, 1=0.001 s, or 1=0.001 ms/kHz) | 1,000,000 |
| | (JOG) Starting speed | Sets the starting speed. Setting range 0 to 4,000,000 Hz | 500 |
| | (JOG) Operating speed (high) | Sets the operating speed for high-speed JOG operation. Setting range 1 to 4,000,000 Hz | 5,000 |

■ Timing chart

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



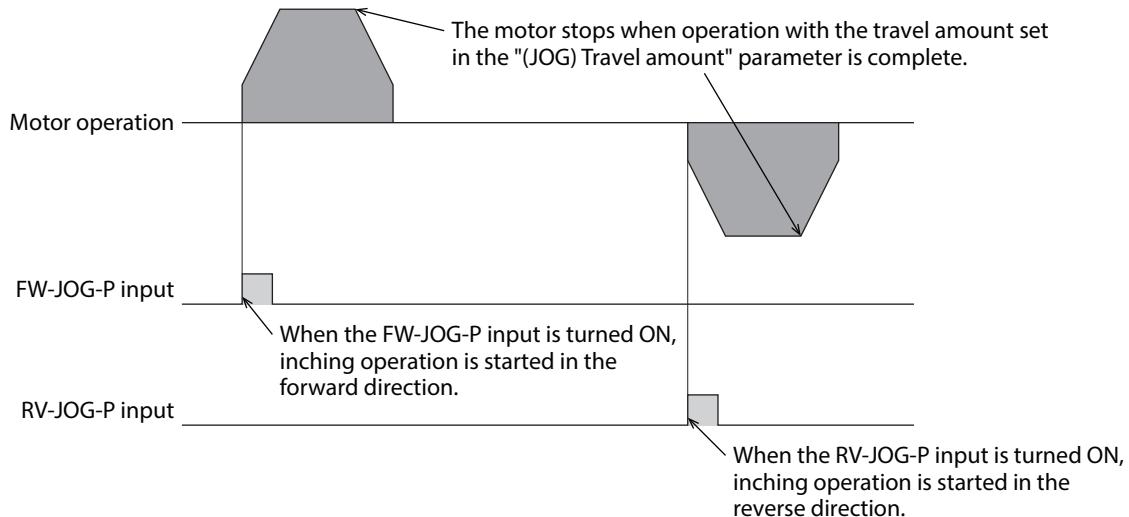
* The specific time varies depending on the load, operating speed, speed filter and other.

5-4 Inching operation

With inching operation, when the FW-JOG-P input or RV-JOG-P input is turned from OFF to ON, positioning operation is executed.

After rotating according to the number of the steps set in "(JOG) Travel amount," the motor stops.

■ Operation image

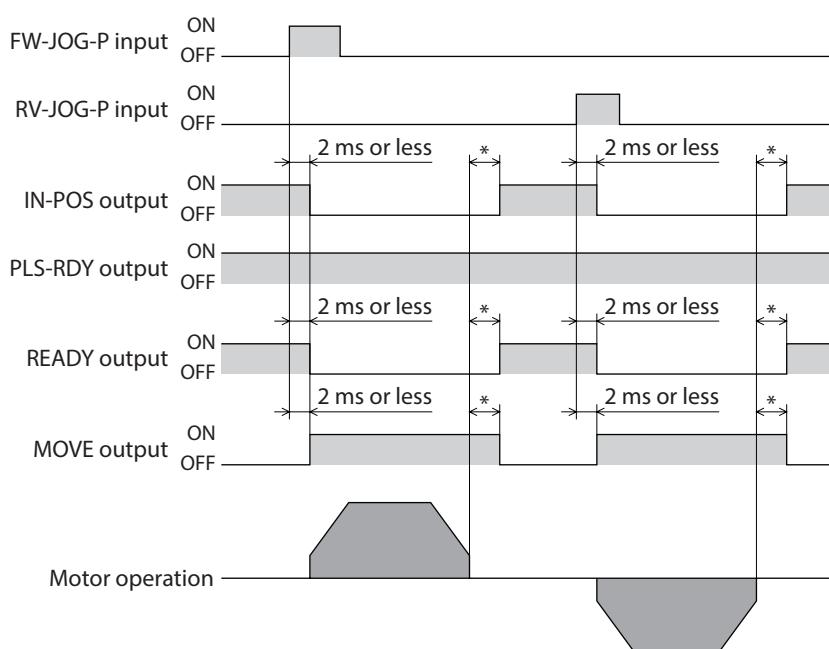
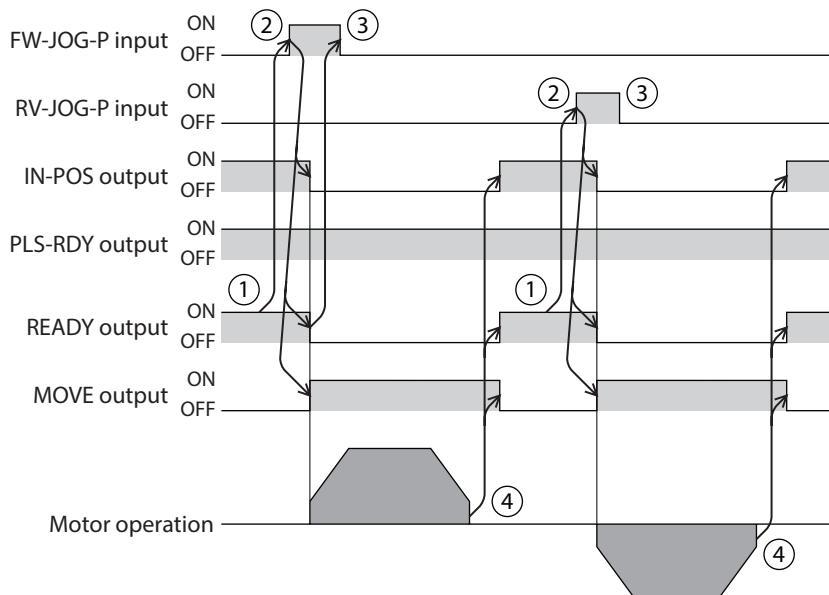


Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|---------------------|---|--|---------------|
| Motor and mechanism | JOG/HOME/ZHOME command filter time constant | Sets the time constant for the command filter. Setting range 1 to 200 ms | 1 |
| | JOG/HOME/ZHOME operating current | Sets the operating current. Setting range 0 to 1,000 (1=0.1%) | 1,000 |
| | (JOG) travel amount | Sets the travel amount for inching operation. Setting range 1 to 8,388,607 steps | 1 |
| | (JOG) Operating speed | Sets the operating speed. Setting range 1 to 4,000,000 Hz | 1,000 |
| | (JOG) Acceleration/deceleration rate | Sets the acceleration/deceleration rate or acceleration/deceleration time. Setting range 1 to 1,000,000,000 (1=0.001 kHz/s, 1=0.001 s, or 1=0.001 ms/kHz) | 1,000,000 |
| | (JOG) Starting speed | Sets the starting speed. Setting range 0 to 4,000,000 Hz | 500 |

■ Timing chart

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

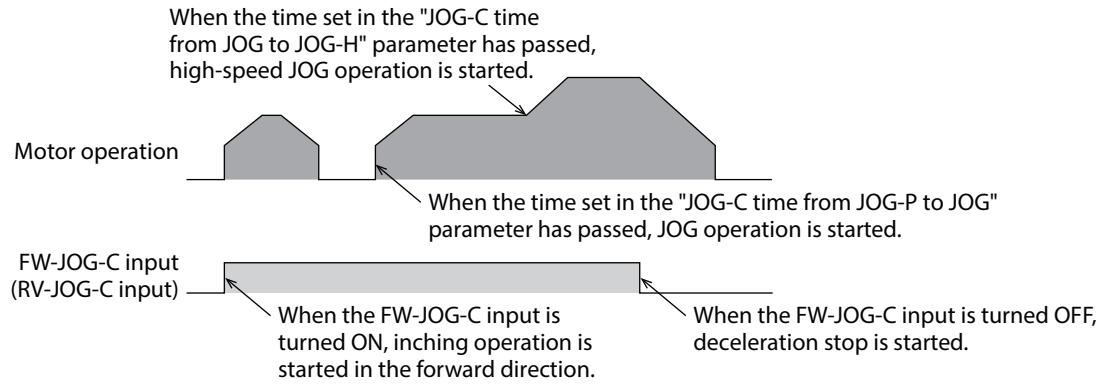


* The specific time varies depending on the load, operating speed, speed filter and other.

5-5 Combined JOG operation

With combined JOG operation, the operation transits in the order of inching operation→JOG operation→high-speed JOG operation while the FW-JOG-C input or RV-JOG-C input is ON. When the FW-JOG-C input or RV-JOG-C input is turned ON, operation is started. When it is turned OFF, the motor decelerates to a stop.

■ Operation image



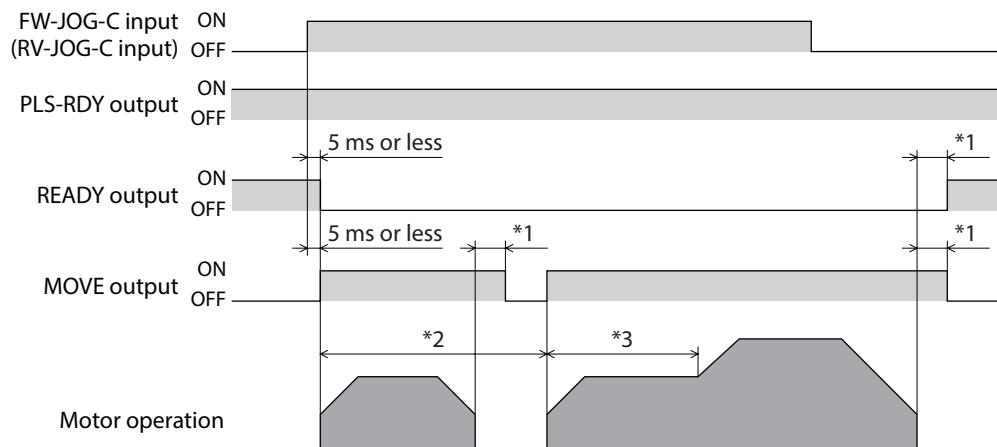
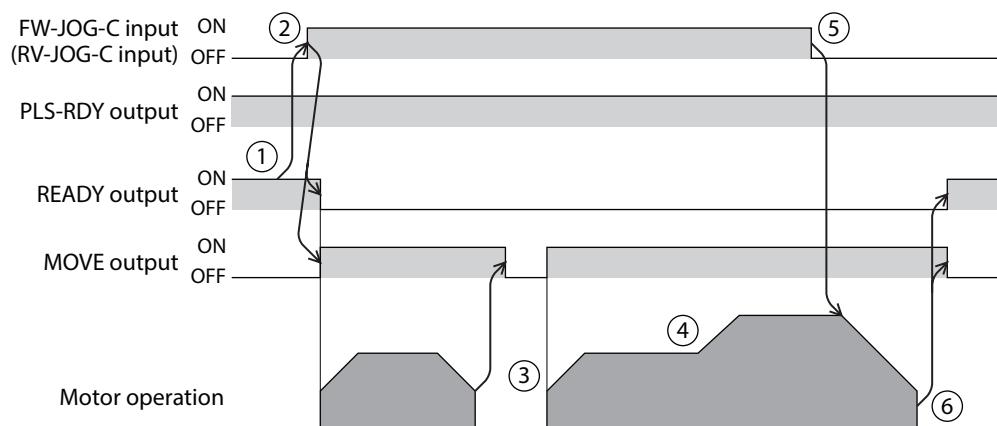
Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|---------------------|---|--|---------------|
| Motor and mechanism | JOG/HOME/ZHOME command filter time constant | Sets the time constant for the command filter. Setting range 1 to 200 ms | 1 |
| | JOG/HOME/ZHOME operating current | Set the operating current. Setting range 0 to 1,000 (1=0.1%) | 1,000 |
| | (JOG) travel amount | Sets the travel amount for inching operation. Setting range 1 to 8,388,607 steps | 1 |
| | (JOG) Operating speed | Sets the operating speed for JOG operation and inching operation. Setting range 1 to 4,000,000 Hz | 1,000 |
| | (JOG) Acceleration/ deceleration rate | Sets the acceleration/deceleration rate or acceleration/deceleration time. Setting range 1 to 1,000,000,000 (1=0.001 kHz/s, 1=0.001 s, or 1=0.001 ms/kHz) | 1,000,000 |
| | (JOG) Starting speed | Sets the starting speed. Setting range 0 to 4,000,000 Hz | 500 |
| | (JOG) Operating speed (high) | Sets the operating speed for high-speed JOG operation. Setting range 1 to 4,000,000 Hz | 5,000 |

| MEXE02 tree view | Parameter name | Description | Initial value |
|-------------------------|------------------------------|--|---------------|
| I/O action and function | JOG-C time from JOG-P to JOG | Sets the timing to transit from inching operation to JOG operation in combined JOG operation. Setting range 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. Setting range 1 to 5,000 (1=0.001 s) | 1,000 |

■ Timing chart

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



*1 The specific time varies depending on the load, operating speed, speed filter and other.

*2 Set in "JOG-C time from JOG-P to JOG."

*3 Set in "JOG-C time from JOG to JOG-H."

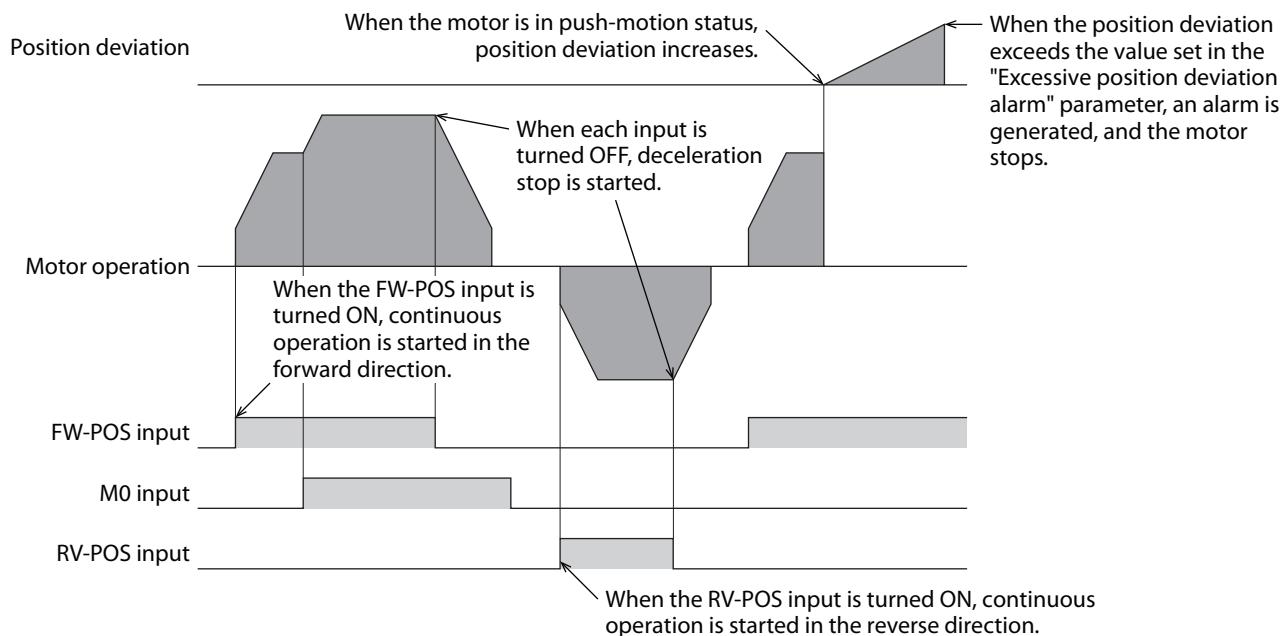
5-6 Continuous operation

The motor operates continuously at the operating speed of the operation data number selected while the FW-POS input or RV-POS input is ON. When the operation data number is changed while executing continuous operation, the speed is changed.

When the FW-POS input or RV-POS input is turned OFF, the motor decelerates to a stop. If the signal of the same rotation direction is turned ON while decelerating, the motor accelerates again and continues operation.

If the FW-POS input and the RV-POS input are turned ON simultaneously, the motor decelerates to a stop.

■ Operation image



Related operation data

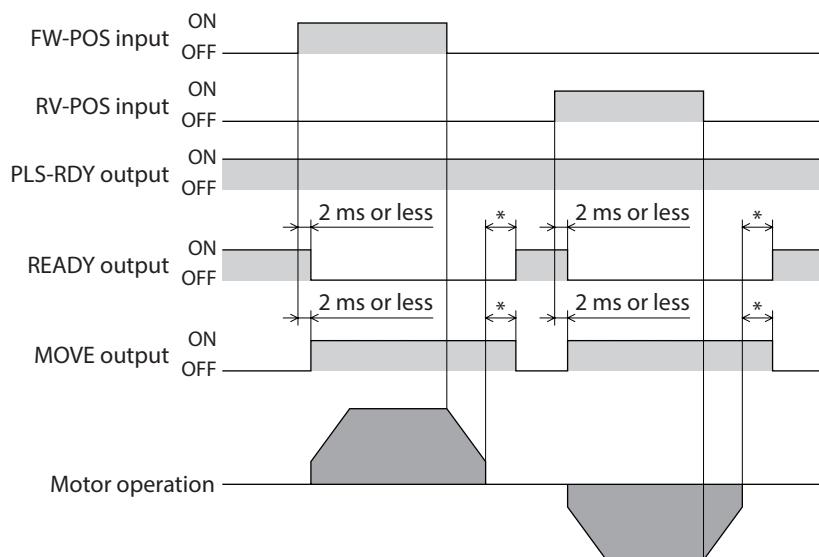
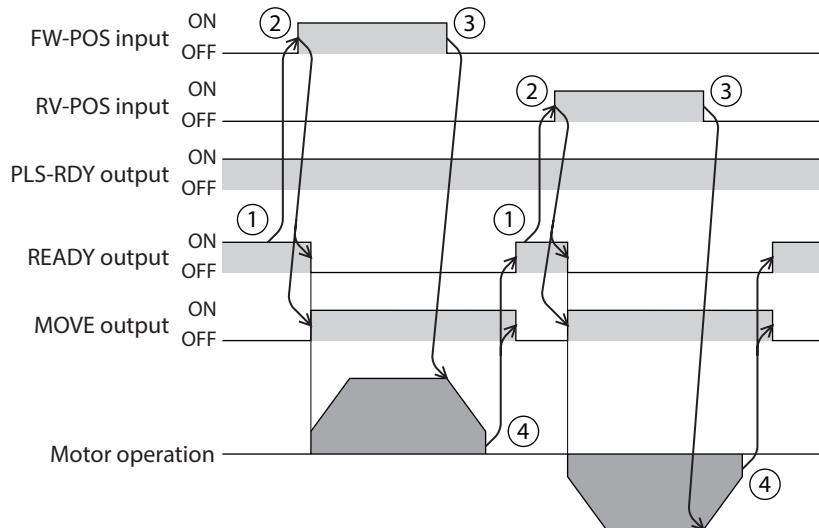
| MEXE02 tree view | Item | Description | Initial value |
|------------------|------------------------|---|---------------|
| Operation data | Operating speed | Sets the operating speed. Setting range -4,000,000 to 4,000,000 Hz | 1,000 |
| | Starting/changing rate | Sets the acceleration/deceleration rate (acceleration/deceleration time) for start and change of the speed. Setting range 1 to 1,000,000,000 (1=0.001 kHz/s, 1=0.001 s, or 1=0.001 ms/kHz) | 1,000,000 |
| | Stopping deceleration | Sets the deceleration rate (deceleration time) for stop. Setting range 1 to 1,000,000,000 (1=0.001 kHz/s, 1=0.001 s, or 1=0.001 ms/kHz) | 1,000,000 |
| | Operating current | Sets the motor operating current based on the base current being 100%. It is a push-motion current when push-motion operation is performed. Setting range 0 to 1,000 (1=0.1%) | 1,000 |

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|------------------|----------------|---|---------------|
| Base setting | Starting speed | Sets the starting speed. Setting range 0 to 4,000,000 Hz | 500 |

■ Timing chart

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



* The specific time varies depending on the load, operating speed, speed filter and other.

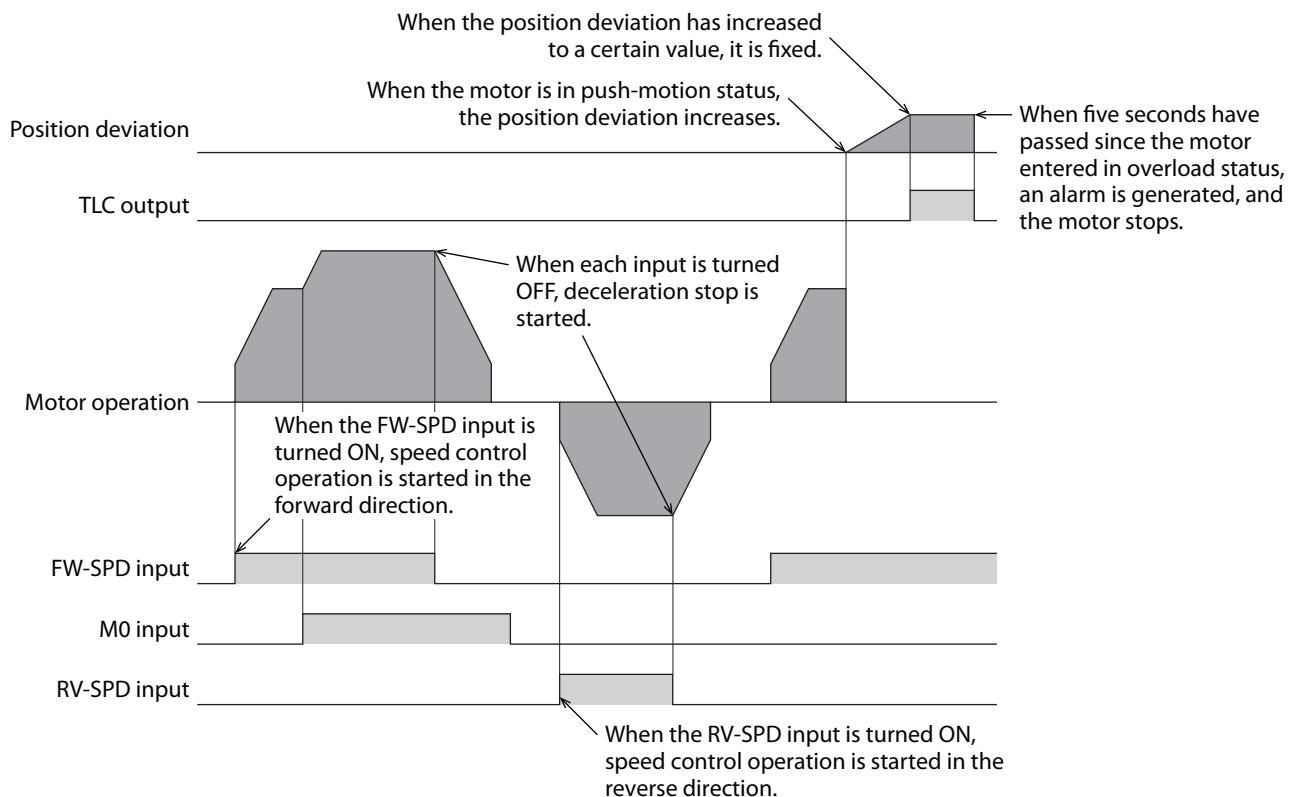
5-7 Speed control operation

The motor operates continuously at the operating speed of the operation data number selected while the FW-SPD input or RV-SPD input is ON. When the operation data number is changed while executing speed control operation, the speed is changed.

When the FW-SPD input or RV-SPD input is turned OFF, the motor decelerates to a stop. If the signal of the same rotation direction is turned ON while decelerating, the motor accelerates again and continues operation.

If the FW-SPD input and the RV-SPD input are turned ON simultaneously, the motor decelerates to a stop.

■ Operation image



Related operation data

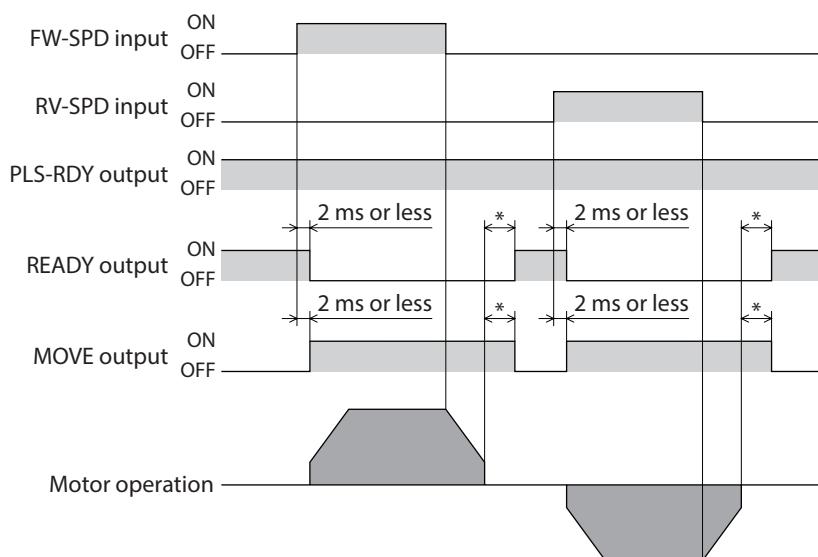
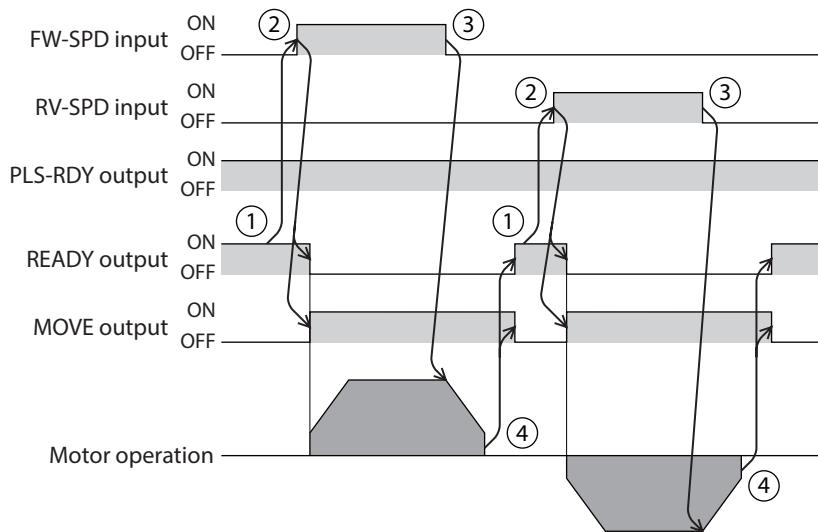
| MEXE02 tree view | Item | Description | Initial value |
|------------------|------------------------|---|---------------|
| Operation data | Operating speed | Sets the operating speed. Setting range -4,000,000 to 4,000,000 Hz | 1,000 |
| | Starting/changing rate | Sets the acceleration/deceleration rate (acceleration/deceleration time) for start and change of the speed. Setting range 1 to 1,000,000,000 (1=0.001 kHz/s, 1=0.001 s, or 1=0.001 ms/kHz) | 1,000,000 |
| | Stopping deceleration | Sets the deceleration rate (deceleration time) for stop. Setting range 1 to 1,000,000,000 (1=0.001 kHz/s, 1=0.001 s, or 1=0.001 ms/kHz) | 1,000,000 |
| | Operating current | Sets the motor operating current based on the base current being 100%. It is a push-motion current when push-motion operation is performed. Setting range 0 to 1,000 (1=0.1%) | 1,000 |

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|------------------|----------------|---|---------------|
| Base setting | Starting speed | Sets the starting speed. Setting range 0 to 4,000,000 Hz | 500 |

■ Timing chart

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



* The specific time varies depending on the load, operating speed, speed filter and other.

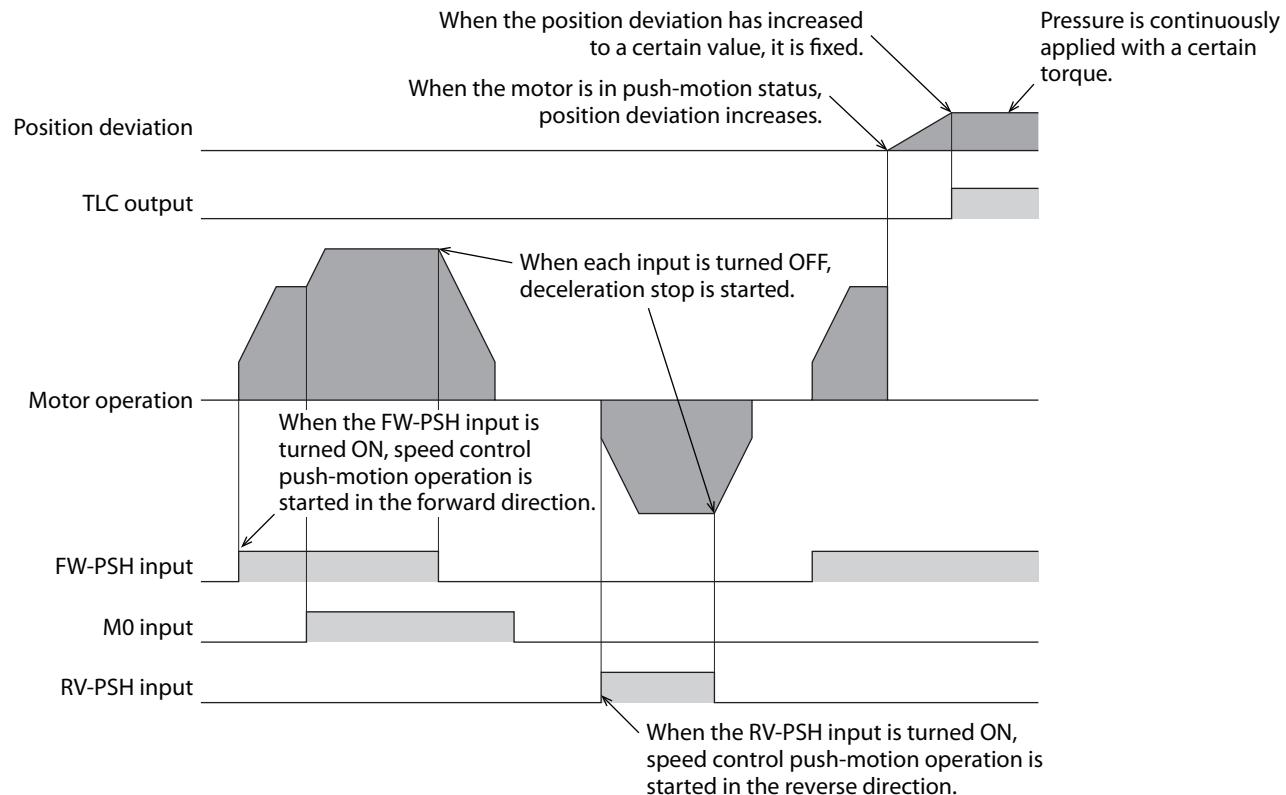
5-8 Speed control push-motion operation

The motor operates continuously at the operating speed of the operation data number selected while the FW-PSH input or RV-PSH input is ON. When the operation data number is changed while executing speed control push-motion operation, the speed is changed.

When the FW-PSH input or RV-PSH input is turned OFF, the motor decelerates to a stop. If the signal of the same rotation direction is turned ON while decelerating, the motor accelerates again and continues operation.

If the FW-PSH input and the RV-PSH input are turned ON simultaneously, the motor decelerates to a stop.

■ Operation image



Related operation data

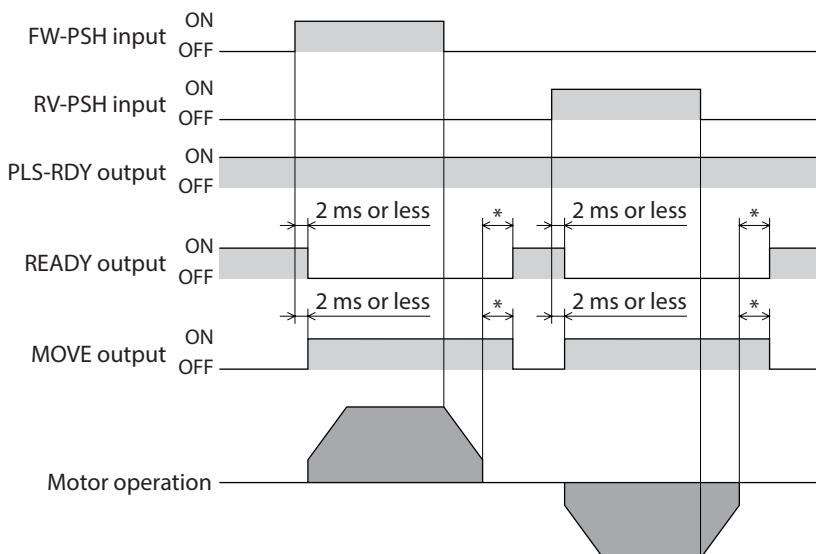
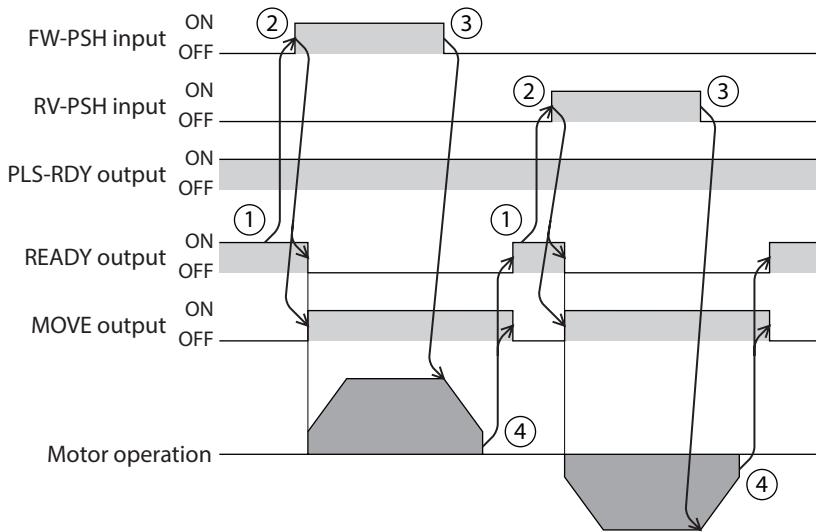
| MEXE02 tree view | Item | Description | Initial value |
|------------------|------------------------|---|---------------|
| Operation data | Operating speed | Sets the operating speed. Setting range -4,000,000 to 4,000,000 Hz | 1,000 |
| | Starting/changing rate | Sets the acceleration/deceleration rate (acceleration/deceleration time) for start and change of the speed. Setting range 1 to 1,000,000,000 (1=0.001 kHz/s, 1=0.001 s, or 1=0.001 ms/kHz) | 1,000,000 |
| | Stopping deceleration | Sets the deceleration rate (deceleration time) for stop. Setting range 1 to 1,000,000,000 (1=0.001 kHz/s, 1=0.001 s, or 1=0.001 ms/kHz) | 1,000,000 |
| | Operating current | Sets the motor operating current based on the base current being 100%. It is a push-motion current when push-motion operation is performed. Setting range 0 to 1,000 (1=0.1%) | 1,000 |

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|------------------|----------------|---|---------------|
| Base setting | Starting speed | Sets the starting speed. Setting range 0 to 4,000,000 Hz | 500 |

■ Timing chart

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



* The specific time varies depending on the load, operating speed, speed filter and other.

6 Relationship between operation type and operation data and parameter

| MEXE02 tree view | Parameter name | High-speed return-to-home operation | Stored data operation |
|---|---|-------------------------------------|-----------------------|
| Operation data | Operation data | <input type="radio"/> | - |
| Operation I/O event | Operation I/O event | <input type="radio"/> | - |
| Extended operation data setting | Extended operation data setting | <input type="radio"/> | - |
| Base setting | Base current | <input type="radio"/> | <input type="radio"/> |
| | Stop current | <input type="radio"/> | <input type="radio"/> |
| | Command filter setting | <input type="radio"/> | <input type="radio"/> |
| | Command filter time constant | <input type="radio"/> | - |
| | Common acceleration rate or time | <input type="radio"/> | - |
| | Common stopping deceleration | <input type="radio"/> | - |
| | Starting speed | <input type="radio"/> | - |
| | Acceleration/deceleration rate | <input type="radio"/> | - |
| | Acceleration/deceleration unit | <input type="radio"/> | <input type="radio"/> |
| | Permission of absolute positioning without setting absolute coordinates | <input type="radio"/> | - |
| Motor and Mechanism (Coordinates/JOG/Home Operation) | (JOG) Travel amount | - | - |
| | (JOG) Operating speed | - | - |
| | (JOG) Acceleration/deceleration rate | - | - |
| | (JOG) Starting speed | - | - |
| | (JOG) Operating speed (high) | - | - |
| | (ZHOME) Operation speed | - | <input type="radio"/> |
| | (ZHOME) Acceleration/deceleration rate | - | <input type="radio"/> |
| | (ZHOME) Starting speed | - | <input type="radio"/> |
| | JOG/HOME/ZHOME command filter time constant | - | <input type="radio"/> |
| | JOG/HOME/ZHOME operating current | - | <input type="radio"/> |
| | (HOME) Home-seeking mode | - | - |
| | (HOME) Starting direction | - | - |

Relationship between operation type and operation data and parameter

| | | Macro operation | | | | | | | | | | | | | |
|--------------------------|--|-------------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Pulse-input operation | O | - | - | O | O | O | O | - | - | - | - | - | - |
| Return-to-home operation | | Speed control push-motion operation | O | O | - | O | O | O | O | O | O | - | - | - | - |
| | | Speed control operation | O | O | - | O | O | O | O | O | O | - | - | - | - |
| | | Continuous operation | O | O | - | O | O | O | O | O | O | - | - | - | - |
| | | Combined JOG operation | O | O | - | O | O | O | O | O | O | - | - | - | - |
| | | Inching operation | O | O | - | O | O | O | O | O | O | - | - | - | - |
| | | High-speed JOG operation | O | O | - | O | O | O | O | O | O | - | - | - | - |
| | | JOG operation | O | O | - | O | O | O | O | O | O | - | - | - | - |
| | | Push mode | O | O | - | O | O | O | O | O | O | - | - | - | - |
| | | One-way rotation mode | O | O | - | O | O | O | O | O | O | - | - | - | - |
| | | 3-sensor mode | O | O | - | O | O | O | O | O | O | - | - | - | - |
| | | 2-sensor mode | O | O | - | O | O | O | O | O | O | - | - | - | - |

| MEXE02 tree view | Parameter name | High-speed return-to-home operation | Stored data operation |
|---|----------------|-------------------------------------|-----------------------|
| (HOME) Acceleration/deceleration rate | – | – | – |
| (HOME) Starting speed | – | – | – |
| (HOME) Operating speed | – | – | – |
| (HOME) Last speed | – | – | – |
| (HOME) SLIT detection | – | – | – |
| (HOME) TIM/ZSG signal detection | – | – | – |
| (HOME) Position offset | – | – | – |
| (HOME) Backward steps in 2 sensor home-seeking | – | – | – |
| (HOME) Operating amount in uni-directional home-seeking | – | – | – |
| (HOME) Operating current for push motion home-seeking | – | – | – |
| (HOME) Backward steps after first entry in push motion home-seeking | – | – | – |
| (HOME) Pushing time in push motion home-seeking | – | – | – |
| (HOME) Backward steps in push motion home-seeking | – | – | – |

Relationship between operation type and operation data and parameter

| | | Pulse-input operation | - | - | - | - | - | - | - | - | - | - |
|--|--|-------------------------------------|---|---|---|---|---|---|---|---|---|---|
| | | Speed control push-motion operation | - | - | - | - | - | - | - | - | - | - |
| | | Speed control operation | - | - | - | - | - | - | - | - | - | - |
| | | Continuous operation | - | - | - | - | - | - | - | - | - | - |
| | | Combined JOG operation | - | - | - | - | - | - | - | - | - | - |
| | | Inching operation | - | - | - | - | - | - | - | - | - | - |
| | | High-speed JOG operation | - | - | - | - | - | - | - | - | - | - |
| | | JOG operation | - | - | - | - | - | - | - | - | - | - |
| | | Push mode | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | | One-way rotation mode | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | | 3-sensor mode | ○ | ○ | ○ | ○ | ○ | - | - | - | - | - |
| | | 2-sensor mode | ○ | ○ | ○ | ○ | ○ | - | - | - | - | - |
| | | | | | | | | | | | | |

7 Position coordinate management

7-1 Overview of position coordinate management

The **AZ** Series manages the position coordinate of the motor with the ABZO sensor (Mechanical multi-rotation absolute sensor). The present position coordinate is mechanically recorded inside the ABZO sensor. Therefore, even if the motor output shaft was externally rotated while the power was OFF, the absolute coordinate against the home position can be maintained.

The coordinate is set in the following flow.

Connect the motor and the driver and turn the power on

The initial coordinate is generated automatically.



Set the mechanical home position

Factory home position or user home position



Set the electrical home position as necessary



Set the generation range of the initial coordinate and the wrap range



Cycle the power

The changed parameter is 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 maintained even if the power is turned off.

The number of count is rest to 0 when the number exceeds 1,800 (*), and the number is newly counted from 1.

* The multi-rotation amount varies depending on the motor frame size. Check with the following table.

Multi-rotation amount of ABZO sensor

| Motor frame size (mm) | Specifications of ABZO sensor |
|-----------------------|-------------------------------|
| 20, 28 | 900 revolutions |
| 40, 42, 60, 85, 90 | 1,800 revolutions |

■ About initial coordinate generation

Decision of how to use the revolution range to 1,800 that can be managed by the ABZO sensor is called "initial coordinate generation."

There are three parameters required for initial coordinate generation as shown below. These parameters are read when the power is turned on.

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

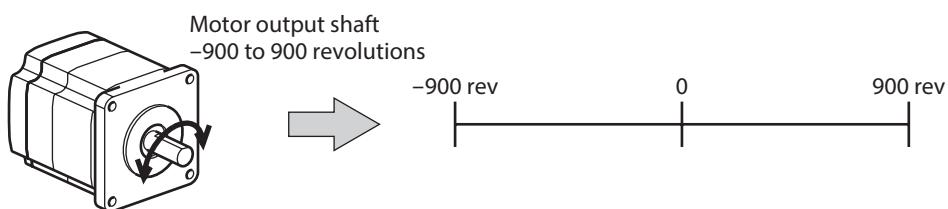


Regardless of whether the wrap function is enabled or disabled, the initial coordinate is generated whenever the control power supply is turned on.

● Factory setting example of the motor

An example of the motor of the frame size 60 mm (2.36 in.) is shown below.

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 position of a motorized actuator 30 mm from the motor side.

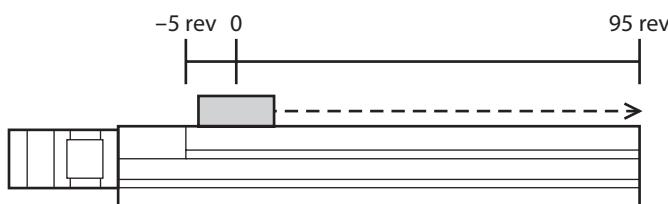
- Stroke of motorized actuator: 600 mm
- Pitch of motorized actuator: 6 mm/rev

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 tree view | Parameter name | Set value |
|---------------------|---|----------------|
| Motor and mechanism | 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 current position when the number of revolutions of the motor output shaft exceeds the set range. Setting of wrap offset allows you to limit the operation area of the equipment and control the index table with coordinates on the positive and negative sides.

Note

To use the wrap function, change the "Initial coordinate generation/wrap coordinate setting" parameter to "Manual setting." (Initial value: ABZO setting is prioritized)
When this parameter is changed, cycle the power of the driver.

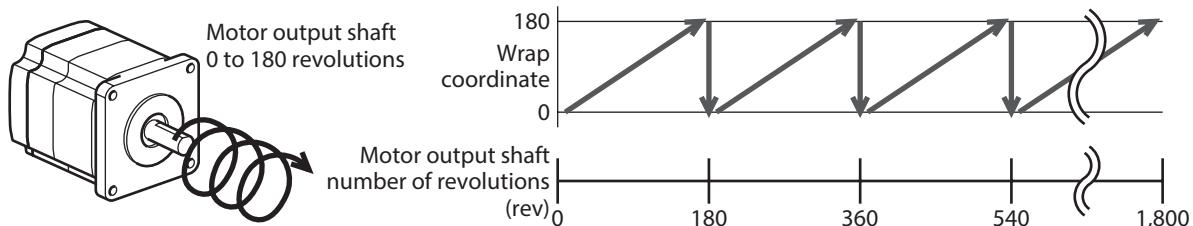
● Concept of wrap setting

This explains as an example for the motor of the frame size 60 mm (2.36 in.).

With wrap setting, 1,800 revolutions managed by the ABZO sensor are divided evenly to generate coordinates within the number of revolutions divided evenly.

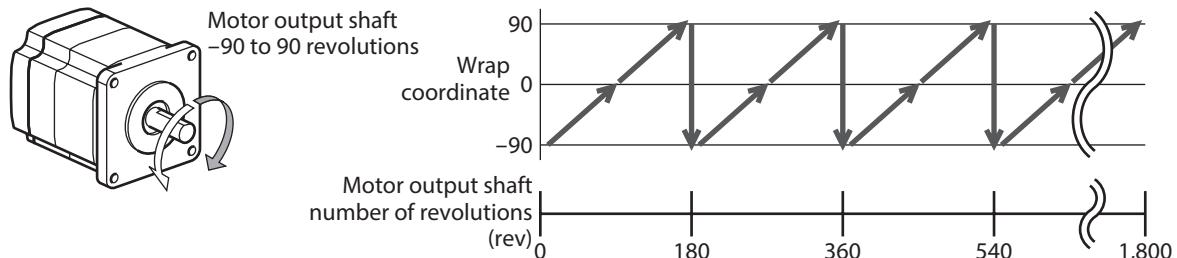
Therefore, set a value by which 1,800 can exactly be divided.

Example: When the wrap function executes if the motor rotates 180 times 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.

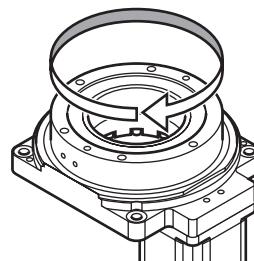
Example: When the range of use of the motor is offset to -90 to 90 revolutions



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

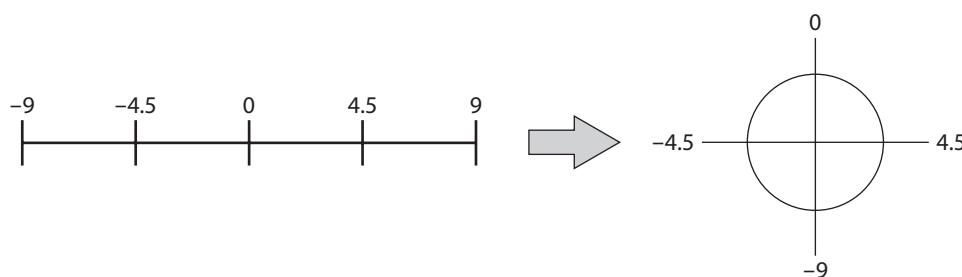
● Setting example of index table

The following is an example in which the index table is made rotate once when the motor output shaft rotates 18 times.
• Gear ratio of motor: 18



Concept of initial coordinate

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



Setting examples of parameters

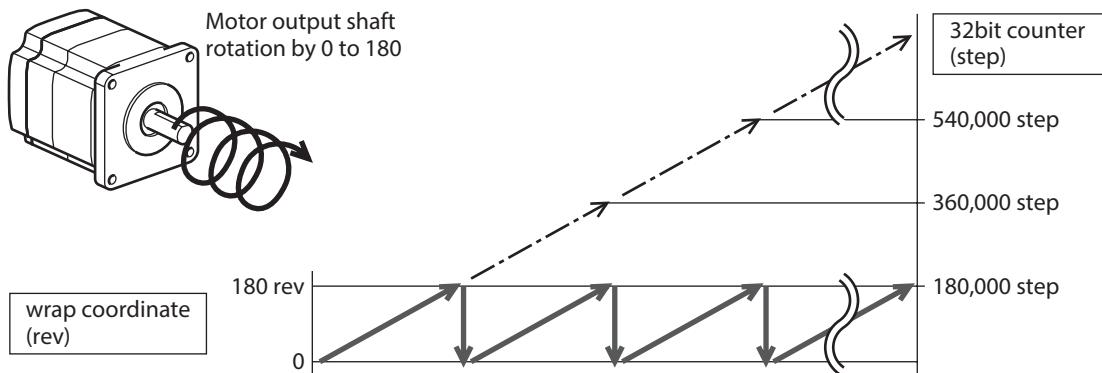
| MEXE02 tree view | Parameter name | Set value |
|---------------------|---|----------------|
| Motor and mechanism | Initial coordinate generation/wrap coordinate setting | Manual setting |
| | Wrap setting | Enable |
| | Initial coordinate generation & wrap setting range | 18.0 rev |
| | Initial coordinate generation & wrap range offset ratio | 50.0% |
| | Initial coordinate generation & wrap range offset value | 0 step |

● Relationship 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 relationship between the wrap coordinate and 32bit counter are as follows.

Example: If the wrap function is performed when the motor rotates 180 revolutions in the same direction

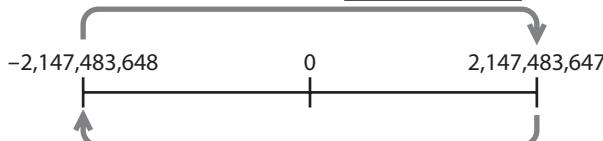


The present position of the motor is preset by 180 revolutions, but the 32 bit counter is not preset. The value of the 32 bit counter can be checked on the status monitor screen of the MEXE02.



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

It shows 2,147,483,647 after -2,147,483,648, and after that it shows in descending order.



It shows -2,147,483,648 after 2,147,483,647, and after that it shows in ascending order.

7-2 Position coordinate origin

The AZ Series has two types of home positions that are a mechanical home position and electrical home position. When the position coordinate has been set, the ABSPEN output is turned ON.

Note

If the position coordinate has not been set, the next operation cannot be performed.

- High-speed return-to-home operation
- Absolute positioning operation (when the "Permission of absolute positioning without setting absolute coordinates" parameter is "Disable")

Related parameters

| MEXE02 tree view | Item | Description | Initial value |
|------------------|---|--|---------------|
| Base setting | Permission of absolute positioning without setting absolute coordinates | Permits absolute positioning operation when the position coordinate is not set. Setting range 0: Disable 1: Enable | 0 |

■ Mechanical home position

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

● Factory home position

The factory home position 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 position is set, the ORGN-STLD output is turned ON.

● User home position

When the user home position is set by performing return-to-home operation or position preset, the PRST-STLD output is turned ON. The user home position can be released by "Position preset clear" of the MEXE02.

If the user home position is set, the home position information is written to the non-volatile memory. The non-volatile memory can be rewritten approximately 100,000 times.

■ Setting of mechanical home position

To set the mechanical home position, perform the position preset or return-to-home operation. When the mechanical home position coordinate is set, operation is performed on coordinates with the mechanical home position in the center.

● Position preset

When position preset is executed, the command position and the feedback position have the values set in the "Preset position" parameter and the home position is set.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|------------------|---|--|---------------|
| Base setting | Preset position | Sets the preset position. Setting range -2,147,483,648 to 2,147,483,647 steps | 0 |
| | Permission of absolute positioning without setting absolute coordinates | Permits absolute positioning operation when the position coordinate is not set. Setting range 0: Disable 1: Enable | 0 |

● Return-to-home operation

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

■ Electrical home position

The electrical home position is the home position that is set in the driver. When the EL-PRST input is turned ON, the electrical home position is set. The motor operates in the coordinate system with the electrical home position as the home position. When the EL-PRST input is turned OFF, the electrical home position is released. While the electrical home position is set, the ELPRST-MON output is turned ON.

Even if the electrical home position is set, it is not written to the non-volatile memory.

■ Setting of electrical home position

The command position when the EL-PRST input is turned from OFF to ON becomes the electrical home position. While the EL-PRST input is ON, operation is performed on coordinates with the electrical home position in the center. When the position preset or return-to-home operation is executed with the EL-PRST input ON, the mechanical home position and the electrical home position have the values set in the "position preset" parameter simultaneously. When the EL-PRST input is turned from ON to OFF, the coordinate returns to the mechanical home position coordinate.



While the electrical home position coordinate is used, high-speed return-to-home operation cannot be executed.

■ Cases in which the position coordinate is not set

In the following cases, the position coordinate is not set. The ABSPEN output is turned OFF.

- Factory setting
- When position preset is performed with the "preset position" parameter set to a value other than "0" and then resolution is changed
- When "Position preset clear" under "Communication menu" of the **MEXE02** is executed
- During return-to-home operation

7-3 Parameters related to ABZO sensor

With the **AZ** Series, the specification 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 has priority over manual setting.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|-------------------------|---|--|---------------|
| Motor and mechanism | Mechanism settings | To change the mechanism settings parameter, select manual setting. Setting range 0: ABZO setting is prioritized 1: Manual setting | 0 |
| | Setting of gear ratio | To change the gear ratio, select manual setting. Setting range 0: ABZO setting is prioritized 1 to 32,767: Gear ratio (1=0.01) | 0 |
| | Initial coordinate generation/wrap coordinate setting | To change the initial coordinate generation & wrap coordinate parameter, select manual setting. Setting range 0: ABZO setting is prioritized 1: Manual setting | 0 |
| | Mechanism limit parameter setting | Disables the ABZO setting of the mechanism limit parameter. Setting range 0: ABZO setting is followed 1: Disable | 0 |

| MEXE02 tree view | Parameter name | Description | Initial value |
|---------------------|--|--|---------------|
| Motor and mechanism | Mechanism protection parameter setting | Disables the ABZO setting of the mechanism protection parameter. Setting range 0: ABZO setting is followed 1: Disable | 0 |
| | JOG/HOME/ZHOME operation setting | To change the operation parameter, select manual setting. Setting range 0: ABZO setting is prioritized 1: Manual setting | 0 |

■ When the parameter of the wrap function is 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 "Manual setting." When it is changed to "Manual setting," the following driver parameters can be set manually.
 - Wrap setting
 - The number of the RND-ZERO output in wrap range
 - Initial coordinate generation & wrap setting range
 - Initial coordinate generation & wrap range offset ratio
 - Initial coordinate generation & wrap range offset value
2. Set each parameters as follows.

| MEXE02 tree view | Parameter name | Set value |
|---------------------|---|-----------|
| Motor and mechanism | Wrap setting | Enable |
| | The number of the RND-ZERO output in wrap range | 1 |
| | 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 |

7-4 Mechanism settings parameter

The mechanism settings parameter is a parameter required for combined use with the mechanism such as the geared motor and motorized actuator.



To change the mechanism settings parameter, change the "Mechanism settings" parameter to "Manual setting." (Initial value: ABZO setting is followed)
When this parameter is changed, cycle the power of the driver.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|---------------------|--------------------------|---|---------------|
| Motor and mechanism | Motor rotation direction | Sets the rotation direction of the motor output shaft. Setting range 0: Positive side=Counterclockwise 1: Positive side=Clockwise | 1 |
| | Mechanism type | This parameter is a reserved function. Not possible to use. | 0 |
| | Mechanical lead pitch | Sets the lead of the ball screw. This parameter is applied to the MEXE02 only. Setting range 1 to 32,767 mm | 1 |

When the unit system of the parameter is changed, each item can be set with the unit in the table below.

| MEXE02 tree view | Item | Standard motor and geared motor | Motorized linear slide |
|------------------|--------------------------|---------------------------------|------------------------|
| Operation data | Position (travel amount) | step | mm |
| | Operating speed | Hz | mm/s |
| | Acceleration * | kHz/s, s, ms/kHz | m/s ² |
| | Stopping deceleration * | kHz/s, s, ms/kHz | m/s ² |

* Depending on the "Acceleration/deceleration unit" parameter.

7-5 Initial coordinate generation & wrap coordinate parameter

These are parameters to be used for generation of the coordinate system.

■ Wrap function

For the wrap function, refer to p.142. (⇒ p.142)

● Related operation type

Set the wrap function to perform the following stored data operations.

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

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|---------------------|---|---|---------------|
| Motor and mechanism | Initial coordinate generation/wrap coordinate setting | To use the wrap function, select manual setting. Setting range 0: ABZO setting is prioritized 1: Manual setting | 0 |
| | Wrap setting | Sets the wrap function. Setting range 0: Disable 1: Enable | 1 |
| | Initial coordinate generation & wrap setting range | Sets the wrap range. The command position returns to 0 when the motor has rotated for the number of times set here. Setting range Refer to the next table. | 10 |
| | Initial coordinate generation & wrap range offset ratio | Sets the offset ratio of the wrap range. Setting range 0 to 10,000 (1=0.01%) | 5,000 |
| | Initial coordinate generation & wrap range offset value | Sets the amount of offset of the wrap range. Setting range -536,870,912 to 536,870,911 steps | 0 |

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 rev (or 900 rev), select a value from the table below, and set in the "Initial coordinate generation & wrap setting range" parameter.

In the table below, the values which are surrounded with thick box border cannot be set in 900 rev.

| 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

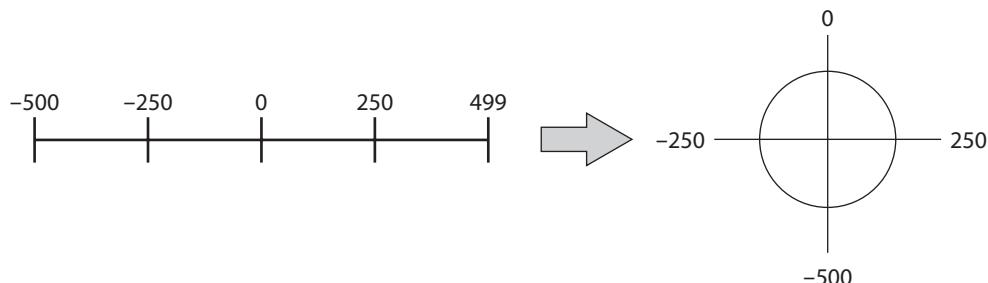
When "Initial coordinate generation & wrap range offset ratio" is set to "50%" and "Initial coordinate generation & wrap range offset value" to "0"

Example 1: Coordinate when the "Wrap setting range" is 1 rev and the resolution is 1,000 P/R

| MEXE02 tree view | Parameter name | Setting |
|---------------------|---|----------------|
| Motor and mechanism | Initial coordinate generation/wrap coordinate setting | Manual setting |
| | Wrap setting | Enable |
| | Initial coordinate generation & wrap setting range | 1 rev |
| | Initial coordinate generation & wrap range offset ratio | 50.00% |
| | Initial coordinate generation & wrap range offset value | 0 step |
| | Electronic gear A | 1 |
| | Electronic gear B | 1 |

Position coordinate image

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

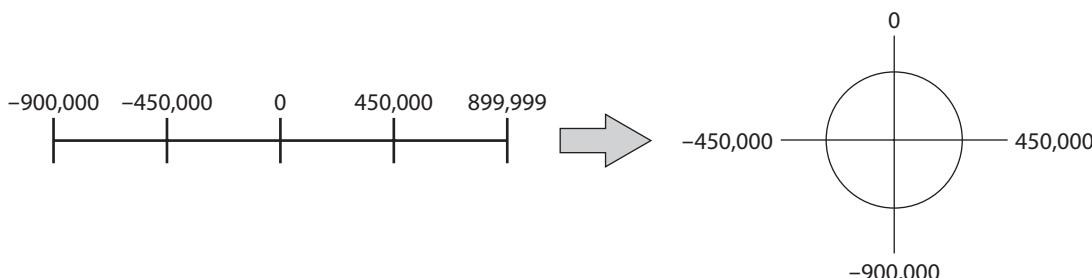


Example 2: Coordinate when the "Wrap setting range" is 1,800 rev and the resolution is 1,000 P/R

| MEXE02 tree view | Parameter name | Setting |
|---------------------|---|----------------|
| Motor and mechanism | Initial coordinate generation/wrap coordinate setting | Manual setting |
| | Wrap setting | Enable |
| | Initial coordinate generation & wrap setting range | 1,800 rev |
| | Initial coordinate generation & wrap range offset ratio | 50.00 |
| | Initial coordinate generation & wrap range offset value | 0 |
| | Electronic gear A | 1 |
| | Electronic gear B | 1 |

Position coordinate image

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



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

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

When the wrap range meets the following condition, continuous rotation in the same direction becomes possible with the home position maintained.

$$\text{Condition (1)} \quad \frac{1,800^*}{\text{Wrap setting range}} = \text{Integer} \quad * \text{The motors of frame size 20 mm (0.79 in.) and 28 mm (1.10 in.) are 900.}$$

$$\text{Condition (2)} \quad \text{Wrap setting range} \times \text{Resolution} = \text{Wrap setting range} \times \frac{\text{Electronic gear B}}{\text{Electronic gear A}} \times 1,000 = \text{Integer}$$



If the setting condition of the "Initial coordinate generation & wrap setting range" parameter is not met even though the "Wrap setting" parameter is set to "Enable," information of wrap setting error is generated. If the power is cycled or configuration is executed while the information of wrap setting error is present, an alarm of wrap setting error is 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)

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

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

Both Condition (1) and (2) are integers and this meets the setting condition. Wrap function can be executed.

Setting example 2

- Wrap setting range: 14.4 rev
- Resolution: 333.333 P/R (Electronic gear A=3, Electronic gear B=1)
- Motor: **TH** geared motor (gear ratio 3.6)

$$\text{Condition (1)} \quad \frac{1,800}{\text{Wrap setting range}} = \frac{1,800}{14.4} = 125$$

$$\text{Condition (2)} \quad \text{Wrap setting range} \times \frac{\text{Electronic gear B}}{\text{Electronic gear A}} \times 1,000 = 14.4 \times \frac{1}{3} \times 1,000 = 4,800$$

Both Condition (1) and (2) are integers and this meets the setting condition. Wrap function can be executed.

Setting example 3

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

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

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

Both Condition (1) and (2) are integers and this meets the setting condition. In the case of this setting, wrap function is executed every time the motor rotates by 90 degrees on the output shaft of **DG** Series.

Setting example 4

- 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 20)

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

$$\text{Condition (2)} \quad \text{Wrap setting range} \times \text{Resolution} = 1,000 \times 1,000 = 1,000,000$$

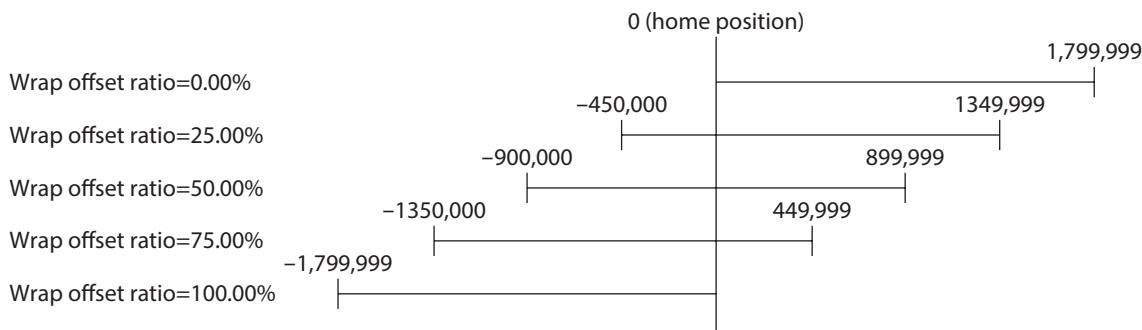
Condition (1) is not an integer and this does not meet the setting condition. The information of wrap setting error is generated and wrap function cannot be executed.

■ Wrap offset function

The position of the boundary point of the wrap range can be offset by using the mechanical home position as a reference. Wrap offset is set in 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 rev and the resolution is 1,000 P/R

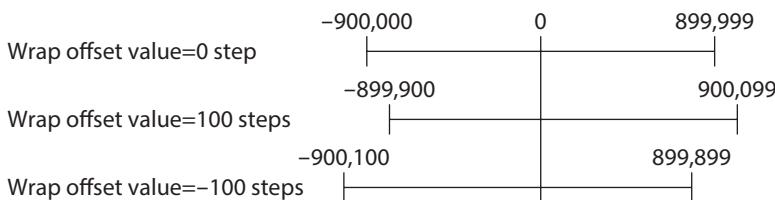
● Wrap range offset value setting

For the coordinate system offset in the "Initial coordinate generation & wrap range offset ratio" parameter, the coordinate can be shifted by step.

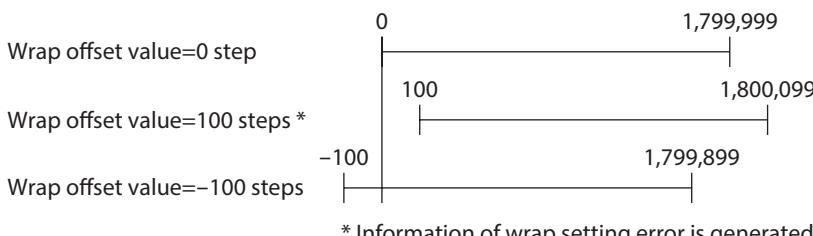
Note

When the coordinate is set in the "Initial coordinate generation & wrap range offset value" parameter, information of wrap setting error is generated if the home position is not included in the coordinate. If the power is cycled or configuration is executed while the information of wrap setting error is present, an alarm of wrap setting error is generated.

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



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



* Information of wrap setting error is generated

■ RND-ZERO output

The RND-ZERO output is a signal output for each boundary point of division when the wrap range is divided evenly with the home position as a reference. The number of division can be set in 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 "Enable."

● Usage example 1

**When the RND-ZERO signal is output for every rotation of the output shaft
(In case of wrap range of 1800 rev and a geared motor of gear ratio 7.2)**

$$\text{The number of the RND-ZERO output in wrap range} = \frac{\text{Wrap range}}{\text{Gear ratio}} = \frac{1,800}{7.2} = 250$$

In this usage example, you can check that the motor is in the home position. With a geared motor, it can be used as a Z-phase signal that outputs one pulse for every rotation.

● Usage example 2

When the movable range is evenly divided by 90 degrees and the RND-ZERO signal is output for a certain travel amount

$$\text{Number of division of movable range} = \frac{360^\circ}{90^\circ} = 4$$

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

In this usage example, the signal can be output 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 parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|---------------------|---|--|---------------|
| Motor and mechanism | 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. Setting range 1 to 536,870,911 divisions | 1 |

7-6 Mechanism limit

With **DRS2** Series guide type, the mechanism limit (mechanical end) is stored in the ABZO sensor at the time of shipment. (fixed value)

If the product having set the home position reaches the mechanism limit stored in the ABZO sensor, an alarm of mechanical overtravel generates.

The details of the fixed value can be checked using the "unit information monitor" of the **MEXE02**. (Unit information monitor ⇒ p.439)

Although the fixed value of the ABZO sensor is normally used, set the "Mechanism limit parameter setting" parameter to "1: Disable" when you want to disable the value.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|---------------------|-----------------------------------|--|---------------|
| Motor and mechanism | Mechanism limit parameter setting | Disables the ABZO setting of the mechanism limit parameter. Setting range 0: ABZO setting is followed 1: Disable | 0 |

7-7 Mechanism protection

With motorized actuators, the maximum values for operating speed and push-motion current based on the product are stored in the ABZO sensor at the time of shipment. (Fixed value)

If the motor is operated beyond the fixed value of the ABZO sensor, an alarm of the operation data error is generated. The details of the fixed value can be checked using the "unit information monitor" of the **MEXE02**. (Unit information monitor ⇒ p.440)

Although the fixed value of the ABZO sensor is normally used, set the "Mechanism protection parameter setting" parameter to "1: Disable" when you want to disable the value.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|---------------------|--|---|---------------|
| Motor and mechanism | Mechanism protection parameter setting | Disables the ABZO setting of the mechanism protection parameter. Setting range 0: ABZO setting is followed 1: Disable | 0 |



If the "Mechanism protection parameter setting" parameter is set to "Disable," the alarm function utilizing the fixed value of the ABZO sensor is also disabled.

7-8 Position coordinate information monitor function

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

- Clear the encoder counter of the master controller to 0 after high-speed return-to-home operation, position preset, or return-to-home operation is complete.
 - Match the values of the present position of the ABZO sensor and encoder counter of the master controller with the position coordinate information monitor function.
- The position 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 transmit position information or alarm information to the master 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 bit (*) and alarm information 8 bit (*) are transmitted, and checksum is transmitted finally. The checksum is the lower 8 bit obtained by dividing the transmission data by 1 byte and adding each value.

* Data are represented in a complement of 2.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|-------------------------|--------------------------------|---|---------------|
| I/O action and function | MON-REQ0 output data selection | Selects information output when input of each monitor request is turned ON. Setting range 1: Feedback position 2: Feedback position (32 bit counter) 3: Command position 4: Command position (32 bit counter) 8: Alarm code (8 bit) 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 position coordinate

The coordinate of the present position is transmitted in 32 bit data.

Set the position information to be output in the "MON-REQ0 output data selection" and "MON-REQ1 output data selection" parameters.

- Feedback position
The present position detected by the ABZO sensor is output. When the "Wrap setting" parameter is set to "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
The command position of the driver is output. When the "Wrap setting" parameter is set to "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 below)

| MEXE02 tree view | Parameter name | Set value |
|---------------------|---|-----------|
| Motor and mechanism | Electronic gear A | 1 |
| | Electronic gear B | 1 |
| | Initial coordinate generation & wrap setting range | 1 rev |
| | Initial coordinate generation & wrap range offset ratio | 50 % |
| | Initial coordinate generation & wrap range offset value | 0 step |

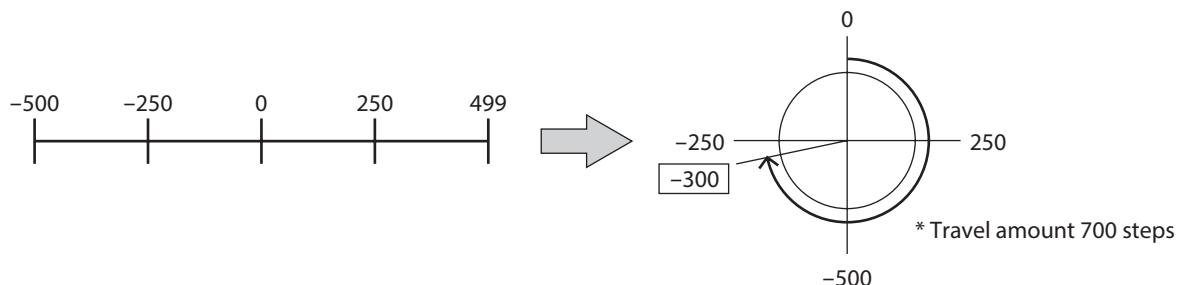
Since the wrap range is -500 to 499 steps, the present position coordinate is output as follows.

Command position (32bit): -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 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 currently generated is transmitted in 8 bit data. (⇒ "1-4 Alarm list" on p.451)

Output example

When an overload alarm (alarm code 30h) is generated

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

● Present position + Alarm code

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

● Checksum

The checksum is the lower 8 bit obtained by dividing the transmission data by 1 byte and adding them by 1 byte. It is information to check whether the data are output correctly.

Output example

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.

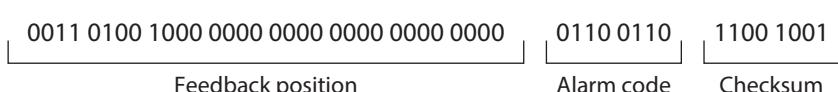
- Checksum

Feedback position: 300 steps = 0000 0000 0000 0000 0001 0010 1100

Alarm code: 66h = 0110 0110

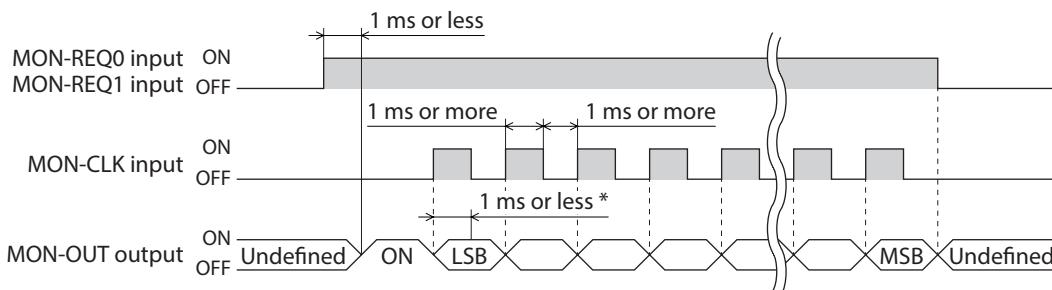
Checksum: 0000 0000 + 0000 0000 + 0000 0001 + 0010 1100 + 0110 0110 = 1001 0011

- Data output from the driver



● Timing chart

1. When the MON-REQ0 input or MON-REQ1 input is turned ON, the command position, feedback position and alarm code at that moment are recorded, and the MON-OUT output is turned ON.
2. Check that 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 by synchronizing 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.



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

■ Pulse request function

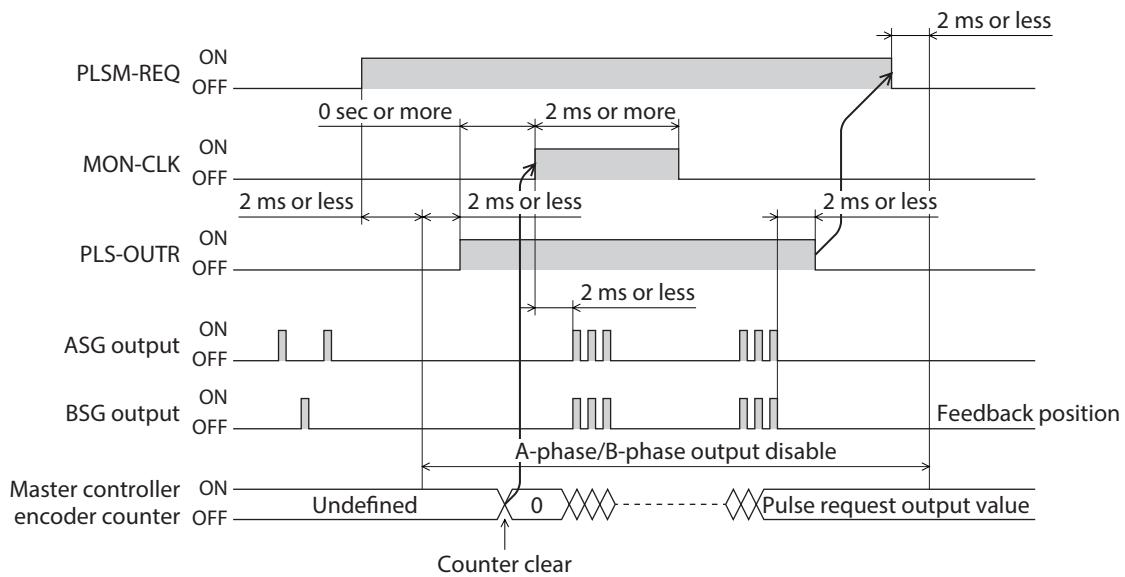
The pulse request function is a function to transmit the present position (absolute position) to the master controller by using the A-phase and B-phase outputs. When the A-phase and B-phase outputs of the encoder counter of the master controller and driver are connected and the pulse request function is executed, the present position of the driver can be output as A-phase and B-phase pulses. By setting the encoder counter of the master controller to "0" in advance, the coordinate systems of the ABZO sensor and master controller can be synchronized easily.

Related parameters

| MEXE02 tree view | Parameter | Description | Initial value |
|-------------------------|-------------------------------|---|---------------|
| I/O action and function | PLS-OUT output data selection | Selects the information to be output by the pulse request function. Setting range 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 pulse output by the pulse request function. Setting range 1 to 10000 (1=0.1 kHz) | 100 |

● Timing chart

1. When the PLSM-REQ input is turned ON, the ASG output and 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 that the PLS-OUTR output is turned ON and clear the encoder counter of the master 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 that the PLS-OUTR output has been turned OFF and turn the PLSM-REQ input OFF.



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

3

I/O signals

This chapter explains input signals and output signals.

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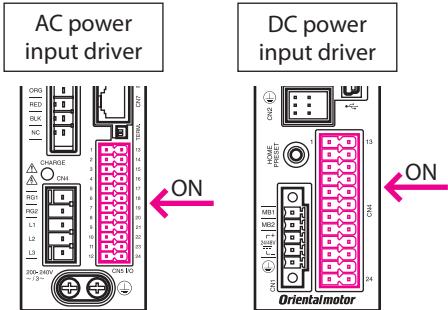
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1 Overview of I/O signals

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 you use the composite function, one input can turn two signals ON simultaneously, realizing saving of wiring.



| Name | Description |
|---------------------|---|
| Input function | Select the input signal to be assigned to DIN. |
| Inverting mode | ON/OFF of the input signal can be changed. |
| ON signal dead-time | When the set time is exceeded, the input signal is turned ON. You can use this value for prevention of noise and adjustment of the timing between devices. |
| 1-shot signal | The input signal that has been turned ON is automatically turned OFF after 250 µs. |
| Composite function | When DIN is turned ON, the signal selected here is also turned ON. |

Setting example of the MEXE02:

When continuous operation is executed with the operation data No.1 if the FW-POS input is turned "ON"

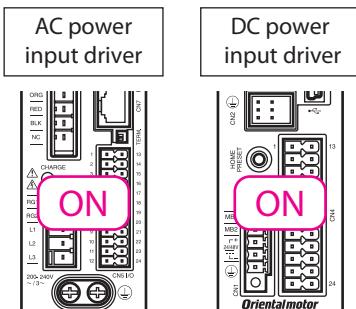
This operation can be executed by assigning "FW-POS" to the input function and "M0" to the composite function.

| | Input function selection | Inverting mode | ON signal dead-time [ms] | 1 shot signal | Composite function |
|--------------------------|--------------------------|----------------|--------------------------|---------------|--------------------|
| (DIN0)Function selection | FW-POS | Non invert | 0 | Disable | 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.

Since it is an input method using internal I/O, it does not require wiring and can be used with direct I/O. Up to four virtual inputs can be set.



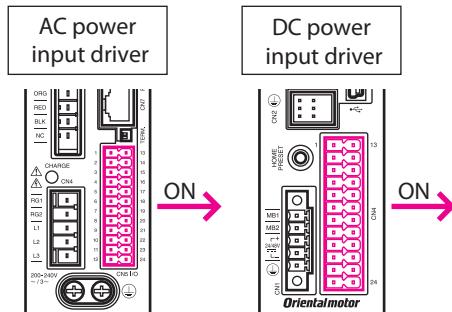
| Name | Description |
|---|---|
| Virtual input function selection | Select the signal to be assigned to VIR-IN. When an signal of the virtual input source is output, VIR-IN is also turned ON. |
| Virtual input source function selection setting | Select the output signal to be a trigger of VIR-IN. |
| Virtual input inverting mode | ON/OFF of the input signal can be changed. |
| Virtual input ON signal dead-time | When the set time is exceeded, the input signal is turned ON. You can use this value for prevention of noise and adjustment of the timing between devices. |
| Virtual input 1-shot signal | The input signal that has been turned ON is automatically turned OFF after 250 µs. |

Setting example of the MEXE02:**When the TLC output is turned ON, stop the motor operation by turning the STOP input ON**

| | |
|--|------------|
| Virtual input (VIR-IN0) function selection | STOP |
| Virtual input (VIR-IN0) source selection | TLC |
| Virtual input (VIR-IN0) inverting mode | Non invert |
| Virtual input (VIR-IN0) ON signal dead time [ms] | 0 |
| Virtual input (VIR-IN0) 1 shot signal mode | Disable |

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. When you use the composite output function, the logical combination result of two output signals can be output in one signal.



| Name | Description |
|-------------------------------|---|
| (Normal) Output function | Select the output signal to be assigned to DOUT. |
| Inverting mode | ON/OFF of the output signal can be changed. |
| OFF output-delay time | When the set time is exceeded, the output signal is turned OFF. You can use this value for prevention of noise and adjustment of the timing between devices. |
| Composite logical combination | Set the logical combination [AND (logical product) or OR (logical sum)] of the composite output function. |
| Composite Output function | Select the 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 | Change ON/OFF of the signal selected in the composite output function. |

Setting example of the MEXE02:**When the HOME-END output and the AREA0 output are turned ON, HOME-END (DOUT0) is output**

When "HOME-END" is set to the (Normal) Output function, "AND" to composite logical combination, and "AREA0" to the composite output function, you can confirm that return-to-home operation is complete (HOME-END) and the motor has reached the specified position (AREA0) with one output signal (DOUT0).

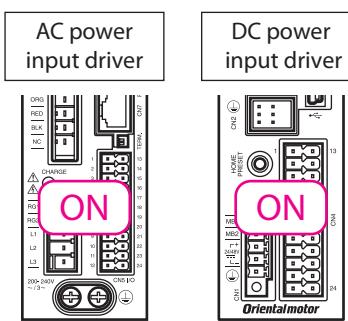
| | (Normal) Output function selection | Inverting mode | OFF delay time [ms] | Composite logical operation | Composite output function | Composite inverting mode |
|-------|------------------------------------|----------------|---------------------|-----------------------------|---------------------------|--------------------------|
| DOUT0 | HOME-END | Non invert | 0 | AND | AREA0 | Non invert |

■ User output

User output (USR-OUT) is a method in which a signal is output by using the internal I/O.

Two types of signals (A and B) are assigned to one user output. When logical combination of A and B has been established, USR-OUT is output.

This method does not require wiring and can be used with direct I/O. Up to two user outputs can be set.



| Name | Description |
|---|---|
| User output resource A - function selection | Select Output function A. |
| User output resource A - inverting mode | Change ON/OFF of Output function A. |
| User output resource B - function selection | Select Output function B. |
| User output resource B - inverting mode | Change ON/OFF of Output function B. |
| User output logic link selection | Set the logical combination [AND (logical product) or OR (logical sum)] of Output function sources A and B. |

Setting example of the MEXE02:

When the IN-POS output and the READY output have been turned ON, USR-OUT is output

| | |
|---|------------|
| User output (USER-OUT0) source A function selection | IN-POS |
| User output (USER-OUT0) source A inverting mode | Non invert |
| User output (USER-OUT0) source B function selection | READY |
| User output (USER-OUT0) source B inverting mode | Non invert |
| User output (USER-OUT0) logical operation | AND |

1-3 Setting contents of input signals and output signals

■ Direct input

● Input function

| MEXE02 tree view | Parameter name | Description | Initial value |
|--------------------|---------------------|--|---------------|
| Direct-IN function | DIN0 input function | Select the input signal to be assigned to DIN0 to DIN9. Setting range ⇒ "2-1 Input signal list" on p.165 | 32: START * |
| | DIN1 input function | | 64: M0 * |
| | DIN2 input function | | 65: M1 * |
| | DIN3 input function | | 66: M2 * |
| | DIN4 input function | | 37: ZHOME |
| | DIN5 input function | | 1: FREE |
| | DIN6 input function | | 5: STOP |
| | DIN7 input function | | 8: ALM-RST |
| | DIN8 input function | | 48: FW-JOG |
| | DIN9 input function | | 49: RV-JOG |

* In the case of the pulse input type with RS-485 communication interface and the pulse input type, the DIN0 to DIN3 are only available to the pulse input. Since other signals cannot be assigned, select "Not used" in the **MEXE02**. The initial values are as shown in the table. The values in brackets [] are of the 1-pulse input mode.

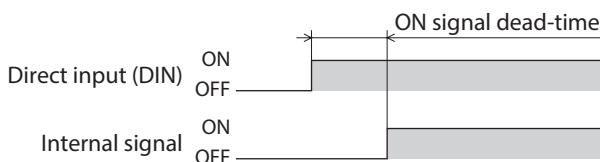
| Input function | Initial value |
|----------------|---------------|
| DIN0 | CW+ [PLS+] |
| DIN1 | CW- [PLS-] |
| DIN2 | CCW+ [DIR+] |
| DIN3 | CCW- [DIR-] |

- Change of ON/OFF setting of input signals

| MEXE02 tree view | Parameter name | Description | Initial value |
|--------------------|----------------|---|---------------|
| Direct-IN function | Inverting mode | Changes ON/OFF of DIN0 to DIN9. Setting range 0: Non invert 1: Invert | 0 |

- ON signal dead-time

| MEXE02 tree view | Parameter name | Description | Initial value |
|--------------------|---------------------|--|---------------|
| Direct-IN function | ON signal dead-time | Sets the ON signal dead-time of DIN0 to DIN9. Setting range 0 to 250 ms | 0 |



- 1-shot signal

| MEXE02 tree view | Parameter name | Description | Initial value |
|--------------------|----------------|--|---------------|
| Direct-IN function | 1-shot signal | Automatically turns the signal, which was input to the DIN0 to the DIN9, to OFF (or ON) 250 µs after input. Setting range 0: Disable 1: Enable | 0 |



Signals of the C-ON input and the HMI input are recommended to use as normally closed (always ON). When these signals are assigned to the DIN input function, do not set "1-shot signal" to "Enable."

- Composite function

| MEXE02 tree view | Parameter name | Description | Initial value |
|--------------------|--------------------|--|---------------|
| Direct-IN function | Composite function | Selects the input signal to be assigned to DIN0 to DIN9 as a composite function. Setting range ⇒ "2-1 Input signal list" on p.165 | 0: Not used |

■ Virtual input

- Virtual input function selection

| MEXE02 tree view | Parameter name | Description | Initial value |
|--|----------------------------------|--|---------------|
| EXT-IN and VIR-IN and USR-OUT function | Virtual input function selection | Selects the input signal to be assigned to VIR-IN0 to VIR-IN3. Setting range ⇒ "2-1 Input signal list" on p.165 | 0: Not used |

- Virtual input source function selection setting

| MEXE02 tree view | Parameter name | Description | Initial value |
|--|---|---|-------------------|
| EXT-IN and VIR-IN and USR-OUT function | Virtual input source function selection setting | Selects the output signal to be a trigger of VIR-IN0 to VIR-IN3. Setting range ⇒ "2-2 Output signal list" on p.167 | 128: CONST-OFF |

- Virtual input inverting mode

| MEXE02 tree view | Parameter name | Description | Initial value |
|--|------------------------------|---|---------------|
| EXT-IN and VIR-IN and USR-OUT function | Virtual input inverting mode | Changes ON/OFF of VIR-IN0 to VIR-IN3. Setting range 0: Non invert 1: Invert | 0 |

- Virtual input ON signal dead-time

| MEXE02 tree view | Parameter name | Description | Initial value |
|--|-----------------------------------|--|---------------|
| EXT-IN and VIR-IN and USR-OUT function | Virtual input ON signal dead-time | Sets the ON signal dead-time of VIR-IN0 to VIR-IN3. Setting range 0 to 250 ms | 0 |

- Virtual input 1-shot signal

| MEXE02 tree view | Parameter name | Description | Initial value |
|--|-----------------------------|---|---------------|
| EXT-IN and VIR-IN and USR-OUT function | Virtual input 1-shot signal | Enables the 1-shot signal of VIR-IN0 to VIR-IN3. Setting range 0: Disable 1: Enable | 0 |

■ Direct output

- (Normal) Output function

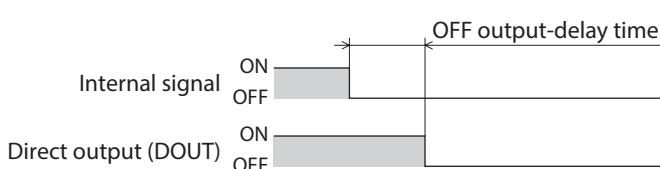
| MEXE02 tree view | Parameter name | Description | Initial value |
|---------------------|-----------------------|--|---------------|
| Direct-OUT function | DOUT0 output function | Selects the output signal to be assigned to DOUT0 to DOUT5. Setting range ⇒ "2-2 Output signal list" on p.167 | 144: HOME-END |
| | DOUT1 output function | | 138: IN-POS |
| | DOUT2 output function | | 133: PLS-RDY |
| | DOUT3 output function | | 132: READY |
| | DOUT4 output function | | 134: MOVE |
| | DOUT5 output function | | 130: ALM-B |

- Inverting mode

| MEXE02 tree view | Parameter name | Description | Initial value |
|---------------------|----------------|---|---------------|
| Direct-OUT function | Inverting mode | Changes ON/OFF of DOUT0 to DOUT5. Setting range 0: Non invert 1: Invert | 0 |

- OFF output-delay time

| MEXE02 tree view | Parameter name | Description | Initial value |
|---------------------|-----------------------|--|---------------|
| Direct-OUT function | OFF output-delay time | Sets the OFF output-delay time of DOUT0 to DOUT5. Setting range 0 to 250 ms | 0 |



- Composite logical combination

| MEXE02 tree view | Parameter name | Description | Initial value |
|---------------------|-------------------------------|--|---------------|
| Direct-OUT function | Composite logical combination | Sets the composite logical combination of DOUT0 to DOUT5. Setting range 0: AND 1: OR | 1 |

- Composite Output function

| MEXE02 tree view | Parameter name | Description | Initial value |
|---------------------|---------------------------|--|-------------------|
| Direct-OUT function | Composite output function | Selects the output signal for logical operation with the signals of DOUT0 to DOUT5. Setting range ⇒ "2-2 Output signal list" on p.167 | 128: CONST-OFF |

- Composite Inverting mode

| MEXE02 tree view | Parameter name | Description | Initial value |
|---------------------|--------------------------|--|---------------|
| Direct-OUT function | Composite Inverting mode | Changes ON/OFF of the composite output function. Setting range 0: Non invert 1: Invert | 0 |

■ User output

- User output resource A - function selection

| MEXE02 tree view | Parameter name | Description | Initial value |
|--|---|---|-------------------|
| EXT-IN and VIR-IN and USR-OUT function | User output resource A - function selection setting | Sets Output resource A of USR-OUT0 and USR-OUT1. Setting range ⇒ "2-2 Output signal list" on p.167 | 128: CONST-OFF |

- User output resource A - inverting mode

| MEXE02 tree view | Parameter name | Description | Initial value |
|--|---|---|---------------|
| EXT-IN and VIR-IN and USR-OUT function | User output resource A - inverting mode | Changes ON/OFF of User output resource A. Setting range 0: Non invert 1: Invert | 0 |

- User output resource B - function selection

| MEXE02 tree view | Parameter name | Description | Initial value |
|--|---|---|-------------------|
| EXT-IN and VIR-IN and USR-OUT function | User output resource B - function selection setting | Sets Output resource B of USR-OUT0 and USR-OUT1. Setting range ⇒ "2-2 Output signal list" on p.167 | 128: CONST-OFF |

- User output resource B - inverting mode

| MEXE02 tree view | Parameter name | Description | Initial value |
|--|---|---|---------------|
| EXT-IN and VIR-IN and USR-OUT function | User output resource B - inverting mode | Changes ON/OFF of User output resource B. Setting range 0: Non invert 1: Invert | 0 |

- User output logic link selection

| MEXE02 tree view | Parameter name | Description | Initial value |
|--|----------------------------------|---|---------------|
| EXT-IN and VIR-IN and USR-OUT function | User output logic link selection | Sets the logical combination of User output resources A and B. Setting range 0: AND 1: OR | 1 |

2 Signal list

Assign input and output signals using the **MEXE02** or network.

2-1 Input signal list

To assign signals via network, use the "Assignment No." in the table instead of the signal names.
For details of each signal, refer to "4 Input signals" on p.183.

| Assignment number | Signal name | Function |
|-------------------|-------------|--|
| 0 | Not used | Set when the input terminal is not used. |
| 1 | FREE | Cut off the current of the motor not to excite it. When an electromagnetic brake motor is used, the electromagnetic brake is released. |
| 2 | C-ON | Excite the motor. |
| 3 | CLR | Clear the deviation (position deviation) between the command position and feedback position. |
| 4 | STOP-COFF | Stop the motor not to excite it. |
| 5 | STOP | Stop the motor. |
| 6 | PAUSE | Stop the motor temporarily. |
| 7 | BREAK-ATSQ | Switch Automatic sequential to Manual sequential. Type connection is not changed. |
| 8 | ALM-RST | Release the alarm that is present. |
| 9 | P-PRESET | Rewrite the mechanical home position to the current position. |
| 10 | EL-PRST | Switch to the coordinate system whose home position is the electrical home position. |
| 12 | ETO-CLR | Reset the ETO-mode. |
| 13 | LAT-CLR | Clear the latch information. |
| 14 | INFO-CLR | Release the information status. |
| 16 | HMI | Release the function limitation of the MEXE02 . |
| 18 | CCM | Switch the current control mode. |
| 19 | PLS-XMODE | Change the number of input pulses and the magnification of the frequency. |
| 20 | PLS-DIS | Disable the pulse input. |
| 21 | T-MODE | Disable the overload alarm. |
| 22 | CRNT-LMT | Execute current limiting. |
| 23 | SPD-LMT | Execute speed limiting. |
| 26 | FW-BLK | Stop operation in the forward direction. |
| 27 | RV-BLK | Stop operation in the reverse direction. |
| 28 | FW-LS | A signal input from the limit sensor in the forward direction. |
| 29 | RV-LS | A signal input from the limit sensor in the reverse direction. |
| 30 | HOMES | A signal input from the mechanical home position sensor. |
| 31 | SLIT | A signal input from the slit sensor. |
| 32 | START | Execute stored data operation. |
| 33 | SSTART | Execute stored data operation. Execute operation of the next data No. in manual sequential operation. |
| 35 | NEXT | Transit forcibly to the linked operation data number. |
| 36 | HOME | Execute return-to-home operation. |
| 37 | ZHOME | Execute high-speed return-to-home operation. |
| 40 | D-SEL0 | Execute direct positioning operation. |
| 41 | D-SEL1 | |

| Assignment number | Signal name | Function |
|-------------------|-------------|---|
| 42 | D-SEL2 | |
| 43 | D-SEL3 | |
| 44 | D-SEL4 | |
| 45 | D-SEL5 | Execute direct positioning operation. |
| 46 | D-SEL6 | |
| 47 | D-SEL7 | |
| 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. |
| 58 | FW-SPD | Execute speed control operation in the forward direction. |
| 59 | RV-SPD | Execute speed control operation in the reverse direction. |
| 60 | FW-PSH | Execute push-motion speed control operation in the forward direction. |
| 61 | RV-PSH | Execute push-motion speed control operation in the reverse direction. |
| 64 | M0 | |
| 65 | M1 | |
| 66 | M2 | |
| 67 | M3 | Select the operation data number using eight bits. |
| 68 | M4 | |
| 69 | M5 | |
| 70 | M6 | |
| 71 | M7 | |
| 75 | TEACH | Execute teaching. |
| 76 | MON-REQ0 | This signal is used to select information to be output by the I/O position output function. |
| 77 | MON-REQ1 | |
| 78 | MON-CLK | Send information of the position coordinate information monitor function. |
| 79 | PLSM-REQ | Enable the pulse request function. |
| 80 | R0 | 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 | |

| Assignment number | Signal name | Function |
|-------------------|-------------|------------------|
| 94 | R14 | General signals. |
| 95 | R15 | |

2-2 Output signal list

To assign signals via network, use the "Assignment No." in the table instead of the signal names.
For details of each signal, refer to "5 Output signals" on p.207.

| Assignment number | Signal name | Function |
|-------------------|--------------|---|
| 0 | Not used | Set when the output terminal is not used. |
| 1 | FREE_R | |
| 2 | C-ON_R | |
| 3 | CLR_R | |
| 4 | STOP-COFF_R | |
| 5 | STOP_R | |
| 6 | PAUSE_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 | |
| 18 | CCM_R | |
| 19 | PLS-XMODE_R | |
| 20 | PLS-DIS_R | |
| 21 | T-MODE_R | |
| 22 | CRNT-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 | |

| Assignment number | Signal name | Function |
|-------------------|-------------|--|
| 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 | |
| 57 | RV-POS_R | |
| 58 | FW-SPD_R | |
| 59 | RV-SPD_R | |
| 60 | FW-PSH_R | |
| 61 | RV-PSH_R | |
| 64 | M0_R | |
| 65 | M1_R | |
| 66 | M2_R | |
| 67 | M3_R | |
| 68 | M4_R | |
| 69 | M5_R | |
| 70 | M6_R | Output in response to the input signal. |
| 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 | The output function is not used. |
| 129 | ALM-A | Output the alarm status of the driver (normally open). |

| Assignment number | Signal name | Function |
|-------------------|-------------|---|
| 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. |
| 133 | PLS-RDY | Output when the pulse input is enabled. |
| 134 | MOVE | Output when the motor operates. |
| 135 | INFO | Output the information status of the driver. |
| 136 | SYS-BSY | Output when the driver is in internal processing status. |
| 137 | ETO-MON | Output when the motor is in ETO-mode. |
| 138 | IN-POS | Output when the positioning operation is complete. |
| 140 | TLC | Output when the output torque reaches the upper limit value. |
| 141 | VA | Output when the operating speed reaches the target speed. |
| 142 | CRNT | Output while the motor is excited. |
| 143 | AUTO-CD | Output when the motor is in automatic current cutback status. |
| 144 | HOME-END | Output upon completion of high-speed return-to-home operation or return-to-home operation and when position preset is executed. |
| 145 | ABSPEN | Output when the position coordinate is set. |
| 146 | ELPRST-MON | Output when the electrical home position coordinate is enabled. |
| 149 | PRST-DIS | Turned ON when preset is required again to operate the motor after preset. |
| 150 | PRST-STLD | Output when the mechanical home position is set. |
| 151 | ORGN-STLD | Output when a mechanical home position suitable to the product is set at the time of factory shipment. |
| 152 | RND-OVF | 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 once from the preset position. |
| 156 | RND-ZERO | Output if the motor is at the home position of wrap range when the "Wrap setting" parameter is set to "Enable." |
| 157 | TIM | Output every time the motor output shaft rotates by 7.2° from the home position. |
| 159 | MAREA | Output when the motor is within the area set in 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 turned on. |
| 169 | MBC | Output when the electromagnetic brake is in release status. |
| 170 | RG | Output when the motor is in regeneration status. |
| 172 | EDM | Output when both HWTO1 and HWTO2 input signals are turned OFF. |
| 173 | HWTOIN-MON | Output when either HWTO1 or HWTO2 input signal is turned OFF. |
| 176 | MON-OUT | Output information responding to the request of the I/O position output function. |
| 177 | PLS-OUTR | Output when preparation of the pulse request function is complete. |
| 180 | USR-OUT0 | Output AND or OR of two types of output signals. |
| 181 | USR-OUT1 | |
| 192 | CRNT-LMTD | Output when current limiting is executed. |

| Assignment number | Signal name | Function |
|-------------------|--------------|---|
| 193 | SPD-LMTD | Output when speed limiting is executed. |
| 196 | OPE-BSY | Output when internal oscillation is executed. |
| 197 | PAUSE-BSY | Output when the motor is in pause status. |
| 198 | SEQ-BSY | Output when stored data operation is executed. |
| 199 | DELAY-BSY | Output when the driver is in waiting status (Drive-complete delay time, Dwell) |
| 200 | JUMP0-LAT | Output when a low event trigger is detected. |
| 201 | JUMP1-LAT | Output when a high event trigger is detected. |
| 202 | NEXT-LAT | Output when operation was transited by the NEXT input |
| 203 | PLS-LOST | Output if a pulse is input when the pulse input is disabled. |
| 204 | DCOM-RDY | Output when preparation of direct data operation is complete. |
| 205 | DCOM-FULL | Output when data is written in the buffer area of direct data operation. |
| 207 | M-CHG | Output is inverted when the operation data number is transited. (Toggle action) |
| 208 | M-ACT0 | Output the status of the M0 input corresponding to the operation data number in operation. |
| 209 | M-ACT1 | Output the status of the M1 input corresponding to the operation data number in operation. |
| 210 | M-ACT2 | Output the status of the M2 input corresponding to the operation data number in operation. |
| 211 | M-ACT3 | Output the status of the M3 input corresponding to the operation data number in operation. |
| 212 | M-ACT4 | Output the status of the M4 input corresponding to the operation data number in operation. |
| 213 | M-ACT5 | Output the status of the M5 input corresponding to the operation data number in operation. |
| 214 | M-ACT6 | Output the status of the M6 input corresponding to the operation data number in operation. |
| 215 | M-ACT7 | Output the status of the M7 input corresponding to the operation data number in operation. |
| 216 | D-END0 | Output when operation of the specified operation data number is complete. |
| 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 corresponding information is generated. For the list of information, refer to p.467. |
| 225 | INFO-POSERR | |
| 226 | INFO-DRV TMP | |
| 227 | INFO-MTR TMP | |
| 228 | INFO-OVOLT | |
| 229 | INFO-UVOLT | |
| 230 | INFO-OLTIME | |
| 232 | INFO-SPD | |
| 233 | INFO-START | |
| 234 | INFO-ZHOME | |
| 235 | INFO-PR-REQ | |
| 237 | INFO-EGR-E | |
| 238 | INFO-RND-E | |

| Assignment number | Signal name | Function |
|-------------------|-------------|---|
| 239 | INFO-NET-E | Output when corresponding information is generated. For the list of information, refer to p.467. |
| 240 | INFO-FW-OT | |
| 241 | INFO-RV-OT | |
| 242 | INFO-CULD0 | |
| 243 | INFO-CULD1 | |
| 244 | INFO-TRIP | |
| 245 | INFO-ODO | |
| 252 | INFO-DSLMTD | |
| 253 | INFO-IOTEST | |
| 254 | INFO-CFG | |
| 255 | INFO-RBT | |

3 Signal types

3-1 Direct I/O

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

For input terminals, signals that can be assigned vary depending on the driver.

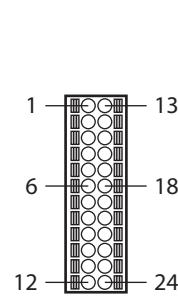
Output terminals are common to all drivers.

■ Assignment to input terminals (Built-in controller type)

Assign the input signals to DIN0 to DIN9 of the input terminals by parameters.

For input signals that can be assigned, refer to "2-1 Input signal list" on p.165.

| Connector terminal number | Terminal name | Initial value |
|---------------------------|---------------|---------------|
| 1 | DIN0 | START |
| 2 | DIN2 | M1 |
| 3 | DIN4 | ZHOME |
| 4 | DIN6 | STOP |
| 6 | DIN8 | FW-JOG |



| Connector terminal number | Terminal name | Initial value |
|---------------------------|---------------|---------------|
| 13 | DIN1 | M0 |
| 14 | DIN3 | M2 |
| 15 | DIN5 | FREE |
| 16 | DIN7 | ALM-RST |
| 18 | DIN9 | RV-JOG |

● Related parameters

The initial values of the input functions of DIN0 to DIN9 are as follows.

For input signals that can be assigned, refer to "2-1 Input signal list" on p.165.

| Input function selection | |
|--------------------------|----------------------------------|
| START | DIN0 (except for PULSE-I/F type) |
| M0 | DIN1 (except for PULSE-I/F type) |
| M1 | DIN2 (except for PULSE-I/F type) |
| M2 | DIN3 (except for PULSE-I/F type) |
| ZHOME | DIN4 |
| FREE | DIN5 |
| STOP | DIN6 |
| ALM-RST | DIN7 |
| FW-JOG | DIN8 |
| RV-JOG | DIN9 |



- When the same input signal is assigned to multiple input terminals, the function is executed if any of the terminals has input.
- When the C-ON input and the HMI input are not assigned to the input terminals, these inputs are always turned ON. Also, when these inputs are assigned to both direct I/O and remote I/O, the function is executed only when both of them are turned ON.



- The AC power input driver and the DC power input driver have different I/O signal connectors.
- AC power input driver: CN5 connector
 - DC power input driver: CN4 connector

■ Assignment to input terminals

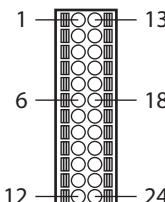
(Pulse input type with RS-485 communication interface, pulse input type)

Assign the input signals to DIN4 to DIN9 of the input terminals by parameters.

For input signals that can be assigned, refer to "2-1 Input signal list" on p.165.

| Connector terminal number | Terminal name | Initial value |
|---------------------------|---------------|---------------|
| 1 | DIN0 | CW+ [PLS+] * |
| 2 | DIN2 | CCW+ [DIR+] * |
| 3 | DIN4 | ZHOME |
| 4 | DIN6 | STOP |
| 6 | DIN8 | FW-JOG |

| Connector terminal number | Terminal name | Initial value |
|---------------------------|---------------|---------------|
| 13 | DIN1 | CW- [PLS-] * |
| 14 | DIN3 | CCW- [DIR-] * |
| 15 | DIN5 | FREE |
| 16 | DIN7 | ALM-RST |
| 18 | DIN9 | RV-JOG |

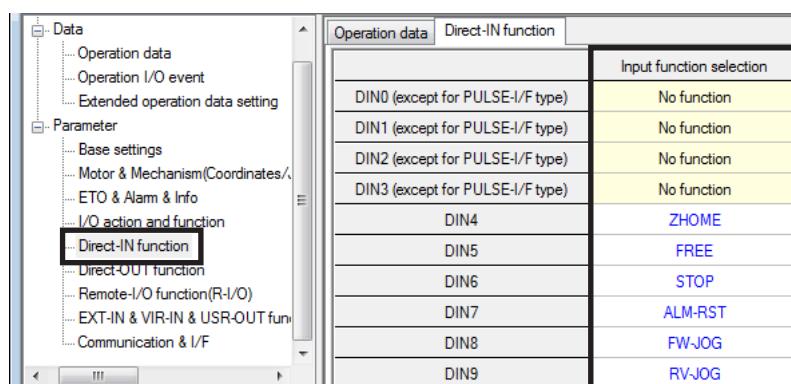


* [:] 1-pulse input mode

● Related parameters

The initial values of the input functions of DIN4 to DIN9 are as follows.

For input signals that can be assigned, refer to "2-1 Input signal list" on p.165.



Note

- When the same input signal is assigned to multiple input terminals, the function is executed if any of the terminals has input.
- When the C-ON input and the HMI input are not assigned to the input terminals, these inputs are always turned ON. Also, when these inputs are assigned to both direct I/O and remote I/O, the function is executed only when both of them are turned ON.



- The DIN0 to DIN3 are only available to the pulse input. Since other signals cannot be assigned, select "Not used" in the **MEXE02**.
- The AC power input driver and the DC power input driver have different I/O signal connectors.
 - AC power input driver: CN5 connector
 - DC power input driver: CN4 connector

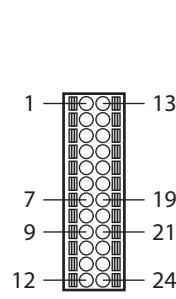
■ Assignment to output terminals (Common)

Assign the output signals to DOUT0 to DOUT5 of the output terminals by parameters.

For output signals that can be assigned, refer to "2-2 Output signal list" on p.167.

Output terminals are common to all drivers.

| Connector terminal number | Terminal name | Initial value |
|---------------------------|---------------|---------------|
| 7 | DOUT0 | HOME-END |
| 8 | DOUT2 | PLS-RDY |
| 9 | DOUT4 | MOVE |

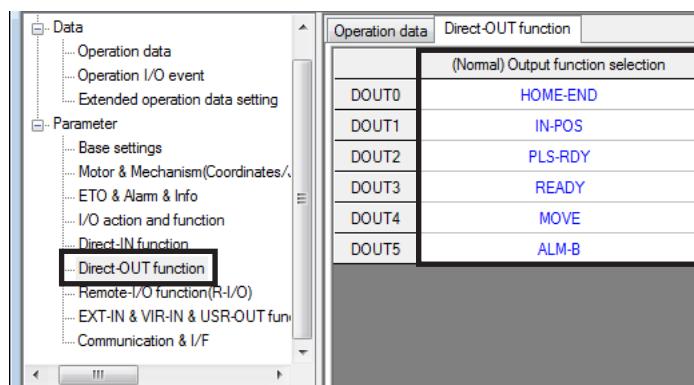


| Connector terminal number | Terminal name | Initial value |
|---------------------------|---------------|---------------|
| 19 | DOUT1 | IN-POS |
| 20 | DOUT3 | READY |
| 21 | DOUT5 | ALM-B |

● Related parameters

The initial values of the (normal) output function of DOUT0 to DOUT5 are as follows.

For output signals that can be assigned, refer to "2-2 Output signal list" on p.167.



■ Pin assignments list

- AC power input driver: CN5 connector
- DC power input driver: CN4 connector

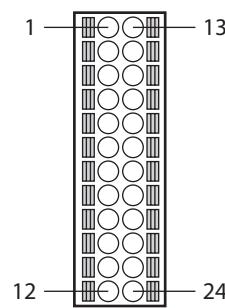


- All input signals of the driver are photocoupler inputs.
- The status of signals is as follows.
I/O of normally open: "ON: Conducting" "OFF: Not conducting"
I/O of normally closed: "ON: Not conducting" "OFF: Conducting"

● Built-in controller type

| Pin No. | Signal name | Description * |
|---------|--------------|-----------------------------|
| 1 | IN0 | Control input 0 (START) |
| 2 | IN2 | Control input 2 (M1) |
| 3 | IN4 | Control input 4 (ZHOME) |
| 4 | IN6 | Control input 6 (STOP) |
| 5 | IN-COM [0-7] | IN0 to IN7 input common |
| 6 | IN8 | Control input 8 (FW-JOG) |
| 7 | OUT0 | Control output 0 (HOME-END) |
| 8 | OUT2 | Control output 2 (PLS-RDY) |
| 9 | OUT4 | Control output 4 (MOVE) |
| 10 | OUT-COM | Output common |
| 11 | ASG+ | A-phase pulse output + |
| 12 | BSG+ | B-phase pulse output + |

* (): Initial value



| Pin No. | Signal name | Description * |
|---------|--------------|---------------------------|
| 13 | IN1 | Control input 1 (M0) |
| 14 | IN3 | Control input 3 (M2) |
| 15 | IN5 | Control input 5 (FREE) |
| 16 | IN7 | Control input 7 (ALM-RST) |
| 17 | IN-COM [8-9] | IN8 and IN9 input common |
| 18 | IN9 | Control input 9 (RV-JOG) |
| 19 | OUT1 | Control output 1 (IN-POS) |
| 20 | OUT3 | Control output 3 (READY) |
| 21 | OUT5 | Control output 5 (ALM-B) |
| 22 | GND | Ground |
| 23 | ASG- | A-phase pulse output - |
| 24 | BSG- | B-phase pulse output - |

* (): Initial value

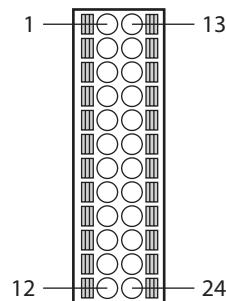
● Pulse input type with RS-485 communication interface, pulse input type

| Pin No. | Signal name | Description * |
|---------|--------------|--|
| 1 | CW+ [PLS+] | CW pulse input+ [Pulse input+] |
| 2 | CCW+ [DIR+] | CCW pulse input+ [Rotation direction input+] |
| 3 | IN4 | Control input 4 (ZHOME) |
| 4 | IN6 | Control input 6 (STOP) |
| 5 | IN-COM [0-7] | IN0 to IN7 input common |
| 6 | IN8 | Control input 8 (FW-JOG) |
| 7 | OUT0 | Control output 0 (HOME-END) |
| 8 | OUT2 | Control output 2 (PLS-RDY) |
| 9 | OUT4 | Control output 4 (MOVE) |
| 10 | OUT-COM | Output common |
| 11 | ASG+ | A-phase pulse output + |
| 12 | BSG+ | B-phase pulse output + |

* (): Initial value

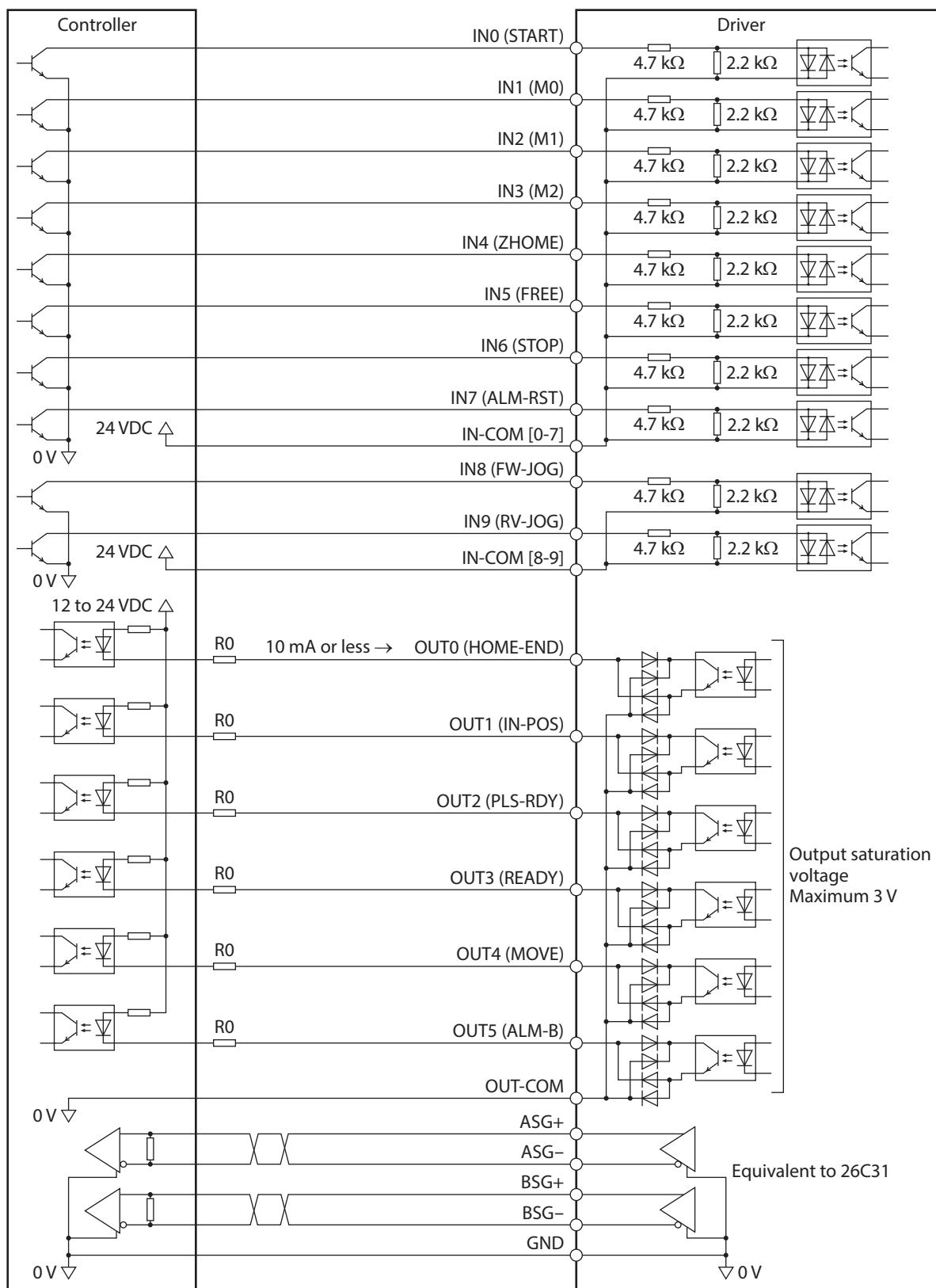
| Pin No. | Signal name | Description * |
|---------|--------------|--|
| 13 | CW- [PLS-] | CW pulse input- [Pulse input-] |
| 14 | CCW- [DIR-] | CCW pulse input- [Rotation direction input-] |
| 15 | IN5 | Control input 5 (FREE) |
| 16 | IN7 | Control input 7 (ALM-RST) |
| 17 | IN-COM [8-9] | IN8 and IN9 input common |
| 18 | IN9 | Control input 9 (RV-JOG) |
| 19 | OUT1 | Control output 1 (IN-POS) |
| 20 | OUT3 | Control output 3 (READY) |
| 21 | OUT5 | Control output 5 (ALM-B) |
| 22 | GND | Ground |
| 23 | ASG- | A-phase pulse output - |
| 24 | BSG- | B-phase pulse output - |

* (): Initial value



■ Connecting to a current sink output circuit

The figure below shows a connection example of the built-in controller type driver. In the case of the pulse input type with RS-485 communication interface and the pulse input type, the pin No.1, No.2, No.13, and No.14 are only available to the pulse input. Refer to p.178 for connection example.

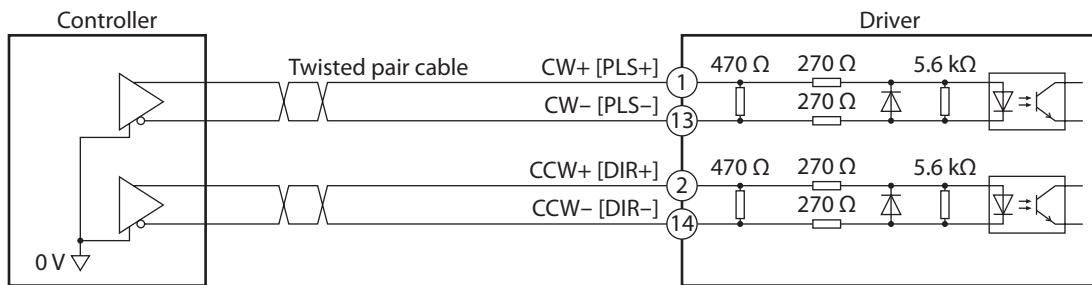


* (): Initial value

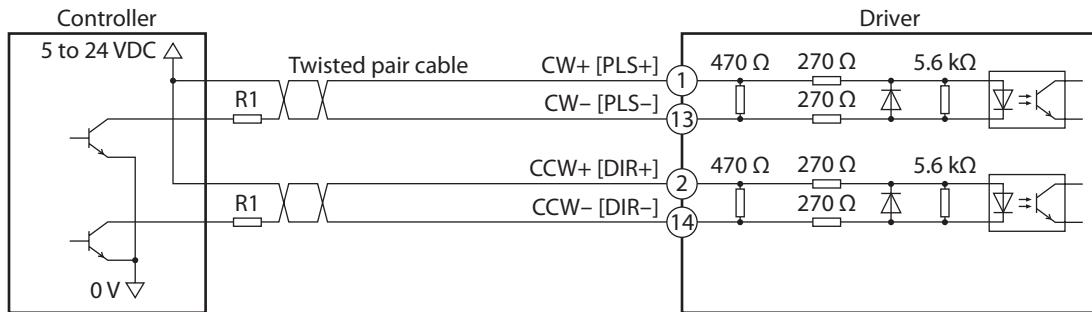
- Pulse input type with RS-485 communication interface, pulse input type

The pin No.1, No.2, No.13, and No.14 are only available to the pulse input. Other functions cannot be assigned.

When pulse input is of line driver type



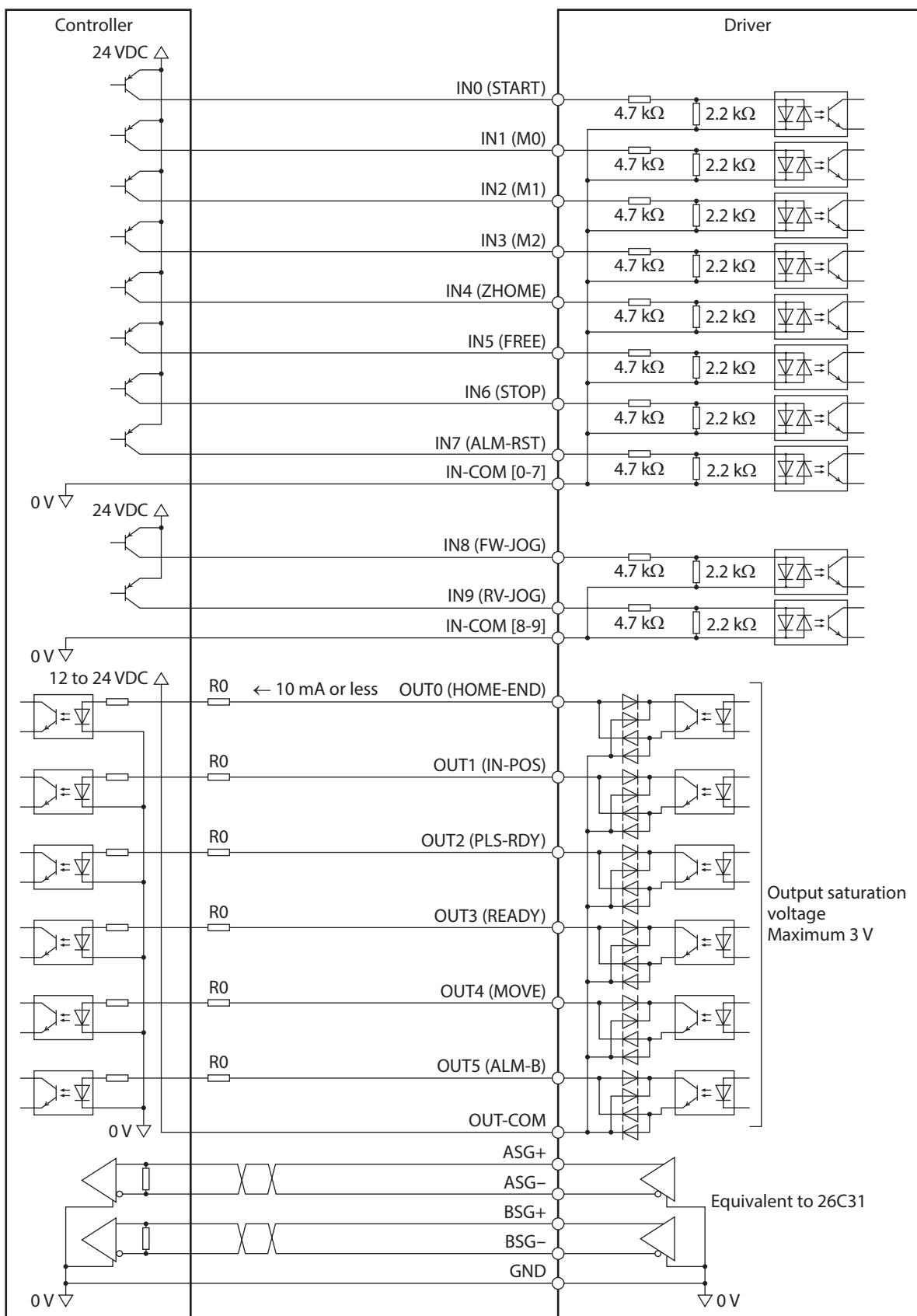
When pulse input is of open-collector type



Use the CW [PLS] input and CCW [DIR] input at 5 VDC to 24 VDC. When using signals at 24 VDC, connect an external resistor R1 (1.2 kΩ to 2.2 kΩ, 0.5 W or more). When using signals at 5 VDC, apply the voltage directly.

■ Connecting to a current source output circuit

The figure below shows a connection example of the built-in controller type driver. In the case of the pulse input type with RS-485 communication interface and the pulse input type, the pin No.1, No.2, No.13, and No.14 are only available to the pulse input. Refer to p.180 for connection example.

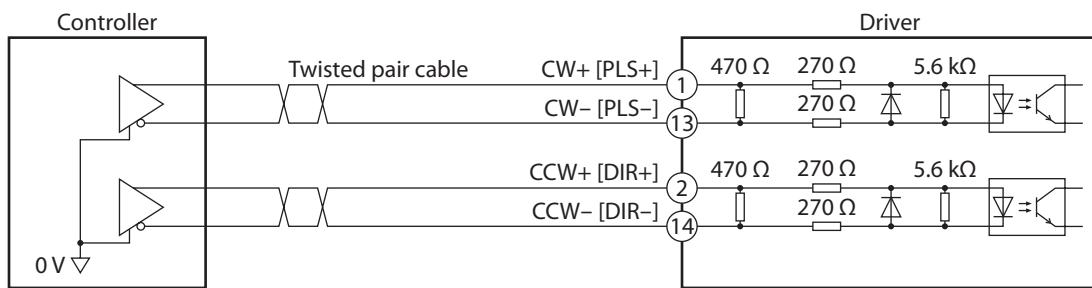


* (): Initial value

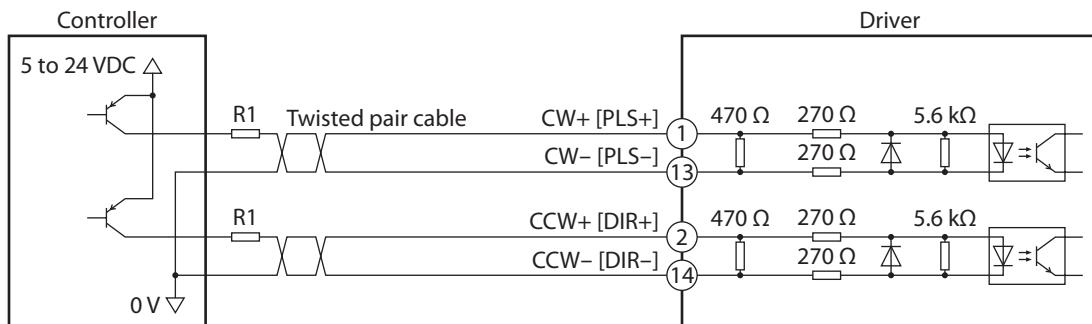
- Pulse input type with RS-485 communication interface, pulse input type

The pin No.1, No.2, No.13, and No.14 are only available to the pulse input. Other functions cannot be assigned.

When pulse input is of line driver type



When pulse input is of open-collector type



Use the CW [PLS] input and CCW [DIR] input at 5 VDC to 24 VDC. When using signals at 24 VDC, connect an external resistor R1 (1.2 kΩ to 2.2 kΩ, 0.5 W or more). When using signals at 5 VDC, apply the voltage directly.

3-2 Remote I/O

Remote I/O is I/O accessed via RS-485 communication.

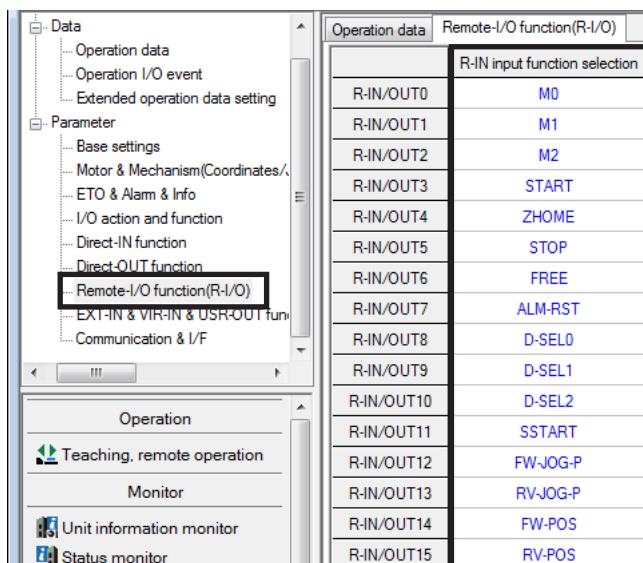
■ Assignment to input signals

Assign the input signals shown below to the R-IN0 to R-IN15 of the remote I/O by parameters.
For input signals that can be assigned, refer to "2-1 Input signal list" on p.165.

| Remote I/O signal name | Initial value | Remote I/O signal name | Initial value |
|------------------------|---------------|------------------------|---------------|
| R-IN0 | M0 | R-IN8 | D-SEL0 |
| R-IN1 | M1 | R-IN9 | D-SEL1 |
| R-IN2 | M2 | R-IN10 | D-SEL2 |
| R-IN3 | START | R-IN11 | SSTART |
| R-IN4 | ZHOME | R-IN12 | FW-JOG-P |
| R-IN5 | STOP | R-IN13 | RV-JOG-P |
| R-IN6 | FREE | R-IN14 | FW-POS |
| R-IN7 | ALM-RST | R-IN15 | RV-POS |

● Related parameters

The initial values of the input functions of R-IN0 to R-IN15 are as follows.
For input signals that can be assigned, refer to "2-1 Input signal list" on p.165.



- When the same input signal is assigned to multiple input terminals, the function is executed if any of the terminals has input.
- When the C-ON input and the HMI input are not assigned to the input terminals, these inputs are always turned ON. Also, when these inputs are assigned to both direct I/O and remote I/O, the function is executed only when both of them are turned ON.

■ Assignment to output signals

Assign the output signals shown below to the R-OUT0 to R-OUT15 of the remote I/O by parameters.
For output signals that can be assigned, refer to "2-2 Output signal list" on p.167.

| Remote I/O signal name | Initial value | Remote I/O signal name | Initial value |
|------------------------|---------------|------------------------|---------------|
| R-OUT0 | M0_R | R-OUT8 | SYS-BSY |
| R-OUT1 | M1_R | R-OUT9 | AREA0 |
| R-OUT2 | M2_R | R-OUT10 | AREA1 |
| R-OUT3 | START_R | R-OUT11 | AREA2 |
| R-OUT4 | HOME-END | R-OUT12 | TIM |
| R-OUT5 | READY | R-OUT13 | MOVE |
| R-OUT6 | INFO | R-OUT14 | IN-POS |
| R-OUT7 | ALM-A | R-OUT15 | TLC |

● Related parameters

The initial values of the output functions of R-OUT0 to R-OUT15 are as follows.
For output signals that can be assigned, refer to "2-2 Output signal list" on p.167.

| Operation data | Remote-I/O function(R-I/O) | | | |
|----------------|----------------------------|-------------------------------|---|---------------------------------|
| R-IN/OUT0 | M0 | R-IN input function selection | R-IN group action mode initial state (for NETC) | R-OUT output function selection |
| R-IN/OUT1 | M1 | | ShaftID action | M0_R |
| R-IN/OUT2 | M2 | | ShaftID action | M1_R |
| R-IN/OUT3 | START | | ShaftID action | M2_R |
| R-IN/OUT4 | ZHOME | | ShaftID action | START_R |
| R-IN/OUT5 | STOP | | ShaftID action | HOME-END |
| R-IN/OUT6 | FREE | | ShaftID action | READY |
| R-IN/OUT7 | ALM-RST | | ShaftID action | INFO |
| R-IN/OUT8 | D-SEL0 | | ShaftID action | ALM-A |
| R-IN/OUT9 | D-SEL1 | | ShaftID action | SYS-BSY |
| R-IN/OUT10 | D-SEL2 | | ShaftID action | AREA0 |
| R-IN/OUT11 | SSTART | | ShaftID action | AREA1 |
| R-IN/OUT12 | FW-JOG-P | | ShaftID action | AREA2 |
| R-IN/OUT13 | RV-JOG-P | | ShaftID action | TIM |
| R-IN/OUT14 | FW-POS | | ShaftID action | MOVE |
| R-IN/OUT15 | RV-POS | | ShaftID action | IN-POS |

4 Input signals

4-1 Operation control

■ Excitation switching signal

This signal is used to switch the motor excitation condition between excitation and non-excitation.

● FREE input

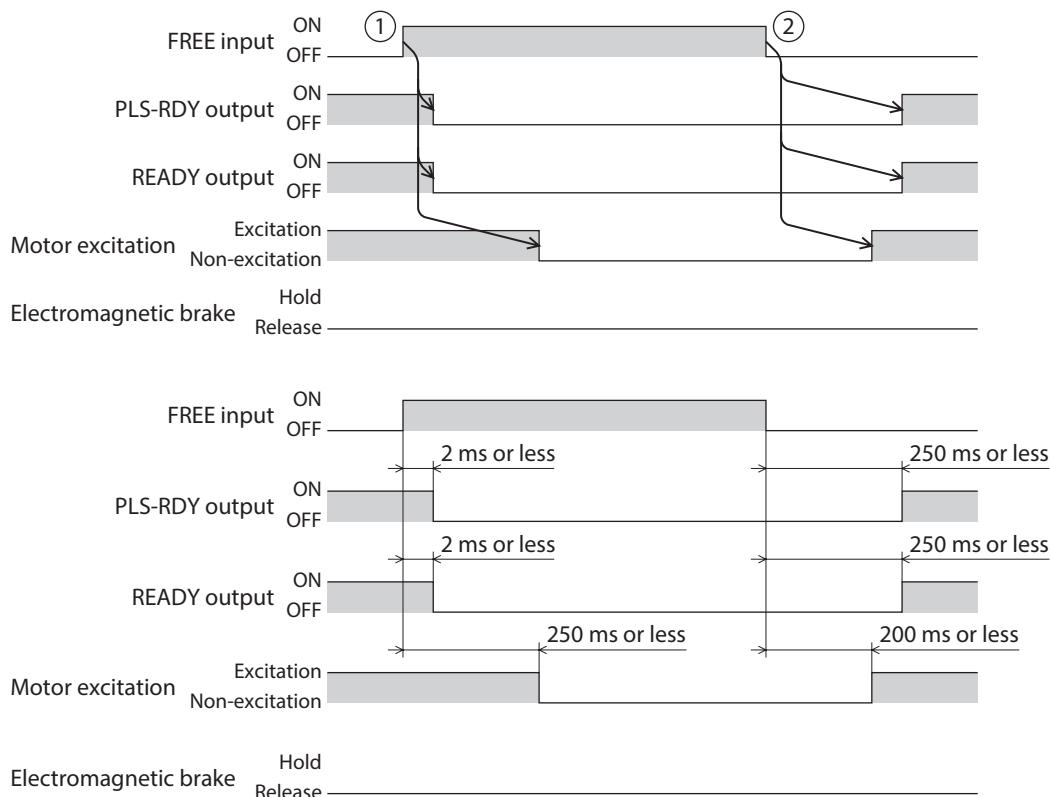
When the FREE input is turned ON, the motor current is cut off and the motor excitation is stopped. The motor output shaft can be rotated manually since the motor holding torque is lost. When an electromagnetic brake motor is used, the electromagnetic brake is also released.



When driving a vertical load, do not turn the FREE input ON. Since the motor loses its holding torque, the load may drop.

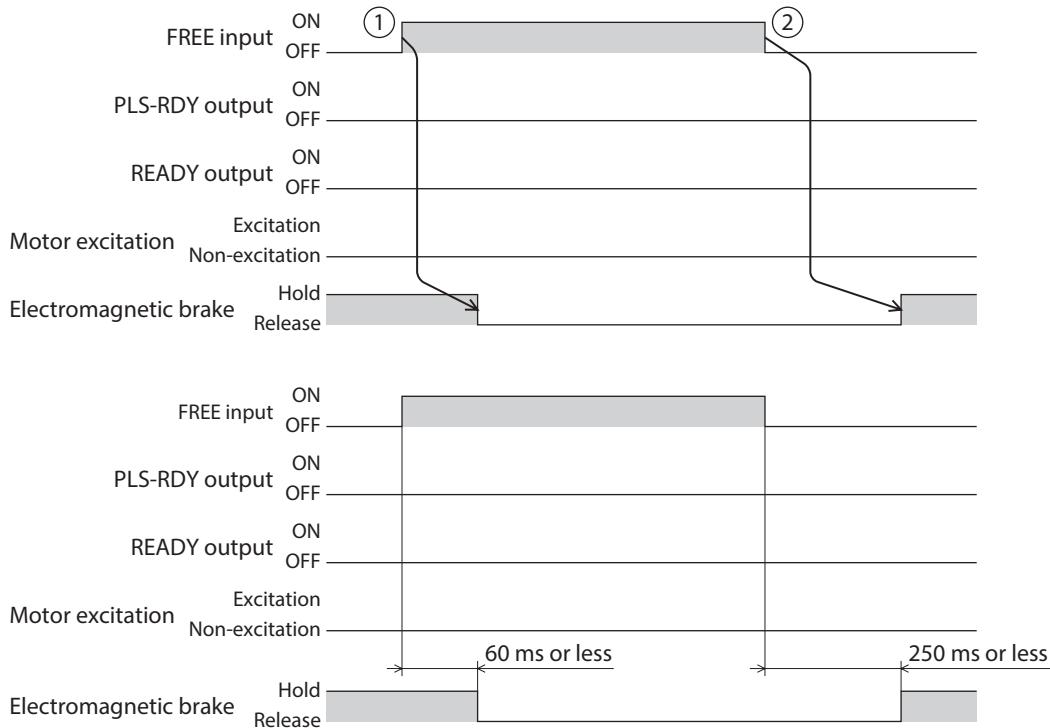
When the motor is excited

1. When the FREE input is turned ON, the PLS-RDY output and the READY output are turned OFF, and the motor excitation is stopped.
2. When the FREE input is turned OFF, the motor is excited, and the PLS-RDY output and the READY output are turned ON.



When The motor is a non-excitation state

1. When the FREE input is turned ON, the electromagnetic brake is released.
2. When the FREE input is turned OFF, the electromagnetic brake is held.



3 I/O signals

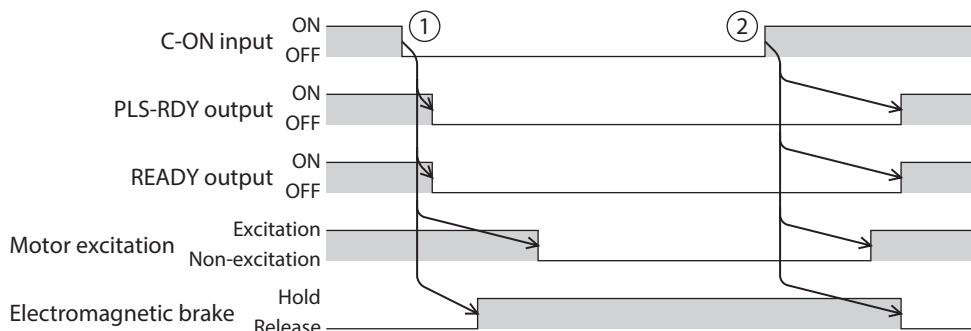
● C-ON input

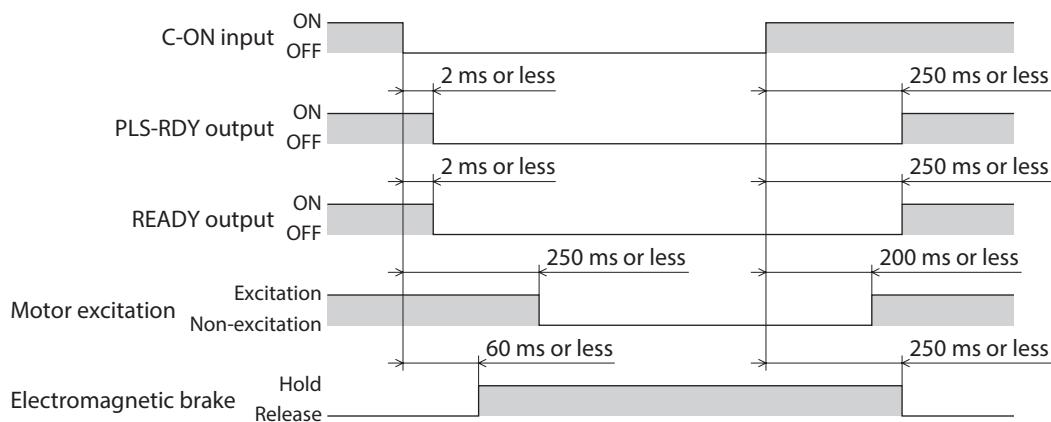
When the C-ON input is turned ON, the motor is excited. When it is turned OFF, the motor excitation is stopped. When an electromagnetic brake motor is used, the electromagnetic brake is released after the motor is excited.



When the C-ON input is not assigned to the direct I/O or remote I/O, this input is always turned ON. Also, when this input is assigned to both direct I/O and remote I/O, the function is executed only when both of them are turned ON.

1. When the C-ON input is turned OFF, the PLS-RDY output and the READY output are turned OFF, and the motor excitation is stopped.
The motor enters the dynamic brake status (*) and the electromagnetic brake is held.
* Dynamic brake means that the motor coil is short-circuited inside the driver and a holding torque larger than the one at the time of power shutdown is generated.
2. When the C-ON input is turned ON, the motor is excited, and the PLS-RDY output and the READY output are turned ON.
The electromagnetic brake is released.





■ Operation stop signal

This signal is used to stop operation of the motor.

Even if the input of operation stop signal is turned ON, the IN-POS output is not turned ON.

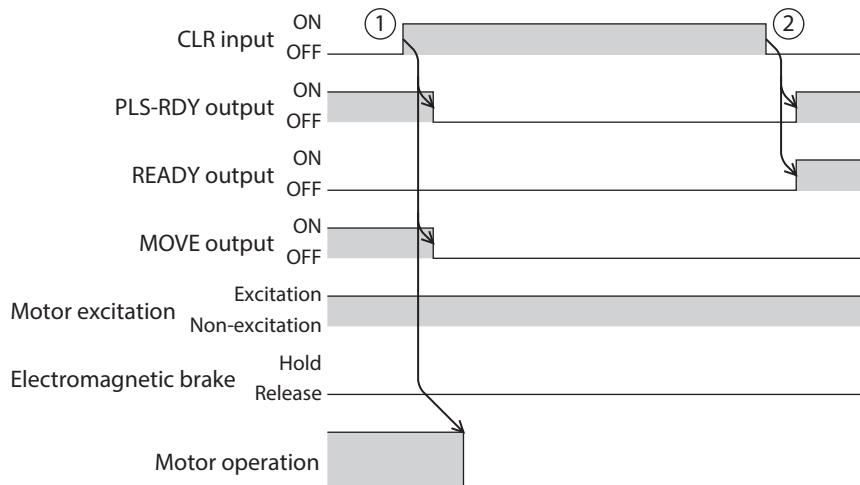
● CLR input

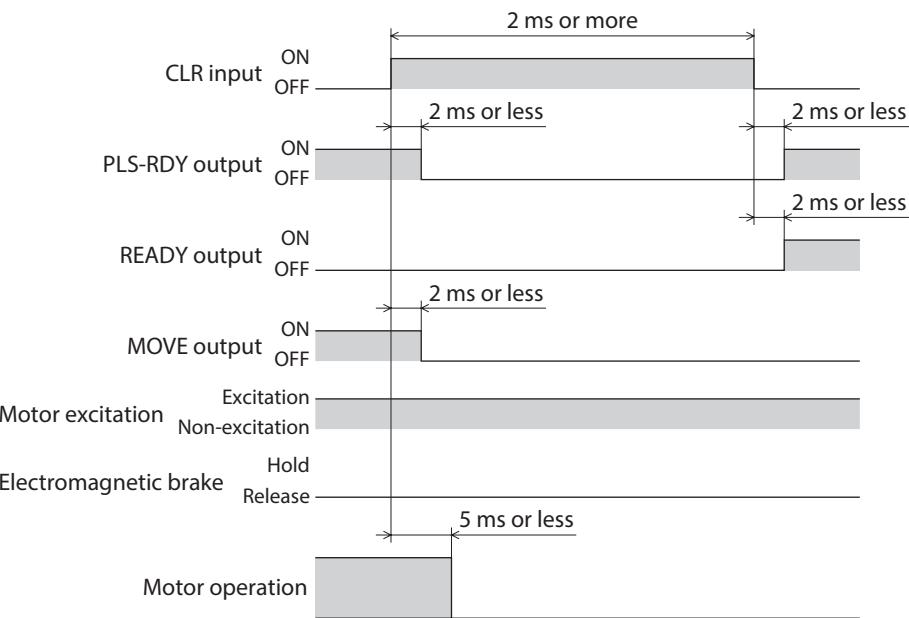
When the CLR input is turned ON, the position deviation counter is cleared, and the deviation between the command position and feedback position becomes 0. During operation, the motor stops at the current feedback position.

Function for each operation

| Operation types | Function |
|-----------------------|--|
| Pulse-input operation | The pulse input is disabled. During operation, the motor stops immediately. |
| Stored data operation | |
| Macro operation | The remaining travel amount is cleared. During operation, the motor stops immediately. |
| Direct data operation | |

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





● STOP-COFF input

When the STOP-COFF input is turned ON, the motor stops and the motor excitation is cut off.

Function for each operation

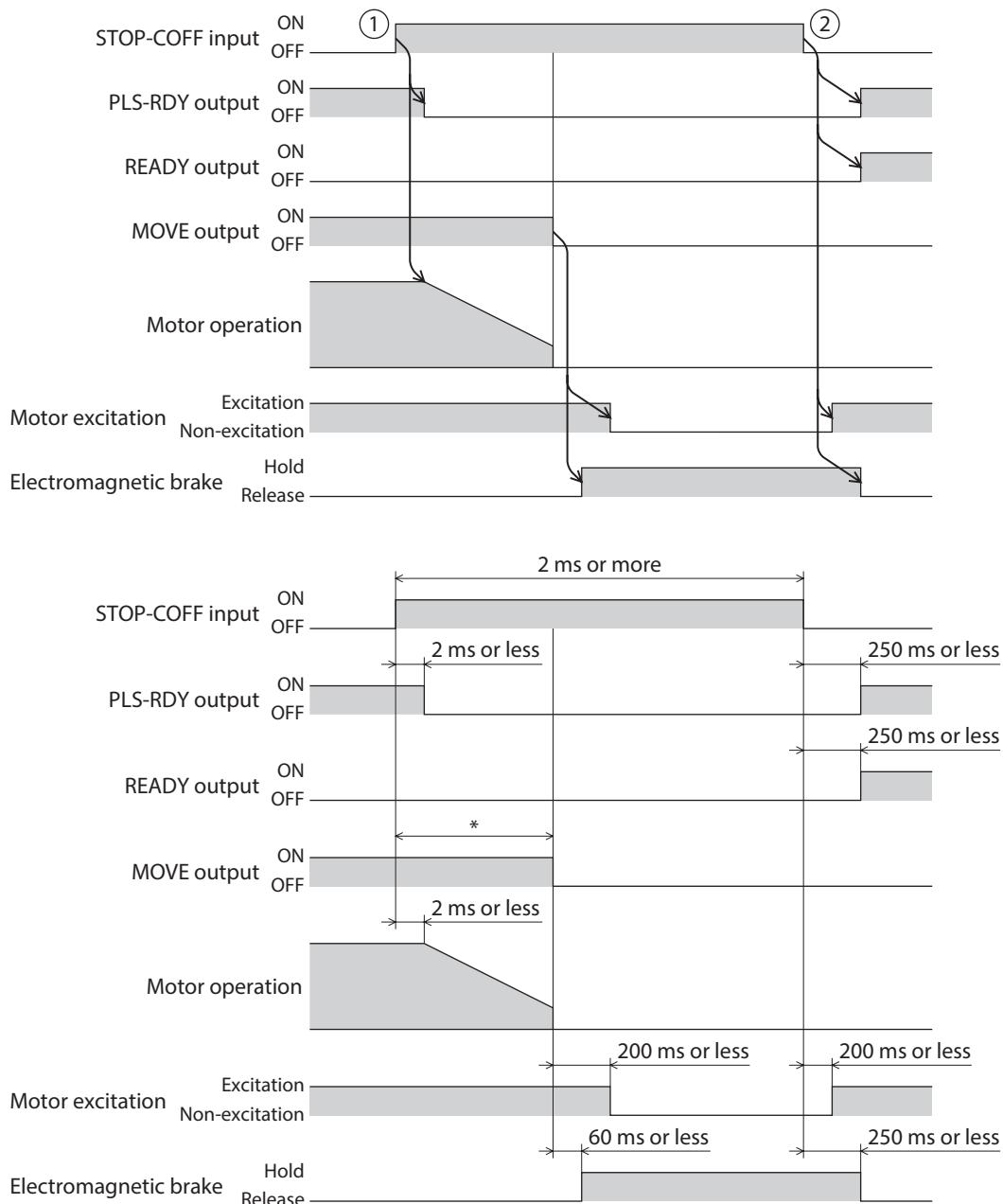
| Operation types | Function |
|-----------------------|---|
| Pulse-input operation | The motor stops immediately. The pulse input is disabled. The motor excitation is stopped. |
| Stored data operation | Operation is stopped according to the "STOP/STOP-COFF input action" parameter. |
| Macro operation | When operation is stopped, the motor excitation is stopped, and the remaining travel amount is cleared. |
| Direct data operation | |

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|-------------------------|-----------------------------|--|---------------|
| I/O action and function | STOP/STOP-COFF input action | Sets how to stop the motor when the STOP input or STOP-COFF input has been turned ON. Setting range 0: Immediate stop for both STOP input and STOP-COFF input 1: Deceleration stop for the STOP input and immediate stop for the STOP-COFF input 2: Immediate stop for the STOP input and deceleration stop for the STOP-COFF input 3: Deceleration stop for both STOP input and STOP-COFF input | 3 |

**When the STOP/STOP-COFF input action is "Deceleration stop"
(The motor stops while the STOP-COFF input is ON)**

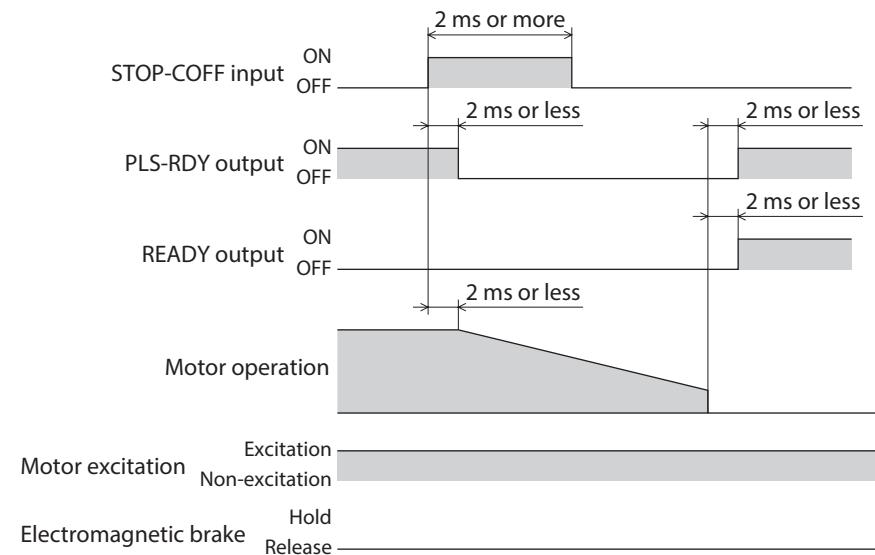
1. When the STOP-COFF input is turned ON during operation, the PLS-RDY output is turned OFF, and the motor starts stop operation.
The motor excitation is stopped when the motor stops.
2. When the STOP-COFF input is turned OFF, the motor is excited, and the PLS-RDY output and the READY output are turned ON.



* It varies depending on the driving condition.

**When the STOP/STOP-COFF input action is "Deceleration stop"
(The motor does not stop while the STOP-COFF input is ON)**

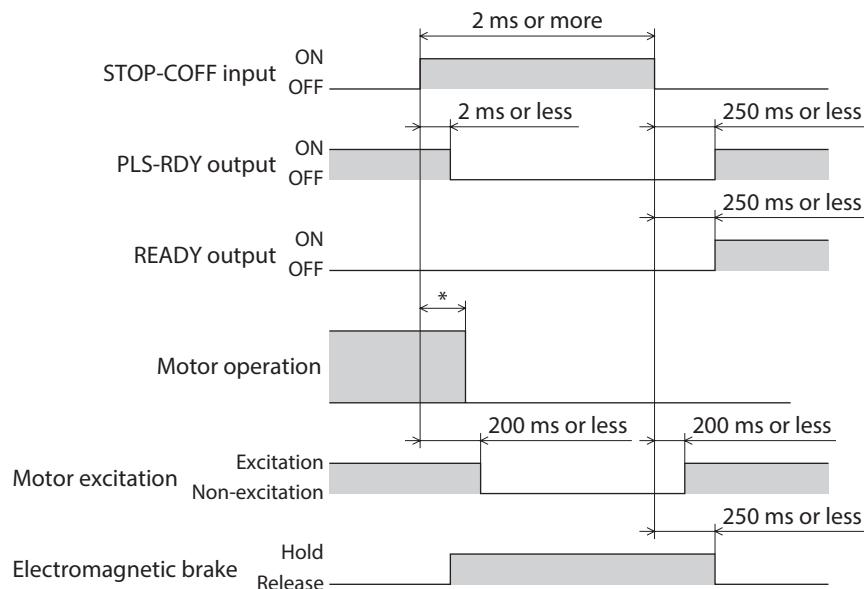
1. When the STOP-COFF input is turned ON during operation, the PLS-RDY output is turned OFF, and the motor starts stop operation.
Even after the STOP-COFF input is turned OFF, the motor continues deceleration operation until it stops.
2. When the motor stops, the PLS-RDY output and the READY output are turned ON.



When the STOP/STOP-COFF input action is "Deceleration stop" (the motor does not stop while the STOP-COFF input is ON), the motor remains in an excitation state even if it stops.

When the STOP/STOP-COFF input action is "Immediate stop"

1. When the STOP-COFF input is turned ON during operation, the PLS-RDY output is turned OFF.
The motor stops at the command position at the time when the ON status of the STOP-COFF input was detected, and the motor excitation is stopped.
2. When the STOP-COFF input is turned OFF, the motor is excited, and the PLS-RDY output and the READY output are turned ON.



* It varies depending on the driving condition.

● STOP input

When the STOP input is turned ON, the motor stops.

Function for each operation

| Operation types | Function |
|-----------------------|---|
| Pulse-input operation | The motor stops immediately. The pulse input is disabled. |
| Stored data operation | |
| Macro operation | Operation is stopped according to the "STOP/STOP-COFF input action" parameter. The remaining travel amount is cleared. |
| Direct data operation | |

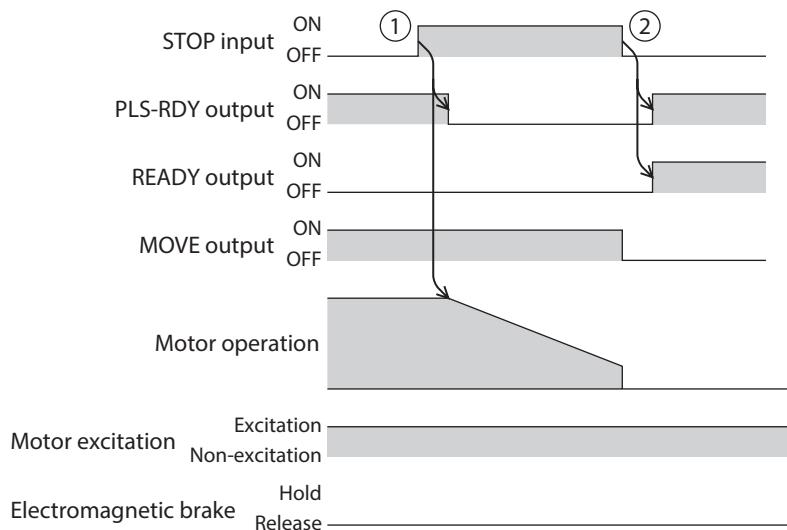
Related parameters

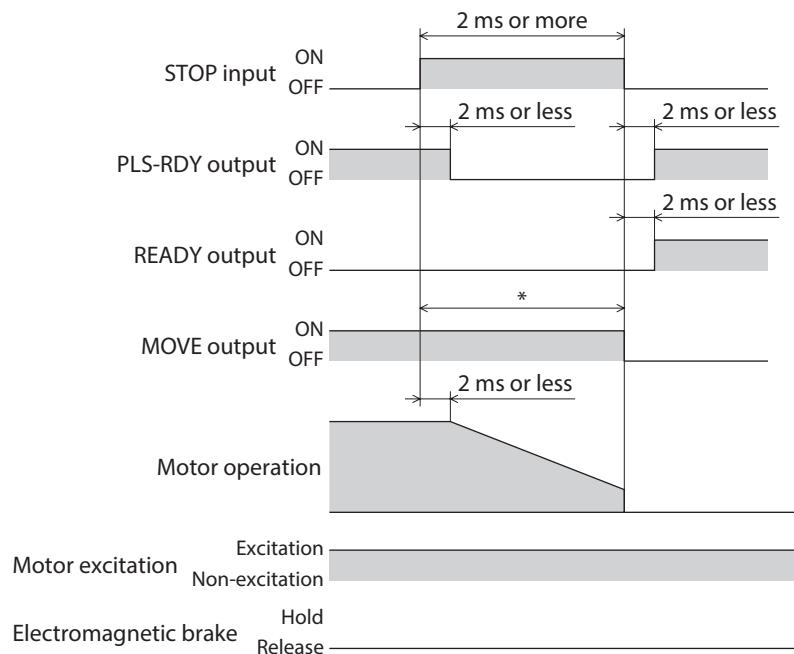
| MEXE02 tree view | Parameter name | Description | Initial value |
|-------------------------|-----------------------------|--|---------------|
| I/O action and function | STOP/STOP-COFF input action | Sets how to stop the motor when the STOP input or STOP-COFF input has been turned ON. Setting range 0: Immediate stop for both STOP input and STOP-COFF input 1: Deceleration stop for the STOP input and immediate stop for the STOP-COFF input 2: Immediate stop for the STOP input and deceleration stop for the STOP-COFF input 3: Deceleration stop for both STOP input and STOP-COFF input | 3 |

When the STOP/STOP-COFF input action is "Deceleration stop"

(The motor stops while the STOP input is ON)

1. When the STOP input is turned ON during operation, the PLS-RDY output is turned OFF, and the motor starts stop operation.
2. When the STOP input is turned OFF, the PLS-RDY output and the READY output are turned ON.

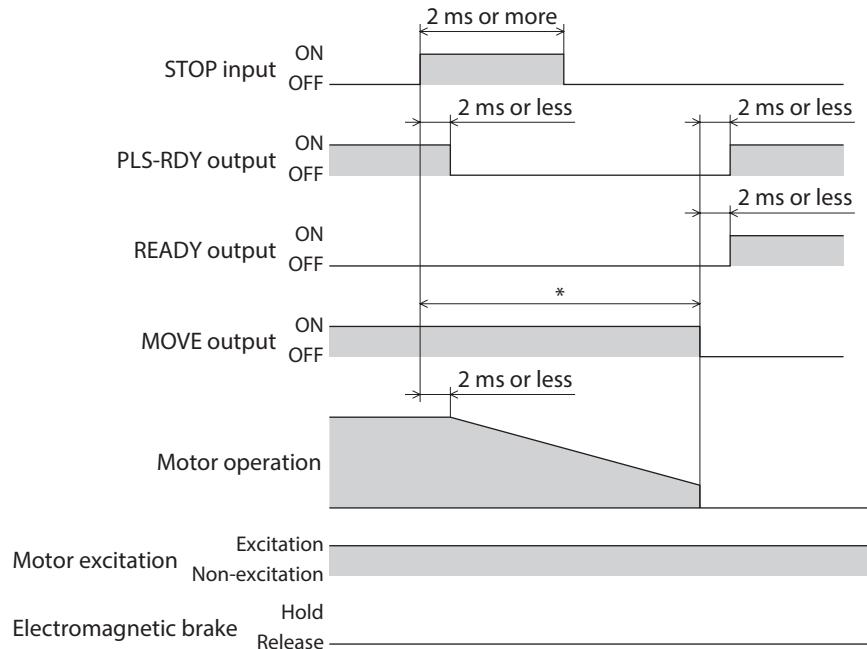




* It varies depending on the driving condition.

**When the STOP/STOP-COFF input action is "Deceleration stop"
(The motor does not stop while the STOP input is ON)**

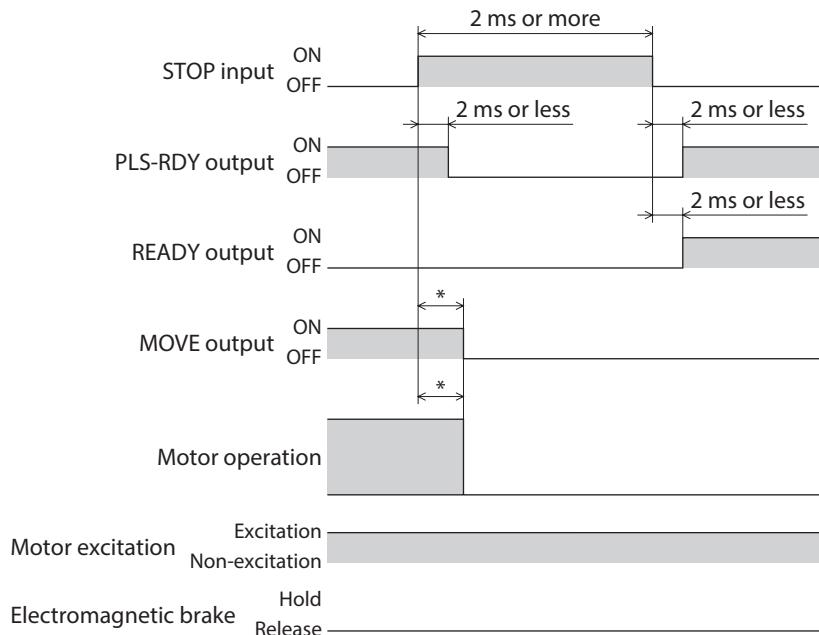
1. When the STOP input is turned ON during operation, the PLS-RDY output is turned OFF, and the motor starts stop operation.
Even after the STOP input is turned OFF, the motor continues deceleration operation until it stops.
2. When the motor stops, the PLS-RDY output and the READY output are turned ON.



* It varies depending on the driving condition.

When the STOP/STOP-COFF input action is "Immediate stop"

1. When the STOP input is turned ON during operation, the PLS-RDY output is turned OFF. 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 PLS-RDY output and the READY output are turned ON.



* It varies depending on the driving condition.

● PAUSE input

When the PAUSE input is turned ON, the motor decelerates to a stop temporarily. While push-motion is applied to the load in push-motion operation, the motor stops with the position deviation retained.

Function for each operation

| Operation types | Function |
|--|--|
| Pulse-input operation | The motor stops immediately. The pulse input is disabled. |
| Stored data operation Direct data operation | When the PAUSE input is turned ON, the motor decelerates to a stop temporarily. When the PAUSE input is turned OFF, operation is restarted. |
| Macro operation | When the PAUSE input is turned ON, the motor decelerates to a stop. The remaining travel amount is cleared. |

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|-------------------------|-----------------------------------|--|---------------|
| I/O action and function | PAUSE standby condition selection | Selects the waiting status when the PAUSE input is turned ON. Setting range 0: Standstill mode 1: Operating status waiting | 0 |

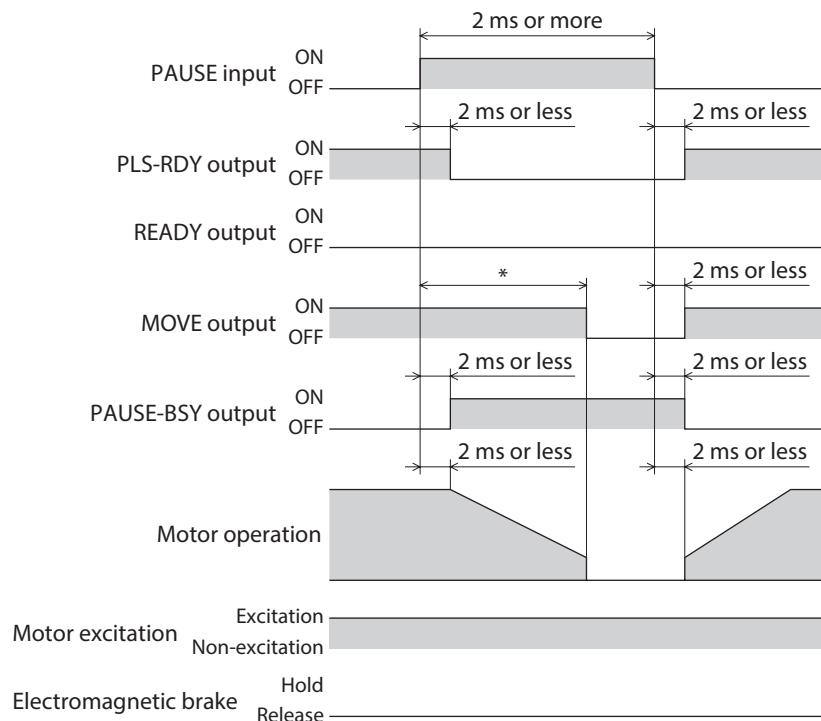
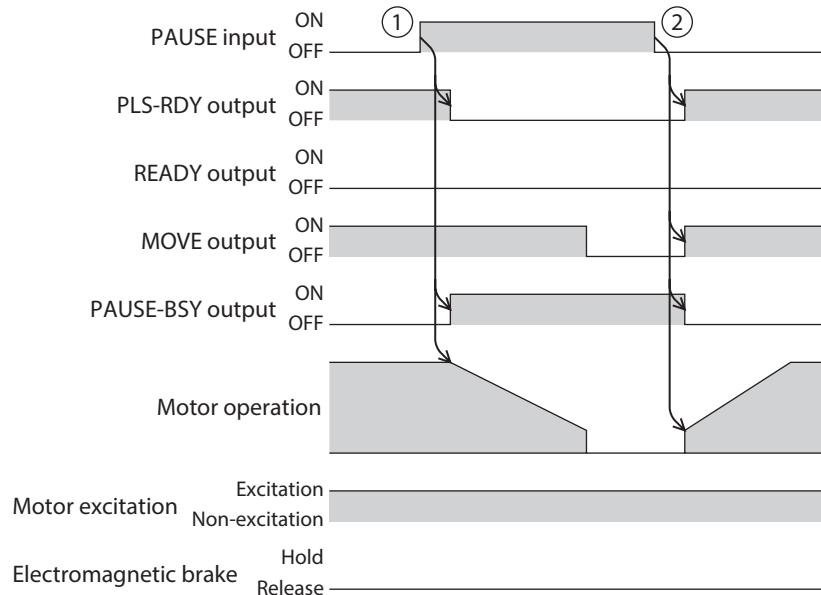


If the PAUSE input is turned ON during push-motion operation, the action will be as follows.

- Standstill mode: The current of the motor follows the setting of the "Automatic current cutback function" parameter. When the "Automatic current cutback function" parameter is enable, an alarm of overload is generated five seconds after the PAUSE input is turned ON.
- Operating status waiting: The motor stops with the operating current retained. An alarm of overload is not generated.

In case of stored data operation and direct data operation

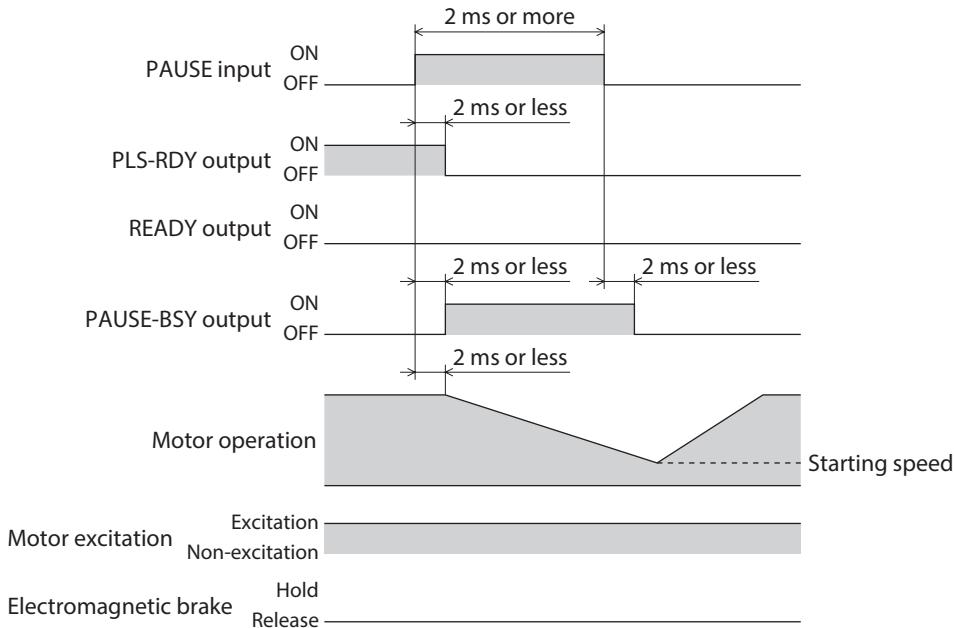
- When the PAUSE input is turned ON during operation, the PLS-RDY output is turned OFF, and the PAUSE-BSY output is turned ON. The motor starts deceleration stop.
- When the PAUSE input is turned OFF, the PLS-RDY output and the MOVE output are turned ON, and the PAUSE-BSY output is turned OFF. The motor restarts operation.



* It varies depending on the driving condition.

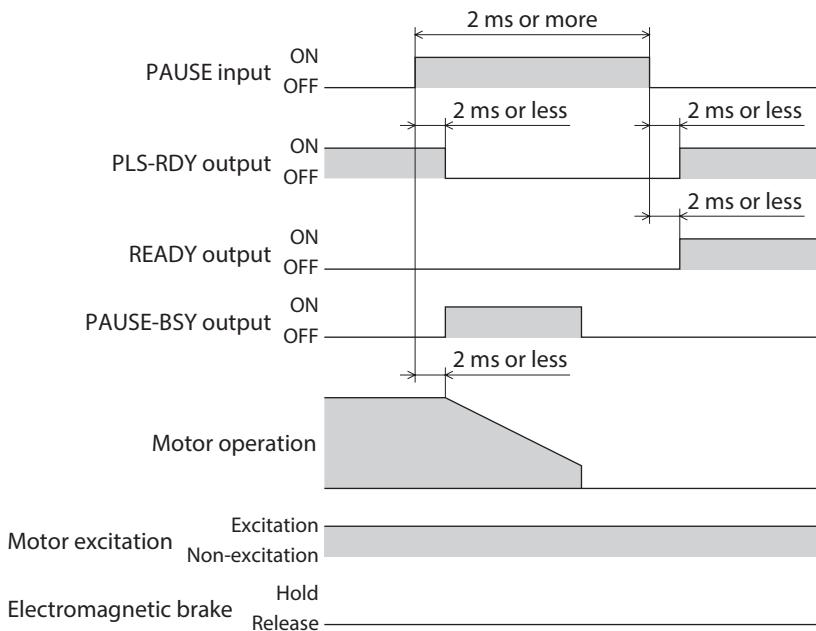
**In case of stored data operation and direct data operation
(The PAUSE input is turned OFF during deceleration stop)**

1. When the PAUSE input is turned ON during operation, the PLS-RDY output is turned OFF, and the PAUSE-BSY output is turned ON. The motor starts deceleration stop.
2. When the PAUSE input is turned OFF during deceleration stop, the motor decelerates to the starting speed and then starts acceleration.



In case of macro operation, high-speed return-to-home operation, and return-to-home operation

1. When the PAUSE input is turned ON during operation, the PLS-RDY output is turned OFF, and the PAUSE-BSY output is turned ON. The motor starts deceleration stop.
2. When the PAUSE input is turned OFF, the PLS-RDY output and the READY output are turned ON. The motor does not restart operation.



● FW-BLK input and RV-BLK input

The motor stops operation in the forward direction when the FW-BLK input is turned ON and stops operation in the reverse direction when the RV-BLK input is turned ON. When each input is ON, the motor does not operate even if the operation start signal in the stopping direction is input. The operation start signal in the opposite direction functions.

Function for each operation

| Operation types | Function |
|-----------------------|---|
| Pulse-input operation | The motor stops immediately. The pulse input for the direction corresponding to the input signal will be disabled. |
| Stored data operation | |
| Macro operation | Operation is stopped according to the "FW-BLK, RV-BLK input action" parameter. The remaining travel amount is cleared. |
| Direct data operation | |

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|-------------------------|-----------------------------|---|---------------|
| I/O action and function | FW-BLK, RV-BLK input action | Sets how to stop the motor when the FW-BLK input or RV-BLK input has been turned ON. Setting range 0: Immediate stop 1: Deceleration stop | 1 |



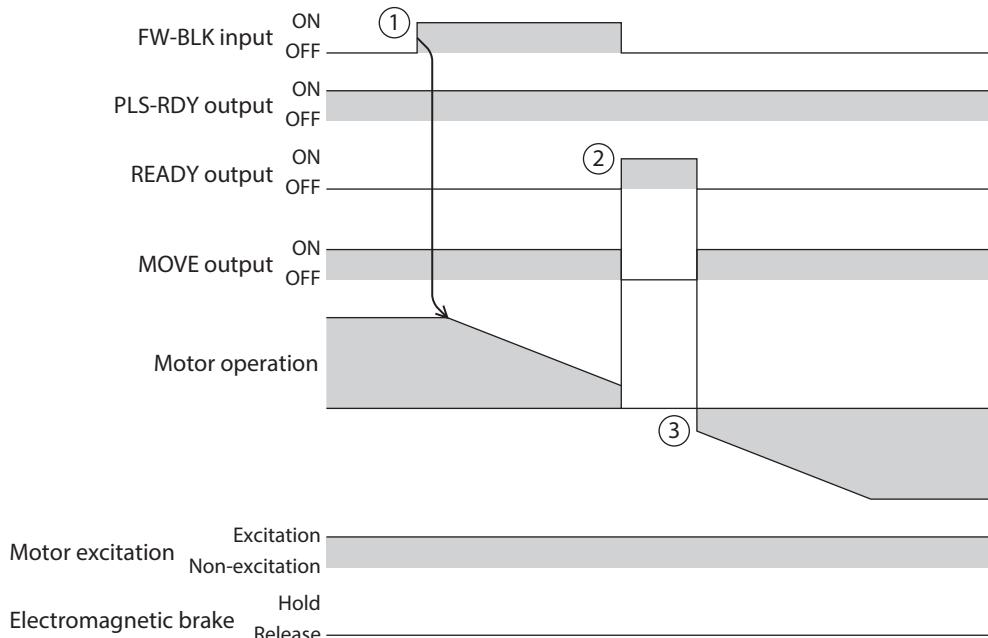
When the FW-BLK input and the RV-BLK input are turned ON, the following information is generated.

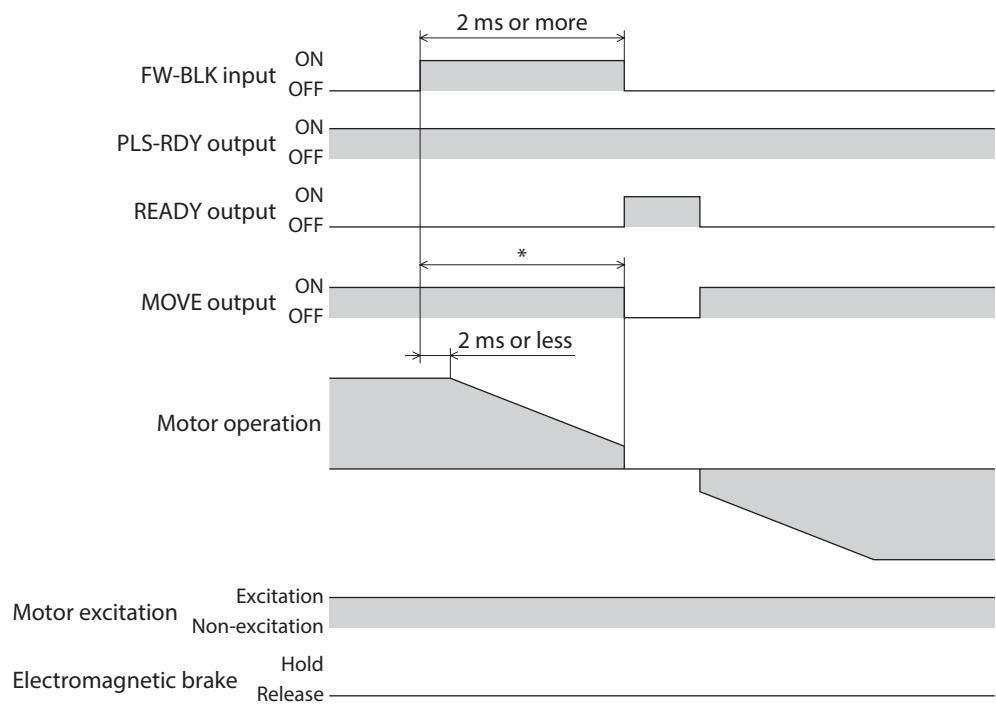
- When the FW-BLK input is ON: "Prohibition for forward direction operation"
- When the RV-BLK input is ON: "Prohibition for reverse direction operation"

When the FW-BLK, RV-BLK input action is "Deceleration stop"

(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 stop operation.
2. When operation stops, the READY output is turned ON.
3. When the operation start signal in the reverse direction is input while the FW-BLK input is ON, the READY output is turned OFF, and the operation is started.

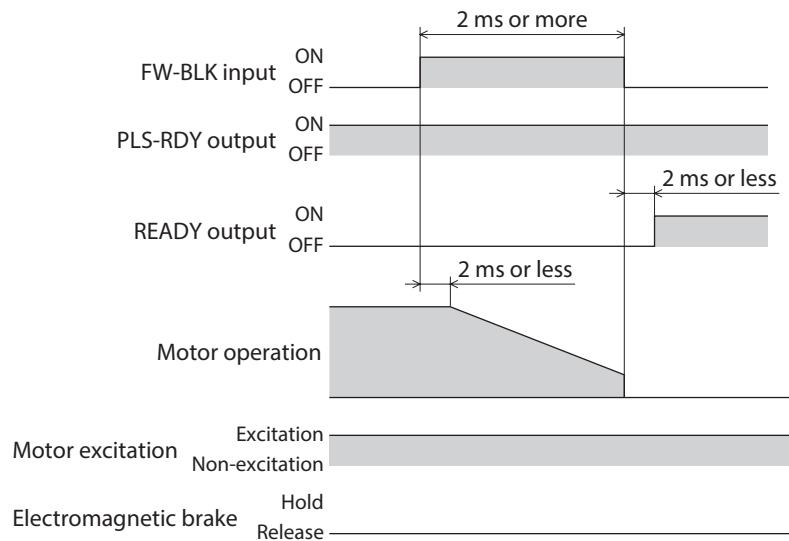




* It varies depending on the driving condition.

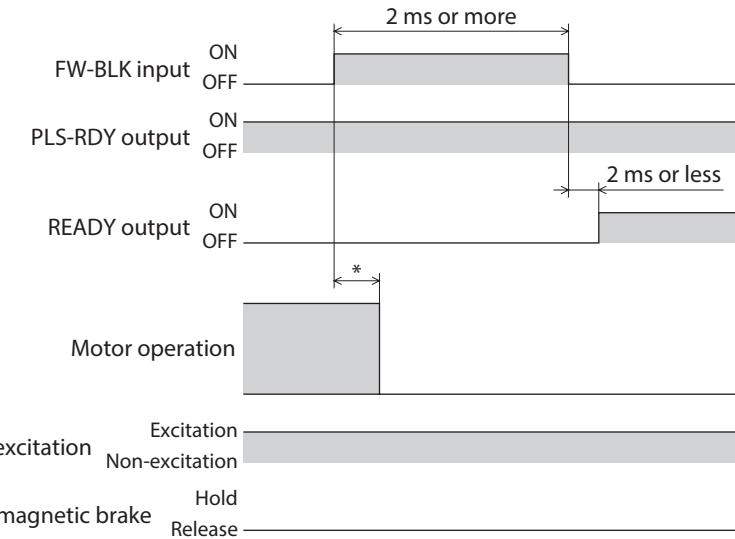
**When the FW-BLK, RV-BLK input action is "Deceleration stop"
(The motor does not stop while the FW-BLK input is ON)**

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



When 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.

**■ Signals used for stored data operation****● BREAK-ATSQ input**

While the BREAK-ATSQ input is ON, Automatic sequential is switched to Manual sequential.

● START input

When the START input is turned ON after selecting the operation data number, stored data operation is started. In manual sequential operation, the operation data number that is the starting point is started.

● SSTART input

When the SSTART input is turned ON, stored data operation is started.

In manual sequential operation, operation of the operation data number of the next data is started. In operation other than manual sequential operation, operation of the selected operation data number is started.

● D-SEL0 to D-SEL7 inputs

When any of the D-SEL0 to D-SEL7 inputs is turned ON, direct positioning operation of the set operation number is started. Since positioning operation can be executed only by turning any of the D-SEL0 to D-SEL7 inputs ON, the troubles of selecting the operation data number can be saved.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|-------------------------|-----------------------------------|--|---------------|
| I/O action and function | D-SEL drive start function | Sets whether to start the operation when the D-SEL input has been turned ON. Setting range 0: Only operation data number selection 1: Operation data number selection+START function | 1 |
| | D-SEL0 operation number selection | Sets the operation data number corresponding to the D-SEL input. Setting range 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 the combination of ON/OFF status of the M0 to M7.

| Operation data No. | M7 | M6 | M5 | M4 | M3 | M2 | M1 | M0 |
|--------------------|-----|-----|-----|-----|-----|-----|-----|-----|
| 0 | OFF |
| 1 | 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 | OFF |
| 255 | ON |

Setting example 1

To specify the operation data No. 8 (binary representation: 00001000)

| Operation data No. | M7 | M6 | M5 | M4 | M3 | M2 | M1 | M0 |
|--------------------|-----|-----|-----|-----|----|-----|-----|-----|
| 8 | OFF | OFF | OFF | OFF | ON | OFF | OFF | OFF |

Setting example 2

To specify the operation data No. 116 (binary representation: 01110100)

| Operation data No. | M7 | M6 | M5 | M4 | M3 | M2 | M1 | M0 |
|--------------------|-----|----|----|----|-----|----|-----|-----|
| 116 | OFF | ON | ON | ON | OFF | ON | OFF | OFF |

● NEXT input

When the NEXT input is turned ON during operation, the motor is transited forcibly to the operation data number of the next data. If there is no next data, the current operation is continued. This is a signal required when performing a different operation in the middle of continuous operation or push-motion operation.

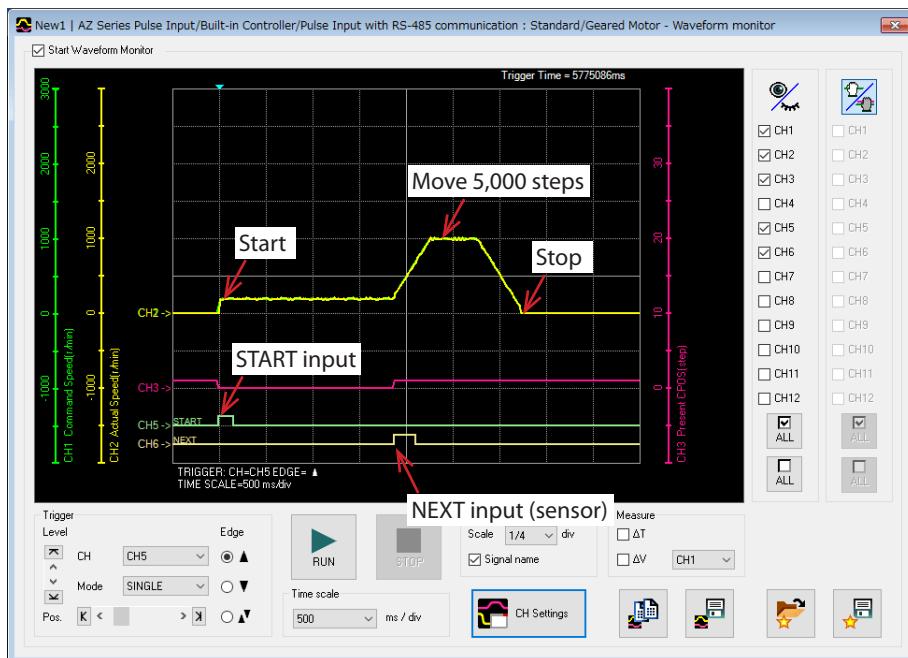
Setting example 1

If the sensor is detected in the middle of unidirectional continuous operation, the motor stops after moving 5,000 steps from the feedback position (actual position).

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

| | Operation type | Position [step] | Speed [Hz] | Acceleration [kHz/s] |
|----|---|-----------------|------------|----------------------|
| #0 | Continuous (Position control) | 0 | 1000 | 1000.000 |
| #1 | Incremental positioning (based on command position) | 5000 | 5000 | 10.000 |

| Stopping deceleration [kHz/s] | Operating current [%] | Drive-complete delay time [s] | Link | Next data No. |
|-------------------------------|-----------------------|-------------------------------|----------------------------|---------------|
| 1000.000 | 100.0 | 0.000 | Continuous form connection | +1 |
| 10.000 | 100.0 | 0.000 | No link | Stop |

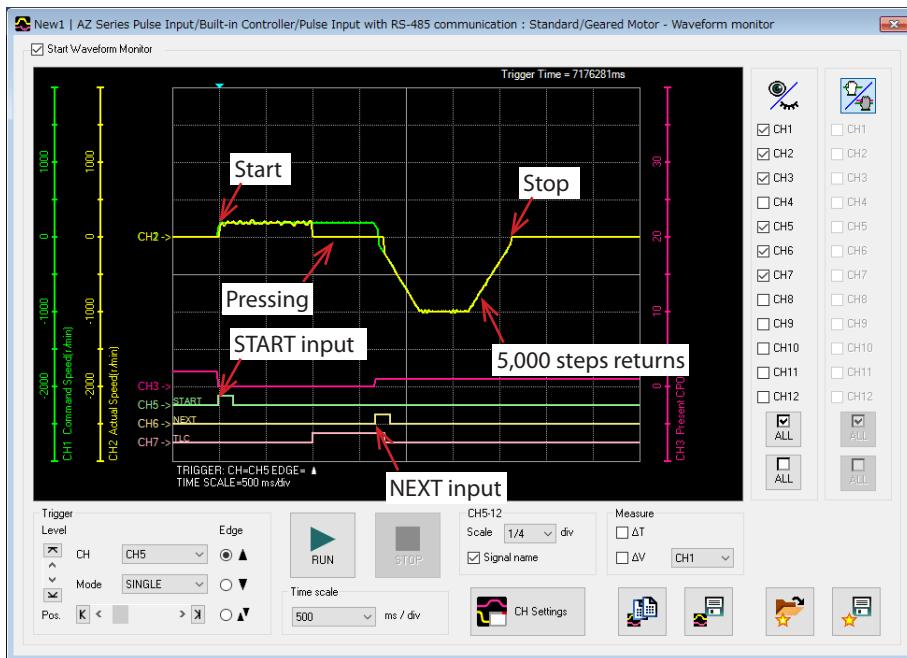


Setting example 2

The motor returns 5,000 steps in an arbitrary timing from the state of pressing on a load in push-motion operation.

| # | Operation type | Position [step] | Speed [Hz] | Acceleration [kHz/s] |
|----|--|-----------------|------------|----------------------|
| #0 | Continuous (Push motion) | 0 | 1000 | 1000.000 |
| #1 | Incremental positioning (based on feedback position) | -5000 | 5000 | 10.000 |

| Stopping deceleration [kHz/s] | Operating current [%] | Drive-complete delay time [s] | Link | Next data No. |
|-------------------------------|-----------------------|-------------------------------|----------------------------|---------------|
| 1000.000 | 30.0 | 0.000 | Continuous form connection | +1 |
| 10.000 | 30.0 | 0.000 | No link | Stop |

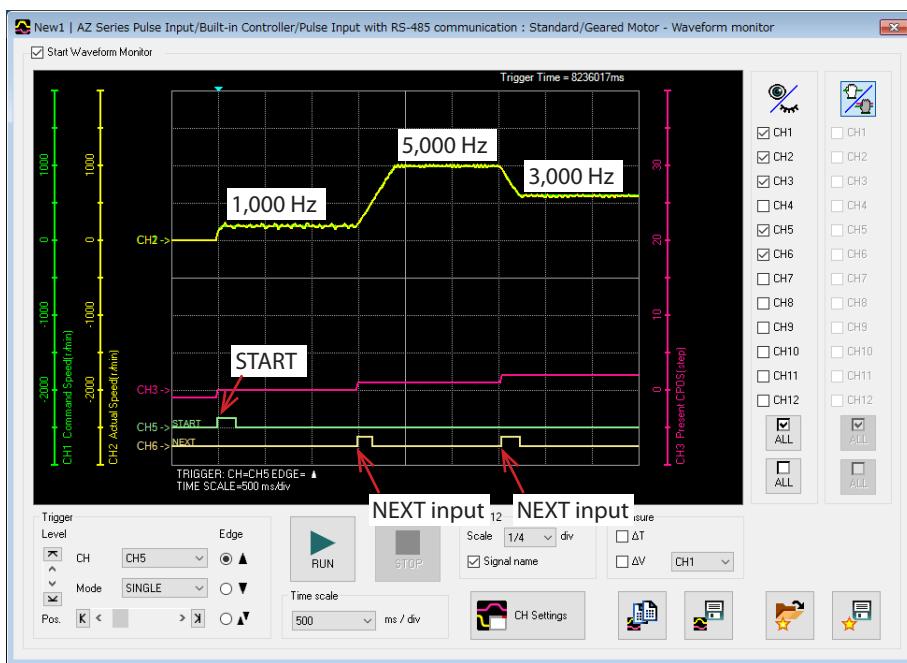


Setting example 3

Link multiple continuous operations having different speeds with "Continuous form connection," and change the operating speed in an arbitrary timing.

| | Operation type | Position [step] | Speed [Hz] | Acceleration [kHz/s] | Stopping deceleration [kHz/s] |
|----|----------------------------|-----------------|------------|----------------------|-------------------------------|
| #0 | Continuous (Speed control) | 0 | 1000 | 10.000 | 10.000 |
| #1 | Continuous (Speed control) | 0 | 5000 | 10.000 | 10.000 |
| #2 | Continuous (Speed control) | 0 | 3000 | 10.000 | 10.000 |

| Operating current [%] | Drive-complete delay time [s] | Link | Next data No.. |
|-----------------------|-------------------------------|----------------------------|----------------|
| 30.0 | 0.000 | Continuous form connection | +1 |
| 30.0 | 0.000 | Continuous form connection | +1 |
| 30.0 | 0.000 | No link | Stop |

**■ Signal used for high-speed return-to-home****● ZHOME input**

When the ZHOME input is turned from OFF to ON, high-speed return-to-home operation is started.



The home position for motorized actuators has been set at the time of shipment. (Excluding the non-guide type of the DRS2 Series.) However, in the case of a motor alone, the home position has not been set at the time of shipment. In addition, the home position becomes an unset state when the resolution is changed. If high-speed return-to-home operation is started in a condition like this, the "ZHOME start error" information is generated, and operation is not performed. Be sure to set the home position before performing high-speed return-to-home operation.

■ Signal used for return-to-home operation**● HOME input**

When the HOME input is turned ON, return-to-home operation is started. When the return-to-home operation is complete and the motor stops, the HOME-END output is turned ON.

■ Signals used for macro operation**● FW-JOG input and RV-JOG input**

When the FW-JOG input is turned ON, JOG operation is performed in the forward direction, and when the RV-JOG input is turned ON, JOG operation is performed in the reverse direction.

- **FW-JOG-H input and RV-JOG-H input**

When the FW-JOG-H input is turned ON, high-speed JOG operation is performed in the forward direction, and when the RV-JOG-H input is turned ON, high-speed JOG operation is performed in the reverse direction.

- **FW-JOG-P input and RV-JOG-P input**

When the FW-JOG-P input is turned ON, inching operation is performed in the forward direction, and when the RV-JOG-P input is turned ON, inching operation is performed in the reverse direction.

- **FW-JOG-C input and RV-JOG-C input**

When the FW-JOG-C input is turned ON, combined JOG operation is performed in the forward direction, and when the RV-JOG-C input is turned ON, combined JOG operation is performed in the reverse direction.

- **FW-POS input and RV-POS input**

When the operation data number is selected and the FW-POS input or RV-POS input is turned ON, continuous operation is started at the operating speed corresponding to the selected operation data number. When the FW-POS input is turned ON, the motor rotates in the forward direction, and when the RV-POS input is turned ON, the motor rotates 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 operating.

If 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 speed is changed to the one specified for the new operation data number.

- **FW-SPD input and RV-SPD input**

When the operation data number is selected and the FW-SPD input or RV-SPD input is turned ON, speed control operation is started at the operation speed corresponding to the selected operation data number. When the FW-SPD input is turned ON, the motor rotates in the forward direction, and when the RV-SPD input is turned ON, the motor rotates 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 operating.

If the FW-SPD input and the RV-SPD input are turned ON simultaneously, the motor decelerates to a stop.

When the operation data number is changed during speed control operation, the speed is changed to the one specified for the new operation data number.

- **FW-PSH input and RV-PSH input**

When the operation data number is selected and the FW-PSH input or RV-PSH input is turned ON, speed control push-motion operation is started at the operation speed corresponding to the selected operation data number. When the FW-PSH input is turned ON, the motor rotates in the forward direction, and when the RV-PSH input is turned ON, the motor rotates 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 operating.

If the FW-PSH input and the RV-PSH input are turned ON simultaneously, the motor decelerates to a stop.

When the operation data number is changed during speed control push-motion operation, the speed is changed to the one specified for the new operation data number.

4-2 Position coordinate management

■ External sensor input signal

● FW-LS input and RV-LS input

These signals are input signals from the limit sensors. The FW-LS input is from the sensor in the forward direction, and the RV-LS input is from the sensor in the reverse direction.

- Return-to-home operation

When the FW-LS input or RV-LS input is detected, return-to-home operation is performed according to the setting of the "Home-seeking mode" parameter.

- Other than return-to-home operation

Detect the hardware overtravel and stop the motor. When the "FW-LS, RV-LS input action" parameter is set to "Only for return-to-home sensor," the motor does not stop.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|-------------------------|---------------------------|---|---------------|
| I/O action and function | FW-LS, RV-LS input action | <p>Sets whether hardware overtravel detection by the FW-LS input and RV-LS input is enabled/disabled, how to stop, and whether or not the "Hardware overtravel" alarm is generated.</p> <p>Setting range</p> <ul style="list-style-type: none"> -1: Used only for the return-to-home sensor 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 position sensor when setting the "(HOME) Home-seeking mode" parameter to the 3-sensor mode or one-way rotation mode.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|---------------------|--------------------------|--|---------------|
| Motor and mechanism | (HOME) Home-seeking mode | <p>Sets the mode for return-to-home operation.</p> <p>Setting range</p> <ul style="list-style-type: none"> 0: 2-sensor 1: 3-sensor 2: One-way rotation 3: Push-motion | 1 |

● SLIT input

Connect when executing return-to-home operation using a sensor with a slit.

When executing return-to-home operation, use of the SLIT input in addition to the HOMES increases the accuracy of home position detection.

■ Position coordinate preset signal

This is a signal to preset the mechanical home position or electrical home position.

● P-PRESET input

When the P-PRESET input is turned ON, the command position and feedback position are rewritten to the values set in the "Preset position" parameter.

At the same time, they are written in the non-volatile memory.

However, preset cannot be executed while the motor is operating.



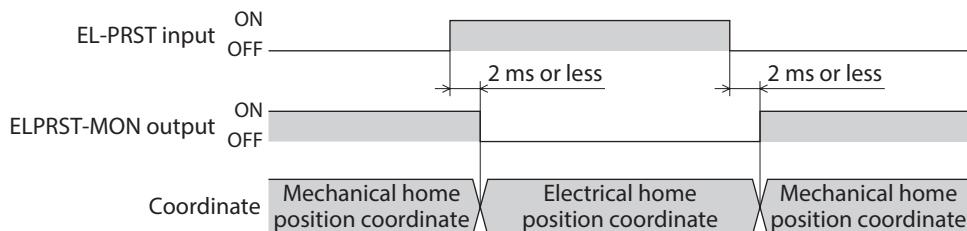
- Preset cannot be executed during temporary stop by the PAUSE input.
- Preset cannot be executed if the position deviation between the command position and feedback position is large (the TLC output is ON) even when the motor is stopped.

● EL-PRST input

While the EL-PRST input is ON, the coordinate system is switched to the one with the electrical home position as the home position.

The coordinate system when the EL-PRST input is turned from OFF to ON becomes the electrical home position, and the motor operates in the electrical home position coordinate system.

When the EL-PRST input is turned OFF, the coordinate system returns to the mechanical home position coordinate. By setting a home position other than the mechanical home position (electrical home position), the motor can be controlled temporarily in another coordinate.



- When the EL-PRST input is turned ON during operation, the command position and the feedback position at that time are set to the electrical home position coordinate. However, the target position of the executed operation remains the one of the mechanical home position coordinate system. Execute operation in the electrical home position coordinate system after stopping the operation.
- While the EL-PRST input is ON, high-speed return-to-home operation cannot be executed.

■ Position coordinate information monitor function signal

This signal is used in the position coordinate information monitor function.

For details of the position coordinate information monitor function, refer to p.153.

● MON-REQ0 input and MON-REQ1 input

This signal is used to select information to be output by the I/O position output function.

When the MON-REQ input is turned ON, information selected in each parameter is output.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|-------------------------|--------------------------------|---|---------------|
| I/O action and function | 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. Setting range 1: Feedback position 2: Feedback position (32 bit counter) 3: Command position 4: Command position (32 bit counter) 8: Alarm code (8 bit) 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

When the MON-CLK input is turned ON, information of the position coordinate information monitor function is sent.

In case of I/O position output function

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

In case of pulse request function

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

● PLSM-REQ input

When the PLSM-REQ input is turned from OFF to ON, the position coordinate information to be sent by the pulse request function is set.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|-------------------------|-------------------------------|---|---------------|
| I/O action and function | PLS-OUT output data selection | Selects the information to be output by the pulse request function. Setting range 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 pulse output used by the pulse request function. Setting range 1 to 10,000 (1=0.1 kHz) | 100 |

4-3 Management of driver

■ Status releasing signal

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

● ALM-RST input

When an alarm is generated, the motor stops. If the ALM-RST input is turned from OFF to ON at this time, the alarm is reset (the alarm is reset at the ON edge of the ALM-RST input). Always reset an alarm after removing the cause of the alarm and ensuring safety.

Note that some alarms cannot be reset by the ALM-RST input.

For the alarms, refer to "1-4 Alarm list" on p.451.

● ETO-CLR input

The ETO-mode can be reset by removing the factor of ETO and turning the ETO-CLR input from OFF to ON (the ETO mode is reset at the ON edge of the ETO-CLR input).

Only the ETO-mode can be reset by the ETO-CLR input.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|------------------------|----------------------------|---|---------------|
| ETO and Alarm and Info | ETO reset action (ETO-CLR) | Sets the criteria of the signal when the ETO-mode is reset by the ETO-CLR input. Setting range 1: Reset at the ON edge 2: Reset at the ON level | 1 |

● LAT-CLR input

This signal is used to clear the latched status. The information cleared by LAT-CLR is as follows. (latch function → p.474)

- The NEXT-LAT output and the command position, feedback position, target position, operation data number, and number of loop latched by the NEXT-LAT output
- The JUMP0-LAT output and the command position, feedback position, target position, operation data number, and number of loop latched by the JUMP0-LAT output
- The JUMP1-LAT output and the command position, feedback position, target position, operation data number, and number of loop latched by the JUMP1-LAT output
- The command position, feedback position, target position, operation data number, and number of loop when operation is interrupted by the STOP input.
- PLS-LOST output
- Cumulative load value

● INFO-CLR input

This signal is enabled when the "Information auto clear" parameter is set to "Disable."

When the INFO-CLR input is turned ON, the information status is released.

■ Driver function change signal

● HMI input

When the HMI input is turned ON, the function limitation of the **MEXE02** is released. When the HMI input is turned OFF, the function limitation is imposed.

The following functions are limited.

- I/O test
- Teaching, remote operation
- Writing parameters, downloading, initializing



- When the HMI input is not assigned to the direct I/O or remote I/O, this input is always set to ON. Also, when this input is assigned to both direct I/O and remote I/O, the function is executed only when both of them are set to ON.
- When the HMI input is assigned to the DIN input function, do not set the "1-shot signal" to "Enable."

● TEACH input

When the TEACH input is turned from OFF to ON, teaching function is executed.

Teaching is a function to set the current position to the "Position" of the operation data. The operation type when the "Position" is set by teaching function can be selected in the "TEACH operation type setting" parameter.

The operation data number written by teaching function is set with the M0 to M7 inputs.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|-------------------------|------------------------------|---|---------------|
| I/O action and function | TEACH operation type setting | Selects the operation type when the "Position" is set by teaching function. Setting range –1: The operation type is not set 1: Absolute positioning 8: Wrap absolute positioning | 1 |

● PLS-XMODE input

When the PLS-XMODE input is turned ON, the number of input pulses and the multiplying factor of the frequency are changed.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|-------------------------|------------------------------------|---|---------------|
| I/O action and function | PLS-XMODE pulse multiplying factor | Sets the number of pulses multiplied by the PLS-XMODE input and the multiplying factor of the pulse frequency. Setting range 2 to 30 times | 10 |



Set the frequency of the pulse input less than 1 MHz.

● PLS-DIS input

When the PLS-DIS input is turned ON, the pulse input is disabled.

● T-MODE input

When the T-MODE input is turned ON, the alarm of overload is disabled. In pulse-input operation, the T-MODE input is turned ON when push-motion is executed.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|-------------------------|---|---|---------------|
| I/O action and function | Current setting during motor standstill at T-MODE | Selects the command current for when the motor is stopped in a state where the T-MODE input is being ON. Setting range 0: Stop current 1: Operating current | 0 |

● CRNT-LMT input

When the CRNT-LMT input is turned ON, the operating current is limited.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|-------------------------|--|---|---------------|
| I/O action and function | CRNT-LMT operating current limit value | Sets the operating current limited in the CRNT-LMT input. Set the ratio of the operating current based on the base current being 100%. Setting range 0 to 1,000 (1=0.1%) | 500 |

● SPD-LMT input

When the SPD-LMT input is turned ON, the operating speed is limited.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|-------------------------|------------------------------------|---|---------------|
| I/O action and function | SPD-LMT speed limit type selection | Selects the setting method of the speed limitation value. Setting range 0: Ratio 1: Value | 0 |
| | SPD-LMT speed limit ratio | Sets the ratio of the speed. This parameter is enabled when the "SPD-LMT speed limit type selection" parameter is set to "Ratio." Setting range 1 to 100% | 50 |
| | SPD-LMT speed limit value | Sets the speed value. This parameter is enabled when the "SPD-LMT speed limit type selection" parameter is set to "Value." Setting range 1 to 4,000,000 Hz | 1,000 |

● CCM input

This signal is used to switch the current control mode.

When the CCM input is turned OFF, the mode is switched to the α control mode. When it is turned ON, the mode is switched to the servo emulation mode.

If noise is heard during high-speed rotation or there is notable vibration, it may be effective to switch to the servo emulation mode.

For details of the current control mode, refer to p.435.

5 Output signals

5-1 Management of driver

■ Driver status indication signal

- **ALM-A output and ALM-B output**

When 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 blinks in red, and the motor stops. When an alarm to turn the excitation OFF is generated, the motor becomes a non-excitation state after it stops.

The ALM-A output is normally open, and the ALM-B output is normally closed.

- **SYS-RDY output**

The SYS-RDY output is turned ON when the driver is ready to operate and enables to receive input signals after power-on.

- **INFO output**

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

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|------------------------|------------------------|---|---------------|
| ETO and Alarm and Info | Information auto clear | Releases the information status automatically when the cause of information generation is removed and turns the INFO output OFF. Setting range 0: Disable 1: Enable | 1 |
| | INFO LED indicator | Makes the PWR/ARM LED blink in orange (*) when the INFO output is turned ON. Setting range 0: Disable 1: Enable | 1 |

* Since the red color and green color of the LED blink at the same time, the two colors overlap and seem to be orange.

- **SYS-BSY output**

This signal is turned ON when the driver executes the maintenance command via RS-485 communication.

- **Output of information signals**

When corresponding information is generated, each output signal is turned ON.

For details of information, refer to "2-2 Information list" on p.467.

■ Hardware status indication

- **CRNT output**

The CRNT output is turned ON while the motor is excited.

- **MPS output**

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

- **MBC output**

Use this signal to control the electromagnetic brake in the master controller.

The MBC output is turned ON when the electromagnetic brake is released and turned OFF when it is held. Detect ON/OFF of the MBC output in the master controller to control the electromagnetic brake.

- **RG output**

This signal is output in the driver with regeneration unit connected. When the input voltage of the driver increases and enters the regeneration status, the RG output is turned ON.

5-2 Management of operation

■ Operating status indication

● READY output

When preparation of stored data operation, macro operation, or return-to-home operation is complete, the READY output is turned ON. Input operation start command to driver after the READY output has turned ON.

The READY output is turned ON when all of the following conditions are satisfied.

- The control power supply and main power supply of the driver are turned on
- All inputs that start operation are OFF
- The FREE input is OFF
- The C-ON input is ON (when the C-ON input is assigned)
- The STOP input is OFF
- The STOP-COFF input is OFF
- The PAUSE input is OFF
- The CLR input is OFF
- An alarm is not present
- The motor is not operated
- Teaching, remote operation, download, and I/O test are not executed in the **MEXE02**.
- Configuration command, data initialization command, and batch non-volatile memory read command are not executed via RS-485 communication.

● MOVE output

The MOVE output is turned ON while the motor is operating.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|-------------------------|----------------------|--|---------------|
| I/O action and function | MOVE minimum ON time | Sets the minimum ON time for the MOVE output. Setting range 0 to 255 ms | 0 |

● OPE-BSY output

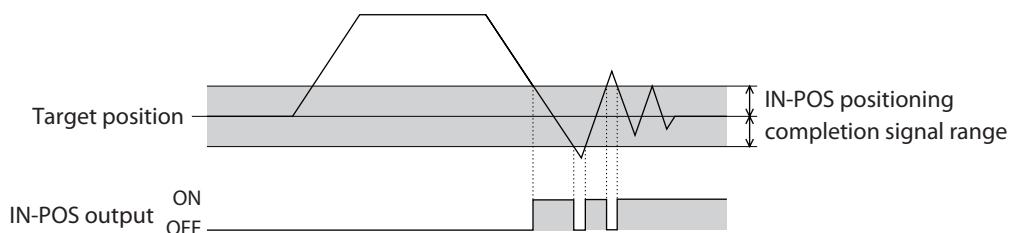
The OPE-BSY output is turned ON while the driver is executing internal oscillation.

Internal oscillation is executed during the following operations.

- 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 tree view | Parameter name | Description | Initial value |
|-------------------------|---|---|---------------|
| I/O action and function | IN-POS positioning completion signal range | Sets the output range of the IN-POS output (the motor operation converges within this angular range) as the center on the target position. Setting range 0 to 180 (1=0.1°) | 18 |
| | IN-POS positioning completion signal offset | Sets the amount of offset from the target position. Setting range -18 to 18 (1=0.1°) | 0 |



When continuous operation is stopped, or when the operation is interrupted by the STOP input or other operation stop signals, the IN-POS output is not turned ON.

● AUTO-CD output

When the current value becomes the one set in the "Stop current" parameter by the automatic current cutback function, the AUTO-CD output is turned ON. When the automatic current cutback function is set to disable, the AUTO-CD output will not turn ON.

● TLC output

When the output torque exceeds the motor torque specification, the TLC output is turned ON. Alternatively, when the output torque reaches the set torque limit value during push-motion operation, the TLC output is turned ON.

The condition under which the TLC output is turned ON varies depending on the current control mode.

When the current control mode is "a control mode"

When the position deviation exceeds 1.8°, the TLC output is turned ON.

When the current control mode is "Servo emulation mode"

A timing to turn the TLC output ON varies depending on the setting of the "Servo emulation (SVE) ratio."

| "Servo emulation (SVE) ratio" parameter | TLC output |
|---|--|
| 0% | It is turned ON when the position deviation exceeds 1.8° |
| 1 to 99% | It is turned ON when the position deviation exceeds 1.8° and the command current reaches the upper limit |
| 100% | It is turned ON when the command position reaches the upper limit |



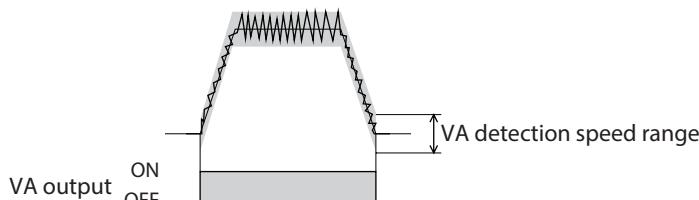
For details of the current control mode, refer to p.435.

● VA output

This signal is turned ON when the operating speed reaches the target speed. The criteria can be set in the "VA mode selection" parameter.

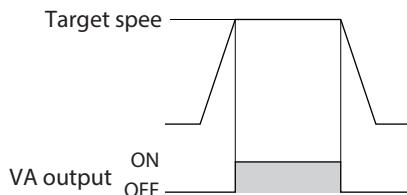
When the "VA mode selection" parameter is "Feedback speed attainment (speed at feedback position)"

When the detection speed of the motor is within the set range of the "VA detection speed range" parameter (around the command speed), the VA output is turned ON.

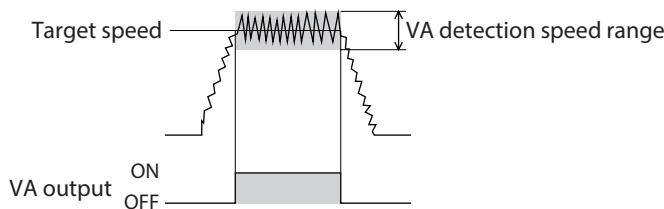


When the "VA mode selection" parameter is "Speed at command position (only internal profile)"

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

**When the "VA mode selection" parameter is "Speed at feedback position & command position (only internal profile)"**

When the detection speed of the motor is within the set range of the "VA detection speed range" parameter (around the target speed), the VA output is turned ON.

**Related parameters**

| MEXE02 tree view | Parameter name | Setting range | Initial value |
|-------------------------|--------------------------|--|---------------|
| I/O action and function | VA mode selection | <p>Selects the criteria of the VA output. In the case of pulse-input operation, only "0: Feedback speed attainment (speed at feedback position)" is enabled.</p> <p>Setting range 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)</p> | 0 |
| | VA detection speed range | <p>Sets the allowable range of the detection speed judgment when the "VA mode selection" parameter is set to "Feedback speed attainment (speed at feedback position)" or "Speed at feedback position & command position (only internal profile)."</p> <p>Setting range 1 to 200 r/min</p> | 30 |

● CRNT-LMTD output

This signal is enabled when current limiting is executed. When the operating current reaches or exceeds the value set in the "CRNT-LMT operating current limit value" parameter, the CRNT-LMTD output is turned ON. At the same time, the operating current is limited.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|-------------------------|--|---|---------------|
| I/O action and function | CRNT-LMT operating current limit value | <p>Sets the operating current limited in the CRNT-LMT input. Set the ratio of the operating current based on the base current being 100%.</p> <p>Setting range 0 to 1,000 (1=0.1%)</p> | 500 |

● SPD-LMTD output

This signal is enabled when speed limiting is executed. When the operating speed reaches or exceeds the value set in the "SPD-LMT speed limit ratio" parameter or "SPD-LMT speed limit value" parameter, the operating speed is limited. At the same time, the SPD-LMTD output is turned ON.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|-------------------------|------------------------------------|--|---------------|
| I/O action and function | SPD-LMT speed limit type selection | Selects the method of speed limitation. Setting range 0: Ratio 1: Value | 0 |
| | SPD-LMT speed limit ratio | Sets the speed limit value as a "Ratio." This parameter is enabled when the "SPD-LMT speed limit type selection" parameter is set to "Ratio." Setting range 1 to 100% | 50 |
| | SPD-LMT speed limit value | Sets the speed limit value as a "Value." This parameter is enabled when the "SPD-LMT speed limit type selection" parameter is set to "Value." Setting range 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 complete
- When return-to-home operation is complete
- When the position coordinate is set after position preset is executed

● M-CHG output

This signal is enabled in operations using operation data (pulse-input operation, stored data operation, continuous macro operation).

ON/OFF of the M-CHG output is inverted when operation is started or the operation data number is switched during operation.

● M-ACT0 to M-ACT7 outputs

These signals are enabled in operations using operation data (pulse-input operation, stored data operation, continuous macro operation).

The operation data number during operation is output in binary numbers.

In operations, which does not use the operation data (high-speed return-to-home operation, JOG operation, etc.), the status of the signal output in the previous operation are kept.

Output example

If high-speed return-to-home operation was performed after completion of positioning operation in the operation data No.1, and the operation data No.3 was finally operated

This is an example for when signals are monitored on the D-I/O, R-I/O monitor screen.

- 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.

| OUTPUT |
|--|
| <input checked="" type="checkbox"/> Do0:M-ACT0 |
| <input type="checkbox"/> Do1:M-ACT1 |
| <input type="checkbox"/> Do2:M-ACT2 |
| <input type="checkbox"/> Do3:M-ACT3 |
| <input type="checkbox"/> Do4:M-ACT4 |
| <input type="checkbox"/> Do5:M-ACT5 |

- When high-speed return-to-home operation is performed, the signal status of the operation data No.1 is kept.

| OUTPUT |
|--|
| <input checked="" type="checkbox"/> Do0:M-ACT0 |
| <input type="checkbox"/> Do1:M-ACT1 |
| <input type="checkbox"/> Do2:M-ACT2 |
| <input type="checkbox"/> Do3:M-ACT3 |
| <input type="checkbox"/> Do4:M-ACT4 |
| <input type="checkbox"/> Do5:M-ACT5 |

- When positioning operation of the operation data No.3 is performed, the signal (M-ACT1) corresponding to the operation data No.3 is turned ON.

| OUTPUT |
|--|
| <input checked="" type="checkbox"/> Do0:M-ACT0 |
| <input checked="" type="checkbox"/> Do1:M-ACT1 |
| <input type="checkbox"/> Do2:M-ACT2 |
| <input type="checkbox"/> Do3:M-ACT3 |
| <input type="checkbox"/> Do4:M-ACT4 |
| <input type="checkbox"/> Do5:M-ACT5 |

- **D-END0 to D-END7 outputs**

These signals are enabled in operations using operation data (pulse-input operation, stored data operation, continuous macro operation).

They are turned OFF when operation is started and turned ON when the operation of the specified operation data number is complete.

Use them to check that each operation is complete during link operation.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|-------------------------|-----------------------------------|--|---------------|
| I/O action and function | D-END0 operation number selection | Sets the operation data number corresponding to the D-END output. Setting range 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 |

■ Stored data operation status indication

- **PAUSE-BSY output**

When the PAUSE input is turned ON during stored data operation, operation stops temporarily, and the PAUSE-BSY output is turned ON.

- **SEQ-BSY output**

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

- **DELAY-BSY output**

The DELAY-BSY output is turned ON when the driver is in the drive-complete delay time or waiting status (Dwell).

■ Direct data operation status indication

- **DCMD-FULL output**

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

- **DCMD-RDY output**

This signal is output when preparation of direct data operation is complete.

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 C-ON input is ON (when the C-ON input is assigned)
- The STOP input is OFF
- The STOP-COFF input is OFF
- The PAUSE input is OFF
- The CLR input is OFF
- An alarm is not present
- Teaching, remote operation, download, and I/O test are not executed in the **MEXE02**
- Configuration command, data initialization command, batch non-volatile memory read command, and backup read command are not executed via RS-485 communication

■ Power removal function signal

● ETO-MON output

If either HWTO1 or HWTO2 is turned OFF when the "HWTO mode selection" parameter is set to "ETO-mode," the ETO-MON output is turned ON.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|------------------------|---------------------|---|---------------|
| ETO and Alarm and Info | HWTO mode selection | Sets the status of the driver when both HWTO1 and HWTO2 are turned OFF. Setting range 0: ETO-mode 1: Alarm generation | 0 |

● EDM output

When both HWTO1 input and HWTO2 input are turned OFF, the EDM output is turned ON.

| HWTO1 input | HWTO2 input | EDM output | Motor excitation |
|-------------|-------------|------------|------------------|
| ON | ON | OFF | Excitation |
| ON | OFF | OFF | |
| OFF | ON | OFF | |
| OFF | OFF | ON | |

Non-excitation

● HWTOIN-MON output

When either HWTO1 or HWTO2 is turned OFF, the HWTOIN-MON output is turned ON.

■ Motor position indication

This signal is output according to the position of the motor.

● ZSG output

This signal is turned ON every time the feedback position of the motor increases by one revolution from the position preset by "ZSG preset" of the **MEXE02** or the maintenance command "ZSG-PRESET" of RS-485 communication.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|-------------------------|------------------|--|---------------|
| I/O action and function | ZSG signal width | Sets the output range for the ZSG output. Setting range 1 to 1,800 (1=0.1°) | 18 |



Set the "ZSG signal width" parameter according to the operating speed so that the ZSG output is output for 1 ms or more.

● RND-ZERO output

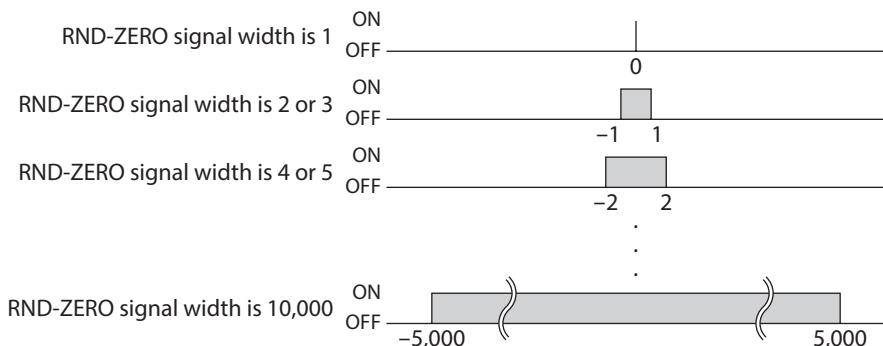
If the feedback position of the motor is in the home position of the wrap range when the "Wrap setting" parameter is set to "Enable," the RND-ZERO output is turned ON.

When "The number of the RND-ZERO output in wrap range" parameter is used, the wrap range can be evenly divided by an arbitrary division number and output per certain zone.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|-------------------------|------------------------|---|---------------|
| I/O action and function | RND-ZERO signal width | Sets the output range for the RND-ZERO output. Setting range 1 to 10,000 steps | 10 |
| | RND-ZERO signal source | Sets the base for the RND-ZERO output. Setting range 0: Based on feedback position 1: Based on command position | 0 |

| MEXE02 tree view | Parameter name | Description | Initial value |
|---------------------|---|--|---------------|
| Motor and mechanism | The number of the RND-ZERO output in wrap range | Sets the frequency to turn the RND-ZERO output ON in the wrap range. Setting range 1 to 536,870,911 divisions | 1 |



● TIM output

This signal is turned ON every time the command position of the motor increases by 7.2° from the home position.



If the command speed is 1,000 Hz or more, the TIM output is not turned ON correctly.

● MAREA output

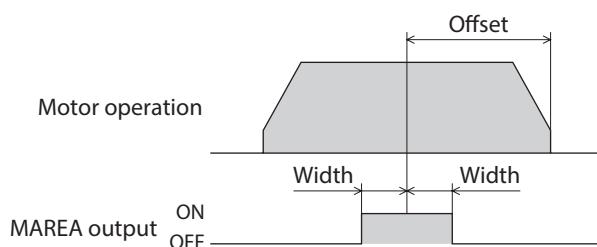
The MAREA output is turned ON when the motor is inside the set area.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|-------------------------|---------------------|---|---------------|
| I/O action and function | MAREA output source | Sets the standard to turn the MAREA output ON and the status of the MAREA output after operation. Setting range 0: Based on feedback position (ON after operation) 1: Based on command position (ON after operation) 2: Based on feedback position (OFF at completion) 3: Based on command position (OFF at completion) | 0 |

Related operation data

| MEXE02 tree view | Item | Description | Initial value |
|------------------|-------------|---|---------------|
| Operation data | Area offset | Sets the amount of offset from the target position of MAREA. Setting range -2,147,483,648 to 2,147,483,647 steps | 0 |
| | Area width | Sets the signal output range of MAREA. Setting range -1: (Disable) 0 to 4,194,303 steps | -1 |



Setting example 1

To turn the MAREA output ON in the range of ± 10 steps with the position of 5,000 steps in the center in incremental positioning operation with an travel amount of 10,000 steps.

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

Setting example 2

To turn the MAREA output ON in the range of ± 100 steps with the coordinate of 1,000 in the center in absolute positioning operation from the current position of 5,000 to the target position of -8,000 steps.

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



When the "operation type" of the operation data is as follows, the standard of area offset is the operation start position.

- Continuous operation (Position control)
- Continuous operation (Speed control)
- Continuous operation (Push motion)
- Continuous operation (Torque control)

● 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 is stopped.

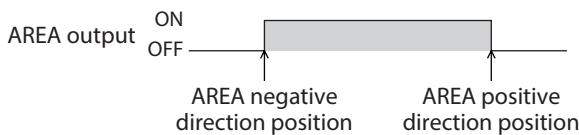
Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|-------------------------|--|--|---------------|
| I/O action and function | AREA0 positive direction position/offset to AREA7 positive direction position/ offset | Sets the positive direction position or offset from the target position for the AREA0 to AREA7 outputs. Setting range -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 AREA0 to AREA7 outputs. Setting range -2,147,483,648 to 2,147,483,647 steps | 0 |
| | AREA0 range setting mode to AREA7 range setting mode | Sets the range setting mode of AREA0 to AREA7. Setting range 0: Range setting with absolute value 1: Offset/width setting from the target position | 0 |
| | AREA0 positioning standard to AREA7 positioning standard | Sets the positioning standard of AREA0 to AREA7 Setting range 0: Based on feedback position 1: Based on command position | 0 |

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

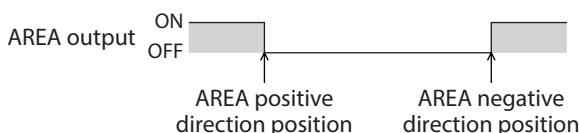
- "AREA positive direction position/offset" parameter > "AREA negative direction position/detection range" parameter

When the position of the motor is "AREA negative direction position/detection range" or more or "AREA positive direction position/offset" or less, the AREA output is turned ON.



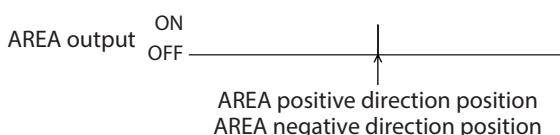
- "AREA positive direction position/offset" parameter < "AREA negative direction position/detection range" parameter

When the position of the motor is "AREA positive direction position/offset" or less or "AREA negative direction position/detection range" or more, the AREA output is turned ON.

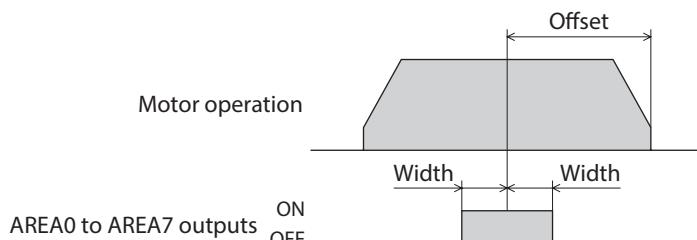


- "AREA positive direction position/offset" parameter = "AREA negative direction position/detection range" parameter

When the position of the motor is equal to "AREA negative direction position/detection range" and "AREA positive direction position/offset," the AREA output is turned ON.



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



● FW-SLS output and RV-SLS output

If the command position exceeds the range specified in the "Software limit" parameter when the "Software overtravel" parameter is set to other than "Disable," the FW-SLS output and the RV-SLS output are turned ON.

● RND-OVF output

When the wrap range is exceeded, ON/OFF of the RND-OVF output is switched.

■ Position monitor function

For details about position monitor function, refer to "5-2 Pulse request function" on p.495. (⇒ p.495)

● MON-OUT output

This signal is used for the I/O position output function. The position coordinate information or alarm information is output.

● PLS-OUTR output

When preparation of the pulse request function is complete, the PLS-OUTR output is turned ON. When output of position coordinate information with pulses is complete, the PLS-OUTR output is turned OFF.

■ Position coordinate status indication

- **ELPRST-MON output**

When the electrical home position coordinate is enabled, the ELPRST-MON output is turned ON.

- **ABSPEN output**

When the position coordinate has been set, the ABSPEN output is turned ON.

- **PRST-DIS output**

When the home position needs to be reset, the PRST-DIS output is turned ON.

In the **AZ Series**, if the resolution is changed after executing preset or return-to-home operation when the "Preset position" parameter is other than "0," the PRST-DIS output is turned ON.

When the PRST-DIS output is turned ON, perform preset or return-to-home operation again to set the home position.



In the **AZ Series**, when the resolution is changed with the "Preset position" parameter "0," the position coordinate is reset automatically. Therefore, even if the resolution is changed, the PRST-DIS output is not turned ON.

- **PRST-STLD output**

This signal is turned ON when the home position information is stored in the ABZO sensor after preset.

- **ORGN-STLD output**

Products such as the motorized actuator whose home position is set at the time of factory shipment are shipped with the ORGN-STLD output ON.

5-3 Latch information indication

For details about latch function, refer to "3-3 Latch function" on p.474. (⇒ p.474)

- **JUMP0-LAT output and JUMP1-LAT output**

When a low event trigger is detected, the JUMP0-LAT output is turned ON. When a high event trigger is detected, the JUMP1-LAT output is turned ON. 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.

- **PLS-LOST output**

If a pulse is input when the PLS-RDY output is OFF (the pulse input is disabled), the PLS-LOST output is turned ON.

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

The pulse input is disabled under the following conditions.

- The motor is a non-excitation state
- The operation stop signal is ON
- The PLS-DIS input is ON

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|-------------------------|--------------------------|---|---------------|
| I/O action and function | PLS-LOST check algorithm | Selects whether the count is increased or decreased according to the rotation direction when the number of disabled pulses is counted. When the parameter is set to "Signed," pulses in the forward direction are counted as positive values, and pulses in the reverse direction as negative values. Setting range 0: Unsigned 1: Signed | 0 |

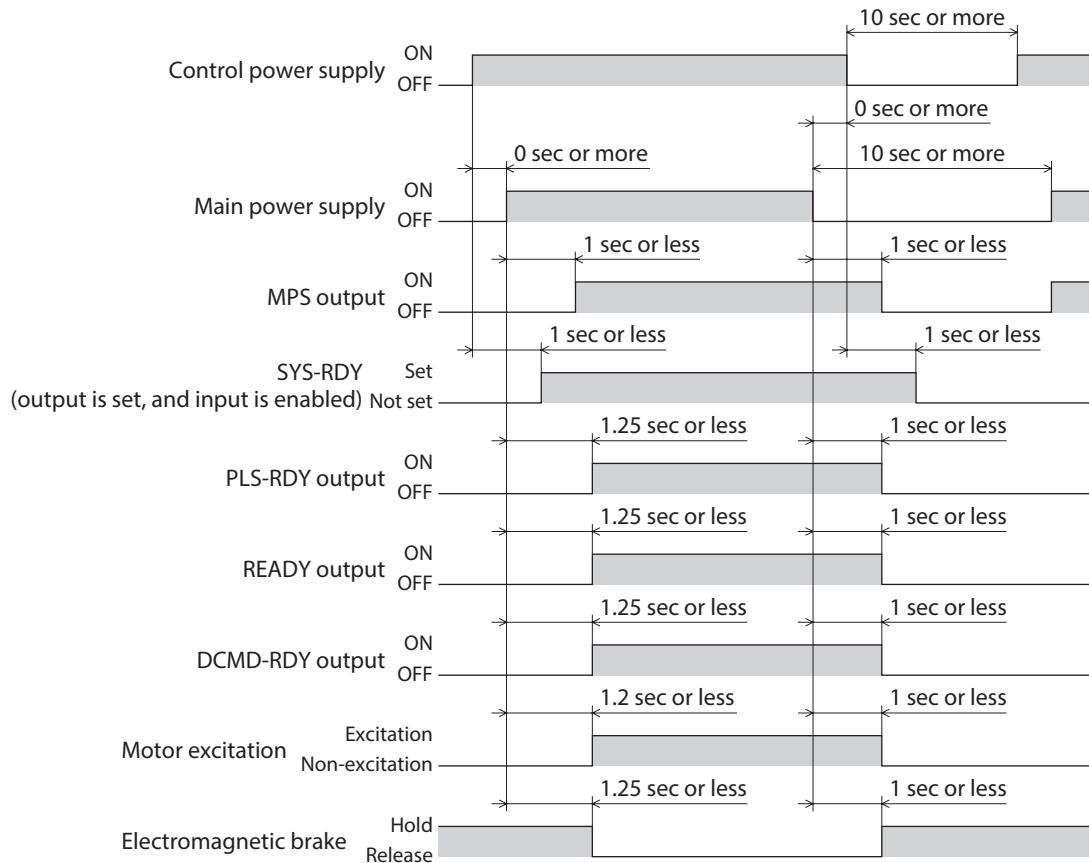
5-4 Response output

The response output is the output signal that shows the ON/OFF status corresponding to the input signals. The following tables show the correspondence between the input signals and output signals.

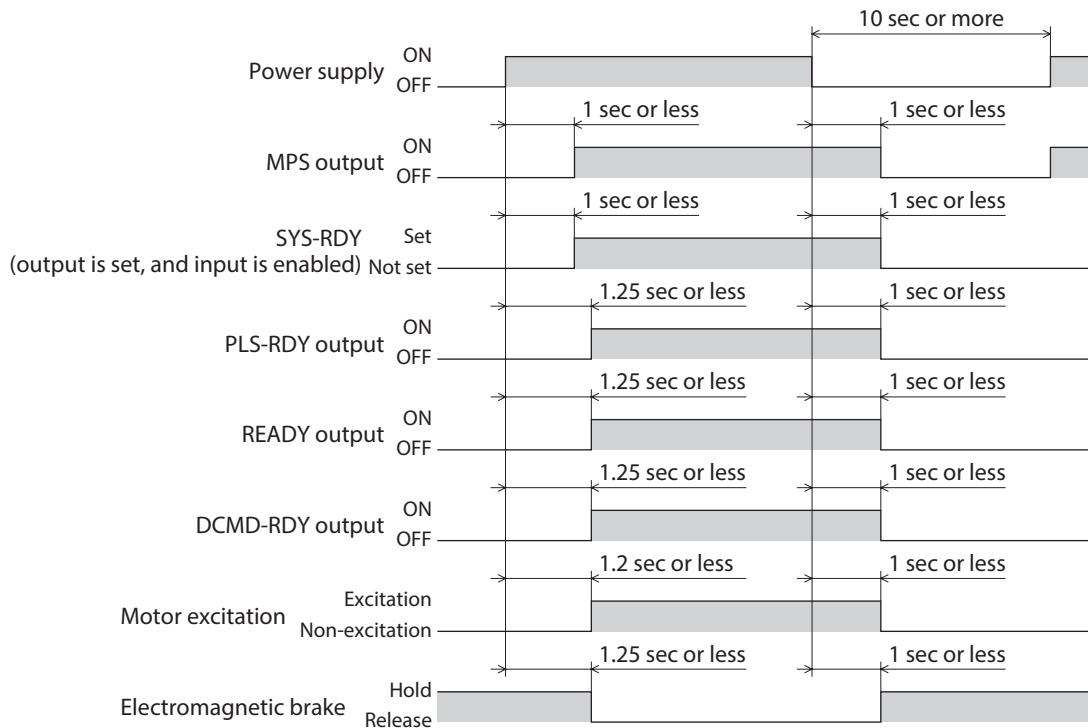
| Input signals | Output signals | Input signals | Output signals | Input signals | Output signals |
|---------------|----------------|---------------|----------------|---------------|----------------|
| FREE | FREE_R | NEXT | NEXT_R | M3 | M3_R |
| C-ON | C-ON_R | HOME | HOME_R | M4 | M4_R |
| CLR | CLR_R | ZHOME | ZHOME_R | M5 | M5_R |
| STOP-COFF | STOP-COFF_R | D-SEL0 | D-SEL0_R | M6 | M6_R |
| STOP | STOP_R | D-SEL1 | D-SEL1_R | M7 | M7_R |
| PAUSE | PAUSE_R | D-SEL2 | D-SEL2_R | TEACH | TEACH_R |
| BREAK-ATSQ | BREAK-ATSQ_R | D-SEL3 | D-SEL3_R | MON-REQ0 | MON-REQ0_R |
| ALM-RST | ALM-RST_R | D-SEL4 | D-SEL4_R | MON-REQ1 | MON-REQ1_R |
| P-PRESET | P-PRESET_R | D-SEL5 | D-SEL5_R | MON-CLK | MON-CLK_R |
| EL-PRST | EL-PRST_R | D-SEL6 | D-SEL6_R | PLSM-REQ | PLSM-REQ_R |
| ETO-CLR | ETO-CLR_R | D-SEL7 | D-SEL7_R | R0 | R0_R |
| LAT-CLR | LAT-CLR_R | FW-JOG | FW-JOG_R | R1 | R1_R |
| INFO-CLR | INFO-CLR_R | RV-JOG | RV-JOG_R | R2 | R2_R |
| HMI | HMI_R | FW-JOG-H | FW-JOG-H_R | R3 | R3_R |
| CCM | CCM_R | RV-JOG-H | RV-JOG-H_R | R4 | R4_R |
| PLS-XMODE | PLS-XMODE_R | FW-JOG-P | FW-JOG-P_R | R5 | R5_R |
| PLS-DIS | PLS-DIS_R | RV-JOG-P | RV-JOG-P_R | R6 | R6_R |
| T-MODE | T-MODE_R | FW-JOG-C | FW-JOG-C_R | R7 | R7_R |
| CRNT-LMT | CRNT-LMT_R | RV-JOG-C | RV-JOG-C_R | R8 | R8_R |
| SPD-LMT | SPD-LMT_R | FW-POS | FW-POS_R | R9 | R9_R |
| FW-BLK | FW-BLK_R | RV-POS | RV-POS_R | R10 | R10_R |
| RV-BLK | RV-BLK_R | FW-SPD | FW-SPD_R | R11 | R11_R |
| FW-LS | FW-LS_R | RV-SPD | RV-SPD_R | R12 | R12_R |
| RV-LS | RV-LS_R | FW-PSH | FW-PSH_R | R13 | R13_R |
| HOMES | HOMES_R | RV-PSH | RV-PSH_R | R14 | R14_R |
| SLIT | SLIT_R | M0 | M0_R | R15 | R15_R |
| START | START_R | M1 | M1_R | | |
| SSTART | SSTART_R | M2 | M2_R | | |

6 Timing chart

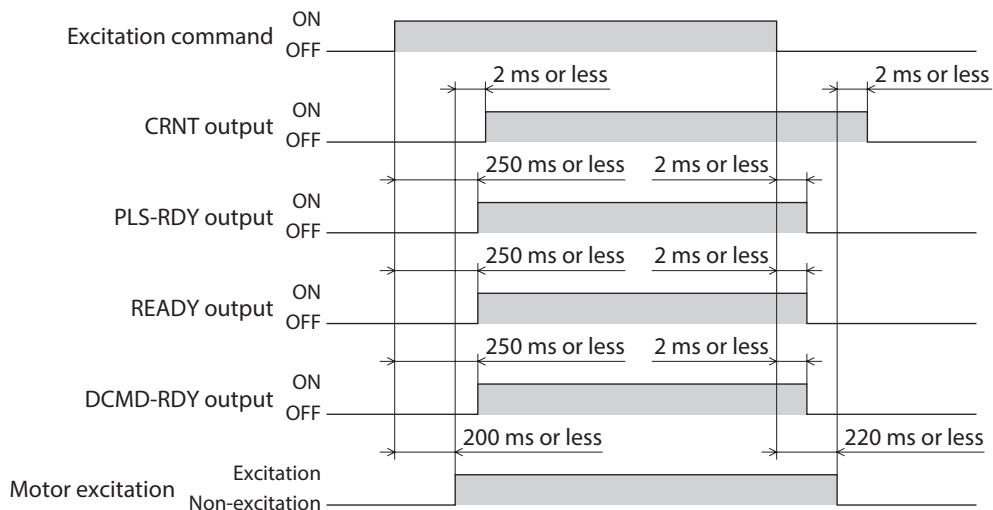
■ Power supply (AC power input driver)



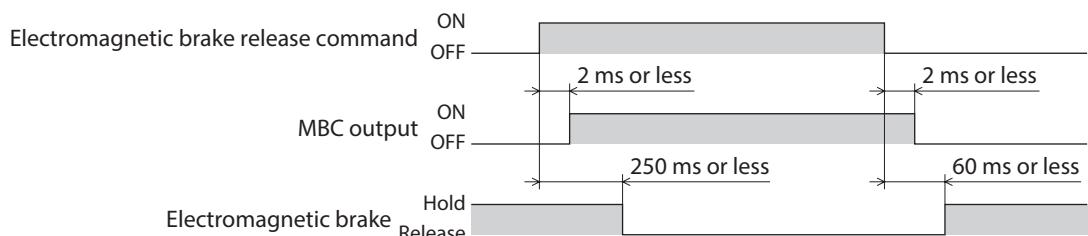
■ Power supply (DC power input driver)



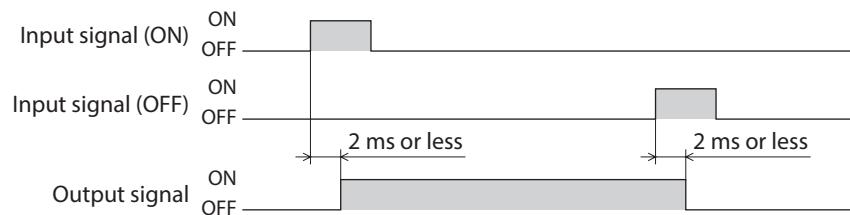
■ Excitation



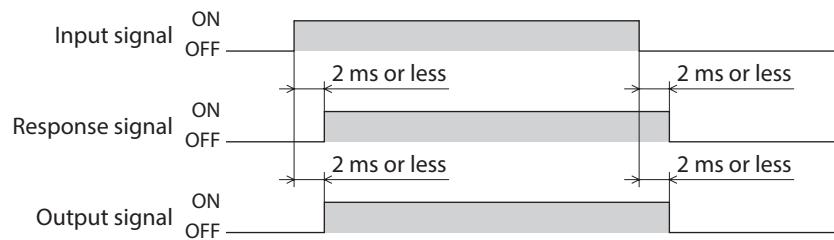
■ Electromagnetic brake



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



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

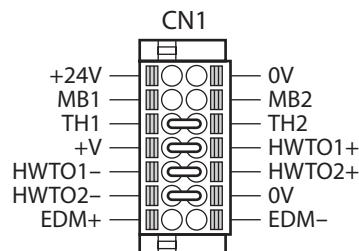


7 Power removal function (ETO function: External Torque Off function)

This is a function of the AC power input driver.

The power removable function (ETO function: External Torque Off function) is the one that stops supplying the power to the motor forcibly to put the motor into a non-excitation state if the HWTO input of the CN1 is shut off. This function, which is different from the FREE input, shuts off the power supply to the motor directly on the circuit.

It can be used for the purpose of preventing dangerous movements of the moving part when maintenance of the equipment is performed.



Overview of the ETO function

When either the HWTO1 input or the HWTO2 input is turned OFF, the hardware cuts off power supply to the motor and stops the motor. Then, the PWR/ALM LED blinks in green.

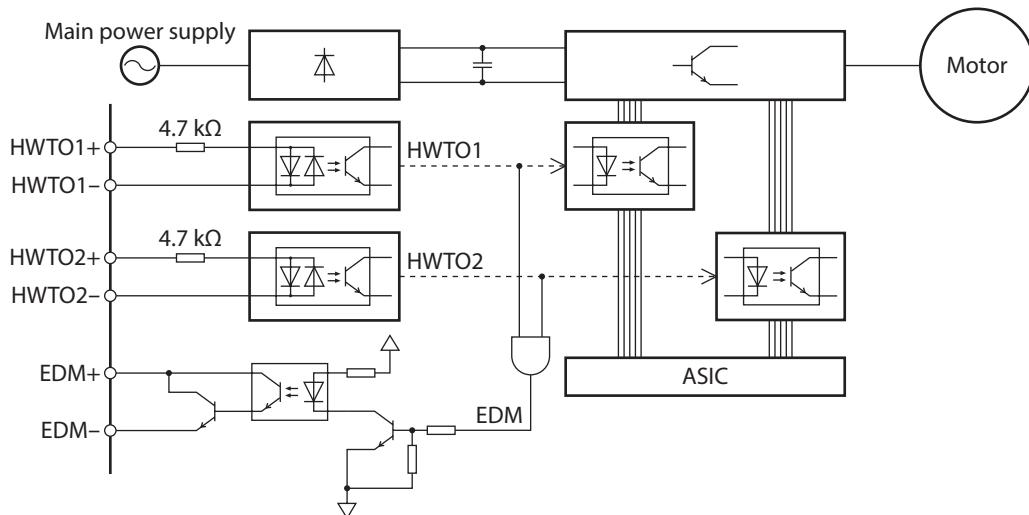
The electromagnetic brake holds the position when the electromagnetic brake motor is used.

Note

- Be sure to check the motor is in a standstill state before executing the ETO function. If the ETO function is executed while the motor is operated, it may cause damage to the motor, driver, or equipment.
- If the ETO function is executed while the motor is operated, an excessive regenerative voltage may cause damage to the driver. To prevent damage from the regenerative voltage, connect an accessory regeneration unit.

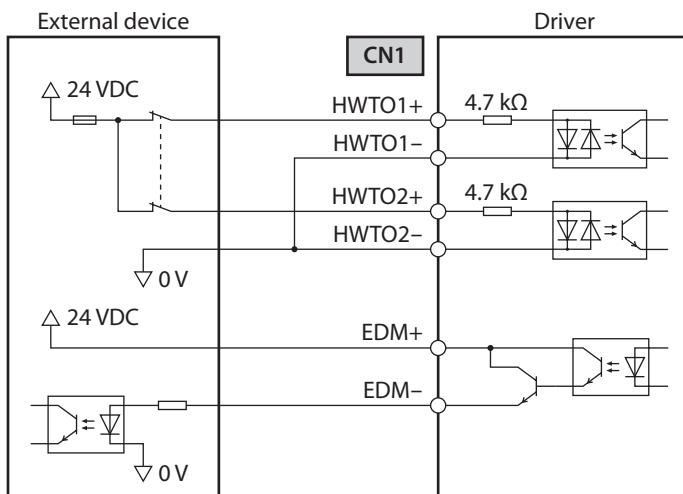
7-1 Block diagram

At the time of shipment, both the HWTO1 input and HWTO2 input are connected with a jumper wire and are turned ON.



| Signal name | Specification |
|------------------------------|--|
| HWTO1+ input HWTO1- input | 24 VDC ±10% |
| HWTO2+ input HWTO2- input | 30 VDC or less, 50 mA or less Output saturation voltage 1.1 V |
| EDM+ output EDM- output | Output saturation voltage 1.1 V |

7-2 Wiring example



- Separately provide contacts to operate the HWTO1 input and the HWTO2 input.
- Turning both the HWTO1 input and the HWTO2 input OFF will execute the ETO function.
- Use the EDM output to monitor an error of the ETO function.

7-3 Detection for error of the ETO function

When the ETO function is properly operated, the combination of the the HWTO1 input, the HWTO2 input, and the EDM output is any of the following.

| HWTO1 input | HWTO2 input | EDM output | Driver status | Motor excitation |
|-------------|-------------|------------|---|------------------|
| ON | ON | OFF | Normal | Excitation |
| ON | OFF | OFF | An alarm of "Emergency stop circuit error" is generated. | Non-excitation |
| OFF | ON | OFF | The setting of the "HWTO mode selection" parameter is followed. (ETO-mode or alarm generation) | Non-excitation |
| OFF | OFF | ON | | |

Combinations other than the above represent that an error occurs in the ETO function. Check the following table.

| HWTO1 input | HWTO2 input | EDM output | Driver status |
|-------------|-------------|------------|-----------------------|
| ON | ON | ON | Error in ETO function |
| ON | OFF | ON | |
| OFF | ON | ON | |
| OFF | OFF | OFF | |

If the error occurs in the ETO function, a failure of the driver or external devices, or a wiring error may have caused. Check the cause and take a measure immediately.

7-4 Reset of ETO-mode

■ When the "HWTO mode selection" parameter is "ETO-mode"

Reset the ETO-mode with a signal for which the parameter of the ETO reset action is set.
When the signal for which the parameter is set is turned from ON to OFF, the ETO-mode is reset.
Be sure to turn the HWTO1 input and the HWTO2 input ON before turning the STOP input ON.

Note

- If either of the HWTO1 input or the HWTO2 input is OFF, the ETO-mode cannot be reset.
- When an alarm is generated, reset the alarm before the ETO-mode.

■ When the "HWTO mode selection" parameter is "Alarm generation"

To reset the ETO-mode, turn the ALM-RST input ON. (It is enabled at the ON edge.)

7-5 Related parameters

The parameters related to the ETO function are as follows.

| MEXE02 tree view | Parameter name | Description | Initial value |
|------------------------|--|--|---------------|
| ETO and Alarm and Info | HWTO mode selection | Sets the status of the driver when both HWTO1 input and HWTO2 input are turned OFF. Setting range 0: ETO-mode (power removal status) 1: Alarm generation | 0 |
| | HWTO delay time of checking dual system [ms] | Sets the time from turn-off of one of HWTO inputs to turn-off of the other. Setting range 0 to 10: Disable 11 to 100 ms | 0 |
| | ETO reset ineffective period | Sets the time until the ETO-mode (power removal status) is reset. Setting range 0 to 100 ms | 0 |
| | ETO reset action (ETO-CLR) | Sets the criteria of the signal when the ETO-mode is reset by the ETO-CLR input. Setting range 1: Reset at the ON edge 2: Reset at the ON level | 1 |
| | ETO reset action (ALM-RST) | Enables reset of the ETO-mode by the ALM-RST input. Setting range 0: ETO-CLR ineffective 1: Reset by the ON edge trigger | 0 |
| | ETO reset action (C-ON) | Enables reset of the ETO-mode by the C-ON input. Setting range 0: ETO-CLR ineffective 1: Reset by the ON edge trigger | 0 |
| | ETO reset action (STOP) | Enables reset of the ETO-mode by the STOP input. Setting range 0: ETO-CLR ineffective 1: Reset by the ON edge trigger | 1 |

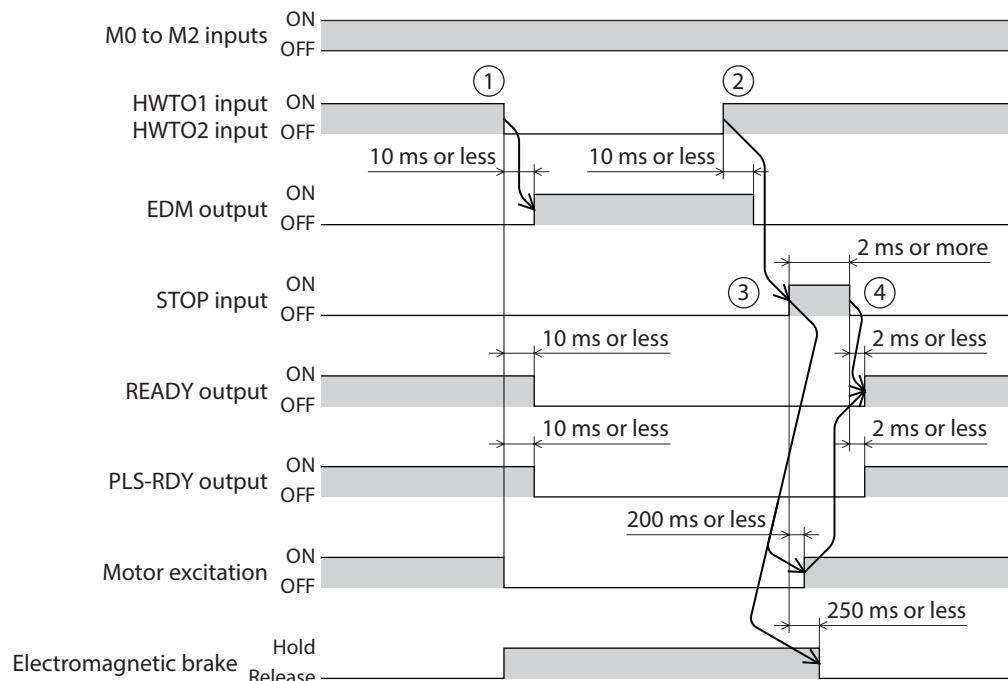
7-6 Timing chart

■ In case of the built-in controller type

Note

Be sure to check the motor is in a standstill state before executing the ETO function. If the ETO function is executed while the motor is operated, it may cause damage to the motor, driver, or equipment.

1. When both HWTO1 input and HWTO2 input are turned OFF, the EDM output is turned ON. The power supplying to the motor is cut off.
2. Turn the HWTO1 input and the HWTO2 input ON.
3. Turn the STOP input ON.
The power is supplied to the motor, and the motor is excited.
4. Turn the STOP input OFF.
The READY output is turned ON, and operation preparation is complete.
5. Check the READY output has been turned ON before turning the START input ON.
The motor operation is resumed.

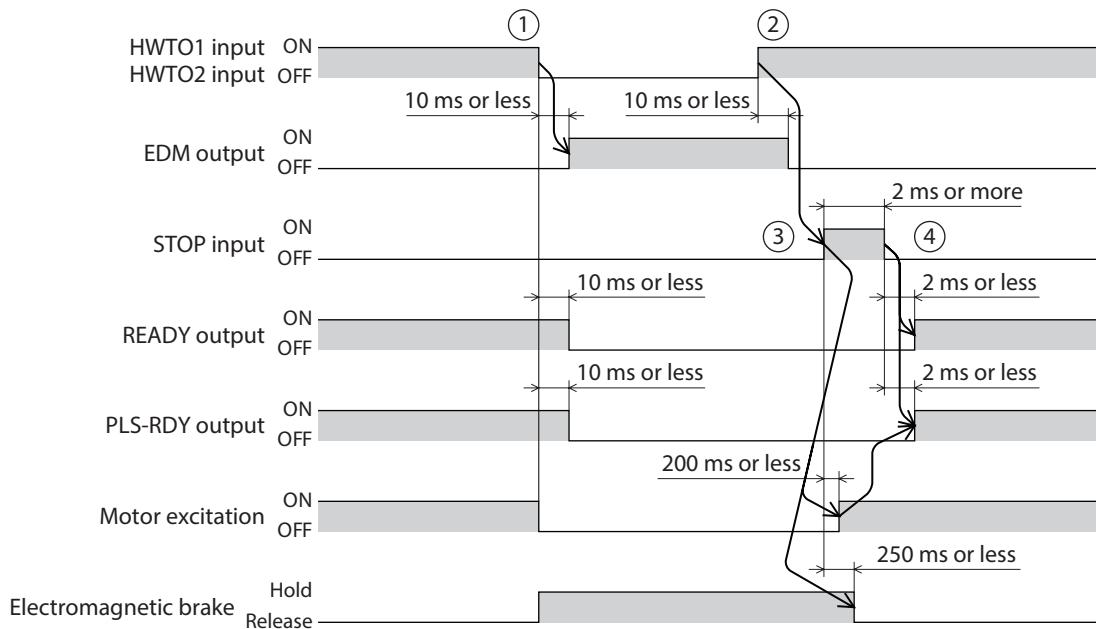


■ In case of the pulse-input operation



Be sure to check the motor is in a standstill state before executing the ETO function. If the ETO function is executed while the motor is operated, it may cause damage to the motor, driver, or equipment.

1. When both HWTO1 input and HWTO2 input are turned OFF, the EDM output is turned ON. The power supplying to the motor is cut off.
2. Turn the HWTO1 input and the HWTO2 input ON.
3. Turn the STOP input ON.
The power is supplied to the motor, and excitation of the motor is restarted.
4. Turn the STOP input OFF.
The PLS-RDY output is turned ON, and operation preparation is complete.
5. Check the PLS-RDY output has been turned ON before resuming the pulse input.



7-7 For safe use

- When the ETO function is used, be sure to conduct a risk assessment of equipment in advance to satisfy the safety requirements of the entire system.
- The ETO function is designed based on the assumption that the motor is in a standstill state. Do not execute the ETO function while the motor is rotating.
- If the ETO function is executed while the motor is operated, an excessive regenerative voltage may cause damage to the driver. To prevent damage from the regenerative voltage, connect an accessory regeneration unit.
- Even if the ETO function is activated, the following potential risks can be estimated. Be sure to check safety in risk assessment.
 - The motor output shaft may be rotated by an external force. If the motor output shaft is kept in place, install an external brake mechanism or equivalent. The brake mechanism of the electromagnetic brake motor is used for the purpose to hold the position. Do not use the brake mechanism of the electromagnetic brake motor for braking the motor rotation.
 - If the ETO function is activated, the driver stops supplying the power to the motor. However, the input power to the driver is not shut off, and the driver is not electrically isolated. Before performing maintenance or inspection, always turn off the driver power, and check the voltage with a circuit tester after the CHARGE LED is turned off.
- The EDM output is not an output signal to ensure the safety. Do not use the EDM output for any other purpose except for monitoring a failure.



3 I/O signals

4

Parameters

This part explains the parameters. The parameters are classified based on the window display of the **MEXE02**.

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1 Parameter: Base setting



If the resolution or display unit is set using the User unit setting support wizard, the value shown in the "Acceleration/deceleration unit" parameter is also changed automatically. The changed value is applied when it is written to the driver. Refer to "5 Setting of display unit and resolution" on p.29 for details. (⇒p.29)

| Parameter name | Description | Setting range | Initial value |
|---|--|--|---------------|
| Motor user name | An arbitrary name can be given to the motor used. | — | — |
| Driver user name | An arbitrary name can be given to the driver used. | — | — |
| Driver simulation mode | The status of the coordinate and I/O can be simulated by using a virtual motor without connecting the motor. | 0: The motor is actually connected 1: A virtual motor is used (When ABZO not connected = no ABZO sensor information) 2: A virtual motor is used (When ABZO not connected = a wrap function with up to 1800 revolutions is enabled) 3: A virtual motor is used (When ABZO not connected = a wrap function with up to 900 revolutions is enabled) * | 0 |
| Base current [%] | Sets the maximum output current of the motor as a percentage of the rated current, based on the rated current being 100%. | 0 to 1,000 (1=0.1%) | 1,000 |
| Base current setting source (only for pulse input type) | This is enabled with the pulse input type. Selects the setting method of the base current rate. | 0: The parameter setting is followed 1: The switch setting of the driver is followed | 1 |
| Stop current [%] | Sets the motor stop current as a percentage against the base current, based on the base current being 100%. | 0 to 1,000 (1=0.1%) | 500 |
| Command filter setting | Sets the filter 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 |
| Command filter time constant setting source (only for pulse input type) | This is enabled with the pulse input type. Selects the setting method of the command filter. | 0: The parameter setting is followed 1: The switch setting of the driver is followed | 1 |
| Smooth drive function | Enables the smooth drive function. | 0: The smooth drive function is disabled 1: The smooth drive function is enabled | 1 |
| Current control mode | Sets the current control mode. | 0: The setting of the CCM input is followed 1: a control mode (CST) 2: Servo emulation mode (SVE) | 0 |
| Servo emulation (SVE) ratio [%] | Sets the ratio of the current controlled in servo emulation, among operating current. When it is set to "0," the mode automatically changes to the a control mode. | 0 to 1,000 (1=0.1%) | 1,000 |

| Parameter name | Description | Setting range | Initial value |
|---|---|---|----------------|
| SVE position loop gain | Adjusts the motor response in reaction to the position deviation. When this value is increased, the deviation between the command position and actual position becomes smaller. | 1 to 50 | 10 |
| SVE speed loop gain | Adjusts the motor response in reaction to the speed deviation. When this value is increased, the deviation between the command speed and actual speed becomes smaller. | 10 to 200 | 180 |
| SVE speed loop gain integral time constant [ms] | Adjusts the deviation that cannot be adjusted with the speed loop gain. An excessively high value may slow the motor response. | 100 to 2,000 (1=0.1 ms) | 1000 |
| Automatic current cutback function | Enables the automatic current cutback function. | 0: The automatic current cutback function is disabled 1: The automatic current cutback function is enabled | 1 |
| Automatic current cutback switching time [ms] | Sets the time from the stop of motor to operation of the automatic current cutback function. | 0 to 1,000 ms | 100 |
| Operating current ramp up rate [ms/100%] | Sets the increasing rate when the operating current increases. | 0 to 100 ms/100% | 0 |
| Operating current ramp down rate [ms/100%] | Sets the decreasing rate when the operating current decreases. | 0 to 100 ms/100% | 0 |
| Resonance suppression control frequency [Hz] | Sets the frequency of the vibration to be controlled. | 100 to 2,000 Hz (With the MEXE02 , a value less than 100 Hz can be input. When a value less than 100 Hz is input, it is considered to be 100 Hz and set.) | 1,000 |
| Resonance suppression control gain | Sets the gain of resonance suppression control. When the value is increased, the response to the deviation is decreased. | -500 to 500 | 0 |
| Deviation acceleration suppressing gain | Restrains occurrence of sudden acceleration and overspeed. When the value is increased, the response is increased. | 0 to 500 | 45 |
| 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 [step] | 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 [step] | Sets the value of software limit in the reverse direction. | -2,147,483,648 to 2,147,483,647 steps | -2,147,483,648 |
| Preset position [step] | Sets the preset position. | -2,147,483,648 to 2,147,483,647 steps | 0 |
| Starting speed [Hz] | Sets the starting speed of stored data operation or continuous macro operation. | 0 to 4,000,000 Hz | 500 |
| Acceleration/stopping unit | Sets the acceleration/deceleration unit. | 0: kHz/s 1: s 2: ms/kHz | 0 |
| Permission of absolute positioning without setting absolute coordinates | Permits absolute positioning operation when the position coordinate is not set. | 0: Disable 1: Enable | 0 |

| Parameter name | Description | Setting range | Initial value |
|---|--|---|---------------|
| Direct data operation zero speed command action | Sets the command when 0 is written for "Operating speed" in direct data operation. | 0: Deceleration stop command 1: Speed zero command | 0 |
| Direct data operation trigger initial value | Sets the initial value of the trigger used in direct data operation. | -7: Operation data number update -6: Operation type update -5: Position update -4: Speed update -3: Acceleration/deceleration rate update -2: Stopping deceleration update -1: Operating current update 0: The trigger is used | 0 |
| Direct data operation data destination initial value | Sets the initial value of the destination used in direct data operation. | 0: Execution memory 1: Buffer memory | 0 |
| Direct data operation Initial operation data | Sets the operation data number to be used as the initial value of direct data. | 0 to 255: Operation data number | 0 |
| Simple direct data operation monitor select 0 (for NETC) | Sets the item that can be monitored in simple direct data operation. | 0: Command position 1: Feedback position 2: Command speed (r/min) 3: Feedback speed (r/min) 4: Command speed (Hz) 5: Feedback speed (Hz) 6: Command position 32 bit counter 7: Feedback position 32 bit counter | 0 |
| Simple direct data operation monitor select 1 (for NETC) | | 0 | 0 |
| Command data access area (for AR FLEX operation data address) | This parameter is a reserved function. Not possible to use. | 0: Operation data area 1: Direct data operation area | 0 |

* It is effective for drivers Ver.4.00 or later. Setting to the drivers older than Ver.4.00 will be the same action as "1: A virtual motor is used (No ABZO sensor information)".

2 Parameter: Motor and Mechanism (Coordinates/JOG/Home Operation)



- Parameters for the Motor and Mechanism (Coordinates/JOG/Home Operation) are linked to the unit information monitor of the **MEXE02**. If these parameters are changed, check the changed value is applied in the "Active" field of the unit information monitor.
(unit information monitor ⇒ p.440)
- If the resolution or display unit is set using the User unit setting support wizard, the values shown in the following parameters are also changed automatically. The changed value is applied when it is written to the driver. Refer to "5 Setting of display unit and resolution" on p.29 for details.
(⇒ p.29)
Electronic gear A, electronic gear B, mechanism lead pitch, setting of gear ratio, unit of display, mechanism selection

| Parameter name | Description | Setting range | Initial value |
|---|---|---|---------------|
| Mechanism settings | To change the mechanism settings parameter, select manual setting. | 0: ABZO setting is prioritized 1: Manual setting | 0 |
| Electronic gear A | Sets the denominator of electronic gear. | 1 to 65,535 | 1 |
| Electronic gear B | Set the numerator of electronic gear. | 1 to 65,535 | 1 |
| Motor rotation direction | Sets the rotation direction of the motor output shaft. | 0: Positive side=Counterclockwise 1: Positive side=Clockwise | 1 |
| Mechanism type | This parameter is a reserved function. Not possible to use. | 0: Step 1: Rev 2: mm 3: Deg | 0 |
| Mechanism lead pitch | Sets the lead of the ball screw. | 1 to 32,767 mm | 1 |
| Setting of gear ratio | Sets the gear ratio for geared motors. If "0: ABZO setting is prioritized" is selected, the unique gear ratio for the product is automatically set. | 0: ABZO setting is prioritized 1 to 32,767: Manual setting/gear ratio (1=0.01) | 0 |
| Initial coordinate generation/ wrap coordinate setting | To change the Initial coordinate generation & wrap coordinate parameter, select manual setting. | 0: ABZO setting is prioritized 1: Manual setting | 0 |
| Wrap setting | Sets the wrap function. | 0: Disable 1: Enable | 1 |
| 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 |
| Initial coordinate generation & wrap setting range | Sets the wrap range. | 5 to 655,360 (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 amount of offset of the wrap range. | -536,870,912 to 536,870,911 steps | 0 |
| Mechanism limit parameter setting | Disables the ABZO setting of the mechanism limit parameter. | 0: ABZO setting is followed 1: Disable | 0 |
| Mechanism protection parameter setting | Disables the ABZO setting of the mechanism protection parameter. | 0: ABZO setting is followed 1: Disable | 0 |
| JOG/HOME/ZHOME operation setting | To change the operation parameter, select manual setting. | 0: ABZO setting is prioritized 1: Manual setting | 0 |
| JOG/HOME/ZHOME command filter time constant | Sets the time constant for command filter. | 1 to 200 ms | 1 |

| Parameter name | Description | Setting range | Initial value |
|---|--|---|---------------|
| JOG/HOME/ZHOME operating current | Set the operating current. | 0 to 1,000 (1=0.1%) | 1,000 |
| (JOG) travel amount [step] | Sets the travel amount for inching operation. | 1 to 8,388,607 steps | 1 |
| (JOG) Operating speed [Hz] | Sets the operating speed for JOG operation and inching operation. | 1 to 4,000,000 Hz | 1,000 |
| (JOG) Acceleration/deceleration [kHz/s] | Sets the acceleration/deceleration rate or acceleration/deceleration time for JOG macro operation. | 1 to 1,000,000,000 (1=0.001 kHz/s, 1=0.001 s, or 1=0.001 ms/kHz) | 1,000,000 |
| (JOG) Starting speed [Hz] | Sets the starting speed for JOG macro operation. | 0 to 4,000,000 Hz | 500 |
| (JOG) Operating speed (high) [Hz] | Sets the operating speed for high-speed JOG operation. | 1 to 4,000,000 Hz | 5,000 |
| (ZHOME) Operation speed [Hz] | Sets the operating speed for high-speed return-to-home operation. | 1 to 4,000,000 Hz | 5,000 |
| (ZHOME) Acceleration/deceleration [kHz/s] | Sets the acceleration/deceleration rate or acceleration/deceleration time for high-speed return-to-home operation. | 1 to 1,000,000,000 (1=0.001 kHz/s, 1=0.001 s, or 1=0.001 ms/kHz) | 1,000,000 |
| (ZHOME) Starting speed [Hz] | Sets the starting speed for high-speed return-to-home operation. | 0 to 4,000,000 Hz | 500 |
| (HOME) Home-seeking mode | Sets the mode for return-to-home operation. | 0: 2-sensor 1: 3-sensor 2: One-way rotation 3: Push-motion | 1 |
| (HOME) Starting direction | Sets the starting direction for home detection. | 0: Negative side 1: Positive side | 1 |
| (HOME) Acceleration/deceleration | Sets the acceleration/deceleration rate or acceleration/deceleration time for return-to-home operation. | 1 to 1,000,000,000 (1=0.001 kHz/s, 1=0.001 s, or 1=0.001 ms/kHz) | 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 to 4,000,000 Hz | 1,000 |
| (HOME) Last speed | Sets the operating speed for final positioning with the home position. | 1 to 10,000 Hz | 500 |
| (HOME) SLIT detection | Sets whether or not to concurrently use the SLIT input for return-to-home operation. | 0: Disable 1: Enable | 0 |
| (HOME) TIM/ZSG signal detection | Sets whether or not to concurrently use the TIM signal or ZSG signal for return-to-home operation. | 0: Disable 1: TIM output 2: ZSG output | 0 |
| (HOME) Position offset | Sets the amount of offset from home position. | -2,147,483,647 to 2,147,483,647 steps | 0 |
| (HOME) Backward steps in 2 sensor home-seeking | Sets the backward steps after 2 sensor return-to-home operation. | 0 to 8,388,607 steps | 500 |
| (HOME) Operating amount in uni-directional home-seeking | Sets the operating amount after one-way rotation return-to-home operation. | 0 to 8,388,607 steps | 500 |
| (HOME) Operating current for push motion home-seeking | Sets the operating current rate for push-motion return-to-home operation based on the base current being 100%. | 0 to 1,000 (1=0.1%) | 1,000 |
| (HOME) Backward steps after first entry in push motion home-seeking | Sets the backward steps after the mechanical end is detected first in push-motion return-to-home operation. | 0 to 8,388,607 steps | 0 |

| Parameter name | Description | Setting range | Initial value |
|---|--|--|---------------|
| (HOME) Pushing time in push motion home-seeking | Sets the generation time of the TLC output to judge push-motion completion. | 1 to 65,535 ms | 200 |
| (HOME) Backward steps in push motion home-seeking | Sets the backward steps after the position of mechanical end is set in push-motion return-to-home operation. | 0 to 8,388,607 steps | 500 |
| Unit of display | This parameter is used for User unit setting support wizard of the MEXE02 . | 0: step 1: rev 2: mm 3: deg | 0 |
| Mechanism selection | This parameter is used for User unit setting support wizard of the MEXE02 . | 0: Motor only 1: Linear motion 2: Belt 3: Table | 0 |

3 Parameter: ETO and Alarm and Info

| Parameter name | Description | Setting range | Initial value |
|--|---|---|----------------|
| HWTO mode selection | Sets the status of the driver when both HWTO1 input and HWTO2 input are turned OFF. | 0: ETO-mode (power removal status) 1: Alarm generation | 0 |
| HWTO delay time of checking dual system [ms] | Sets the time from turn-off of one of HWTO inputs to turn-off of the other. This is a threshold value to identify power removal due to emergency stop or circuit error. | 0 to 10: Disable 11 to 100 ms | 0 |
| ETO reset ineffective period | Sets the time until the ETO-mode (power removal status) is reset. | 0 to 100 ms | 0 |
| ETO reset action (ETO-CLR) | Sets the criteria of the signal when the ETO-mode is reset by the ETO-CLR input. | 1: Reset at the ON edge 2: Reset at the ON level | 1 |
| ETO reset action (ALM-RST) | Enables reset of the ETO-mode by the ALM-RST input. | 0: ETO-CLR ineffective 1: Reset by the ON edge trigger | 0 |
| ETO reset action (C-ON) | Enables reset of the ETO-mode by the C-ON input. | 0: ETO-CLR ineffective 1: Reset by the ON edge trigger | 0 |
| ETO reset action (STOP) | Enables reset of the ETO-mode by the STOP input. | 0: ETO-CLR ineffective 1: Reset by the ON edge trigger | 1 |
| Overload alarm [s] | Sets the condition under which the overload alarm is generated. | 1 to 300 (1=0.1 s) | 50 |
| Excessive position deviation alarm [rev] | Sets the condition under which the excessive position deviation alarm is generated. | 1 to 30,000 (1=0.01 rev) | 300 |
| 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 indicator | Sets the status of the LED when information is generated. | 0: The LED does not blink 1: The LED blinks | 1 |
| INFO-USRIO output selection | Selects the I/O status to be checked in the INFO-USRIO output. | Output signal list → p.257 | 128: CONST-OFF |
| INFO-USRIO output inversion | Sets the output logic of the INFO-USRIO output. | 0: Non invert 1: Invert | 0 |
| Position deviation information (INFO-POSERR) [rev] | Sets the generation condition of the position deviation information (INFO-POSERR). | 1 to 30,000 (1=0.01 rev) | 300 |
| Driver temperature information (INFO-DRVTEMP) [°C] | Sets the generation condition of the driver temperature information (INFO-DRVTEMP). | 40 to 85 °C | 85 |
| Motor temperature information (INFO-MTRTEMP) [°C] | Sets the generation condition of the motor temperature information (INFO-MTRTEMP). | 40 to 120 °C | 85 |
| Overvoltage information (INFO-OVOLT) (AC power input type driver) [V] | Sets the generation condition of the overvoltage information (INFO-OVOLT). [AC power input driver only] | 120 to 450 V | 435 |
| Undervoltage information (INFO-UVOLT) (AC power input type driver) [V] | Sets the generation condition of the undervoltage information (INFO-UVOLT). [AC power input driver only] | 120 to 280 V | 120 |
| Overvoltage information (INFO-OVOLT) (DC power input type driver) [V] | Sets the generation condition of the overvoltage information (INFO-OVOLT). [DC power input driver only] | 150 to 630 (1=0.1 V) | 630 |

| Parameter name | Description | Setting range | Initial value |
|--|--|---|---------------|
| Undervoltage information (INFO-UVOLT) (DC power input type driver) [V] | Sets the generation condition of the undervoltage information (INFO-UVOLT). [DC power input driver only] | 150 to 630 (1=0.1 V) | 180 |
| Overload time information (INFO-OLTIME) [s] | Sets the generation condition of the overload time information (INFO-OLTIME). | 1 to 300 (1=0.1 s) | 50 |
| Overspeed information (INFO-SPD) [r/min] | Sets the generation condition of the overspeed information (INFO-SPD). | 0: Disable 1 to 12,000 r/min | 0 |
| Cumulative load 0 information (INFO-CULD0) | Sets the generation condition of the cumulative load 0 information (INFO-CULD0). | 0 to 2,147,483,647 | 0 |
| Cumulative load 1 information (INFO-CULD1) | Sets the generation condition of the cumulative load 1 information (INFO-CULD1). | 0 to 2,147,483,647 | 0 |
| Cumulative load value auto clear | Clears the cumulative load when operation is started (ON edge of the MOVE output). | 0: Does not clear 1: Clear | 1 |
| Cumulative load value count divisor | Sets the divisor of the cumulative load. | 1 to 32,767 | 1 |
| Tripmeter information (INFO-TRIP) [kRev] | Sets the generation condition of the tripmeter information (INFO-TRIP). | 0: Disable 1 to 2,147,483,647 (1=0.1 kRev) | 0 |
| Odometer information (INFO-ODO) [kRev] | Sets the generation condition of the odometer information (INFO-ODO). | 0: Disable 1 to 2,147,483,647 (1=0.1 kRev) | 0 |
| INFO action (Assigned I/O status information (INFO-USRIO)) | Sets the bit output, INFO output, and the status of the LED 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-DRV TMP)) | | | 1 |
| INFO action (Motor temperature information (INFO-MTP TMP)) | | | 1 |
| INFO action (Overvoltage information (INFO-OVOLT)) | | | 1 |
| INFO action (Undervoltage information (INFO-UVOLT)) | | | 1 |
| INFO action (Overload time information (INFO-OLTIME)) | | | 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 |
| INFO action (RS-485 communication error information (INFO-NET-E)) | | | 1 |

| Parameter name | Description | Setting range | Initial value |
|--|--|---|---------------|
| INFO action (Forward operation prohibition information (INFO-FW-OT)) | Sets the bit output, INFO output, and the status of the LED 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 (Tripmeter information (INFO-TRIP)) | | | 1 |
| INFO action (Odometer information (INFO-ODO)) | | | 1 |
| INFO action (Start operation restriction 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 |

* Even if the "INFO action" parameter is set to "0," this remains in the information record of the **MEXE02**.

4 Parameter: I/O action and function

| Parameter name | Description | Setting range | Initial value |
|---|--|---|---------------|
| STOP/STOP-COFF input action | Sets how to stop the motor when the STOP input or STOP-COFF input has been turned ON. | 0: Immediate stop for both STOP input and STOP-COFF input 1: Deceleration stop for the STOP input and immediate stop for the STOP-COFF input 2: Immediate stop for the STOP input and deceleration stop for the STOP-COFF input 3: Deceleration stop for both STOP input and STOP-COFF input | 3 |
| FW-LS, RV-LS input action | Sets how to stop the motor when the FW-LS input or RV-LS input has been turned ON. | -1: Used as a return-to-home sensor 0: Immediate stop 1: Deceleration stop 2: Immediate stop with alarm 3: Deceleration stop with alarm | 2 |
| FW-BLK, RV-BLK input action | Sets how to stop the motor when the FW-BLK input or RV-BLK input has been turned ON. | 0: Immediate stop 1: Deceleration stop | 1 |
| IN-POS positioning completion signal range [deg] | Sets the output range of the IN-POS output (the motor operation converges within this angular range) as the center on the target position. | 0 to 180 (1=0.1°) | 18 |
| IN-POS positioning completion signal offset [deg] | Sets the amount of offset from the target position. | -18 to 18 (1=0.1°) | 0 |
| D-SEL drive start function | Sets whether to start operation when the D-SEL input has been turned ON. | 0: Only operation data number selection 1: Operation data number selection + START function | 1 |
| TEACH operation type setting | Selects the operation type when the "Position" is set by teaching function. | -1: The operation type is not set 1: Absolute positioning 8: Wrap absolute positioning | 1 |
| ZSG signal width [deg] | Sets the output range for the ZSG output. | 1 to 1,800 (1=0.1°) | 18 |
| RND-ZERO signal width [step] | Sets the output range for the RND-ZERO output. | 1 to 10,000 steps | 10 |
| RND-ZERO signal source | Sets the base for the RND-ZERO output. | 0: Based on feedback position 1: Based on command position | 0 |
| MOVE minimum ON time [ms] | Sets the minimum ON time for the MOVE output. | 0 to 255 ms | 0 |
| PAUSE standby condition selection | Selects the waiting status when the PAUSE input is turned ON. | 0: Standstill mode (current cutback) 1: Operating status waiting (operating current is retained) | 0 |
| Current setting during motor standstill at T-MODE | Selects the command current for when the motor is stopped in a state where the T-MODE input is being ON. | 0: Stop current 1: Operating current | 0 |
| PLS-XMODE pulse multiplying factor [xN] | This is enabled with the pulse-input operation. Sets the pulse multiplying factor when the PLS-XMODE input is turned ON. | 2 to 30 times | 10 |
| CRNT-LMT operating current limit value [%] | Sets the operating current limited in the CRNT-LMT input. Set the ratio of the operating current based on the base current being 100%. | 0 to 1,000 (1=0.1%) | 500 |

| Parameter name | Description | Setting range | Initial value |
|------------------------------------|---|--|---------------|
| SPD-LMT speed limit type selection | Selects the setting method of the speed limitation value. | 0: Ratio 1: Value | 0 |
| SPD-LMT speed limit ratio [%] | Sets the speed limit value as a "Ratio." This parameter is enabled when the "SPD-LMT speed limit type selection" parameter is set to "Ratio." | 1 to 100% | 50 |
| SPD-LMT speed limit value [Hz] | Sets the speed limit value as a "Value." This parameter is enabled when the "SPD-LMT speed limit type selection" parameter is set to "Value." | 1 to 4,000,000 Hz | 1,000 |
| JOG-C time from JOG-P to JOG [s] | 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 [s] | Sets the timing to transit from JOG operation to high-speed JOG operation in combined JOG operation. | 1 to 5,000 (1=0.001 s) | 1,000 |
| PLS-LOST check algorithm | This is enabled with the pulse-input operation. Selects whether the count is increased or decreased according to the rotation direction when the number of disabled pulses is counted. When the parameter is set to "Signed," pulses in the forward direction are counted as positive values, and pulses in the reverse direction as negative values. | 0: Unsigned 1: Signed | 0 |
| MON-REQ0 output data selection | Selects information to be output by the I/O position output function when the MON-REQ0 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 bit) 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 | Selects information to be output by the I/O position output function when the MON-REQ1 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 bit) 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 | 8 |
| 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 [kHz] | Sets the frequency of the pulse output to be used by the pulse request function. | 1 to 10,000 (1=0.1 kHz) | 100 |
| VA mode selection | Selects the criteria of the VA output. In the case of pulse-input operation, only "0: Feedback speed attainment (speed at feedback position)" is enabled. | 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 [r/min] | Sets the allowable range of the detection speed judgment when the "VA mode selection" parameter is set to "Feedback speed attainment (speed at feedback position)" or "Speed at feedback position & command position (only internal profile)." | 1 to 200 r/min | 30 |

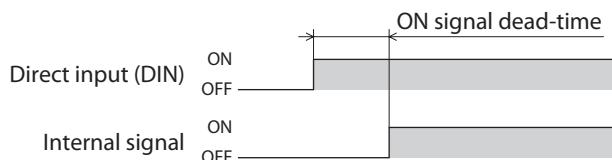
| Parameter name | Description | Setting range | Initial value |
|--|---|--|---------------|
| MAREA output source | Sets the standard to turn the MAREA output ON and the status of the MAREA output after operation. | 0: Feedback position (ON after operation) 1: Command position (ON after operation) 2: Feedback position (MAREA output OFF at completion) 3: Command position (MAREA output OFF at completion) | 0 |
| D-SEL0 operation number selection | Sets the operation data number that is started when the D-SEL0 input is turned ON. | 0 to 255: Operation data number | 0 |
| D-SEL1 operation number selection | Sets the operation data number that is started when the D-SEL1 input is turned ON. | | 1 |
| D-SEL2 operation number selection | Sets the operation data number that is started when the D-SEL2 input is turned ON. | | 2 |
| D-SEL3 operation number selection | Sets the operation data number that is started when the D-SEL3 input is turned ON. | | 3 |
| D-SEL4 operation number selection | Sets the operation data number that is started when the D-SEL4 input is turned ON. | | 4 |
| D-SEL5 operation number selection | Sets the operation data number that is started when the D-SEL5 input is turned ON. | | 5 |
| D-SEL6 operation number selection | Sets the operation data number that is started when the D-SEL6 input is turned ON. | | 6 |
| D-SEL7 operation number selection | Sets the operation data number that is started when the D-SEL7 input is turned ON. | | 7 |
| D-END0 operation number selection | Sets the operation data number corresponding to the D-END0 output. | 0 to 255: Operation data number | 0 |
| D-END1 operation number selection | Sets the operation data number corresponding to the D-END1 output. | | 1 |
| D-END2 operation number selection | Sets the operation data number corresponding to the D-END2 output. | | 2 |
| D-END3 operation number selection | Sets the operation data number corresponding to the D-END3 output. | | 3 |
| D-END4 operation number selection | Sets the operation data number corresponding to the D-END4 output. | | 4 |
| D-END5 operation number selection | Sets the operation data number corresponding to the D-END5 output. | | 5 |
| D-END6 operation number selection | Sets the operation data number corresponding to the D-END6 output. | | 6 |
| D-END7 operation number selection | Sets the operation data number corresponding to the D-END7 output. | | 7 |
| AREA0 positive direction position/offset [step] | Sets the positive direction position or offset from the target position for the AREA0 output. | -2,147,483,648 to 2,147,483,647 steps | 0 |
| AREA0 negative direction position/detection range [step] | Sets the negative direction position or distance from the offset position for the AREA0 output. | -2,147,483,648 to 2,147,483,647 steps | 0 |
| AREA0 range setting mode | Sets the range setting mode of AREA0 output. | 0: Range setting with absolute value 1: Offset/width setting from the target position | 0 |

| Parameter name | Description | Setting range | Initial value |
|--|---|--|---------------|
| AREA0 positioning standard | Sets the positioning standard of AREA0 output. | 0: Based on feedback position 1: Based on command position | 0 |
| AREA1 positive direction position/offset [step] | Sets the positive direction position or offset from the target position for the AREA1 output. | -2,147,483,648 to 2,147,483,647 steps | 0 |
| AREA1 negative direction position/detection range [step] | Sets the negative direction position or distance from the offset position for the AREA1 output. | -2,147,483,648 to 2,147,483,647 steps | 0 |
| AREA1 range setting mode | Sets the range setting mode of AREA1 output. | 0: Range setting with absolute value 1: Offset/width setting from the target position | 0 |
| AREA1 positioning standard | Sets the positioning standard of AREA1 output. | 0: Based on feedback position 1: Based on command position | 0 |
| AREA2 positive direction position/offset [step] | Sets the positive direction position or offset from the target position for the AREA2 output. | -2,147,483,648 to 2,147,483,647 steps | 0 |
| AREA2 negative direction position/detection range [step] | Sets the negative direction position or distance from the offset position for the AREA2 output. | -2,147,483,648 to 2,147,483,647 steps | 0 |
| AREA2 range setting mode | Sets the range setting mode of AREA2 output. | 0: Range setting with absolute value 1: Offset/width setting from the target position | 0 |
| AREA2 positioning standard | Sets the positioning standard of AREA2 output. | 0: Based on feedback position 1: Based on command position | 0 |
| AREA3 positive direction position/offset [step] | Sets the positive direction position or offset from the target position for the AREA3 output. | -2,147,483,648 to 2,147,483,647 steps | 0 |
| AREA3 negative direction position/detection range [step] | Sets the negative direction position or distance from the offset position for the AREA3 output. | -2,147,483,648 to 2,147,483,647 steps | 0 |
| AREA3 range setting mode | Sets the range setting mode of AREA3 output. | 0: Range setting with absolute value 1: Offset/width setting from the target position | 0 |
| AREA3 positioning standard | Sets the positioning standard of AREA3 output. | 0: Based on feedback position 1: Based on command position | 0 |
| AREA4 positive direction position/offset [step] | Sets the positive direction position or offset from the target position for the AREA4 output. | -2,147,483,648 to 2,147,483,647 steps | 0 |
| AREA4 negative direction position/detection range [step] | Sets the negative direction position or distance from the offset position for the AREA4 output. | -2,147,483,648 to 2,147,483,647 steps | 0 |
| AREA4 range setting mode | Sets the range setting mode of AREA4 output. | 0: Range setting with absolute value 1: Offset/width setting from the target position | 0 |
| AREA4 positioning standard | Sets the positioning standard of AREA4 output. | 0: Based on feedback position 1: Based on command position | 0 |
| AREA5 positive direction position/offset [step] | Sets the positive direction position or offset from the target position for the AREA5 output. | -2,147,483,648 to 2,147,483,647 steps | 0 |
| AREA5 negative direction position/detection range [step] | Sets the negative direction position or distance from the offset position for the AREA5 output. | -2,147,483,648 to 2,147,483,647 steps | 0 |
| AREA5 range setting mode | Sets the range setting mode of AREA5 output. | 0: Range setting with absolute value 1: Offset/width setting from the target position | 0 |

| Parameter name | Description | Setting range | Initial value |
|--|---|--|---------------|
| AREA5 positioning standard | Sets the positioning standard of AREA5 output. | 0: Based on feedback position 1: Based on command position | 0 |
| AREA6 positive direction position/offset [step] | Sets the positive direction position or offset from the target position for the AREA6 output. | -2,147,483,648 to 2,147,483,647 steps | 0 |
| AREA6 negative direction position/detection range [step] | Sets the negative direction position or distance from the offset position for the AREA6 output. | -2,147,483,648 to 2,147,483,647 steps | 0 |
| AREA6 range setting mode | Sets the range setting mode of AREA6 output. | 0: Range setting with absolute value 1: Offset/width setting from the target position | 0 |
| AREA6 positioning standard | Sets the positioning standard of AREA6 output. | 0: Based on feedback position 1: Based on command position | 0 |
| AREA7 positive direction position/offset [step] | Sets the positive direction position or offset from the target position for the AREA7 output. | -2,147,483,648 to 2,147,483,647 steps | 0 |
| AREA7 negative direction position/detection range [step] | Sets the negative direction position or distance from the offset position for the AREA7 output. | -2,147,483,648 to 2,147,483,647 steps | 0 |
| AREA7 range setting mode | Sets the range setting mode of AREA7 output. | 0: Range setting with absolute value 1: Offset/width setting from the target position | 0 |
| AREA7 positioning standard | Sets the positioning standard of AREA7 output. | 0: Based on feedback position 1: Based on command position | 0 |

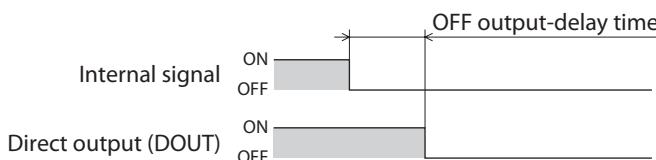
5 Parameter: Direct-IN function

| Parameter name | Description | Setting range | Initial value |
|-------------------------------|--|---|---------------|
| DIN0 input function selection | Selects the input signal to be assigned to DIN0. | Input signal list → p.256 | 32: START |
| DIN1 input function selection | Selects the input signal to be assigned to DIN1. | | 64: M0 |
| DIN2 input function selection | Selects the input signal to be assigned to DIN2. | | 65: M1 |
| DIN3 input function selection | Selects the input signal to be assigned to DIN3. | | 66: M2 |
| DIN4 input function selection | Selects the input signal to be assigned to DIN4. | | 37: ZHOME |
| DIN5 input function selection | Selects the input signal to be assigned to DIN5. | | 1: FREE |
| DIN6 input function selection | Selects the input signal to be assigned to DIN6. | | 5: STOP |
| DIN7 input function selection | Selects the input signal to be assigned to DIN7. | | 8: ALM-RST |
| DIN8 input function selection | Selects the input signal to be assigned to DIN8. | | 48: FW-JOG |
| DIN9 input function selection | Selects the input signal to be assigned to DIN9. | | 49: RV-JOG |
| Inverting mode | Changes ON/OFF setting of DIN0 to DIN9. | 0: Non invert 1: Invert | 0 |
| ON signal dead-time [ms] | Sets the ON signal dead-time of DIN0 to DIN9. (Refer to the figure below) | 0 to 250 ms | 0 |
| 1-shot signal | Sets the 1-shot signal function of DIN0 to DIN9. | 0: The 1 shot signal function is disabled 1: The 1 shot signal function is enabled | 0 |
| Composite Function | Selects the input signal to be assigned to DIN0 to DIN9 as a composite function. | Input signal list → p.256 | 0: Not used |



6 Parameter: Direct-OUT function

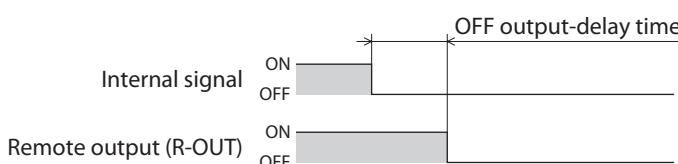
| Parameter name | Description | Setting range | Initial value |
|---------------------------------|---|----------------------------|----------------|
| DOUT0 output function selection | Selects the output signal to be assigned to DOUT0. | Output signal list → p.257 | 144: HOME-END |
| DOUT1 output function selection | Selects the output signal to be assigned to DOUT1. | | 138: IN-POS |
| DOUT2 output function selection | Selects the output signal to be assigned to DOUT2. | | 133: PLS-RDY |
| DOUT3 output function selection | Selects the output signal to be assigned to DOUT3. | | 132: READY |
| DOUT4 output function selection | Selects the output signal to be assigned to DOUT4. | | 134: MOVE |
| DOUT5 output function selection | Selects the output signal to be assigned to DOUT5. | | 130: ALM-B |
| Inverting mode | Changes ON/OFF setting of DOUT0 to DOUT5. | 0: Non invert 1: Invert | 0 |
| OFF output-delay time [ms] | Sets the OFF output-delay time of DOUT0 to DOUT5. (Refer to the figure below) | 0 to 250 ms | 0 |
| Composite logical combination | Sets the composite logical combination of DOUT0 to DOUT5. | 0: AND 1: OR | 1 |
| Composite output function | Selects the output signal for logical operation with the signals of DOUT0 to DOUT5. | Output signal list → p.257 | 128: CONST-OFF |
| Composite inverting mode | Changes ON/OFF setting of the composite output function of DOUT0 to DOUT5. | 0: Non invert 1: Invert | 0 |



7 Parameter: Remote-I/O function (R-I/O)

| Parameter name | Description | Setting range | Initial value |
|---|---|---|---------------|
| R-IN0 input function selection | Selects the input signal to be assigned to R-IN0. | Input signal list ⇒ p.256 | 64: M0 |
| R-IN1 input function selection | Selects the input signal to be assigned to R-IN1. | | 65: M1 |
| R-IN2 input function selection | Selects the input signal to be assigned to R-IN2. | | 66: M2 |
| R-IN3 input function selection | Selects the input signal to be assigned to R-IN3. | | 32: START |
| R-IN4 input function selection | Selects the input signal to be assigned to R-IN4. | | 37: ZHOME |
| R-IN5 input function selection | Selects the input signal to be assigned to R-IN5. | | 5: STOP |
| R-IN6 input function selection | Selects the input signal to be assigned to R-IN6. | | 1: FREE |
| R-IN7 input function selection | Selects the input signal to be assigned to R-IN7. | | 8: ALM-RST |
| R-IN8 input function selection | Selects the input signal to be assigned to R-IN8. | | 40: D-SEL0 |
| R-IN9 input function selection | Selects the input signal to be assigned to R-IN9. | | 41: D-SEL1 |
| R-IN10 input function selection | Selects the input signal to be assigned to R-IN10. | | 42: D-SEL2 |
| R-IN11 input function selection | Selects the input signal to be assigned to R-IN11. | | 33: SSTART |
| R-IN12 input function selection | Selects the input signal to be assigned to R-IN12. | | 52: FW-JOG-P |
| R-IN13 input function selection | Selects the input signal to be assigned to R-IN13. | | 53: RV-JOG-P |
| R-IN14 input function selection | Selects the input signal to be assigned to R-IN14. | | 56: FW-POS |
| R-IN15 input function selection | Selects the input signal to be assigned to R-IN15. | | 57: RV-POS |
| R-IN group action mode initial state (NETC) | This is enabled when setting a group. Sets the input method of remote I/O. When setting via communication, specify the remote I/O to be input to the group by bit. (Bit arrangement ⇒ Refer to the next page) | <ul style="list-style-type: none"> • When setting in MEXE02 <ul style="list-style-type: none"> 0: Operation with the slave ID 1: Operation with the group ID • When setting via communication <ul style="list-style-type: none"> 0: Input for each driver 1: Input to the group 0 to 65,535 (0 to FFFFh) | 0 |

| Parameter name | Description | Setting range | Initial value |
|-----------------------------------|--|-------------------------------|---------------|
| R-OUT0 output function selection | Selects the output signal to be assigned to R-OUT0. | Output signal list ⇒ p.257 | 64: M0_R |
| R-OUT1 output function selection | Selects the output signal to be assigned to R-OUT1. | | 65: M1_R |
| R-OUT2 output function selection | Selects the output signal to be assigned to R-OUT2. | | 66: M2_R |
| R-OUT3 output function selection | Selects the output signal to be assigned to R-OUT3. | | 32: START_R |
| R-OUT4 output function selection | Selects the output signal to be assigned to R-OUT4. | | 144: HOME-END |
| R-OUT5 output function selection | Selects the output signal to be assigned to R-OUT5. | | 132: READY |
| R-OUT6 output function selection | Selects the output signal to be assigned to R-OUT6. | | 135: INFO |
| R-OUT7 output function selection | Selects the output signal to be assigned to R-OUT7. | | 129: ALM-A |
| R-OUT8 output function selection | Selects the output signal to be assigned to R-OUT8. | | 136: SYS-BSY |
| R-OUT9 output function selection | Selects the output signal to be assigned to R-OUT9. | | 160: AREA0 |
| R-OUT10 output function selection | Selects the output signal to be assigned to R-OUT10. | | 161: AREA1 |
| R-OUT11 output function selection | Selects the output signal to be assigned to R-OUT11. | | 162: AREA2 |
| R-OUT12 output function selection | Selects the output signal to be assigned to R-OUT12. | | 157: TIM |
| R-OUT13 output function selection | Selects the output signal to be assigned to R-OUT13. | | 134: MOVE |
| R-OUT14 output function selection | Selects the output signal to be assigned to R-OUT14. | | 138: IN-POS |
| R-OUT15 output function selection | Selects the output signal to be assigned to R-OUT15. | | 140: TLC |
| OFF output-delay time [ms] | Sets the OFF output-delay time of R-OUT0 to R-OUT15. (Refer to the figure below) | 0 to 250 ms | 0 |



● Bit arrangement of R-IN Group action mode (NETC)

| bit15 | bit14 | bit13 | bit12 | bit11 | bit10 | bit9 | bit8 |
|--------|--------|--------|--------|--------|--------|-------|-------|
| R-IN15 | R-IN14 | R-IN13 | R-IN12 | R-IN11 | R-IN10 | R-IN9 | R-IN8 |
| bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
| R-IN7 | R-IN6 | R-IN5 | R-IN4 | R-IN3 | R-IN2 | R-IN1 | R-IN0 |

8 Parameter: EXT-IN and VIR-IN and USR-OUT function (Extend)

| Parameter name | Description | Setting range | Initial value |
|--|--|---|----------------|
| Extended input (EXT-IN) function selection | Selects the input signal to be assigned to the HOME PRESET switch. | Input signal list ⇒ p.256 | 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 [s] | Normally, the HOME PRESET switch is interlocked. By holding down the switch for a certain time, interlock is released and the assigned function is enabled. With this parameter, the time to hold down the switch to release interlock is set. | 0: Interlock disabled 1 to 50 (1=0.1 s) | 10 |
| Extended input (EXT-IN) interlock releasing duration [s] | Sets the time to retain the status in which the interlock is released. | 0 to 50 (1=0.1 s) | 30 |
| Extended input (EXT-IN) ON monitor time [s] | The LED is lit when the signal assigned to the switch is input. With this parameter, the time to light the LED is set. | 0 to 50 (1=0.1 s) | 10 |
| Differential output mode selection | Selects the type of the signal output from the differential output. | -1: No output 0: A-phase/B-phase output 8: I/O status output | 0 |
| Differential output (EXT-OUTA) function selection on I/O mode | This is enabled when the "Differential output mode selection" parameter is set to "I/O status output." Selects the output signal to be assigned to the differential output. | Output signal list ⇒ p.257 | 128: CONST-OFF |
| Differential output (EXT-OUTA) inverting mode on I/O mode | This is enabled when the "Differential output mode selection" parameter is set to "I/O status output." Changes ON/OFF setting of the differential output. | 0: Non invert 1: Invert | 0 |
| Differential output (EXT-OUTA) OFF delay time [ms] on I/O mode | This is enabled when the "Differential output mode selection" parameter is set to "I/O status output." Sets the OFF delay time of the output signal. | 0 to 250 ms | 0 |
| Differential output (EXT-OUTB) function selection on I/O mode | This is enabled when the "Differential output mode selection" parameter is set to "I/O status output." Selects the output signal to be assigned to the differential output. | Output signal list ⇒ p.257 | 128: CONST-OFF |
| Differential output (EXT-OUTB) inverting mode on I/O mode | This is enabled when the "Differential output mode selection" parameter is set to "I/O status output." Changes ON/OFF setting of the differential output. | 0: Non invert 1: Invert | 0 |
| Differential output (EXT-OUTB) OFF delay time [ms] on I/O mode | This is enabled when the "Differential output mode selection" parameter is set to "I/O status output." Sets the OFF delay time of the output signal. | 0 to 250 ms | 0 |
| Virtual input (VIR-IN0) function selection | Selects the input signal to be assigned to VIR-IN0. | Input signal list ⇒ p.256 | 0: Not used |
| Virtual input (VIR-IN0) source selection | Selects the output signal to be the trigger of VIR-IN0. | Output signal list ⇒ p.257 | 128: CONST-OFF |
| Virtual input (VIR-IN0) inverting mode | Changes ON/OFF setting of VIR-IN0. | 0: Non invert 1: Invert | 0 |
| Virtual input (VIR-IN0) ON signal dead time | Sets the ON signal dead-time of VIR-IN0. | 0 to 250 ms | 0 |
| Virtual input (VIR-IN0) 1 shot signal mode | Enables the 1 shot signal function of VIR-IN0. | 0: The 1 shot signal function is disabled 1: The 1 shot signal function is enabled | 0 |

| Parameter name | Description | Setting range | Initial value |
|---|--|---|-------------------|
| Virtual input (VIR-IN1) function selection | Selects the input signal to be assigned to VIR-IN1. | Input signal list ⇒ p.256 | 0: Not used |
| Virtual input (VIR-IN1) source selection | Selects the output signal to be the trigger of VIR-IN1. | Output signal list ⇒ p.257 | 128: CONST-OFF |
| Virtual input (VIR-IN1) inverting mode | Changes ON/OFF setting of VIR-IN1. | 0: Non invert 1: Invert | 0 |
| Virtual input (VIR-IN1) ON signal dead time | Sets the ON signal dead time of VIR-IN1. | 0 to 250 ms | 0 |
| Virtual input (VIR-IN1) 1 shot signal mode | Enables the 1 shot signal function of VIR-IN1. | 0: The 1 shot signal function is disabled 1: The 1 shot signal function is enabled | 0 |
| Virtual input (VIR-IN2) function selection | Selects the input signal to be assigned to VIR-IN2. | Input signal list ⇒ p.256 | 0: Not used |
| Virtual input (VIR-IN2) source selection | Selects the output signal to be the trigger of VIR-IN2. | Output signal list ⇒ p.257 | 128: CONST-OFF |
| Virtual input (VIR-IN2) inverting mode | Changes ON/OFF setting of VIR-IN2. | 0: Non invert 1: Invert | 0 |
| Virtual input (VIR-IN2) ON signal dead time | Sets the ON signal dead time of VIR-IN2. | 0 to 250 ms | 0 |
| Virtual input (VIR-IN2) 1 shot signal mode | Enables the 1 shot signal function of VIR-IN2. | 0: The 1 shot signal function is disabled 1: The 1 shot signal function is enabled | 0 |
| Virtual input (VIR-IN3) function selection | Select the input signal to be assigned to VIR-IN3. | Input signal list ⇒ p.256 | 0: Not used |
| Virtual input (VIR-IN3) source selection | Selects the output signal to be the trigger of VIR-IN3. | Output signal list ⇒ p.257 | 128: CONST-OFF |
| Virtual input (VIR-IN3) inverting mode | Changes ON/OFF setting of VIR-IN3. | 0: Non invert 1: Invert | 0 |
| Virtual input (VIR-IN3) ON signal dead time | Sets the ON signal dead time of VIR-IN3. | 0 to 250 ms | 0 |
| Virtual input (VIR-IN3) 1 shot signal mode | Enables the 1 shot signal function of VIR-IN3. | 0: The 1 shot signal function is disabled 1: The 1 shot signal function is enabled | 0 |
| User output (USER-OUT0) source A function selection | Sets the Output source A of USR-OUT0. | Output signal list ⇒ p.257 | 128: CONST-OFF |
| User output (USER-OUT0) source A inverting mode | Changes ON/OFF of the Output source A of USR-OUT0. | 0: Non invert 1: Invert | 0 |
| User output (USER-OUT0) source B function selection | Sets the Output source B of USR-OUT0. | Output signal list ⇒ p.257 | 128: CONST-OFF |
| User output (USER-OUT0) source B inverting mode | Changes ON/OFF of the Output source B of USR-OUT0. | 0: Non invert 1: Invert | 0 |
| User output (USER-OUT0) logical operation | Sets the logical combination of the User output sources A and B of USR-OUT0. | 0: AND 1: OR | 1 |
| User output (USER-OUT1) source A function selection | Sets the Output source A of USR-OUT1. | Output signal list ⇒ p.257 | 128: CONST-OFF |
| User output (USER-OUT1) source A inverting mode | Changes ON/OFF of the Output source A of USR-OUT1. | 0: Non invert 1: Invert | 0 |
| User output (USER-OUT1) source B function selection | Sets the Output source B of USR-OUT1. | Output signal list ⇒ p.257 | 128: CONST-OFF |
| User output (USER-OUT1) source B inverting mode | Changes ON/OFF of the Output source B of USR-OUT1. | 0: Non invert 1: Invert | 0 |
| User output (USER-OUT1) logical operation | Sets the logical combination of the User output sources A and B of USR-OUT1. | 0: AND 1: OR | 1 |

9 Parameter: Communication & I/F

| Parameter name | Description | Setting range | Initial value |
|--|--|---|----------------|
| PULSE-I/F mode selection | This is enabled with the pulse-input type with RS-485 communication interface and pulse-input type. Sets the pulse input mode. | -1: Disable 0: The switch setting of the driver is followed.* 1: 2-pulse input mode 2: 1-pulse input mode 3: Phase difference input mode (x1) 4: Phase difference input mode (x2) 5: Phase difference input mode (x4) * If "0: The switch setting is followed" is selected using the pulse-input type with RS-485 communication interface, the 2-pulse input mode will be set. | 0 |
| RS485-I/F mode selection | Sets the protocol of RS-485 communication. | -1: Disable 0: The switch setting of the driver is followed. 1: Network converter (NETC) 2: Modbus RTU | 0 |
| USB-ID enable | The COM port can be fixed. (⇒ p.254) | 0: Disable 1: Enable | 1 |
| USB-ID | This is settable when the "USB-ID enable" parameter is set to "Enable." Sets the ID to the COM port. (⇒ p.254) | 0 to 999,999,999 | 0 |
| USB-PID | Sets an ID number of a driver that will be shown along with a COM port number. (⇒ p.255) | 0 to 31 | 0 |
| LED-OUT mode | Sets the information to be indicated by the C-DAT/C-ERR LED or READY LED. | -1: The LED is not lit 0: The status of the output signal is indicated 1: Functions as C-DAT/C-ERR LED with the built-in controller type and pulse-input type with RS-485 communication interface, and indicates the status of the output signal with the pulse-input type | 1 |
| LED-OUT-GREEN function (I/O status output) | Selects the output signal to be displayed by the green LED. | Output signal list ⇒ p.257 | 132: READY |
| LED-OUT-GREEN inverting mode (I/O status output) | Changes ON/OFF setting of the output signal to be displayed by the green LED. | 0: Non invert 1: Invert | 0 |
| LED-OUT-RED function (I/O status output) | Selects the output signal to be indicated by the red LED. | Output signal list ⇒ p.257 | 128: CONST-OFF |
| LED-OUT-RED inverting mode (I/O status output) | Changes ON/OFF setting of the output signal to be indicated by the red LED. | 0: Non invert 1: Invert | 0 |
| RS-485 monitor object for MEXE02 | Selects the monitoring target in communication. | 0: All 1: Only to own station | 0 |
| Slave address (Modbus) | This is enabled in Modbus communication. Sets the address number (slave address). | -1: The switch setting of the driver is followed 1 to 31: Slave address 1 to 31 * Do not use 0 | -1 |

| Parameter name | Description | Setting range | Initial value |
|---|---|---|---------------|
| Baudrate (Modbus) | This is enabled in Modbus communication. Sets the transmission rate. | -1: The switch setting of the driver is followed 0: 9,600 bps 1: 19,200 bps 2: 38,400 bps 3: 57,600 bps 4: 115,200 bps 5: 230,400 bps | 1 |
| Byte & word order (Modbus) | This is enabled in Modbus communication. Sets the byte order of 32-bit data. Set it when the arrangement of the communication data is different from that of the master controller. | 0: Even Address-High Word & Big-Endian 1: Even Address-Low Word & Big-Endian 2: Even Address-High Word & Little-Endian 3: Even Address-Low Word & Little-Endian | 0 |
| Communication parity (Modbus) | This is enabled in Modbus communication. Sets the communication parity. | 0: None 1: Even parity 2: Odd parity | 1 |
| Communication stop bit (Modbus) | This is enabled in Modbus communication. Sets the communication stop bit. | 0: 1 bit 1: 2 bit | 0 |
| Communication timeout (Modbus) [ms] | This is enabled in Modbus communication. Sets the generation condition of communication timeout. | 0: Not monitored 1 to 10,000 ms | 0 |
| Communication error detection (Modbus) | This is enabled in Modbus communication. When the RS-485 communication error has occurred for the set number of times, a communication error alarm is generated. | 1 to 10 times | 3 |
| Transmission waiting time (Modbus) [ms] | This is enabled in Modbus communication. Sets the transmission waiting time. | 0 to 10,000 (1=0.1 ms) | 30 |
| Silent interval (Modbus) [ms] | This is enabled in Modbus communication. Sets the silent interval. | 0: Automatically set 1 to 100 (0.1 ms) | 0 |
| Slave error response mode (Modbus) | This is enabled in Modbus communication. Sets the response when a slave error occurs. | 0: Normal response is returned 1: Exception response is returned | 1 |
| Initial group ID (Modbus) | This is enabled in Modbus communication. Sets the address (address number of the parent slave) of the group. It is stored even if the power is turned off. | -1: Disable (no group transmission) 1 to 31: Group ID1 to 31 * Do not use 0 | -1 |
| Test mode timeout (Modbus) | This parameter is a reserved function of Modbus communication. Not possible to use. | 1 to 10,000 ms | 300 |
| Slave ID (NETC) | This is enabled in the industrial network. Sets the address number (slave address). | -1: The switch setting of the driver is followed. 1 to 31: Address number 1 to 31 * Do not use 0 | -1 |
| Initial group ID (NETC) | This is enabled in the industrial network. Sets the address (address number of the parent slave) of the group. It is stored even if the power is turned off. | -1: Disable 0 to 31: Address of group | -1 |
| Baudrate (NETC) | This is enabled in the industrial network. Sets the communication speed. | -1: The switch setting of the driver is followed 0: 9,600 bps 1: 19,200 bps 2: 38,400 bps 3: 57,600 bps 4: 115,200 bps 5: 230,400 bps 6: 312,500 bps 7: 625,000 bps | 7 |

| Parameter name | Description | Setting range | Initial value |
|---|---|------------------------------------|---------------|
| Frame time (NETC) [ms] | This is enabled in the industrial network. Sets the frame time. | 1 to 10,000 ms | 50 |
| Communication connection time (NETC) [ms] | This is enabled in the industrial network. Sets the communication connection time. | 0 to 10,000 ms | 80 |
| Communication timeout (NETC) [ms] | This is enabled in the industrial network. Sets the generation condition of communication timeout. | 0: Not monitored 1 to 10,000 ms | 0 |
| Communication error detection (NETC) | This is enabled in the industrial network. When the RS-485 communication error has occurred for the set number of times, a communication error alarm is generated. | 1 to 10 times | 3 |
| Transmission waiting time (NETC) [ms] | This is enabled in the industrial network. Sets the transmission waiting time. | 0 to 10,000 (1=0.1 ms) | 100 |
| Connection check (NETC) | This is enabled in the industrial network. Check if the connection has been established. | 0: Disable 1: Enable | 1 |
| Indirect reference address setting (0) | Sets the ID of the data to be stored in the indirect reference address (0). | 0 to 65,535 (0 to FFFFh) | 0 |
| Indirect reference address setting (1) | Sets the ID of the data to be stored in the indirect reference address (1). | | 0 |
| Indirect reference address setting (2) | Sets the ID of the data to be stored in the indirect reference address (2). | | 0 |
| Indirect reference address setting (3) | Sets the ID of the data to be stored in the indirect reference address (3). | | 0 |
| Indirect reference address setting (4) | Sets the ID of the data to be stored in the indirect reference address (4). | | 0 |
| Indirect reference address setting (5) | Sets the ID of the data to be stored in the indirect reference address (5). | | 0 |
| Indirect reference address setting (6) | Sets the ID of the data to be stored in the indirect reference address (6). | | 0 |
| Indirect reference address setting (7) | Sets the ID of the data to be stored in the indirect reference address (7). | | 0 |
| Indirect reference address setting (8) | Sets the ID of the data to be stored in the indirect reference address (8). | | 0 |
| Indirect reference address setting (9) | Sets the ID of the data to be stored in the indirect reference address (9). | | 0 |
| Indirect reference address setting (10) | Sets the ID of the data to be stored in the indirect reference address (10). | | 0 |
| Indirect reference address setting (11) | Sets the ID of the data to be stored in the indirect reference address (11). | | 0 |
| Indirect reference address setting (12) | Sets the ID of the data to be stored in the indirect reference address (12). | | 0 |
| Indirect reference address setting (13) | Sets the ID of the data to be stored in the indirect reference address (13). | | 0 |
| Indirect reference address setting (14) | Sets the ID of the data to be stored in the indirect reference address (14). | | 0 |
| Indirect reference address setting (15) | Sets the ID of the data to be stored in the indirect reference address (15). | | 0 |
| Indirect reference address setting (16) | Sets the ID of the data to be stored in the indirect reference address (16). | | 0 |
| Indirect reference address setting (17) | Sets the ID of the data to be stored in the indirect reference address (17). | | 0 |
| Indirect reference address setting (18) | Sets the ID of the data to be stored in the indirect reference address (18). | | 0 |
| Indirect reference address setting (19) | Sets the ID of the data to be stored in the indirect reference address (19). | | 0 |

| Parameter name | Description | Setting range | Initial value |
|---|--|--------------------------|---------------|
| Indirect reference address setting (20) | Sets the ID of the data to be stored in the indirect reference address (20). | 0 to 65,535 (0 to FFFFh) | 0 |
| Indirect reference address setting (21) | Sets the ID of the data to be stored in the indirect reference address (21). | | 0 |
| Indirect reference address setting (22) | Sets the ID of the data to be stored in the indirect reference address (22). | | 0 |
| Indirect reference address setting (23) | Sets the ID of the data to be stored in the indirect reference address (23). | | 0 |
| Indirect reference address setting (24) | Sets the ID of the data to be stored in the indirect reference address (24). | | 0 |
| Indirect reference address setting (25) | Sets the ID of the data to be stored in the indirect reference address (25). | | 0 |
| Indirect reference address setting (26) | Sets the ID of the data to be stored in the indirect reference address (26). | | 0 |
| Indirect reference address setting (27) | Sets the ID of the data to be stored in the indirect reference address (27). | | 0 |
| Indirect reference address setting (28) | Sets the ID of the data to be stored in the indirect reference address (28). | | 0 |
| Indirect reference address setting (29) | Sets the ID of the data to be stored in the indirect reference address (29). | | 0 |
| Indirect reference address setting (30) | Sets the ID of the data to be stored in the indirect reference address (30). | | 0 |
| Indirect reference address setting (31) | Sets the ID of the data to be stored in the indirect reference address (31). | | 0 |
| Encoder maintenance mode | Our exclusive menu for maintenance. Not possible to use. | — | — |

■ USB-ID

The USB-ID is a parameter to associate the USB port (COM port number) of a PC with the driver. The COM port number is used when setting the communication port with the **MEXE02**.

If multiple drivers are connected to a PC, the PC allocates empty COM ports to the driver in the connected order. If the driver power is turned on again or if the UBS cable is removed and inserted, the allocated COM port numbers may change because the order of connection recognized by the PC is changed.

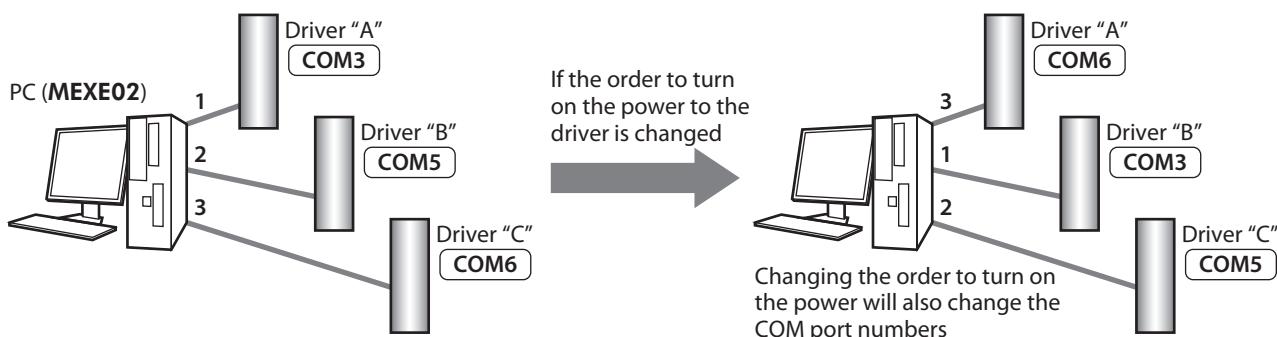
● When the USB-ID is not set

| COM port number | Connection status |
|-----------------|-------------------|
| 1 | Connected |
| 2 | Connected |
| 3 | Empty |
| 4 | Connected |
| 5 | Empty |
| 6 | Empty |

← COM port on the driver that was turned on the power first

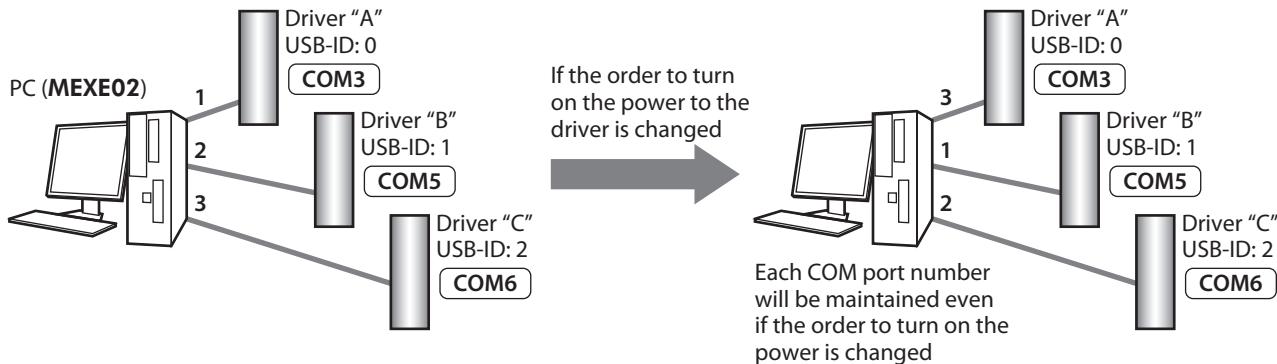
← COM port on the driver that was turned on the power second

← COM port on the driver that was turned on the power third



● When the USB-ID is set

If the "USB-ID" parameter is set, the same COM port numbers are always displayed regardless of the order of connection because the COM port number is fixed to each driver. (The USB-ID and the COM port number may not match because a PC associates with empty COM port numbers in descending order.)



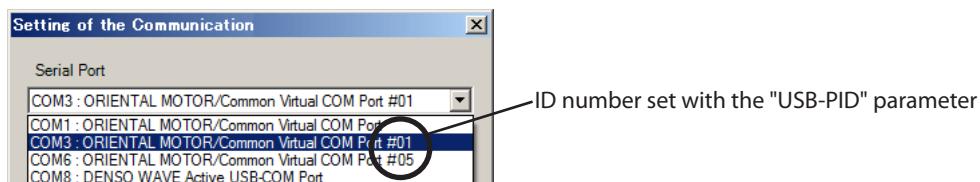
The COM port number set with the "USB-ID" parameter is disabled if the PC is changed.

■ USB-PID

Although the USB-ID can fix the COM port number to each driver, changing the PC will also change and disable the COM port numbers.

Meanwhile, the USB-PID is a parameter to set an ID number to the driver itself.

Even if the PC or the COM port number is changed, the product can easily be distinguished using the **MEXE02** because the ID number of the driver is not changed.



If the USB-PID of the same number is set to multiple drivers, the COM port numbers are allocated in the order of connection.

10 I/O signal assignment list

10-1 Input signals

To assign signals via network, use the "Assignment No." in the table instead of the signal names.

| Assignment No. | Signal name |
|----------------|-------------|
| 0 | Not used |
| 1 | FREE |
| 2 | C-ON |
| 3 | CLR |
| 4 | STOP-COFF |
| 5 | STOP |
| 6 | PAUSE |
| 7 | BREAK-ATSQ |
| 8 | ALM-RST |
| 9 | P-PRESET |
| 10 | EL-PRST |
| 12 | ETO-CLR |
| 13 | LAT-CLR |
| 14 | INFO-CLR |
| 16 | HMI |
| 18 | CCM |
| 19 | PLS-XMODE |
| 20 | PLS-DIS |
| 21 | T-MODE |
| 22 | CRNT-LMT |
| 23 | SPD-LMT |
| 26 | FW-BLK |
| 27 | RV-BLK |
| 28 | FW-LS |
| 29 | RV-LS |
| 30 | HOMES |
| 31 | SLIT |
| 32 | START |

| Assignment No. | Signal name |
|----------------|-------------|
| 33 | SSTART |
| 35 | NEXT |
| 36 | HOME |
| 37 | ZHOME |
| 40 | DSEL0 |
| 41 | DSEL1 |
| 42 | DSEL2 |
| 43 | DSEL3 |
| 44 | DSEL4 |
| 45 | DSEL5 |
| 46 | DSEL6 |
| 47 | DSEL7 |
| 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 |
| 58 | FW-SPD |
| 59 | RV-SPD |
| 60 | FW-PSH |
| 61 | RV-PSH |
| 64 | M0 |
| 65 | M1 |

| Assignment No. | Signal name |
|----------------|-------------|
| 66 | M2 |
| 67 | M3 |
| 68 | M4 |
| 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 |

10-2 Output signals

To assign signals via network, use the "Assignment No." in the table instead of the signal names.

| Assignment No. | Signal name |
|----------------|--------------|
| 0 | Not used |
| 1 | FREE_R |
| 2 | C-ON_R |
| 3 | CLR_R |
| 4 | STOP-COFF_R |
| 5 | STOP_R |
| 6 | PAUSE_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 |
| 18 | CCM_R |
| 19 | PLS-XMODE_R |
| 20 | PLS-DIS_R |
| 21 | T-MODE_R |
| 22 | CRNT-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 | DSEL0_R |
| 41 | DSEL1_R |
| 42 | DSEL2_R |
| 43 | DSEL3_R |
| 44 | DSEL4_R |
| 45 | DSEL5_R |
| 46 | DSEL6_R |
| 47 | DSEL7_R |
| 48 | FW-JOG_R |
| 49 | RV-JOG_R |
| 50 | FW-JOG-H_R |
| 51 | RV-JOG-H_R |

| Assignment No. | Signal name |
|----------------|-------------|
| 52 | FW-JOG-P_R |
| 53 | RV-JOG-P_R |
| 54 | FW-JOG-C_R |
| 55 | RV-JOG-C_R |
| 56 | FW-POS_R |
| 57 | RV-POS_R |
| 58 | FW-SPD_R |
| 59 | RV-SPD_R |
| 60 | FW-PSH_R |
| 61 | RV-PSH_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 |

| Assignment No. | Signal name |
|----------------|-------------|
| 133 | PLS-RDY |
| 134 | MOVE |
| 135 | INFO |
| 136 | SYS-BSY |
| 137 | ETO-MON |
| 138 | IN-POS |
| 140 | TLC |
| 141 | VA |
| 142 | CRNT |
| 143 | AUTO-CD |
| 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 |
| 157 | TIM |
| 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 |
| 173 | HWTOIN-MON |
| 176 | MON-OUT |
| 177 | PLS-OUTR |
| 180 | USR-OUT0 |
| 181 | USR-OUT1 |
| 192 | CRNT-LMTD |
| 193 | SPD-LMTD |
| 196 | OPE-BSY |
| 197 | PAUSE-BSY |

I/O signal assignment list

| Assignment No. | Signal name |
|----------------|--------------|
| 198 | SEQ-BSY |
| 199 | DELAY-BSY |
| 200 | JUMP0-LAT |
| 201 | JUMP1-LAT |
| 202 | NEXT-LAT |
| 203 | PLS-LOST |
| 204 | DCOM-RDY |
| 205 | DCOM-FULL |
| 207 | M-CHG |
| 208 | M-ACT0 |
| 209 | M-ACT1 |
| 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-DRV TMP |
| 227 | INFO-MTR TMP |
| 228 | INFO-OVOLT |
| 229 | INFO-UVOLT |
| 230 | INFO-OLTIME |
| 232 | INFO-SPD |
| 233 | INFO-START |
| 234 | INFO-ZHOME |
| 235 | INFO-PR-REQ |
| 237 | INFO-EGR-E |
| 238 | INFO-RND-E |
| 239 | INFO-NET-E |
| 240 | INFO-FW-OT |
| 241 | INFO-RV-OT |
| 242 | INFO-CULD0 |
| 243 | INFO-CULD1 |
| 244 | INFO-TRIP |

| Assignment No. | Signal name |
|----------------|-------------|
| 245 | INFO-ODO |
| 252 | INFO-DSLMTD |
| 253 | INFO-IOTEST |
| 254 | INFO-CFG |
| 255 | INFO-RBT |

5

Method of control via Modbus RTU (RS-485 communication)

This part explains how to control from the master controller via RS-485 communication. The protocol for the RS-485 communication is the Modbus protocol.

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1 Specification of Modbus RTU

The Modbus protocol is simple and its specification is open to the public, so this protocol is used widely in industrial applications.

Modbus communication is based on the single-master/multiple-slave method. Only the master can issue a query (command).

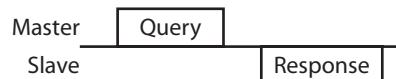
Each slave executes the process requested by query and returns a response message.

The AZ Series supports only the RTU mode as a transmission mode. It does not support the ASCII mode.

Messages are sent in one of two methods.

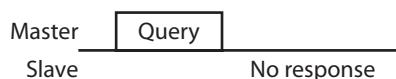
● Unicast mode

The master sends a query to only one slave. The slave executes the process and returns a response.



● Broadcast mode

If slave address 0 is specified on the master, the master can send a query to all slaves. Each slave executes the process, but does not return a response.

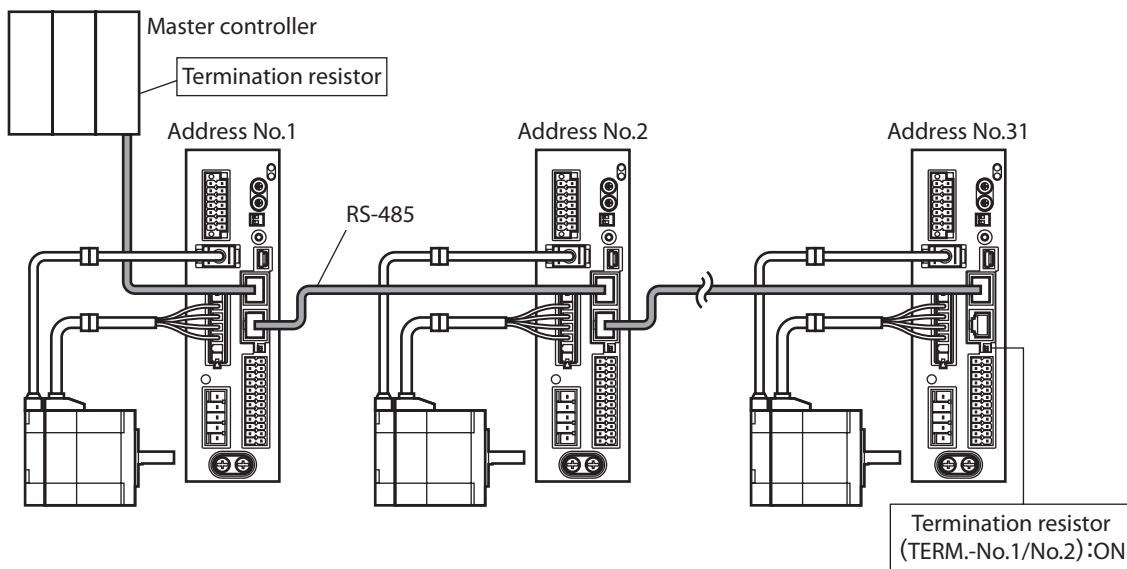


1-1 Communication specifications

| | |
|-----------------------------|--|
| Electrical characteristics | Compliant with EIA-485, straight cable Use a shielded twist pair cable (TIA/EIA-568B CAT5e or higher is recommended) and keep the total wiring distance up to 50 m (164 ft.). |
| Communication mode | Half-duplex communication Asynchronous mode (data: 8 bits, stop bit: 1 bit/2 bits, parity: none/even number/odd number) |
| Transmission rate | Selectable from 9,600 bps, 19,200 bps, 38,400 bps, 57,600 bps, 115,200 bps, and 230,400 bps |
| Protocol | Modbus RTU mode |
| Number of connectable units | Up to 31 units can be connected to one master controller. |

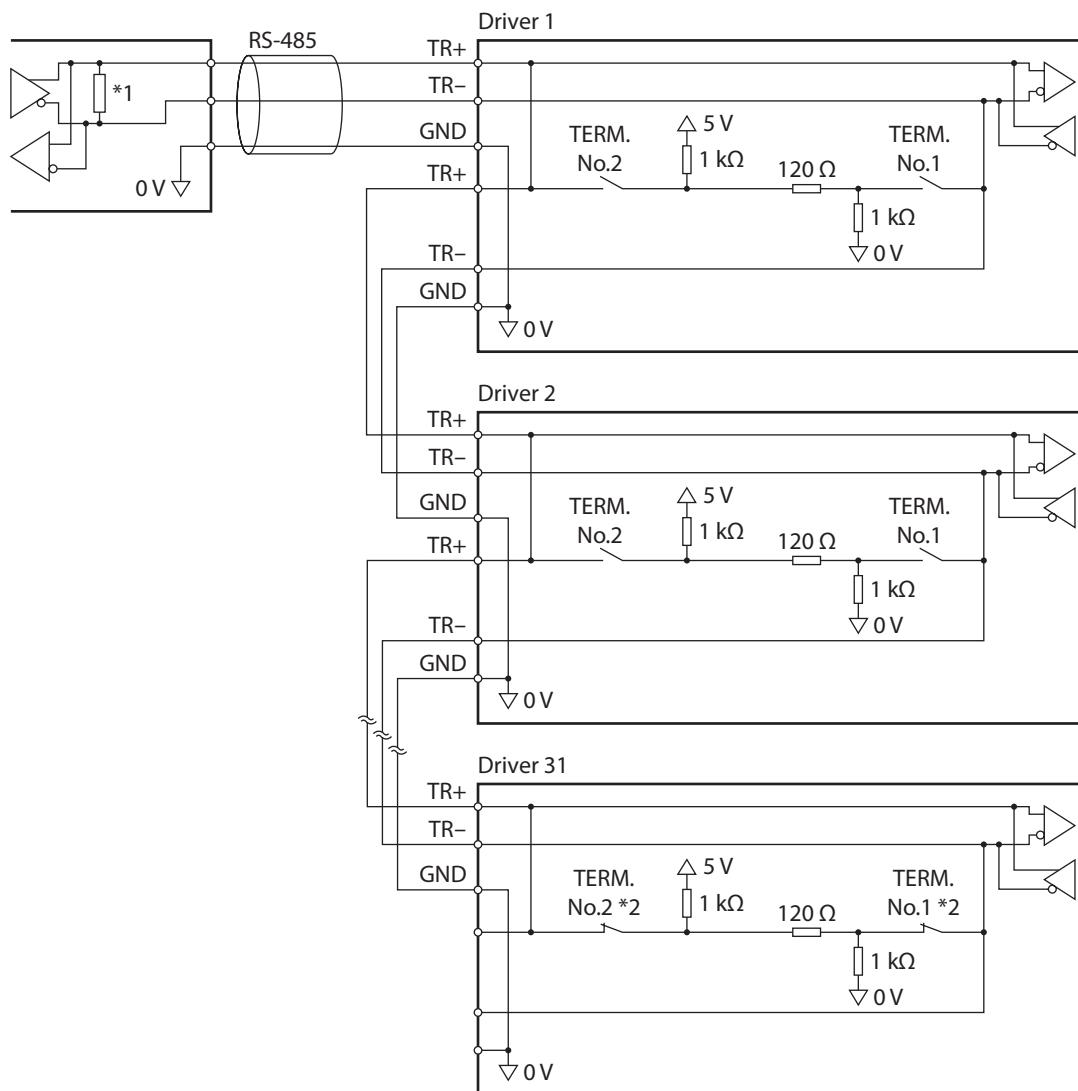
■ Connection example

The figure shows the case of the AC power input driver.



■ Internal circuit diagram

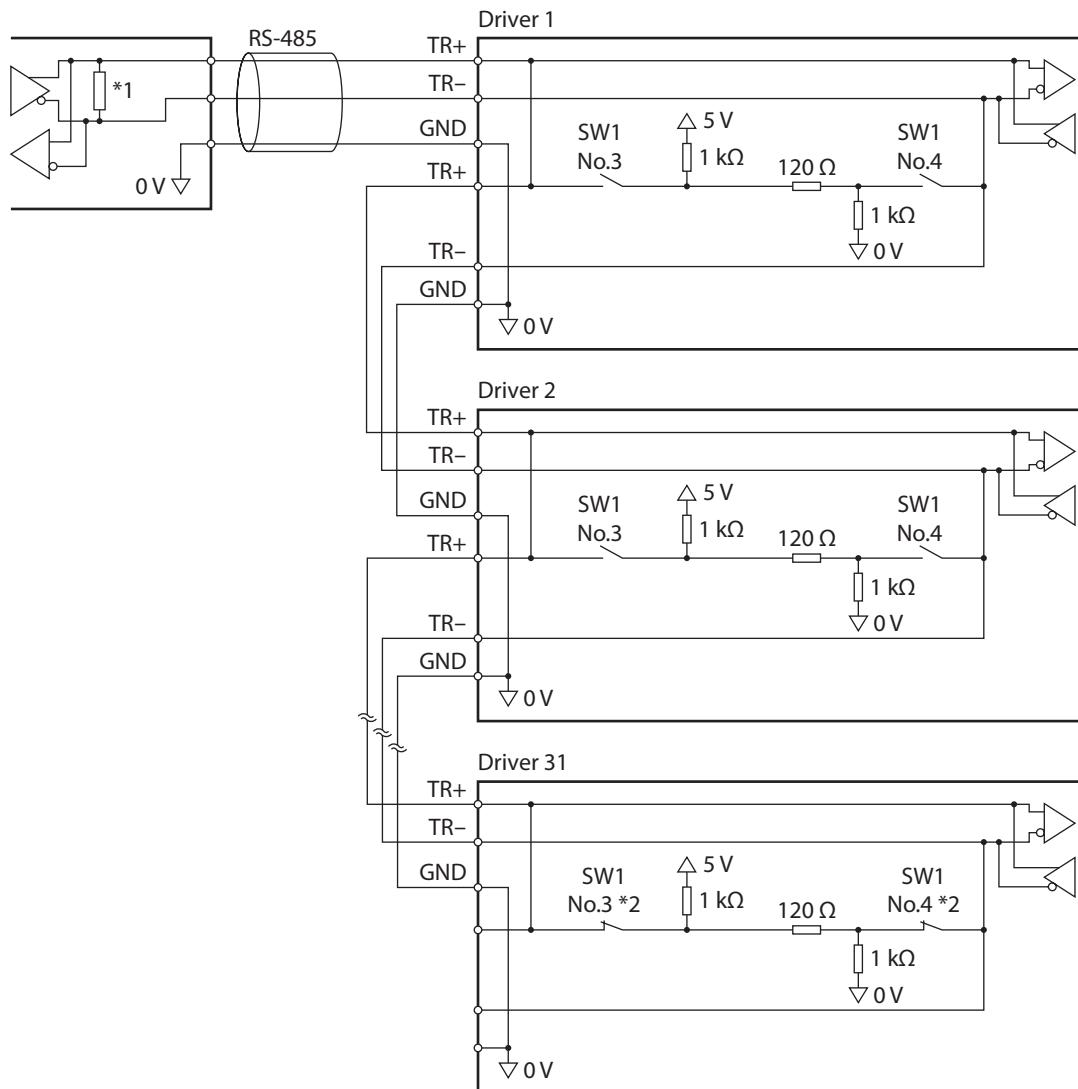
● In case of AC power input driver



*1 Termination resistor 120 Ω

*2 Turn the termination resistor ON.

- In case of DC power input driver

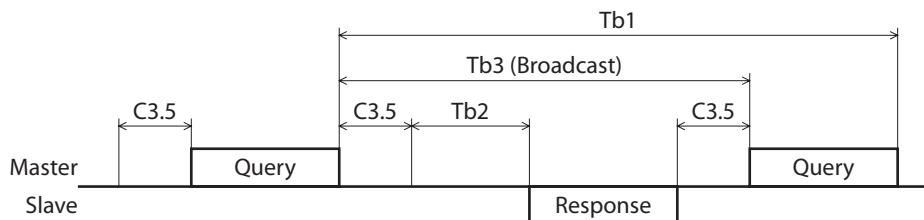


*1 Termination resistor $120\ \Omega$

*2 Turn the termination resistor ON.

1-2 Communication timing

The communication time monitored by the driver and the communication timing of the master are as follows.



| Character | Name | Description |
|-----------|---------------------------|--|
| Tb1 | Communication timeout | Intervals between received queries are monitored. If no query could be received after the time set in the "Communication timeout (Modbus)" parameter, a communication timeout alarm is generated. When normal messages including messages to other slaves were received, communication timeout does not occur. |
| Tb2 | Transmission waiting time | This is the time after the slave switches its communication line to the transmission mode upon receiving a query from the master, until it starts sending a response. This is set using the "Transmission waiting time (Modbus)" parameter. The actual transmission waiting time corresponds to the silent interval (C3.5) + command processing time + transmission waiting time (Tb2). |
| Tb3 | Broadcasting interval | This is the time until the next query is sent in broadcasting. A time equivalent to or longer than the silent interval (C3.5) plus 5 ms is required. |
| C3.5 | Silent interval | Be sure to provide a transmission waiting time of 3.5 characters or more. If this waiting time is less than 3.5 characters long, the driver cannot respond. When the "Silent interval (Modbus)" parameter is set to "0: Automatic," the silent interval varies depending on the transmission rate. Refer to the next table for details. |

■ When the "Silent interval (Modbus)" parameter is set to "0: Automatic"

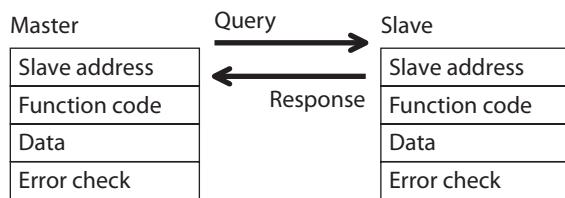
| Transmission rate (bps) | Silent interval | Frame interval of master (reference) |
|-------------------------|-----------------|--------------------------------------|
| 9,600 | 4 ms or more | 5.0 ms or more |
| 19,200 | | |
| 38,400 | | |
| 57,600 | 2.5 ms or more | 3.0 ms or more |
| 115,200 | | |
| 230,400 | | |

Note

- If frames are received at an interval shorter than the required silent interval, the frames are discarded, and a communication error occurs. When a communication error occurs, check the silent interval of the slave and reset the transmission interval of frames.
- The silent interval may vary depending on the product series connected. When connecting multiple product series, set parameters as follows.
 - "Silent interval (Modbus)" parameter: "0: Automatic"
 - "Transmission waiting time (Modbus)" parameter: 1.0 ms or more
- If the setting of the "Silent interval" parameter is common to systems in which only products with the "Silent interval" parameter are connected, the communication cycle can be improved. Normally, use it as "Automatic."

2 Message structure

The message format is shown.



2-1 Query

The query message structure is shown.

| Slave address | Function code | Data | Error check |
|---------------|---------------|---------|-------------|
| 8 bit | 8 bit | Nx8 bit | 16 bit |

■ Slave address

Specify the slave address (unicast mode).

If the slave address is set to 0, the master can send a query to all slaves (broadcast mode).

■ Function code

The function codes and message lengths supported by the driver are as follows.

| Function code | Function | Number of registers | Broadcast |
|---------------|---------------------------------------|---------------------|--------------|
| 03h | Reading from a holding register(s) | 1 to 125 | Not possible |
| 06h | Writing to a holding register | 1 | Possible |
| 08h | Diagnosis | – | Not possible |
| 10h | Writing to multiple holding registers | 1 to 123 | Possible |

■ Data

Set data associated with the function code. The data length varies depending on the function code.

■ Error check

In the Modbus RTU mode, error checks are based on the CRC-16 method. The slave calculates a CRC-16 of each received message and compares the result against the error check value included in the message. If the calculated CRC-16 value matches the error check value, the slave determines that the message is normal.

● CRC-16 calculation method

1. Calculate an exclusive-OR (XOR) value of the initial value of FFFFh and slave address (8 bits).
2. Shift the result of step 1 to the right by 1 bit. Repeat this shift until the overflow bit becomes "1."
3. Upon obtaining "1" as the overflow bit, calculate an XOR of the result of step 2 and A001h.
4. Repeat steps 2 and 3 until a shift is performed eight times.
5. Calculate an XOR of the result of step 4 and function code (8 bits).
Repeat steps 2 to 4 for all bytes.
The final result gives the result of CRC-16 calculation result.

● Calculation example of CRC-16

The following table is a calculation example when setting the slave address of the first byte to 02h and setting the function code of the second byte to 07h.

The result of actual CRC-16 calculation is calculated including the data on and after the third byte.

| Description | Result | Bit shifted out |
|----------------------------------|--|-----------------|
| CRC register initial value FFFFh | 1111 1111 1111 1111 | – |
| Lead byte 02h | 0000 0000 0000 0010 | – |
| Initial value FFFFh and XOR | 1111 1111 1111 1101 | – |
| First time of right shift | 0111 1111 1111 1110 | 1 |
| A001h and XOR | 1010 0000 0000 0001 1101 1111 1111 1111 | – |
| Second time of right shift | 0110 1111 1111 1111 | 1 |
| A001h and XOR | 1010 0000 0000 0001 1100 1111 1111 1110 | – |
| Third time of right shift | 0110 0111 1111 1111 | 0 |
| Fourth time of right shift | 0011 0011 1111 1111 | 1 |
| A001h and XOR | 1010 0000 0000 0001 1001 0011 1111 1110 | – |
| Fifth time of right shift | 0100 1001 1111 1111 | 0 |
| Sixth time of right shift | 0010 0100 1111 1111 | 1 |
| A001h and XOR | 1010 0000 0000 0001 1000 0100 1111 1110 | – |
| Seventh time of right shift | 0100 0010 0111 1111 | 0 |
| Eighth time of right shift | 0010 0001 0011 1111 | 1 |
| A001h and XOR | 1010 0000 0000 0001 1000 0001 0011 1110 | – |
| Next byte 07h and XOR | 0000 0000 0000 0111 1000 0001 0011 1001 | – |
| First time of right shift | 0100 0000 1001 1100 | 1 |
| A001h and XOR | 1010 0000 0000 0001 1110 0000 1001 1101 | – |
| Second time of right shift | 0111 0000 0100 1110 | 1 |
| A001h and XOR | 1010 0000 0000 0001 1101 0000 0100 1111 | – |
| Third time of right shift | 0110 1000 0010 0111 | 1 |
| A001h and XOR | 1010 0000 0000 0001 1100 1000 0010 0110 | – |
| Fourth time of right shift | 0110 0100 0001 0011 | 0 |
| Fifth time of right shift | 0011 0010 0000 1001 | 1 |
| A001h and XOR | 1010 0000 0000 0001 1001 0010 0000 1000 | – |
| Sixth time of right shift | 0100 1001 0000 0100 | 0 |
| Seventh time of right shift | 0010 0100 1000 0010 | 0 |
| Eighth time of right shift | 0001 0010 0100 0001 | 0 |
| Result of CRC-16 | 0001 0010 0100 0001 | – |

2-2 Response

Slave-returned responses are classified into three types: normal response, no response, and exception response. The response message structure is the same as the query message structure.

| Slave address | Function code | Data | Error check |
|---------------|---------------|---------|-------------|
| 8 bit | 8 bit | Nx8 bit | 16 bit |

■ Normal response

Upon receiving a query from the master, the slave executes the requested process and returns a response corresponding to the function code.

■ No response

The slave may not return a response to a query sent by the master. This condition is referred to as "No response." The causes of no response are explained.

- **Transmission error**

The slave discards the query if any of the transmission errors in the following table is detected. No response is returned.

| Cause of transmission error | Description |
|-----------------------------|--|
| Framing error | Stop bit 0 was detected. |
| Parity error | A mismatch with the specified parity was detected. |
| Mismatched CRC | The calculated value of CRC-16 was found not matching the error check value. |
| Invalid message length | The message length exceeded 256 bytes. |

- **Other than transmission error**

A response may not be returned without any transmission error being detected.

| Cause | Description |
|--------------------------|--|
| Broadcast | If the query was broadcast, the slave executes the requested process but does not return a response. |
| Mismatched slave address | The slave address in the query was found not matching the slave address of the driver. |

■ Exception response

An exception response is returned if the slave cannot execute the process requested by the query. Appended to this response is an exception code indicating why the process cannot be executed. The message structure of exception response is as follows.

| Slave address | Function code | Exception code | Error check |
|---------------|---------------|----------------|-------------|
| 8 bit | 8 bit | 8 bit | 16 bit |

- **Function code**

The function code in the exception response is a sum of the function code in the query and 80h.

| Function code of query | Exception response |
|------------------------|--------------------|
| 03h | 83h |
| 06h | 86h |
| 08h | 88h |
| 10h | 90h |

- Example of exception response

| | | | | | |
|---------------|---|-------|---------------|---------------------|-----|
| Slave address | 01h | Query | Slave address | 01h | |
| Function code | 10h | | Function code | 90h | |
| Data | Register address (upper) | 02h | Data | Exception code | 04h |
| | Register address (lower) | 4Ch | | Error check (lower) | 4Dh |
| | Number of registers (upper) | 00h | | Error check (upper) | C3h |
| | Number of registers (lower) | 02h | | | |
| | Number of bytes | 04h | | | |
| | Value write to register address (upper) | 00h | | | |
| | Value write to register address (lower) | 00h | | | |
| | Value write to register address + 1 (upper) | 03h | | | |
| | Value write to register address + 1 (lower) | E9h | | | |
| | Error check (lower) | 2Fh | | | |
| | Error check (upper) | D4h | | | |

- Exception code

Indicates why the process cannot be executed.

| Exception code | Communication error code | Cause | Description |
|----------------|--------------------------|----------------------|---|
| 01h | 88h | Invalid function | <p>The process could not be executed because the function code was invalid.</p> <ul style="list-style-type: none"> • The function code is not supported. • The sub-function code for diagnosis (08h) is other than 00h. |
| 02h | 88h | Invalid data address | <p>The process could not be executed because the data address was invalid.</p> <ul style="list-style-type: none"> • The register address is not supported (other than 0000h to 57FFh). • Register address and number of registers are 5800h or more in total. |
| 03h | 8Ch | Invalid data | <p>The process could not be executed because the data was invalid.</p> <ul style="list-style-type: none"> • The number of registers is 0. • The number of bytes is other than "the number of register x 2." • The data length is outside the specified range. |
| 04h | 89h 8Ah 8Ch 8Dh | Slave error | <p>The process could not be executed because an error occurred at the slave.</p> <ul style="list-style-type: none"> • Communication with user I/F is in progress (89h). Downloading or initializing in the MEXE02 is in progress. • Non-volatile memory processing is in progress (8Ah). <ul style="list-style-type: none"> - Internal processing is in progress (S-BSY is ON). - An alarm of EEPROM error is present. • Outside the parameter setting range (8Ch) Value write is out of the setting range. • Command execute disable (8Dh) |

- About slave error

When the "Slave error response mode (Modbus)" parameter is set to "0: Normal response," even if a slave error occurs, a normal response is returned. Set it when no exception response is required, as in the case of a touch panel.

3 Function codes

This chapter explains the function codes supported by the **AZ** Series drivers.

Note that the function code cannot be executed if function codes other than those introduced here are sent.

3-1 Reading from a holding register(s) (03h)

Read a register (16 bits). Up to 125 successive registers (125×16 bits) can be read.

Read the upper and lower data at the same time. If they are not read at the same time, the value may be invalid.

If multiple holding registers are read, they are read in order of register addresses.

■ Example of read

Read the "operation type, position, operating speed" of the operation data No.1 of the slave address 1.

| Description | Register address | Value read | Corresponding decimal |
|--|------------------|------------|-----------------------|
| Operation type of operation data No.1 (upper) | 6208 (1840h) | 0000h | 2 |
| Operation type of operation data No.1 (lower) | 6209 (1841h) | 0002h | |
| Position of operation data No.1 (upper) | 6210 (1842h) | FFFFh | -10,000 |
| Position of operation data No.1 (lower) | 6211 (1843h) | D8F0h | |
| Operating speed of operation data No.1 (upper) | 6212 (1844h) | 0000h | 10,000 |
| Operating speed of operation data No.1 (lower) | 6213 (1845h) | 2710h | |

● Query

| Field name | Data | Description |
|---------------------|-----------------------------|--------------------------------|
| Slave address | 01h | Slave address 1 |
| Function code | 03h | Reading from holding registers |
| Data | Register address (upper) | 18h |
| | Register address (lower) | 40h |
| | Number of registers (upper) | 00h |
| | Number of registers (lower) | 06h |
| Error check (lower) | C2h | Calculation result of CRC-16 |
| Error check (upper) | BCh | |

- Response

| Field name | Data | Description |
|---------------------|--|--|
| Slave address | 01h | Same as query |
| Function code | 03h | Same as query |
| Data | Number of data bytes | 0Ch Twice the number of registers in the query |
| | Value read from register address (upper) | 00h Value read from register address 1840h |
| | Value read from register address (lower) | 00h |
| | Value read from register address + 1 (upper) | 00h Value read from register address 1841h |
| | Value read from register address + 1 (lower) | 02h |
| | Value read from register address + 2 (upper) | FFh Value read from register address 1842h |
| | Value read from register address + 2 (lower) | FFh |
| | Value read from register address + 3 (upper) | D8h Value read from register address 1843h |
| | Value read from register address + 3 (lower) | F0h |
| | Value read from register address + 4 (upper) | 00h Value read from register address 1844h |
| | Value read from register address + 4 (lower) | 00h |
| | Value read from register address + 5 (upper) | 27h Value read from register address 1845h |
| | Value read from register address + 5 (lower) | 10h |
| Error check (lower) | 82h | Calculation result of CRC-16 |
| Error check (upper) | EAh | |

3-2 Writing to a holding register (06h)

This function code is used to write data to a specified register address.

However, since the result combining the upper and lower may be outside the data range, write the upper and lower at the same time using the "Multiple holding registers (10h)."

■ Example of write

Write 80 (50h) as a command filter time constant to slave address 2.

| Description | Register address | Value write | Corresponding decimal |
|--------------------------------------|------------------|-------------|-----------------------|
| Command filter time constant (lower) | 597 (255h) | 50h | 80 |

● Query

| Field name | Data | Description |
|---------------------|--------------------------|---|
| Slave address | 02h | Slave address 2 |
| Function code | 06h | Writing to a holding register |
| Data | Register address (upper) | 02h Register address to be written |
| | Register address (lower) | 55h |
| | Value write (upper) | 00h Value written to the register address |
| | Value write (lower) | 50h |
| Error check (lower) | 98h | Calculation result of CRC-16 |
| Error check (upper) | 6Dh | |

- Response

| Field name | | Data | Description |
|---------------------|--------------------------|------|------------------------------|
| Slave address | | 02h | Same as query |
| Function code | | 06h | Same as query |
| Data | Register address (upper) | 02h | Same as query |
| | Register address (lower) | 55h | |
| | Value write (upper) | 00h | Same as query |
| | Value write (lower) | 50h | |
| Error check (lower) | | 98h | Calculation result of CRC-16 |
| Error check (upper) | | 6Dh | |

3-3 Diagnosis (08h)

Diagnose the communication between the master and slave. Arbitrary data is sent and the result of returned data is used to determine whether the communication is normal. 00h (reply to query) is the only sub-function.

- Example of diagnosis

Send arbitrary data (1234h) to the slave for diagnosis.

- Query

| Field name | | Data | Description |
|---------------------|---------------------------|------|------------------------------|
| Slave address | | 03h | Slave address 3 |
| Function code | | 08h | Diagnosis |
| Data | Sub-function code (upper) | 00h | Return the query data |
| | Sub-function code (lower) | 00h | |
| | Data value (upper) | 12h | Arbitrary data (1234h) |
| | Data value (lower) | 34h | |
| Error check (lower) | | ECh | Calculation result of CRC-16 |
| Error check (upper) | | 9Eh | |

- Response

| Field name | | Data | Description |
|---------------------|---------------------------|------|---------------|
| Slave address | | 03h | Same as query |
| Function code | | 08h | Same as query |
| Data | Sub-function code (upper) | 00h | Same as query |
| | Sub-function code (lower) | 00h | |
| | Data value (upper) | 12h | Same as query |
| | Data value (lower) | 34h | |
| Error check (lower) | | ECh | Same as query |
| Error check (upper) | | 9Eh | |

3-4 Writing to multiple holding registers (10h)

This function code is used to write data to multiple successive registers. Up to 123 registers can be written.

Write the data to the upper and lower at the same time. If not, an invalid value may be written.

Registers are written in order of register addresses. Note that even when an exception response is returned because some data is invalid as being outside the specified range, etc., other data may have been written properly.

■ Example of write

Set the following data as "starting/changing speed, stopping deceleration, operating current" of the operation data No.3 at the slave address 4.

| Description | Register address | Value write | Corresponding decimal |
|---|------------------|-------------|-----------------------|
| Starting/changing speed rate of operation data No.3 (upper) | 6342 (18C6h) | 0000h | 10,000 |
| Starting/changing speed rate of operation data No.3 (lower) | 6343 (18C7h) | 2710h | |
| Stopping deceleration of operation data No.3 (upper) | 6344 (18C8h) | 0000h | 20,000 |
| Stopping deceleration of operation data No.3 (lower) | 6345 (18C9h) | 4E20h | |
| Operating current of operation data No.3 (upper) | 6346 (18CAh) | 0000h | 500 |
| Operating current of operation data No.3 (lower) | 6347 (18CBh) | 01F4h | |

● Query

| Field name | Data | Description |
|---------------------|---|---------------------------------------|
| Slave address | 04h | Slave address 4 |
| Function code | 10h | Writing to multiple holding registers |
| Data | Register address (upper) | 18h |
| | Register address (lower) | C6h |
| | Number of registers (upper) | 00h |
| | Number of registers (lower) | 06h |
| | Number of bytes | 0Ch |
| | Value write to register address (upper) | 00h |
| | Value write to register address (lower) | 00h |
| | Value write to register address + 1 (upper) | 27h |
| | Value write to register address + 1 (lower) | 10h |
| | Value write to register address + 2 (upper) | 00h |
| | Value write to register address + 2 (lower) | 00h |
| | Value write to register address + 3 (upper) | 4Eh |
| | Value write to register address + 3 (lower) | 20h |
| | Value write to register address + 4 (upper) | 00h |
| | Value write to register address + 4 (lower) | 00h |
| | Value write to register address + 5 (upper) | 01h |
| | Value write to register address + 5 (lower) | F4h |
| Error check (lower) | 6Ch | Calculation result of CRC-16 |
| Error check (upper) | A0h | |

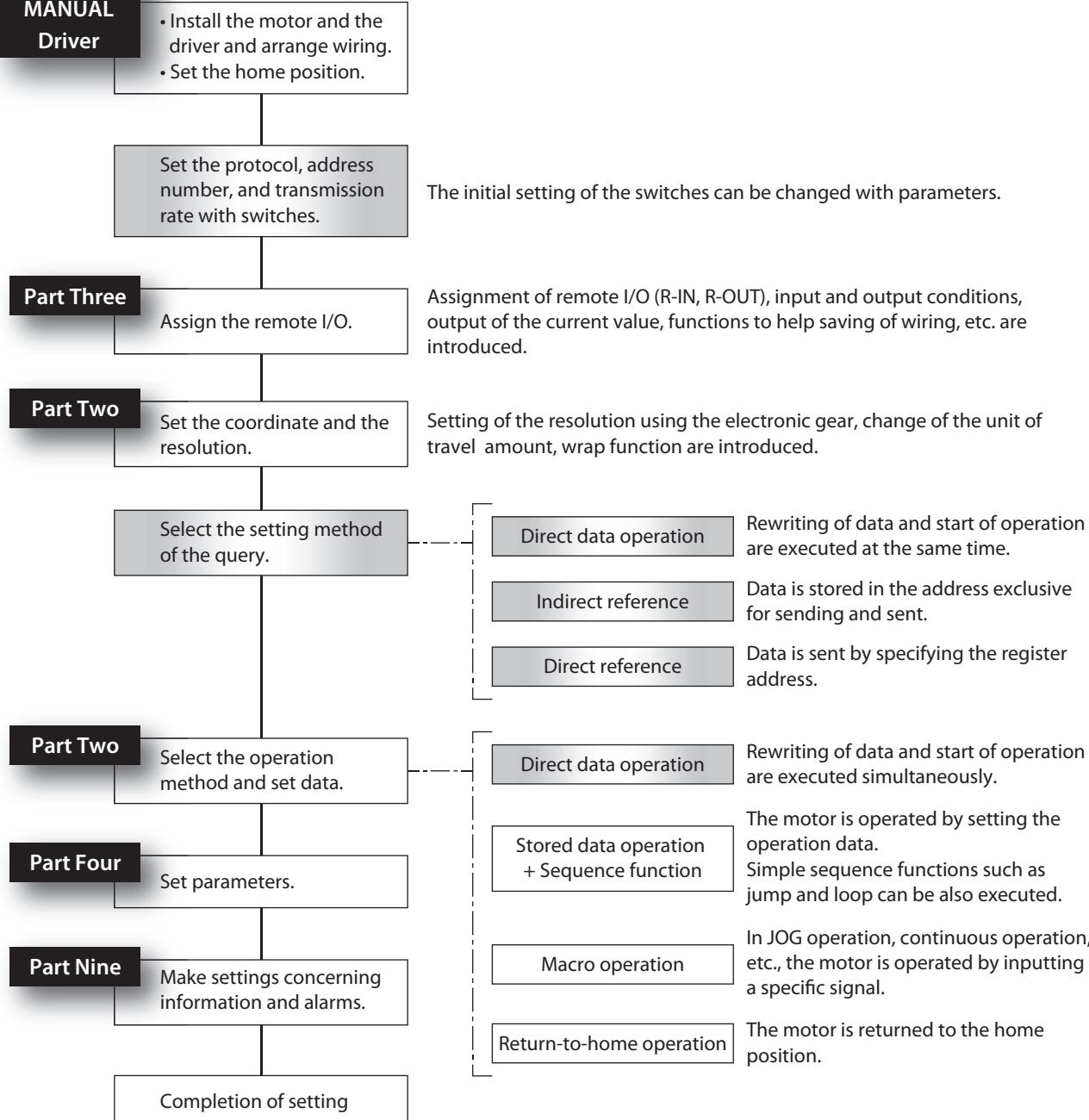
- Response

| Field name | | Data | Description |
|---------------------|-----------------------------|------|------------------------------|
| Slave address | | 04h | Same as query |
| Function code | | 10h | Same as query |
| Data | Register address (upper) | 18h | Same as query |
| | Register address (lower) | C6h | |
| | Number of registers (upper) | 00h | Same as query |
| | Number of registers (lower) | 06h | |
| Error check (lower) | | A6h | Calculation result of CRC-16 |
| Error check (upper) | | C3h | |

4 Flow of setting required for Modbus communication

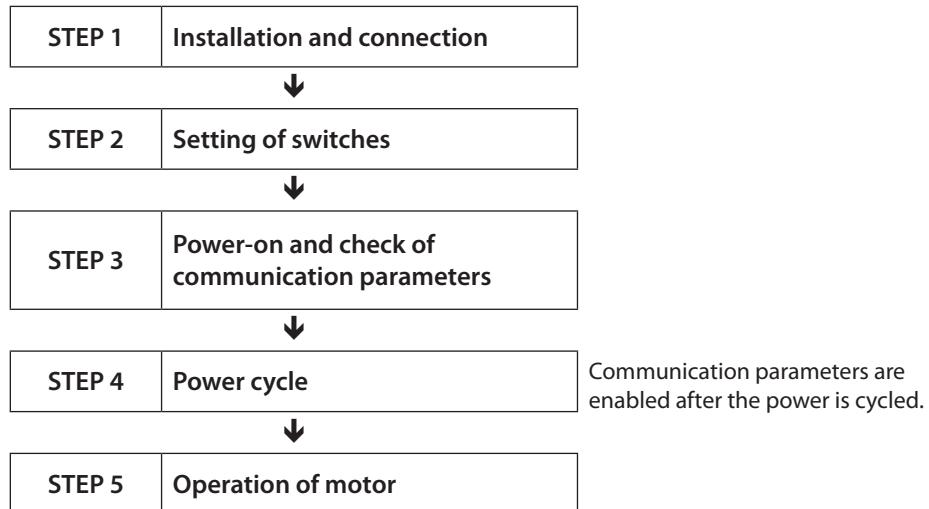
OPERATING MANUAL Driver

The contents of [] are explained in this manual.



5 Guidance

If you are new to this type, read this section to understand the operating methods along with the operation flow. This is an example how to operate the motor based on the operation data and parameters being set to the driver via the master controller.



- Example of operating condition

Here, the motor is assumed to be operated under the following conditions.

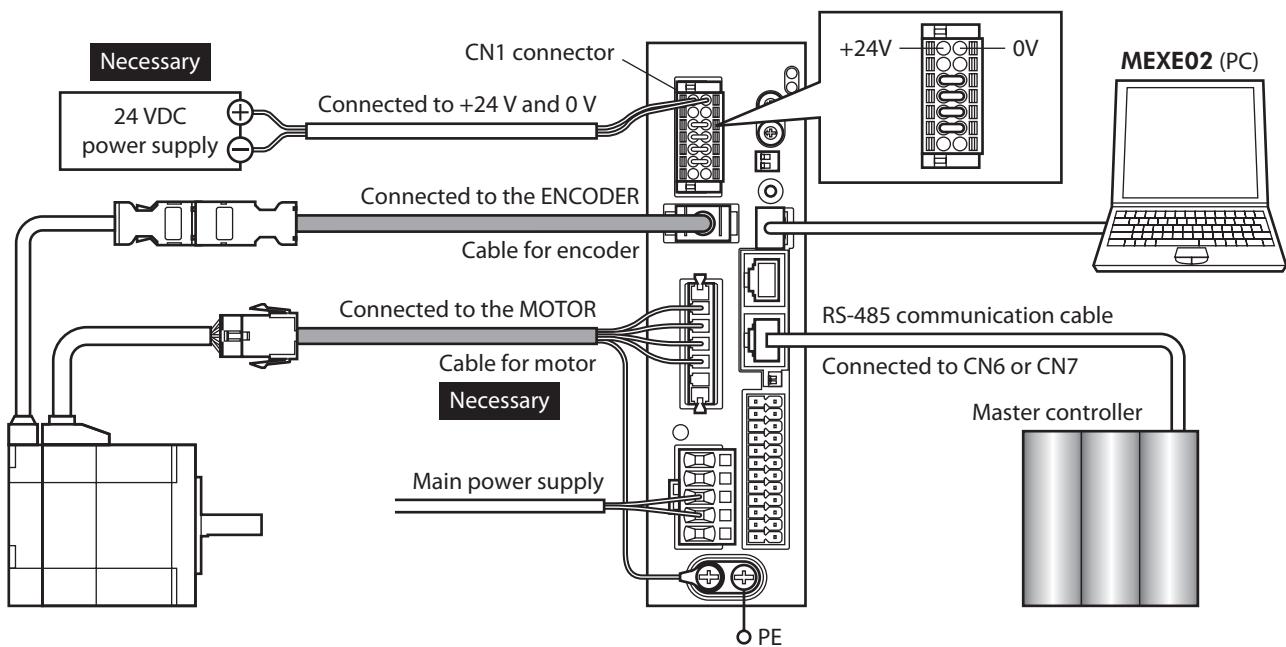
- Number of drivers connected: One
- Address number: 1
- Transmission rate: 115,200 bps
- Termination resistor: Set



Before operating the motor, check the condition of the surrounding area to ensure safety.

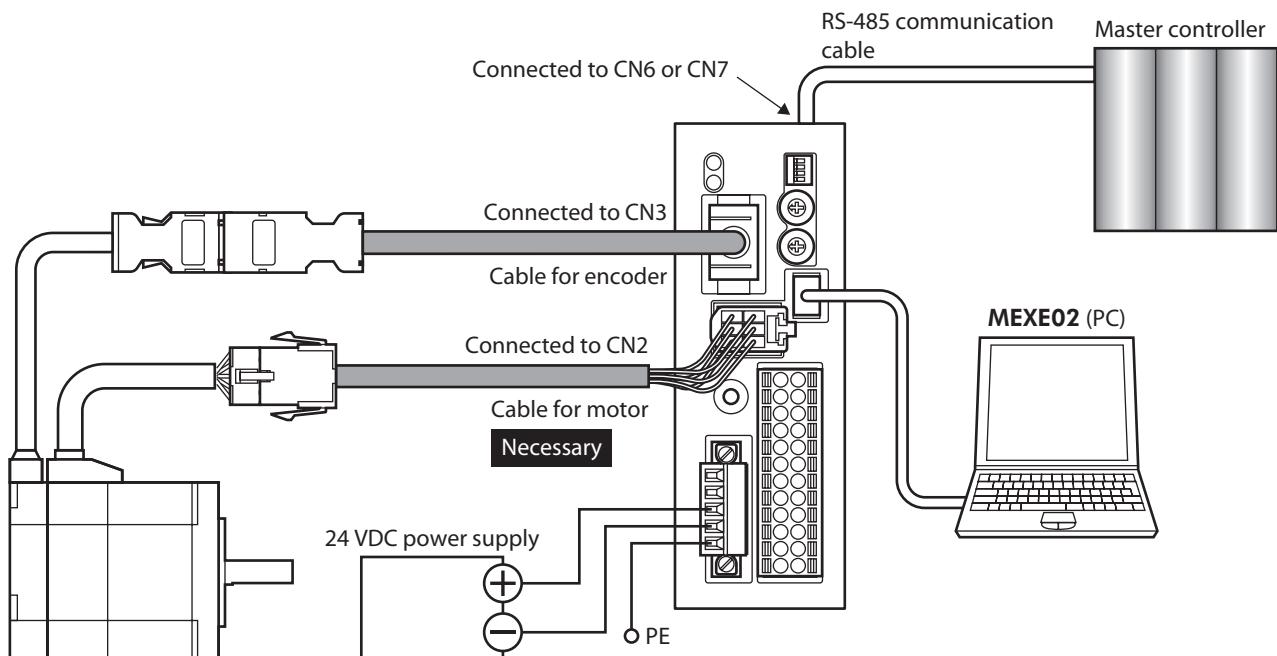
STEP 1 Check the installation and connection

■ AC power input driver



Cables represented in gray color are accessories. Use the cable for encoder when the length of the encoder cable of motor is not enough.

■ DC power input driver



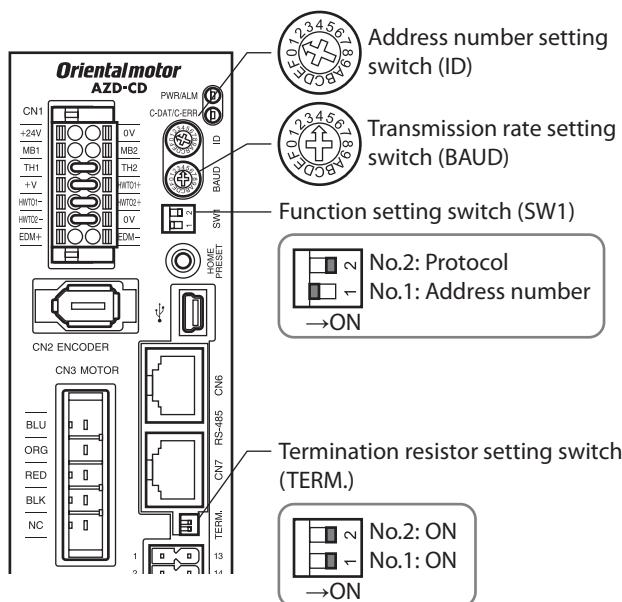
Cables represented in gray color are accessories. Use the cable for encoder when the length of the encoder cable of motor is not enough.

STEP 2 Set the switches

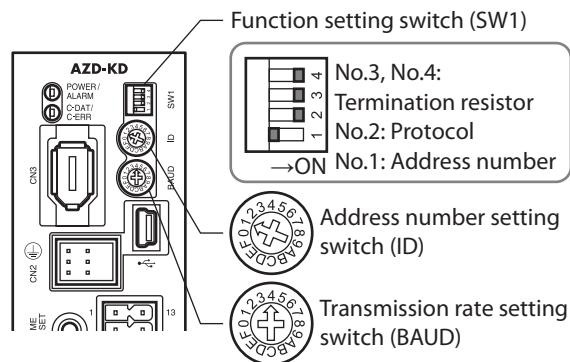
Set as shown in the following table with the switches. The status becomes as shown in the following figures after setting.

| Setting contents | Switch |
|--------------------------------|---|
| Protocol: Modbus protocol | Turn No.2 of SW1 ON |
| Address number: 1 | Turn No.1 of SW1 OFF, set ID to 1 |
| Transmission rate: 115,200 bps | Set BAUD to 4 |
| Termination resistor: ON | AC power input driver: Turn No.1 and No.2 of TERM ON DC power input driver: Turn No.3 and No.4 of SW1 ON |

■ AC power input driver



■ DC power input driver



STEP 3 Turn on the power and set the communication parameters

Check the following communication parameters with the **MEXE02**.

If communication cannot be established, review the communication parameters of the driver.

| MEXE02 tree view | Parameter name |
|---------------------|--|
| Communication & I/F | • Communication parity [Initial value: 1 (even)] |
| | • Communication stop bit [Initial value: 0 (1 bit)] |
| | • Transmission waiting time [Initial value: 30 (3.0 ms)] |
| | • Silent interval [Initial value: 0 (automatic)] |



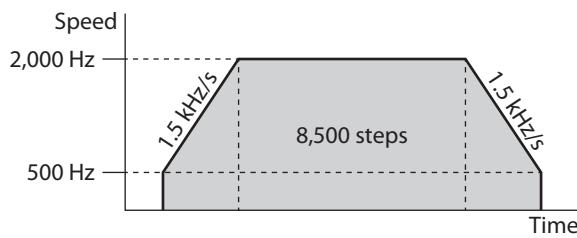
Set the transmission interval of frames sent from the master to be longer than the silent interval of the driver. When the transmission rate is 115,200 bps, the silent interval of the driver is 2.5 ms.

STEP 4 Cycle the power

The switches of the driver and the communication parameters are enabled after the power is cycled.

STEP 5 Send a message and operate the motor

As an example, here is a description how to execute the following positioning operation.



- Send the following five queries and set the operation data.

| Communication data (Hex) | Description |
|--|---|
| 01 10 18 00 00 02 04 00 00 00 02 D8 6E | Operation data No.0 operation type=2: Incremental positioning (based on command position) |
| 01 10 18 02 00 02 04 00 00 21 34 C1 F1 | Operation data No.0 position=8,500 steps |
| 01 10 18 04 00 02 04 00 00 07 D0 5B F0 | Operation data No.0 speed=2,000 Hz |
| 01 10 18 06 00 02 04 00 00 05 DC DB 4C | Operation data No.0 starting/changing speed rate=1.5 kHz/s |
| 01 10 18 08 00 02 04 00 00 05 DC 5A C0 | Operation data No.0 stopping deceleration=1.5 kHz/s |

- Send the following two queries and execute operation.

| Communication data (Hex) | Description |
|--|---|
| 01 10 00 7C 00 02 04 00 00 00 08 F5 18 | START input ON (operation No.0 operation start) |
| 01 10 00 7C 00 02 04 00 00 00 00 F4 DE | START input OFF |

- Confirm that the motor rotates without any problem.

STEP 6 Could you operate the motor?

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

- Is any alarm present?
- Are the power supply, motor and RS-485 communication cable connected securely?
- Are the slave address, transmission rate and termination resistor set correctly?
- Is the C-DAT/C-ERR LED turned off? Or is it lit in red? (A communication error has occurred)

6 Setting of switches

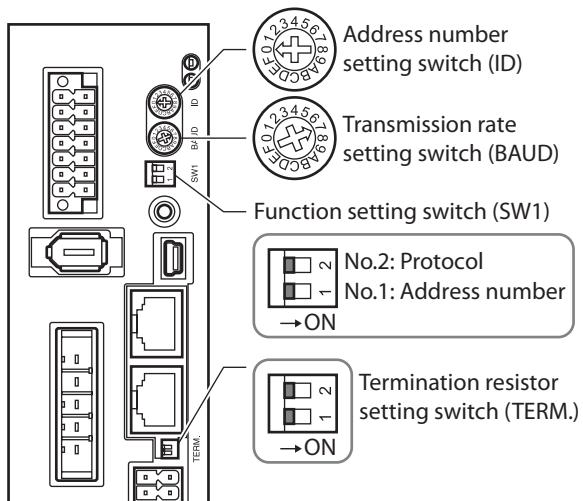
The following figure shows the status of factory setting.

Note

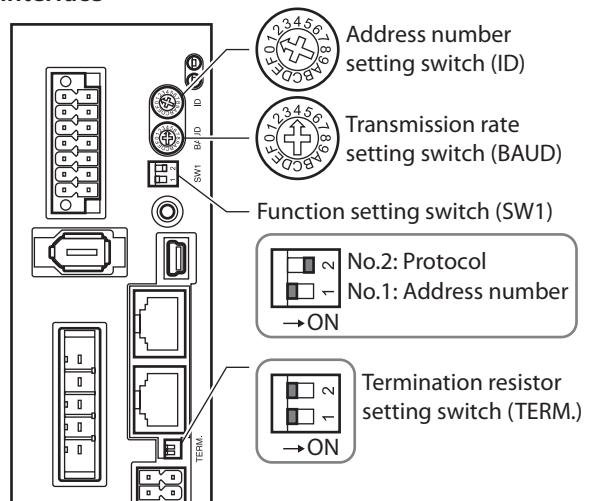
Be sure to turn off the driver power before setting the switches. If the switches are set while the power is still on, the new setting will not become effective.

■ AC power input driver

● Built-in controller type

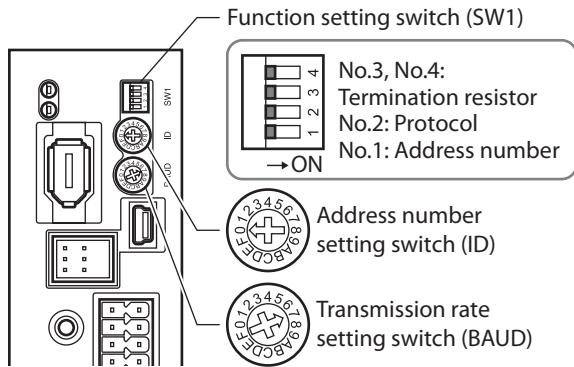


● Pulse input type with RS-485 communication interface

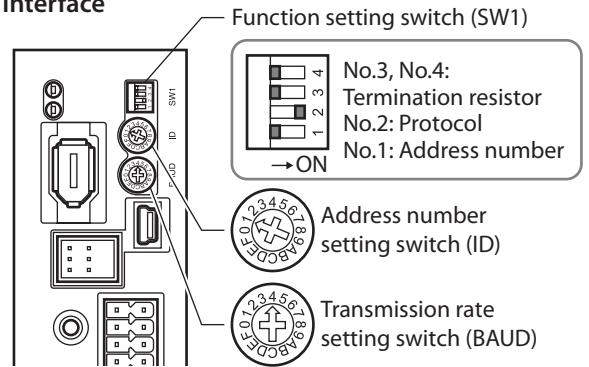


■ DC power input driver

● Built-in controller type



● Pulse input type with RS-485 communication interface



6-1 Protocol

Turn No.2 of the SW1 switch ON. The Modbus protocol is selected.

| | | |
|------------------------|--|-----|
| Factory setting | • Built-in controller type | OFF |
| | • Pulse input type with RS-485 communication interface | ON |

| SW1-No.2 | Protocol |
|----------|----------------------------------|
| ON | Modbus RTU |
| OFF | Connect to the network converter |

6-2 Address number (slave address)

Set the address number (slave address) using the ID switch and No.1 of the SW1 switch. Make sure each address number (slave address) you set for each driver is unique. Address number (slave address) 0 is reserved for broadcasting, so do not use this address.

| | | |
|------------------------|--|---|
| Factory setting | • Built-in controller type | Address number 0 (ID switch: 0, No.1 of the SW1 switch: OFF) |
| | • Pulse input type with RS-485 communication interface | Address number 1 (ID switch: 1, No.1 of the SW1 switch: OFF) |

| ID switch | SW1-No.1 | Address number | ID switch | SW1-No.1 | Address number |
|-----------|----------|----------------|-----------|----------|----------------|
| 0 | OFF | Not used | 0 | ON | 16 |
| 1 | | 1 | 1 | | 17 |
| 2 | | 2 | 2 | | 18 |
| 3 | | 3 | 3 | | 19 |
| 4 | | 4 | 4 | | 20 |
| 5 | | 5 | 5 | | 21 |
| 6 | | 6 | 6 | | 22 |
| 7 | | 7 | 7 | | 23 |
| 8 | | 8 | 8 | | 24 |
| 9 | | 9 | 9 | | 25 |
| A | | 10 | A | | 26 |
| B | | 11 | B | | 27 |
| C | | 12 | C | | 28 |
| D | | 13 | D | | 29 |
| E | | 14 | E | | 30 |
| F | | 15 | F | | 31 |



Address number (slave address) 0 is reserved for broadcasting, so do not set this address.

6-3 Transmission rate

Set the transmission rate of RS-485 communication with the BAUD switch.

The transmission rate to be set should be the same as the transmission rate of the master controller.

| | | |
|------------------------|--|-----------------|
| Factory setting | • Built-in controller type | 7 (115,200 bps) |
| | • Pulse input type with RS-485 communication interface | 4 (115,200 bps) |

| BAUD Switch | Transmission rate (bps) |
|-------------|-------------------------|
| 0 | 9,600 |
| 1 | 19,200 |
| 2 | 38,400 |
| 3 | 57,600 |
| 4 | 115,200 |

| BAUD switch | Transmission rate (bps) |
|-------------|-------------------------|
| 5 | 230,400 |
| 6 | Not used |
| 7 | 115,200 |
| 8 to F | Not used |



- Do not set to positions 6 or 8 to F.
- When the BAUD switch is set to "7," the default function is enabled. (Default function → p.282)

6-4 Termination resistor

For the driver that is most distant from the master controller (termination), set the termination register ($120\ \Omega$) of RS-485 communication.

For the AC power input driver, turn both No.1 and No. 2 of the TERM switch ON.

For the DC power input driver, turn both No. 3 and No. 4 of the SW1 switch ON.

| | | |
|------------------------|--|-----|
| Factory setting | • Built-in controller type | OFF |
| | • Pulse input type with RS-485 communication interface | OFF |

| | |
|---|---|
| No.1 and No.2 of the TERM switch or No.3 and No.4 of the SW1 switch | Termination resistor ($120\ \Omega$) |
| Both are OFF | Disabled |
| Both are ON | Enabled |



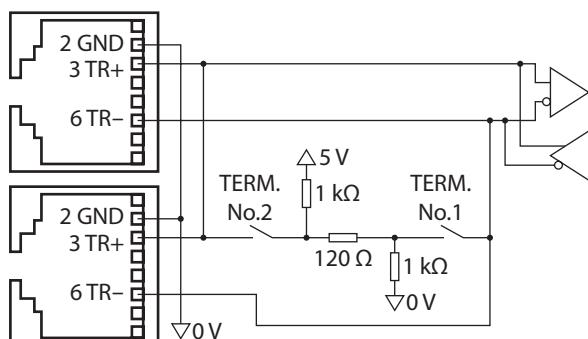
If only one of the two switches is turned ON, a communication error may occur.

■ CN6/CN7 pin assignment

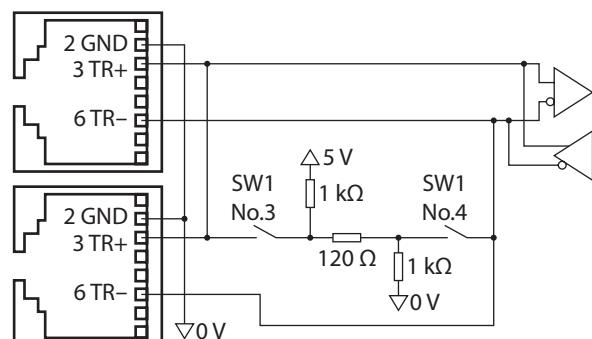
| Pin No. | Signal name | Description |
|---------|-------------|---------------------------------|
| 1 | NC | Not used |
| 2 | GND | GND |
| 3 | TR+ | RS-485 communication signal (+) |
| 4 | NC | Not used |
| 5 | NC | Not used |
| 6 | TR- | RS-485 communication signal (-) |
| 7 | NC | Not used |
| 8 | NC | Not used |

■ Internal input circuit

• AC power input driver



• DC power input driver



7 Setting of RS-485 communication

Set parameters required for RS-485 communication before performing communication.

7-1 Parameters reflected when turning on the power

These are parameters related to sending/receiving via RS-485 communication. Set these parameters using the **MEXE02**.

- They are out of the range of configuration.
- They are not initialized even if the maintenance command "Batch data initialization" is executed.
- They are initialized if the maintenance command "All data batch initialization" is executed. When the power is cycled after execution of "All data batch initialization," the communication setting may be changed, disabling communication.
- When "Return to factory setting" of the **MEXE02** is executed, they are initialized.

| MEXE02 tree view | Parameter name | Description | Initial value |
|---------------------|------------------------------------|---|---------------|
| Communication & I/F | RS485-I/F mode selection | Sets the protocol of RS-485 communication. Setting range –1: Disable 0: The switch setting of the driver is followed 1: Network converter (NETC) 2: Modbus RTU mode | 0 |
| | Slave address (Modbus) | Sets the address number (slave address). Setting range –1: The switch setting of the driver is followed 1 to 31: Address number 1 to 31 (0 is not used) | -1 |
| | Baudrate (Modbus) | Sets the transmission rate. Setting range –1: Follow the switch setting of the driver 0: 9,600 bps 1: 19,200 bps 2: 38,400 bps 3: 57,600 bps 4: 115,200 bps 5: 230,400 bps | -1 |
| | Byte & word order (Modbus) | Sets the byte order of 32-bit data. Set it when the arrangement of the communication data is different from that of the master controller. (Setting example → p.282) Setting range 0: Even Address-High Word & Big-Endian 1: Even Address-Low Word & Big-Endian 2: Even Address-High Word & Little-Endian 3: Even Address-Low Word & Little-Endian | 0 |
| | Communication parity (Modbus) | Setting range 0: None 1: Even parity 2: Odd parity | 1 |
| | Communication stop bit (Modbus) | Setting range 0: 1 bit 1: 2 bit | 0 |
| | Transmission waiting time (Modbus) | Sets the transmission waiting time of RS-485 communication. Setting range 0 to 10,000 (1=0.1 s) | 30 |
| Communication & I/F | Silent interval (Modbus) | Setting range 0: Set automatically 1 to 100: Set by 0.1 ms | 0 |

■ Setting example of the "Byte & word order (Modbus)" parameter

When 32-bit data "12345678h" is stored at the register addresses 1000h and 1001h, arrangement is changed as follows depending on the setting of parameters.

| Setting of parameters | 1000h (even address) | | 1001h (odd address) | |
|---|----------------------|-------|---------------------|-------|
| | Upper | Lower | Upper | Lower |
| 0: Even Address-High Word & Big-Endian | 12h | 34h | 56h | 78h |
| 1: Even Address-Low Word & Big-Endian | 56h | 78h | 12h | 34h |
| 2: Even Address-High Word & Little-Endian | 34h | 12h | 78h | 56h |
| 3: Even Address-Low Word & Little-Endian | 78h | 56h | 34h | 12h |



The description in this document is based on "0: Even Address-High Word & Big-Endian."

7-2

Parameters reflected immediately after rewriting

Set the following parameters using the **MEXE02** or via RS-485 communication.

| MEXE02 tree view | Parameter name | Description | Initial value |
|---------------------|--|--|---------------|
| Communication & I/F | Communication timeout (Modbus) | Sets the condition under which a communication timeout occurs in RS-485 communication. Setting range 0: Not monitored 1 to 10,000: Set by 1 ms | 0 |
| | Communication error detection (Modbus) | When the RS-485 communication error has occurred for the set number of times, a communication error alarm is generated. Setting range 1 to 10 times | 3 |
| | Slave error response mode (Modbus) | Setting range 0: Even if a slave error occurs, a normal response is returned 1: When a slave error occurs, an exception response is returned | 1 |
| | Test mode timeout (Modbus) | This parameter is a reserved function. Not possible to use. | 300 |

7-3

Forcible return of parameters to initial values (default function)

Return some parameters related to RS-485 communication to their initial values.

- Turn No.2 of the SW1 switch ON.
The Modbus protocol is selected.
- Set the BAUD switch to "7."
The default function is enabled, and the following parameters are returned to their initial values.

| MEXE02 tree view | Parameter name | Initial value |
|---------------------|------------------------------------|--|
| Communication & I/F | Baudrate (Modbus) | -1: The switch setting of the driver is followed |
| | Byte & word order (Modbus) | 0: Even Address-High Word & Big-Endian |
| | Communication parity (Modbus) | 1: Even parity |
| | Communication stop bit (Modbus) | 0: 1 bit |
| | Transmission waiting time (Modbus) | 30 (3 ms) |
| | Silent interval (Modbus) | 0: Set automatically |

8 Example of data setting in Modbus RTU mode

8-1 Remote I/O command

These are commands related to remote I/O. The set values are stored in RAM.

| Register address | | Name | Description | Initial value | R/W |
|------------------|----------------|--------------------------------------|---|---------------|-----|
| Upper | Lower | | | | |
| 114 (0072h) | 115 (0073h) | NET selection number | Selects the operation data number. Operation data can be sent at the same time as "Driver input command (2nd)." | -1 | R/W |
| 116 (0074h) | 117 (0075h) | Driver input command (2nd) | The input command same as "Driver input command (reference)" is set automatically. | 0 | R/W |
| 118 (0076h) | 119 (0077h) | NET selection number | Selects the operation data number. Operation data can be sent at the same time as "Driver input command (automatic OFF)." | -1 | R/W |
| 120 (0078h) | 121 (0079h) | Driver input command (automatic OFF) | The input command same as "Driver input command (reference)" is set automatically. When the input signal is turned ON with this command, it is turned OFF automatically after 250 µs. | 0 | R/W |
| 122 (007Ah) | 123 (007Bh) | NET selection number | Selects the operation data number. Operation data can be sent at the same time as "Driver input command (reference)." | -1 | R/W |
| 124 (007Ch) | 125 (007Dh) | Driver input command (reference) | Sets the input command to the driver. (Details of bit arrangement ⇒ Next paragraph) | 0 | R/W |
| 126 (007Eh) | 127 (007Fh) | Driver output status | Acquires the output status of the driver. (Details of bit arrangement ⇒ p.284) | - | R |

■ Driver input command

These are the driver input signals that can be accessed via Modbus communication. They can be accessed by one register (16 bit).

● Upper

| Register address | Description | | | | | | | |
|------------------|-------------|-------|-------|-------|-------|-------|------|------|
| | bit15 | bit14 | bit13 | bit12 | bit11 | bit10 | bit9 | bit8 |
| 124 (007Ch) | - | - | - | - | - | - | - | - |
| | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
| | - | - | - | - | - | - | - | - |

● Lower

| Register address | Description * | | | | | | | |
|------------------|--------------------|--------------------|----------------------|----------------------|--------------------|--------------------|-------------------|-------------------|
| | bit15 | bit14 | bit13 | bit12 | bit11 | bit10 | bit9 | bit8 |
| 125 (007Dh) | R-IN15 [RV-POS] | R-IN14 [FW-POS] | R-IN13 [RV-JOG-P] | R-IN12 [FW-JOG-P] | R-IN11 [SSTART] | R-IN10 [D-SEL2] | R-IN9 [D-SEL1] | R-IN8 [D-SEL0] |
| | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
| | R-IN7 [ALM-RST] | R-IN6 [FREE] | R-IN5 [STOP] | R-IN4 [ZHOME] | R-IN3 [START] | R-IN2 [M2] | R-IN1 [M1] | R-IN0 [M0] |

* []: Initial value

■ Driver output status

These are the driver output signals that can be accessed via Modbus communication. They can be accessed by one register (16 bit).

● Upper

| Register address | Description | | | | | | | |
|------------------|-------------|-------|-------|-------|-------|-------|------|------|
| 126 (007Eh) | bit15 | bit14 | bit13 | bit12 | bit11 | bit10 | bit9 | bit8 |
| | – | – | – | – | – | – | – | – |
| | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
| | – | – | – | – | – | – | – | – |

● Lower

| Register address | Description * | | | | | | | |
|------------------|-------------------|---------------------|-------------------|----------------------|---------------------|--------------------|-------------------|---------------------|
| 127 (007Fh) | bit15 | bit14 | bit13 | bit12 | bit11 | bit10 | bit9 | bit8 |
| | R-OUT15 [TLC] | R-OUT14 [IN-POS] | R-OUT13 [MOVE] | R-OUT12 [TIM] | R-OUT11 [AREA2] | R-OUT10 [AREA1] | R-OUT9 [AREA0] | R-OUT8 [SYS-BSY] |
| | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
| | R-OUT7 [ALM-A] | R-OUT6 [INFO] | R-OUT5 [READY] | R-OUT4 [HOME-END] | R-OUT3 [START_R] | R-OUT2 [M2_R] | R-OUT1 [M1_R] | R-OUT0 [M0_R] |

* []: Initial value

8-2 Positioning operation

As an example, here is a description how to execute the following positioning operation.

● Setting example

- Address number (slave address): 1
- Operation data number: 0
- Position (travel amount): 1,000 steps
- Operating speed: 5,000 Hz

● Operation procedure

1. Send the following query and set the position (travel amount) of the operation data No.0 to 1,000 steps and the operating speed to 5,000 Hz.

Query

| Field name | Data | Description |
|---------------------|---|---------------------------------------|
| Slave address | 01h | Slave address 1 |
| Function code | 10h | Writing to multiple holding registers |
| Data | Register address (upper) | 18h |
| | Register address (lower) | 02h |
| | Number of registers (upper) | 00h |
| | Number of registers (lower) | 04h |
| | Number of bytes | 08h |
| | Value write to register address (upper) | 00h |
| | Value write to register address (lower) | 00h |
| | Value write to register address + 1 (upper) | 03h |
| | Value write to register address + 1 (lower) | E8h |
| | Value write to register address + 2 (upper) | 00h |
| | Value write to register address + 2 (lower) | 00h |
| | Value write to register address + 3 (upper) | 13h |
| | Value write to register address + 3 (lower) | 88h |
| Error check (lower) | 03h | Calculation result of CRC-16 |
| Error check (upper) | 17h | |

Response

| Field name | Data | Description |
|---------------------|-----------------------------|------------------------------|
| Slave address | 01h | Same as query |
| Function code | 10h | Same as query |
| Data | Register address (upper) | 18h |
| | Register address (lower) | 02h |
| | Number of registers (upper) | 00h |
| | Number of registers (lower) | 04h |
| Error check (lower) | 66h | Calculation result of CRC-16 |
| Error check (upper) | AAh | |

2. Send the following query and turn START ON. Positioning operation is started.

Query

| Field name | | Data | Description |
|---------------------|--------------------------|------|--|
| Slave address | | 01h | Slave address 1 |
| Function code | | 06h | Writing to a holding register |
| Data | Register address (upper) | 00h | Register address to which writing is executed =Driver input command (007Dh) |
| | Register address (lower) | 7Dh | |
| | Value write (upper) | 00h | Value written to the register address =START ON (0008h) * |
| | Value write (lower) | 08h | |
| Error check (lower) | | 18h | Calculation result of CRC-16 |
| Error check (upper) | | 14h | |

* START is assigned to bit 3 of the driver input command (007Dh) in initial setting.
(1000 in a binary number=0008h in a hexadecimal number)

Response

| Field name | | Data | Description |
|---------------------|--------------------------|------|------------------------------|
| Slave address | | 01h | Same as query |
| Function code | | 06h | Same as query |
| Data | Register address (upper) | 00h | Same as query |
| | Register address (lower) | 7Dh | |
| | Value write (upper) | 00h | Same as query |
| | Value write (lower) | 08h | |
| Error check (lower) | | 18h | Calculation result of CRC-16 |
| Error check (upper) | | 14h | |

3. When positioning operation is started, send the following query and turn START OFF again.

Query

| Field name | | Data | Description |
|---------------------|--------------------------|------|--|
| Slave address | | 01h | Slave address 1 |
| Function code | | 06h | Writing to a holding register |
| Data | Register address (upper) | 00h | Register address to which writing is executed =Driver input command (007Dh) |
| | Register address (lower) | 7Dh | |
| | Value write (upper) | 00h | Value written to the register address =START OFF (0000h) |
| | Value write (lower) | 00h | |
| Error check (lower) | | 19h | Calculation result of CRC-16 |
| Error check (upper) | | D2h | |

Response

| Field name | | Data | Description |
|---------------------|--------------------------|------|------------------------------|
| Slave address | | 01h | Same as query |
| Function code | | 06h | Same as query |
| Data | Register address (upper) | 00h | Same as query |
| | Register address (lower) | 7Dh | |
| | Value write (upper) | 00h | Same as query |
| | Value write (lower) | 00h | |
| Error check (lower) | | 19h | Calculation result of CRC-16 |
| Error check (upper) | | D2h | |

8-3 Continuous operation

As an example, here is a description how to execute the following continuous operation.

● Setting example

- Address number (slave address): 1
- Operation data number: 0
- Rotation direction: Forward direction
- Operating speed: 5,000 Hz

● Operation procedure

1. Send the following query and set the operating speed of the operation data No.0 to 5,000 Hz.

Query

| Field name | Data | Description |
|---------------------|---|---|
| Slave address | 01h | Slave address 1 |
| Function code | 10h | Writing to multiple holding registers |
| Data | Register address (upper) | 04h |
| | Register address (lower) | 80h |
| | Number of registers (upper) | 00h |
| | Number of registers (lower) | 02h |
| | Number of bytes | 04h |
| | Value write to register address (upper) | 00h |
| | Value write to register address (lower) | 00h |
| | Value write to register address + 1 (upper) | 13h |
| | Value write to register address + 1 (lower) | 88h |
| Error check (lower) | C4h | Value written to register address 0480h =Operating speed 5,000 Hz (0000 1388h) |
| Error check (upper) | 59h | |
| | | Calculation result of CRC-16 |

Response

| Field name | Data | Description |
|---------------------|-----------------------------|------------------------------|
| Slave address | 01h | Same as query |
| Function code | 10h | Same as query |
| Data | Register address (upper) | 04h |
| | Register address (lower) | 80h |
| | Number of registers (upper) | 00h |
| | Number of registers (lower) | 02h |
| Error check (lower) | 41h | Same as query |
| Error check (upper) | 10h | |
| | | Calculation result of CRC-16 |

2. Send the following query and turn FW-POS ON. Continuous operation is started.

Query

| Field name | | Data | Description |
|---------------------|--------------------------|------|--|
| Slave address | | 01h | Slave address 1 |
| Function code | | 06h | Writing to a holding register |
| Data | Register address (upper) | 00h | Register address to which writing is executed =Driver input command (007Dh) |
| | Register address (lower) | 7Dh | |
| | Value write (upper) | 40h | Value written to the register address =FW-POS ON (4000h) * |
| | Value write (lower) | 00h | |
| Error check (lower) | | 28h | Calculation result of CRC-16 |
| Error check (upper) | | 12h | |

* FW-POS is assigned to bit 15 of the driver input command (007Dh) in initial setting.
(0100 0000 0000 0000 in a binary number=4000h in a hexadecimal number)

Response

| Field name | | Data | Description |
|---------------------|--------------------------|------|------------------------------|
| Slave address | | 01h | Same as query |
| Function code | | 06h | Same as query |
| Data | Register address (upper) | 00h | Same as query |
| | Register address (lower) | 7Dh | |
| | Value write (upper) | 40h | Same as query |
| | Value write (lower) | 00h | |
| Error check (lower) | | 28h | Calculation result of CRC-16 |
| Error check (upper) | | 12h | |

3. To stop continuous operation, send the following query and turn FW-POS OFF again. The motor decelerates to a stop.

Query

| Field name | | Data | Description |
|---------------------|--------------------------|------|--|
| Slave address | | 01h | Slave address 1 |
| Function code | | 06h | Writing to a holding register |
| Data | Register address (upper) | 00h | Register address to which writing is executed =Driver input command (007Dh) |
| | Register address (lower) | 7Dh | |
| | Value write (upper) | 00h | Value written to the register address =FW-POS OFF (0000h) |
| | Value write (lower) | 00h | |
| Error check (lower) | | 19h | Calculation result of CRC-16 |
| Error check (upper) | | D2h | |

Response

| Field name | | Data | Description |
|---------------------|--------------------------|------|------------------------------|
| Slave address | | 01h | Same as query |
| Function code | | 06h | Same as query |
| Data | Register address (upper) | 00h | Same as query |
| | Register address (lower) | 7Dh | |
| | Value write (upper) | 00h | Same as query |
| | Value write (lower) | 00h | |
| Error check (lower) | | 19h | Calculation result of CRC-16 |
| Error check (upper) | | D2h | |

8-4 High-speed return-to-home operation

As an example, here is a description how to execute the following high-speed return-to-home operation.

● Setting example

- Address number (slave address): 1
- Operation condition: Initial value

● Operation procedure

1. Send the following query and turn ZHOME ON. High-speed return-to-home operation is started.

Query

| Field name | | Data | Description |
|---------------------|--------------------------|------|--|
| Slave address | | 01h | Slave address 1 |
| Function code | | 06h | Writing to a holding register |
| Data | Register address (upper) | 00h | Register address to which writing is executed =Driver input command (007Dh) |
| | Register address (lower) | 7Dh | |
| | Value write (upper) | 00h | Value written to the register address =ZHOME ON (0010h) * |
| | Value write (lower) | 10h | |
| Error check (lower) | | 18h | Calculation result of CRC-16 |
| Error check (upper) | | 1Eh | |

* ZHOME is assigned to bit 4 of the driver input command (007Dh) in initial setting.
(10000 in a binary number=0010h in a hexadecimal number)

Response

| Field name | | Data | Description |
|---------------------|--------------------------|------|------------------------------|
| Slave address | | 01h | Same as query |
| Function code | | 06h | Same as query |
| Data | Register address (upper) | 00h | Same as query |
| | Register address (lower) | 7Dh | |
| | Value write (upper) | 00h | Same as query |
| | Value write (lower) | 10h | |
| Error check (lower) | | 18h | Calculation result of CRC-16 |
| Error check (upper) | | 1Eh | |

2. When high-speed return-to-home operation is complete, send the following query and turn ZHOME OFF again.

Query

| Field name | | Data | Description |
|---------------------|--------------------------|------|--|
| Slave address | | 01h | Slave address 1 |
| Function code | | 06h | Writing to a holding register |
| Data | Register address (upper) | 00h | Register address to which writing is executed =Driver input command (007Dh) |
| | Register address (lower) | 7Dh | |
| | Value write (upper) | 00h | Value written to the register address =ZHOME OFF (0000h) |
| | Value write (lower) | 00h | |
| Error check (lower) | | 19h | Calculation result of CRC-16 |
| Error check (upper) | | D2h | |

Response

| Field name | | Data | Description |
|---------------------|--------------------------|------|------------------------------|
| Slave address | | 01h | Same as query |
| Function code | | 06h | Same as query |
| Data | Register address (upper) | 00h | Same as query |
| | Register address (lower) | 7Dh | |
| | Value write (upper) | 00h | Same as query |
| | Value write (lower) | 00h | |
| Error check (lower) | | 19h | Calculation result of CRC-16 |
| Error check (upper) | | D2h | |

9 Data setting method

9-1 Overview of setting method

There are three methods to set data via Modbus communication.

The communication specification of Modbus allows reading/writing from/to successive addresses when multiple data pieces are handled.

■ When operation data is set

| Input method | Features |
|-----------------------|---|
| Direct data operation | Rewriting of data and start of operation can be executed at the same time. (Ref. \Rightarrow p.299) |
| Direct reference | <ul style="list-style-type: none"> • Data is set by specifying the address. • If the data consists of successive addresses, multiple data pieces can be handled with one query. • The set data is operated by inputting the remote I/O. |
| Indirect reference | <ul style="list-style-type: none"> • This is a method in which data is stored in addresses exclusive for sending (indirect reference addresses) and set. • Even if addresses of the data to be set are not successive, multiple data pieces can be handled with one query because the indirect reference addresses are successive. • The set data is operated by inputting the remote I/O. |

■ When setting of parameters, monitoring, or information, etc. is executed

- When addresses are successive: Set data by using direct reference.
- When addresses are not successive: If indirect reference is used, multiple commands can be executed with one query.

Here, direct reference and indirect reference are explained.

9-2 Direct reference

Direct reference is a method in which data is set by specifying addresses. Multiple successive addresses can be sent with one query. However, if addresses to be set are not successive, queries as many as the number of addresses should be sent.

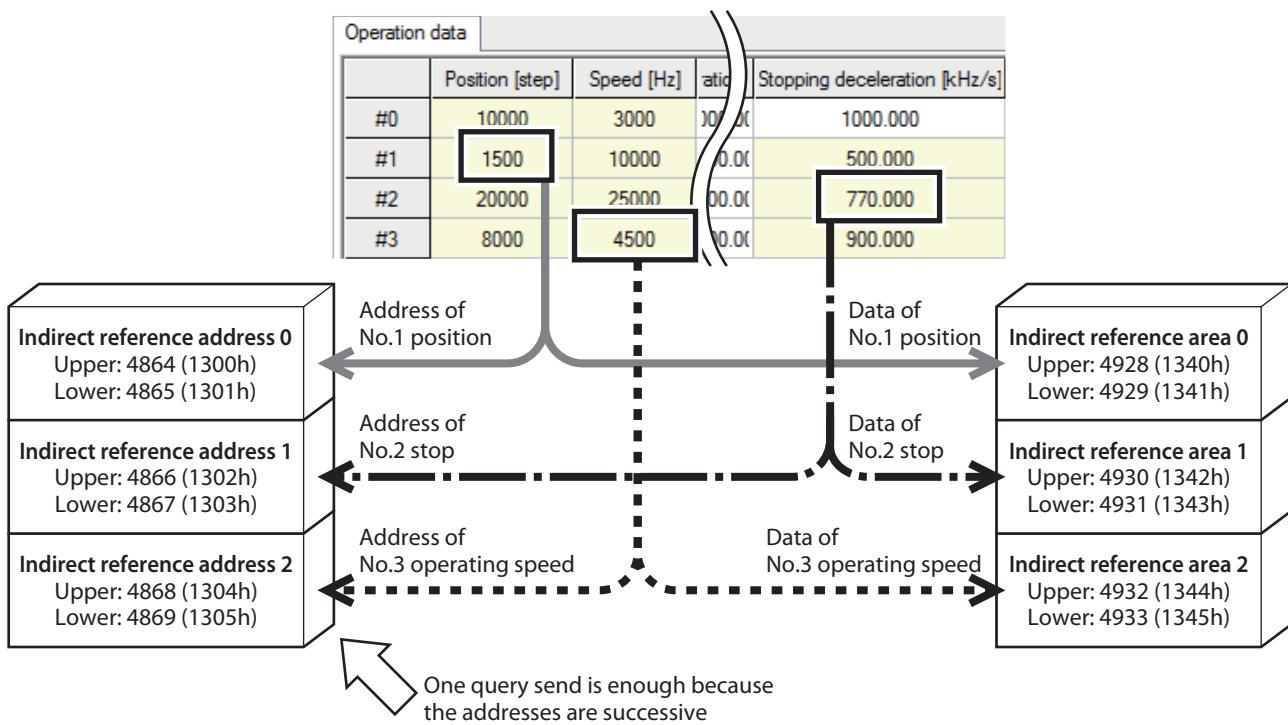


Operation data has two types of addresses: addresses arranged by operation data number and addresses arranged by item of operation data. Use them respectively in accordance with your purpose. (\Rightarrow p.379)

9-3 Indirect reference

Indirect reference is a method in which data is stored in addresses exclusive for sending (indirect reference addresses) and set. Even if addresses of the data to be set are not successive, multiple data pieces can be sent with one query because the indirect reference addresses are successive.

The addresses of the data to be set are stored in "Address" of indirect reference. The set values of data are stored in "Area" of indirect reference.



■ Addresses and areas of indirect reference

Indirect reference has 32 addresses and 32 areas (0 to 31).

| Name | Description |
|---|--|
| Indirect reference address setting (0) | |
| Indirect reference address setting (1) | Stores the ID of data to be sent in indirect reference. The ID is a unique number retained inside the driver and assigned to each setting item. In Modbus communication, a value twice as much as the ID is the register address. Be sure to input the "half value of the register address." |
| Indirect reference address setting (30) | |
| Indirect reference address setting (31) | |
| Indirect reference area 0 | |
| Indirect reference area 1 | |
| Indirect reference area 30 | Stores the set value of data to be sent in indirect reference. |
| Indirect reference area 31 | |

Related parameters

| MEXE02 tree view | Name | Description | Initial value |
|---------------------|---|---|---------------|
| | Indirect reference address setting (0) | | |
| | Indirect reference address setting (1) | | |
| | Indirect reference address setting (2) | | |
| | Indirect reference address setting (3) | | |
| | Indirect reference address setting (4) | | |
| | Indirect reference address setting (5) | | |
| | Indirect reference address setting (6) | | |
| | Indirect reference address setting (7) | | |
| | Indirect reference address setting (8) | | |
| | Indirect reference address setting (9) | | |
| | Indirect reference address setting (10) | | |
| | Indirect reference address setting (11) | | |
| | Indirect reference address setting (12) | | |
| | Indirect reference address setting (13) | | |
| | Indirect reference address setting (14) | Sets the ID of the data to be stored in the indirect reference address. | |
| | Indirect reference address setting (15) | | |
| Communication & I/F | Indirect reference address setting (16) | Setting range 0 to 65,535 (0 to FFFFh) | 0 |
| | Indirect reference address setting (17) | | |
| | Indirect reference address setting (18) | | |
| | Indirect reference address setting (19) | | |
| | Indirect reference address setting (20) | | |
| | Indirect reference address setting (21) | | |
| | Indirect reference address setting (22) | | |
| | Indirect reference address setting (23) | | |
| | Indirect reference address setting (24) | | |
| | Indirect reference address setting (25) | | |
| | Indirect reference address setting (26) | | |
| | Indirect reference address setting (27) | | |
| | Indirect reference address setting (28) | | |
| | Indirect reference address setting (29) | | |
| | Indirect reference address setting (30) | | |
| | Indirect reference address setting (31) | | |

● Register addresses of indirect reference addresses

| Register address | | Name |
|------------------|-----------------|---|
| Upper | Lower | |
| 4864 (1300h) | 4865 (1301h) | Indirect reference address setting (0) |
| 4866 (1302h) | 4867 (1303h) | Indirect reference address setting (1) |
| 4868 (1304h) | 4869 (1305h) | Indirect reference address setting (2) |
| 4870 (1306h) | 4871 (1307h) | Indirect reference address setting (3) |
| 4872 (1308h) | 4873 (1309h) | Indirect reference address setting (4) |
| 4874 (130Ah) | 4875 (130Bh) | Indirect reference address setting (5) |
| 4876 (130Ch) | 4877 (130Dh) | Indirect reference address setting (6) |
| 4878 (130Eh) | 4879 (130Fh) | Indirect reference address setting (7) |
| 4880 (1310h) | 4881 (1311h) | Indirect reference address setting (8) |
| 4882 (1312h) | 4883 (1313h) | Indirect reference address setting (9) |
| 4884 (1314h) | 4885 (1315h) | Indirect reference address setting (10) |
| 4886 (1316h) | 4887 (1317h) | Indirect reference address setting (11) |
| 4888 (1318h) | 4889 (1319h) | Indirect reference address setting (12) |
| 4890 (131Ah) | 4891 (131Bh) | Indirect reference address setting (13) |
| 4892 (131Ch) | 4893 (131Dh) | Indirect reference address setting (14) |
| 4894 (131Eh) | 4895 (131Fh) | Indirect reference address setting (15) |

| Register address | | Name |
|------------------|-----------------|---|
| Upper | Lower | |
| 4896 (1320h) | 4897 (1321h) | Indirect reference address setting (16) |
| 4898 (1322h) | 4899 (1323h) | Indirect reference address setting (17) |
| 4900 (1324h) | 4901 (1325h) | Indirect reference address setting (18) |
| 4902 (1326h) | 4903 (1327h) | Indirect reference address setting (19) |
| 4904 (1328h) | 4905 (1329h) | Indirect reference address setting (20) |
| 4906 (132Ah) | 4907 (132Bh) | Indirect reference address setting (21) |
| 4908 (132Ch) | 4909 (132Dh) | Indirect reference address setting (22) |
| 4910 (132Eh) | 4911 (132Fh) | Indirect reference address setting (23) |
| 4912 (1330h) | 4913 (1331h) | Indirect reference address setting (24) |
| 4914 (1332h) | 4915 (1333h) | Indirect reference address setting (25) |
| 4916 (1334h) | 4917 (1335h) | Indirect reference address setting (26) |
| 4918 (1336h) | 4919 (1337h) | Indirect reference address setting (27) |
| 4920 (1338h) | 4921 (1339h) | Indirect reference address setting (28) |
| 4922 (133Ah) | 4923 (133Bh) | Indirect reference address setting (29) |
| 4924 (133Ch) | 4925 (133Dh) | Indirect reference address setting (30) |
| 4926 (133Eh) | 4927 (133Fh) | Indirect reference address setting (31) |

● Register addresses of indirect reference areas

| Register address | | Name |
|------------------|-----------------|----------------------------|
| Upper | Lower | |
| 4928 (1340h) | 4929 (1341h) | Indirect reference area 0 |
| 4930 (1342h) | 4931 (1343h) | Indirect reference area 1 |
| 4932 (1344h) | 4933 (1345h) | Indirect reference area 2 |
| 4934 (1346h) | 4935 (1347h) | Indirect reference area 3 |
| 4936 (1348h) | 4937 (1349h) | Indirect reference area 4 |
| 4938 (134Ah) | 4939 (134Bh) | Indirect reference area 5 |
| 4940 (134Ch) | 4941 (134Dh) | Indirect reference area 6 |
| 4942 (134Eh) | 4943 (134Fh) | Indirect reference area 7 |
| 4944 (1350h) | 4945 (1351h) | Indirect reference area 8 |
| 4946 (1352h) | 4947 (1353h) | Indirect reference area 9 |
| 4948 (1354h) | 4949 (1355h) | Indirect reference area 10 |
| 4950 (1356h) | 4951 (1357h) | Indirect reference area 11 |
| 4952 (1358h) | 4953 (1359h) | Indirect reference area 12 |
| 4954 (135Ah) | 4955 (135Bh) | Indirect reference area 13 |
| 4956 (135Ch) | 4957 (135Dh) | Indirect reference area 14 |
| 4958 (135Eh) | 4959 (135Fh) | Indirect reference area 15 |

| Register address | | Name |
|------------------|-----------------|----------------------------|
| Upper | Lower | |
| 4960 (1360h) | 4961 (1361h) | Indirect reference area 16 |
| 4962 (1362h) | 4963 (1363h) | Indirect reference area 17 |
| 4964 (1364h) | 4965 (1365h) | Indirect reference area 18 |
| 4966 (1366h) | 4967 (1367h) | Indirect reference area 19 |
| 4968 (1368h) | 4969 (1369h) | Indirect reference area 20 |
| 4970 (136Ah) | 4971 (136Bh) | Indirect reference area 21 |
| 4972 (136Ch) | 4973 (136Dh) | Indirect reference area 22 |
| 4974 (136Eh) | 4975 (136Fh) | Indirect reference area 23 |
| 4976 (1370h) | 4977 (1371h) | Indirect reference area 24 |
| 4978 (1372h) | 4979 (1373h) | Indirect reference area 25 |
| 4980 (1374h) | 4981 (1375h) | Indirect reference area 26 |
| 4982 (1376h) | 4983 (1377h) | Indirect reference area 27 |
| 4984 (1378h) | 4985 (1379h) | Indirect reference area 28 |
| 4986 (137Ah) | 4987 (137Bh) | Indirect reference area 29 |
| 4988 (137Ch) | 4989 (137Dh) | Indirect reference area 30 |
| 4990 (137Eh) | 4991 (137Fh) | Indirect reference area 31 |

■ Setting example

The following is an example of sending/receiving of data to/from the address number 1 using indirect reference.

● STEP 1: Registration in indirect reference addresses

Set data

| Indirect reference address | Register address | | Data to be sent | ID |
|--|------------------|-------|--|--|
| | Upper | Lower | | |
| Indirect reference address setting (0) | 1300h | 1301h | Position of operation data No.1 | C21h (Half value of register address 1842h) |
| Indirect reference address setting (1) | 1302h | 1303h | Stopping deceleration of operation data No.2 | C44h (Half value of register address 1888h) |
| Indirect reference address setting (2) | 1304h | 1305h | Operating speed of operation data No.3 | C62h (Half value of register address 18C4h) |

Send the following query and register the ID of the data to be sent in the indirect reference addresses.

Query

| Field name | | Data | Description |
|---------------------|---|------|---|
| Slave address | | 01h | Slave address 1 |
| Function code | | 10h | Writing to multiple holding registers |
| Data | Register address (upper) | 13h | Register address to start writing from =Indirect reference address setting (0) (1300h) |
| | Register address (lower) | 00h | |
| | Number of registers (upper) | 00h | Number of registers to be written from the starting register address=6 registers (0006h) |
| | Number of registers (lower) | 06h | |
| | Number of bytes | 0Ch | Twice the number of registers in the query=12 |
| | Value write to register address (upper) | 00h | |
| | Value write to register address (lower) | 00h | Value written to register address 1300h =ID of operation data No.1 position (C21h) |
| | Value write to register address + 1 (upper) | 0Ch | |
| | Value write to register address + 1 (lower) | 21h | |
| | Value write to register address + 2 (upper) | 00h | Value written to register address 1302h =ID of operation data No.2 stopping deceleration (C44h) |
| | Value write to register address + 2 (lower) | 00h | |
| | Value write to register address + 3 (upper) | 0Ch | |
| | Value write to register address + 3 (lower) | 44h | |
| | Value write to register address + 4 (upper) | 00h | Value written to register address 1304h =ID of operation data No.3 operating speed (C62h) |
| | Value write to register address + 4 (lower) | 00h | |
| | Value write to register address + 5 (upper) | 0Ch | |
| | Value write to register address + 5 (lower) | 62h | |
| Error check (lower) | | D7h | |
| Error check (upper) | | A6h | Calculation result of CRC-16 |

- STEP 2: Writing to indirect reference areas

Set data

| Indirect reference area | Register address | | Data to be sent | Setting value |
|---------------------------|------------------|-------|--|------------------|
| | Upper | Lower | | |
| Indirect reference area 0 | 1340h | 1341h | Position of operation data No.1 | 1,500 (5DCh) |
| Indirect reference area 1 | 1342h | 1343h | Stopping deceleration of operation data No.2 | 770,000 (BBFD0h) |
| Indirect reference area 2 | 1344h | 1345h | Operating speed of operation data No.3 | 4,500 (1194h) |

Send the following query and write the set values of the data to be sent in the indirect reference areas.

Query

| Field name | Data | Description |
|---|------|--|
| Slave address | 01h | Slave address 1 |
| Function code | 10h | Writing to multiple holding registers |
| Register address (upper) | 13h | Register address to start writing from =Indirect reference area 0 (1340h) |
| Register address (lower) | 40h | |
| Number of registers (upper) | 00h | Number of registers to be written from the starting register address=6 registers (0006h) |
| Number of registers (lower) | 06h | |
| Number of bytes | 0Ch | Twice the number of registers in the query=12 |
| Value write to register address (upper) | 00h | Value written to register address 1340h =Operation data No.1 position 1,500 (5DCh) |
| Value write to register address (lower) | 00h | |
| Value write to register address + 1 (upper) | 05h | Value written to register address 1342h =Operation data No.2 stopping deceleration 770,000 (BBFD0h) |
| Value write to register address + 1 (lower) | DCh | |
| Value write to register address + 2 (upper) | 00h | Value written to register address 1344h =Operation data No.3 operating speed 4,500 (1194h) |
| Value write to register address + 2 (lower) | 0Bh | |
| Value write to register address + 3 (upper) | BFh | |
| Value write to register address + 3 (lower) | D0h | |
| Value write to register address + 4 (upper) | 00h | |
| Value write to register address + 4 (lower) | 00h | |
| Value write to register address + 5 (upper) | 11h | |
| Value write to register address + 5 (lower) | 94h | |
| Error check (lower) | 72h | Calculation result of CRC-16 |
| Error check (upper) | E5h | |

- **STEP 3: Reading from indirect reference areas**

Send the following query and read the data written in the indirect reference areas.

Query

| Field name | | Data | Description |
|---------------------|-----------------------------|------|--|
| Slave address | | 01h | Slave address 1 |
| Function code | | 03h | Reading from holding registers |
| Data | Register address (upper) | 13h | Register address to start reading from =Indirect reference area 0 (1340h) |
| | Register address (lower) | 40h | |
| | Number of registers (upper) | 00h | Number of registers to be read from the starting register address=6 registers (0006h) |
| | Number of registers (lower) | 06h | |
| Error check (lower) | | C0h | Calculation result of CRC-16 |
| Error check (upper) | | 98h | |

Response

| Field name | | Data | Description |
|---------------------|--|------|---|
| Slave address | | 01h | Same as query |
| Function code | | 03h | Same as query |
| Data | Number of data bytes | 0Ch | Twice the number of registers in the query=12 |
| | Value read from register address (upper) | 00h | Value read from register address 1340h =1,500 (5DCh) |
| | Value read from register address (lower) | 00h | |
| | Value read from register address + 1 (upper) | 05h | |
| | Value read from register address + 1 (lower) | DCh | |
| | Value read from register address + 2 (upper) | 00h | Value read from register address 1342h =770,000 (BBFD0h) |
| | Value read from register address + 2 (lower) | 0Bh | |
| | Value read from register address + 3 (upper) | Bfh | |
| | Value read from register address + 3 (lower) | D0h | |
| | Value read from register address + 4 (upper) | 00h | Value read from register address 1344h =4,500 (1194h) |
| | Value read from register address + 4 (lower) | 00h | |
| | Value read from register address + 5 (upper) | 11h | |
| | Value read from register address + 5 (lower) | 94h | |
| Error check (lower) | | 27h | Calculation result of CRC-16 |
| Error check (upper) | | 87h | |

It was found that the data had been written normally by using indirect reference.

10 Direct data operation

10-1 Overview of direct data operation

Direct data operation is a mode that allows rewriting of data and start of operation to be executed at the same time. It is suitable to frequently change operation data such as the position (travel amount) and operating speed or to fine-tune the position.

There are eight types of triggers to start operation at the same time as rewriting of data.

- One of the following items: operation data number, operation type, position, operating speed, starting/changing speed rate, stopping deceleration, and operating current
- The above seven items are collectively rewritten

■ Usage examples of direct data operation

● Example 1

The position (travel amount) and the operating speed should be adjusted since the feed rate varies depending on lots.

Setting example

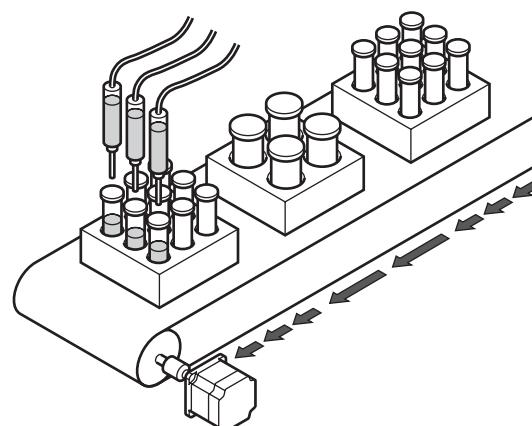
- Position (travel amount): Change arbitrarily
- Operating speed: Change arbitrarily
- Trigger: All the items (set value of trigger: 1)

Steps

1. Write the data of the position and operating speed.
2. Write "1" to the trigger.

Result

When the trigger is written, the changed value is reflected immediately, and operation is performed with the new position and operating speed.



● Example 2

The operating speed should be changed immediately with the touch panel since a large workpiece is inspected at a lower speed.

Setting example

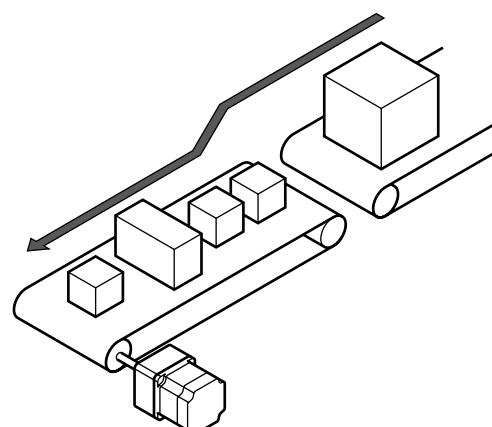
- Operating speed: Change arbitrarily
- Trigger: Operating speed (set value of trigger: -4)

Steps

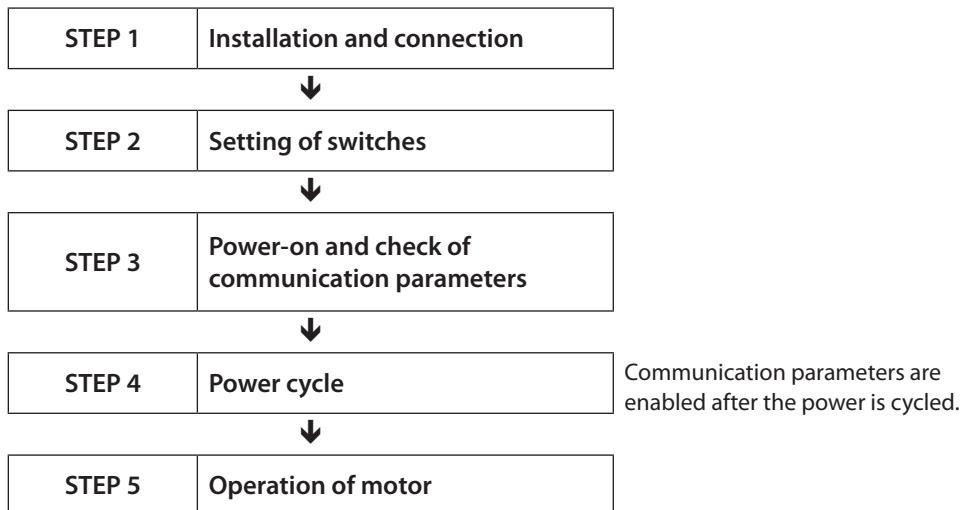
1. Write "-4" to the trigger.
2. Write the data of the operating speed.

Result

When the operating speed is written, the changed value is reflected immediately, and operation is performed at the new speed.



10-2 Guidance



● Example of operating condition

Here, the motor is assumed to be operated under the following conditions.

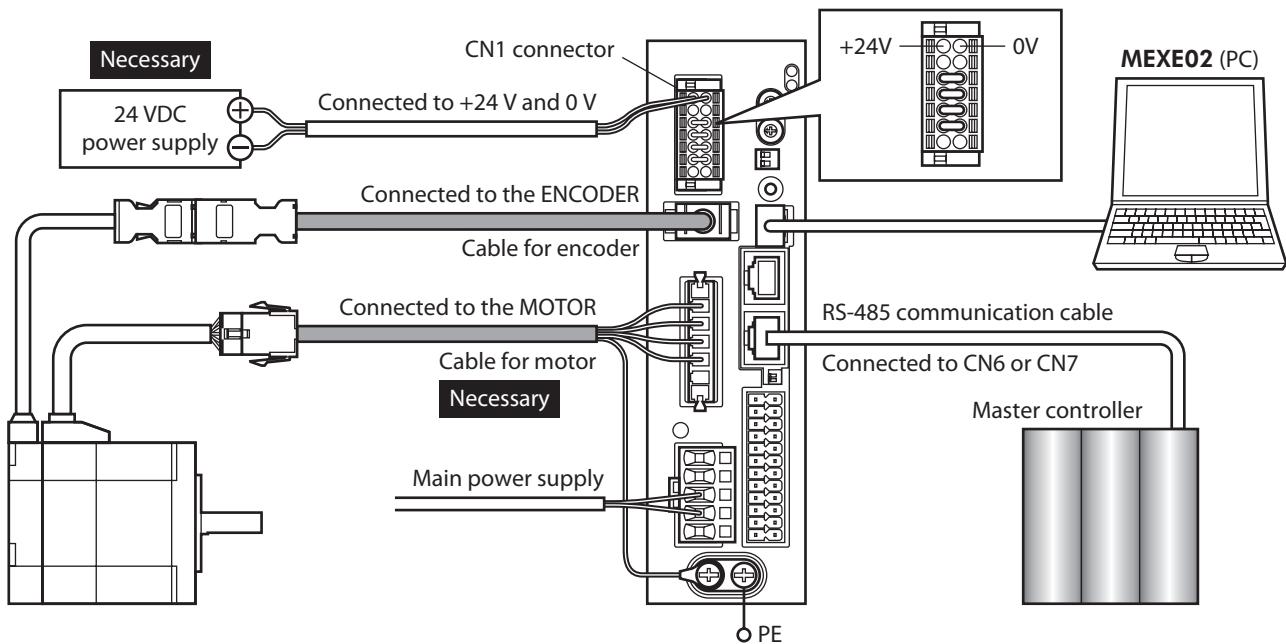
- Number of drivers connected: One
- Address number: 1
- Transmission rate: 115,200 bps
- Termination resistor: Set



Before operating the motor, check the condition of the surrounding area to ensure safety.

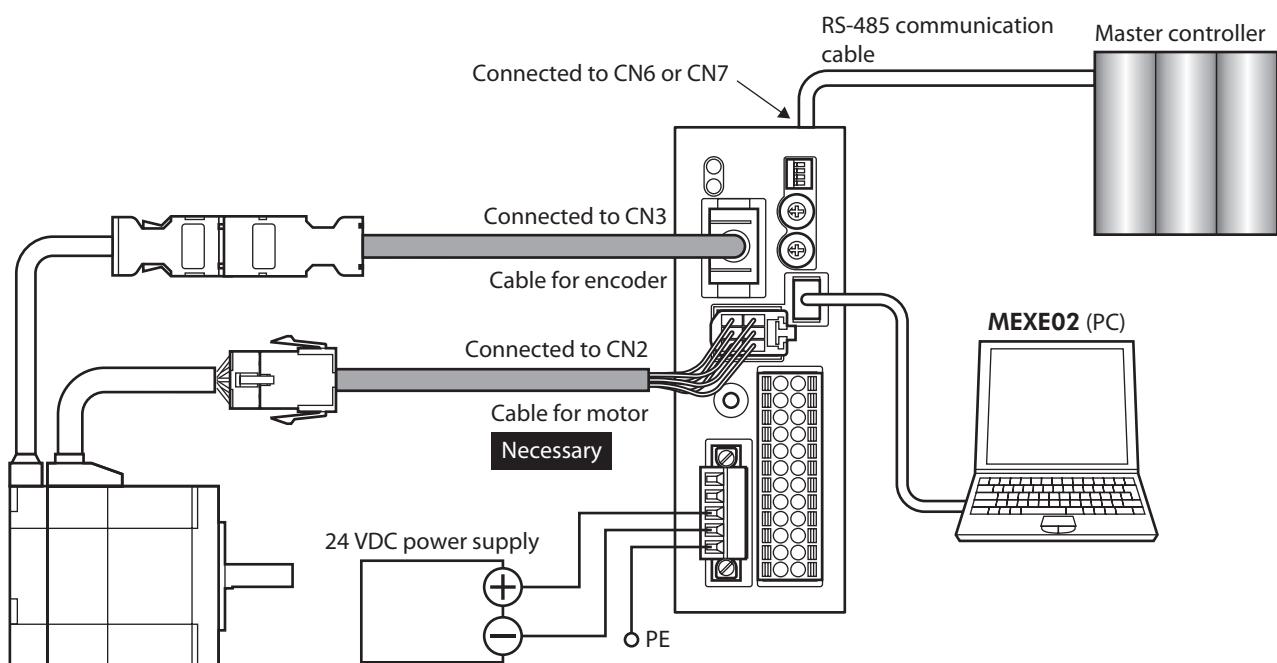
STEP 1 Check the installation and connection

■ AC power input driver



Cables represented in gray color are accessories. Use the cable for encoder when the length of the encoder cable of motor is not enough.

■ DC power input driver



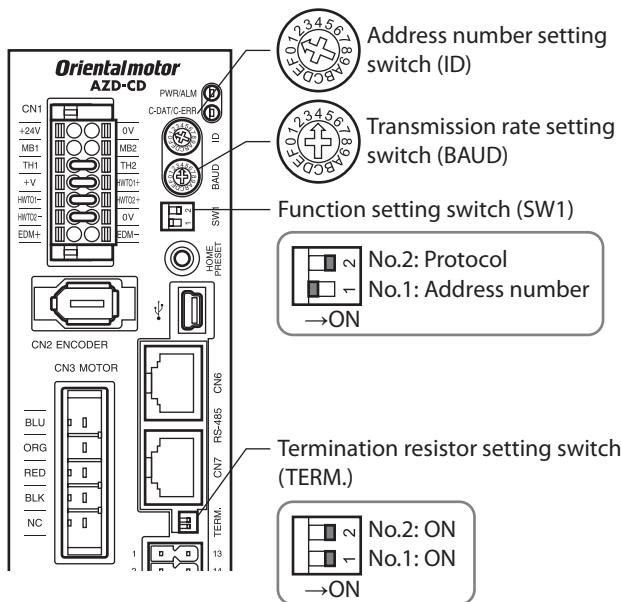
Cables represented in gray color are accessories. Use the cable for encoder when the length of the encoder cable of motor is not enough.

STEP 2 Set the switches

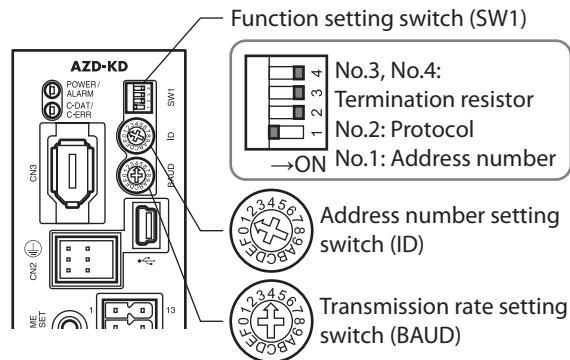
Set as shown in the following table with the switches. The status becomes as shown in the figures below after setting.

| Setting contents | Switch |
|--------------------------------|---|
| Protocol: Modbus protocol | Turn No.2 of SW1 ON |
| Address number: 1 | Turn No.1 of SW1 OFF, set ID to 1 |
| Transmission rate: 115,200 bps | Set BAUD to 4 |
| Termination resistor: ON | AC power input driver: Turn No.1 and No.2 of TERM ON DC power input driver: Turn No.3 and No.4 of SW1 ON |

■ AC power input driver



■ DC power input driver



STEP 3 Turn on the power and set the communication parameters

Check that the following communication parameters have the same values as those of the master controller in the **MEXE02**.

If the values are different, change the communication parameters of the driver.

| MEXE02 tree view | Parameter name |
|---------------------|--|
| Communication & I/F | • Communication parity [Initial value: 1 (even)] |
| | • Communication stop bit [Initial value: 0 (1 bit)] |
| | • Transmission waiting time [Initial value: 30 (3.0 ms)] |
| | • Silent interval [Initial value: 0 (automatic)] |



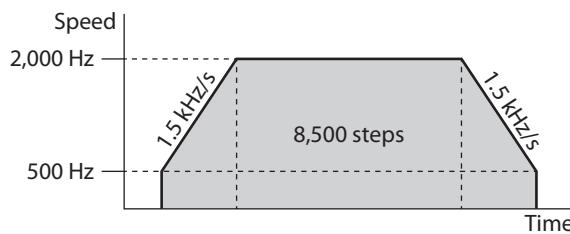
Set the silent interval of the driver to be shorter than the transmission interval of frames sent from the master. When the transmission rate is 115,200 bps, the silent interval of the driver is 2.5 ms.

STEP 4 Cycle the power

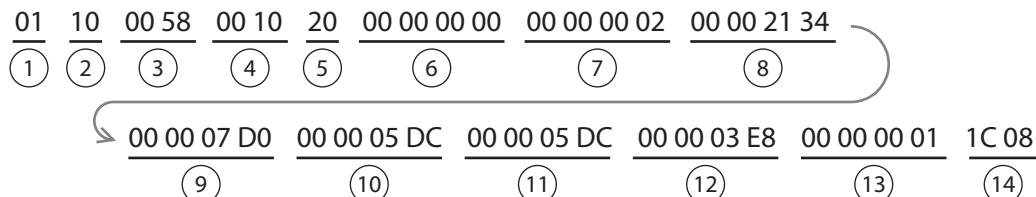
The switches of the driver and the communication parameters are enabled after the power is cycled.

STEP 5 Operate the motor

As an example, here is a description how to execute the following positioning operation. The trigger is the one for collective rewriting.



- With the following query, send the operation data and the trigger. Operation is started at the same time as transmission.



| No. | Communication data (Hex) | Description |
|------|--------------------------|---|
| (1) | 01 | Address number=1 |
| (2) | 10 | Function code=0010h |
| (3) | 00 58 | Writing register first address=0058h |
| (4) | 00 10 | Number of writing registers=16 |
| (5) | 20 | Number of writing bytes=32 bytes |
| (6) | 00 00 00 00 | Operation data number=0 |
| (7) | 00 00 00 02 | Operation type=2: Incremental positioning (based on command position) |
| (8) | 00 00 21 34 | Position=8,500 steps |
| (9) | 00 00 07 D0 | Operating speed=2,000 Hz |
| (10) | 00 00 05 DC | Starting/changing speed rate=1.5 kHz/s |
| (11) | 00 00 05 DC | Stopping deceleration=1.5 kHz/s |
| (12) | 00 00 03 E8 | Operating current=100.0% |
| (13) | 00 00 00 01 | Trigger=1: All data reflected |
| (14) | 1C 08 | Error check |

- Confirm that the motor rotates without any problem.



Compared with the transmission example of p.277, we can see that the motor can be operated by sending a query only once in direct data operation.

STEP 6 Could you operate the motor?

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

- Is any alarm present?
- Are the power supply, motor and RS-485 communication cable connected securely?
- Are the slave address, transmission rate and termination resistor set correctly?
- Is the C-DAT/C-ERR LED turned off? Or is it lit in red? (An communication error has occurred)

10-3 Commands required for direct data operation

Related commands

| Register address | | Name | Description | Initial value |
|------------------|----------------|--|---|---------------|
| Upper | Lower | | | |
| 88 (0058h) | 89 (0059h) | Direct data operation operation data number | Sets the operation data number to be used in direct data operation. Setting range 0 to 255: Operation data No.0 to 255 | 0 |
| 90 (005Ah) | 91 (005Bh) | Direct data operation operation type | Sets the operation type for direct data operation. Setting range 0: No setting 1: Absolute positioning 2: Incremental positioning (based on command position) 3: Incremental positioning (based on feedback position) 7: Continuous operation (Position control) 8: Wrap absolute positioning 9: Wrap proximity positioning 10: Wrap absolute positioning (FWD) 11: Wrap absolute positioning (RVS) 12: Wrap absolute push-motion 13: Wrap proximity push-motion 14: Wrap push-motion (FWD) 15: Wrap push-motion (RVS) 16: Continuous operation (Speed control) 17: Continuous operation (Push motion) 18: Continuous operation (Torque control) 20: Absolute push-motion 21: Incremental push-motion (based on command position) 22: Incremental push-motion (based on feedback position) | 2 |
| 92 (005Ch) | 93 (005Dh) | Direct data operation position | Sets the target position for direct data operation. Setting range -2,147,483,648 to 2,147,483,647 steps | 0 |
| 94 (005Eh) | 95 (005Fh) | Direct data operation operating speed | Sets the operating speed for direct data operation. Setting range -4,000,000 to 4,000,000 Hz | 1,000 |
| 96 (0060h) | 97 (0061h) | Direct data operation starting/changing speed rate | Sets the acceleration/deceleration rate or acceleration/deceleration time for direct data operation. Setting range 1 to 1,000,000,000 (1=0.001 kHz/s, 1=0.001 s, or 1=0.001 ms/kHz) | 1,000,000 |
| 98 (0062h) | 99 (0063h) | Direct data operation stopping deceleration | Sets the stopping deceleration or stop time for direct data operation. Setting range 1 to 1,000,000,000 (1=0.001 kHz/s, 1=0.001 s, or 1=0.001 ms/kHz) | 1,000,000 |
| 100 (0064h) | 101 (0065h) | Direct data operation operating current | Sets the operating current for direct data operation. Setting range 0 to 1,000 (1=0.1 %) | 1,000 |

| Register address | | Name | Description | Initial value |
|------------------|----------------|--|--|---------------|
| Upper | Lower | | | |
| 102 (0066h) | 103 (0067h) | Direct data operation trigger | Sets the trigger for direct data operation. (About the trigger ⇒ Next paragraph) Setting range -7: Operation data number -6: Operation type -5: Position -4: Operating speed -3: Starting/changing speed rate -2: Stopping deceleration -1: Operating current 0: Disable 1: All data reflected | 0 |
| 104 (0068h) | 105 (0069h) | Direct data operation forwarding destination | Selects the stored area when the next direct data is transmitted during direct data operation.. (About data destination ⇒ p.307) Setting range 0: Execution memory 1: Buffer memory | 0 |

■ Trigger

This is a trigger to start operation at the same time as rewriting of data in direct data operation.

- When the trigger is "0" or "1"

When "1" is written to the trigger, all the data are written, and direct data operation is started at the same time.
When operation is started the trigger automatically returns to "0".

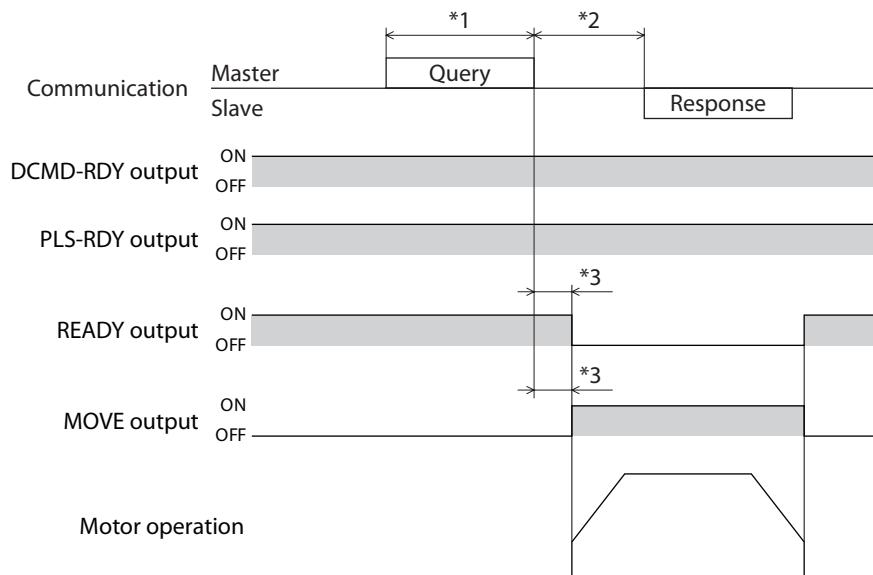
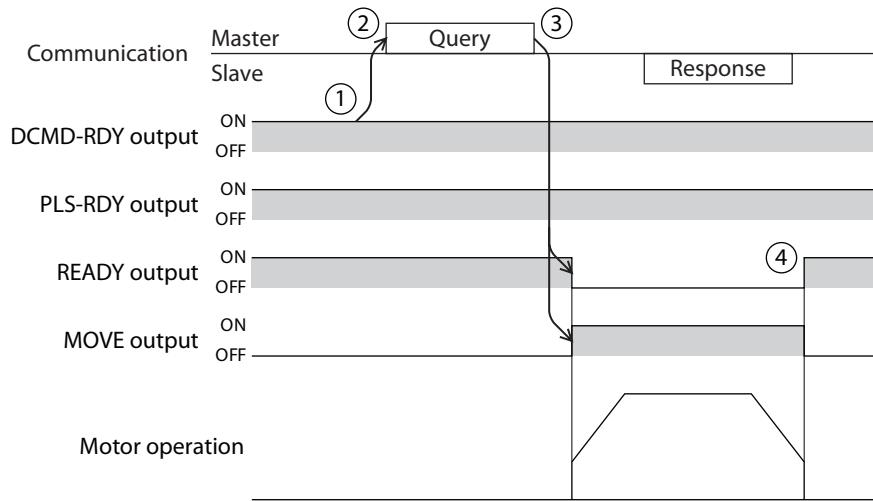
- When the trigger is "-1 to -7"

When the data corresponding to the trigger is written, direct data operation is started. Even if operation is started, the set value of the trigger is retained.

| Set value | | Trigger |
|-----------|------------|------------------------------|
| Dec | Hex | |
| -7 | FFFF FFF9h | Operation data number |
| -6 | FFFF FFFAh | Type |
| -5 | FFFF FFFBh | Position |
| -4 | FFFF FFFCh | Operating speed |
| -3 | FFFF FFFDh | Starting/changing speed rate |
| -2 | FFFF FFFEh | Stopping deceleration |
| -1 | FFFF FFFFh | Operating current |

- **Timing chart**

1. Check that the DCMD-RDY output is ON.
2. Send a query (including the trigger and data) to execute direct data operation.
3. When the master receives the query, the READY output is turned OFF, and operation is started.
4. When the motor stops, the READY output is turned ON.



*1 Query via RS-485 communication

*2 Tb2 (transmission waiting time) + C3.5 (silent interval) + command processing time

*3 C3.5 (silent interval) + 4 ms or less

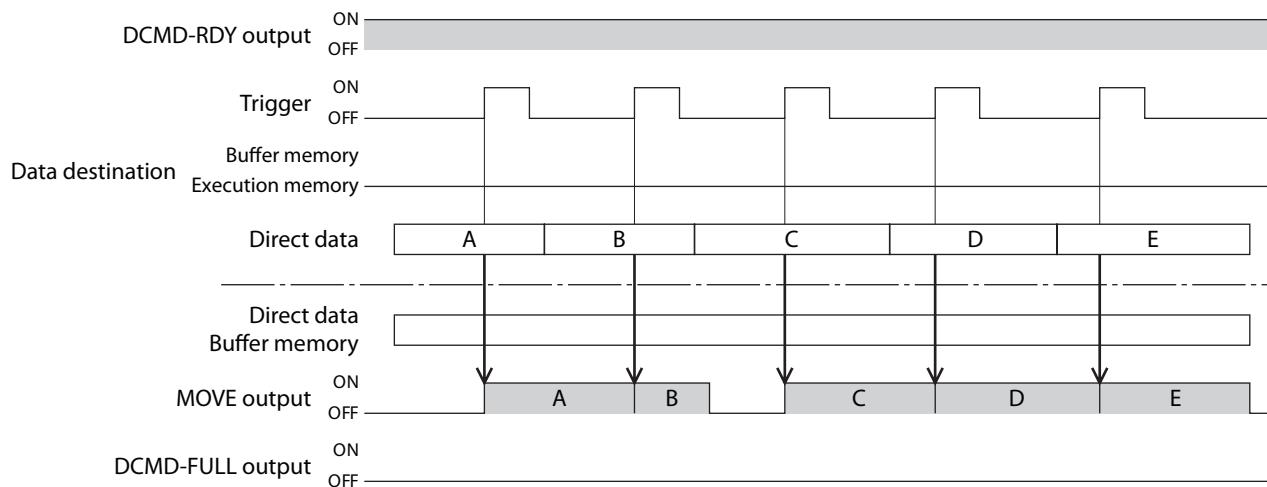
■ Data destination

Select the stored area when the next direct data is transmitted during direct data operation.

| Set value | | Linked method |
|-----------|------------|------------------|
| Dec | Hex | |
| 0 | 0000 0000h | Execution memory |
| 1 | 0000 0001h | Buffer memory |

● When the data destination is set to "Execution memory"

When the trigger is written, the data in operation is rewritten to the next direct data. When the next direct data is stored in the buffer memory, the data in the buffer memory is deleted.

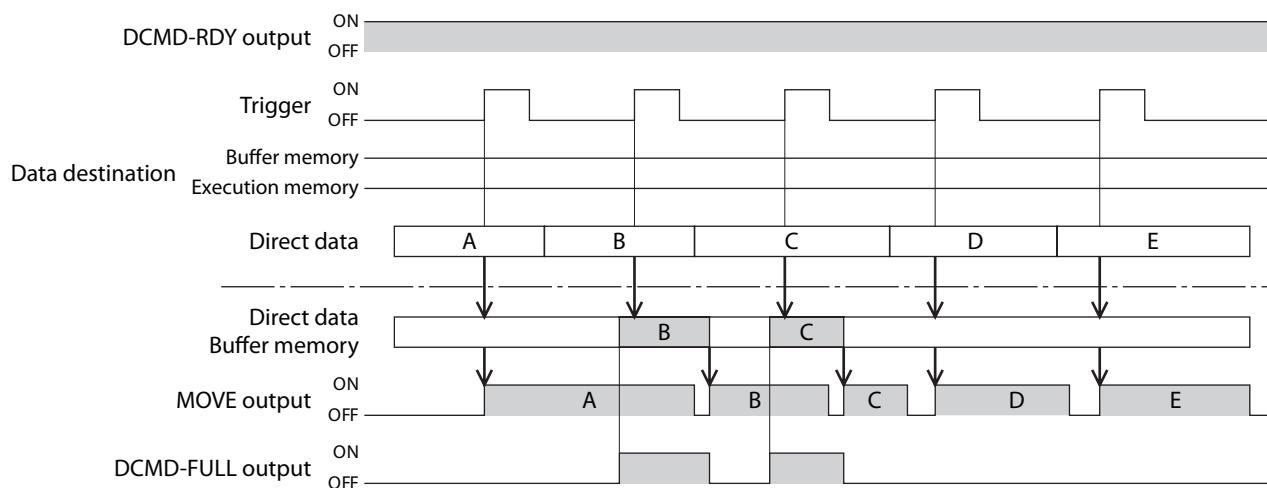


● When the data destination is set to "Buffer memory"

When the trigger is written, the next direct data is stored in the buffer memory. When the data in operation is complete, operation of the buffer memory is started automatically. Only one piece of direct data can be stored in the buffer memory.

When the next direct data is written in the buffer memory, the DCMD-FULL output is turned ON.

During stop and continuous operation, the data is not stored in the buffer memory even if "Buffer memory" is specified and is rewritten to the next direct data immediately.



Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|------------------|--|---|---------------|
| Base setting | Direct data operation zero speed command action | When "0" is written to the operating speed, selects whether to cause the motor to decelerate to a stop or to change the speed to 0 r/min in an operating status. Setting range 0: Deceleration stop 1: Speed zero command * | 0 |
| | Direct data operation trigger initial value | Sets the initial value of the trigger. Setting range -7: Operation data number update -6: Operation type update -5: Position update -4: Speed update -3: Acceleration/deceleration rate update -2: Stopping deceleration update -1: Operating current update 0: The trigger is used | 0 |
| | Direct data operation data destination initial value | Sets the initial value of the data destination Setting range 0: Execution memory 1: Buffer memory | 0 |
| | Direct data operation Initial operation data | Sets the operation data number to be used as the initial value of direct data. Setting range 0 to 255: Operation data number | 0 |
| | Command data access area | This parameter is a reservation function. Not possible to use. | 0 |

* Although the motor does not rotate because the speed is 0 r/min, the I/O signals are in operating status.

11 Group send

Multiple slaves are made into a group and a query is sent to these group at once.

■ Group composition

A group consists of one parent slave and child slaves, and only the parent slave returns a response.

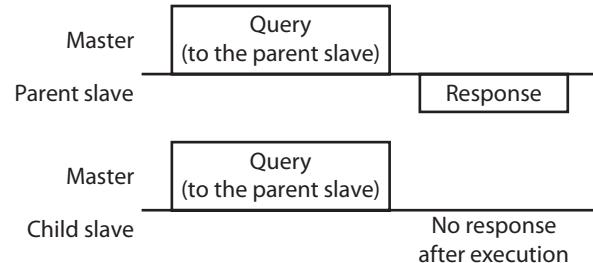
■ Group address

To perform a group send, set a group address to the child slaves to be included in the group. The child slaves to which the group address has been set can receive a query sent to the parent slave.

The parent slave is not always required. A group can be composed by only child slaves. In this case, set an unused address as an address of the group.

When a query is sent from the master to the address of the group, the child slaves execute the process.

However, no response is returned. In broadcasting, all the slaves execute the process, however, the slaves that execute the process can be limited in this method.



■ Parent slave

No special setting is required on the parent slave to perform a group send. The address of the parent slave becomes the group address. Upon sending a query from the master to the parent slave, the parent slave executes the requested process and returns a response. (Same as the unicast mode)

■ Child slave

Slaves to which the address of the parent slave is set become the child slaves.

When a query sent to the address of the group is received, the child slaves execute the process. However, no response is returned.

The function code executable in group send is only "Writing to multiple holding registers (10h)."

■ Setting of Group

Set the address of the parent slave to the "group ID" of the child slaves. Change the group in the unicast mode. Execute upper and lower reading and writing at the same time when setting the "group ID."

● Related commands

| Register address | | Name | Description | READ/ WRITE | Setting range |
|------------------|-------|------------------|-----------------------|----------------|--|
| Dec | Hex | | | | |
| 48 | 0030h | Group ID (upper) | Sets a group address. | R/W | -1: No group specification (group send is not performed) 1 to 31: The address (address of the parent slave) of the group |
| 49 | 0031h | Group ID (lower) | | | |

Note

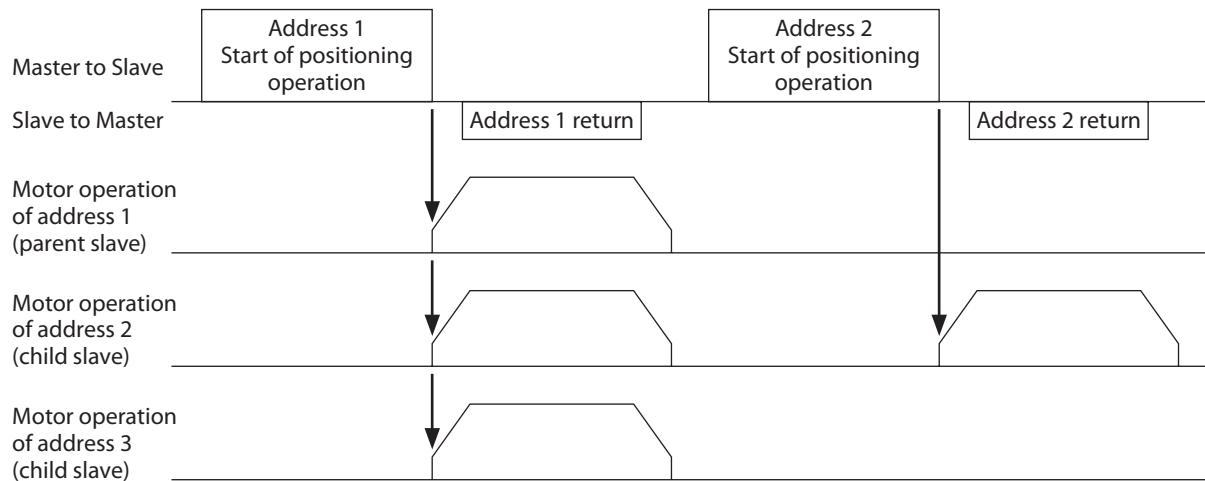
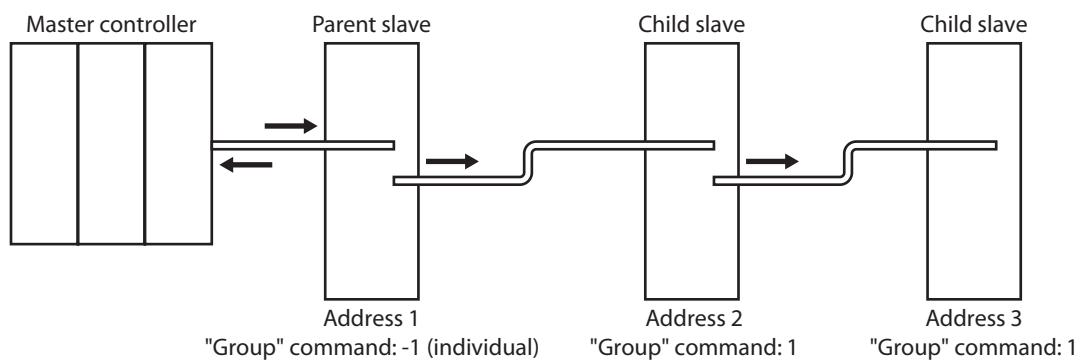
- Do not set "0" to the group ID.
- Change the group address in the unicast mode.
- Since the group setting is stored in RAM, the initial value is returned when the driver is turned off.

- Related parameters

Since the set value of the "Group ID" command is stored in RAM, the initial value is returned when the power is turned off, and the group is released. Therefore, the group should be always reset after power-on.

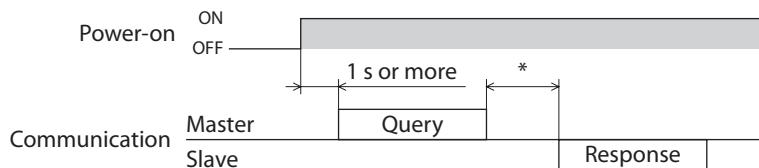
On the other hand, since the "Initial group ID" parameter is saved in the non-volatile memory, if the group is set to this parameter, the group is not released even if the power is turned off. The group function can be used immediately after power-on.

| MEXE02 tree view | Parameter name | Description | Initial value |
|---------------------|---------------------------|---|---------------|
| Communication & I/F | Initial group ID (Modbus) | Sets the address (address number of the parent slave) of the group. It is stored even if the power is turned off. Setting range Disable: Group send is not executed 0 to 31: Group ID | Disable |



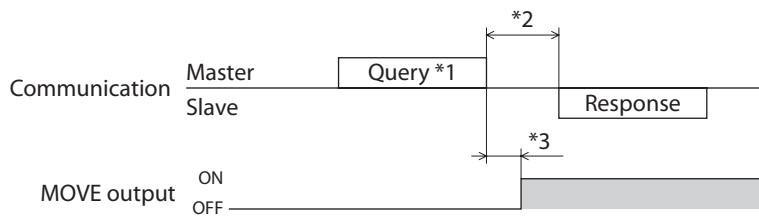
12 Timing chart

12-1 Communication start



* Tb2 (transmission waiting time) + C3.5 (silent interval)

12-2 Start of operation

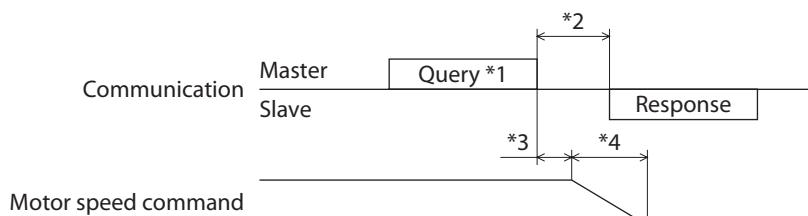


*1 A message including a query to start operation via RS-485 communication.

*2 Tb2 (transmission waiting time) + C3.5 (silent interval)

*3 C3.5 (silent interval) + 2 ms or less

12-3 Operation stop, speed change



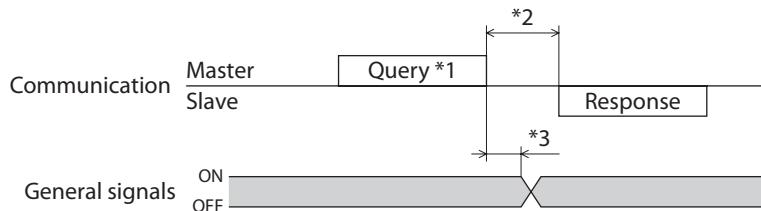
*1 A message including a query to stop operation and another to change the speed via RS-485 communication.

*2 Tb2 (transmission waiting time) + C3.5 (silent interval)

*3 It varies depending on the operating condition.

*4 It varies depending on the setting of the "STOP/STOP-COFF input action" parameter.

12-4 General signals

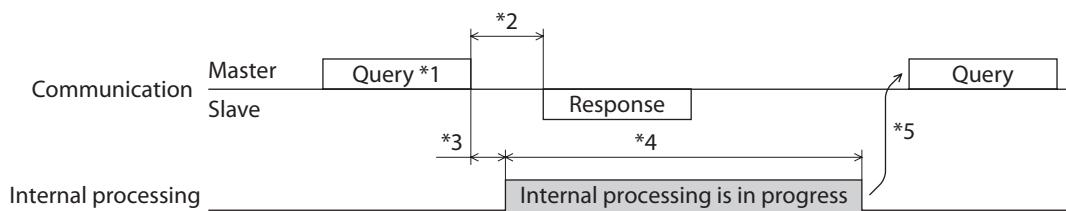


*1 A message including a query for remote output via RS-485 communication.

*2 Tb2 (transmission waiting time) + C3.5 (silent interval)

*3 C3.5 (silent interval) + 2 ms or less

12-5 Configuration



*1 A message including a query for configuration via RS-485 communication.

*2 Tb2 (transmission waiting time) + C3.5 (silent interval)

*3 C3.5 (silent interval) + 2 ms or less

*4 1 s or less

*5 Do not execute writing while configuration is executed.

13 Detection of communication errors

This is a function to detect abnormalities that may occur in RS-485 communication, including two types: communication errors and alarms.

13-1 Communication errors

When the communication error with error code 84h occurs, the C-DAT/C-ERR LED of the driver is lit in red. In addition, the red color and green color on the PWR/ALM LED (POWER/ALARM LED) blink twice at the same time. (Red and green colors may overlap and it may seem to be orange.) For communication errors other than 84h, the LED is not lit and does not blink. You can check the communication errors using the "Communication error records" command or using the **MEXE02**.



Since communication error records are saved in RAM, they are cleared when the driver is turned off.

■ Communication error list

| Communication error type | Error code | Cause |
|--|------------|--|
| RS-485 communication error | 84h | A transmission error was detected. (Ref. ⇨ p.266) |
| Command not yet defined | 88h | An exception response (exception code 01h, 02h) was detected. (Ref. ⇨ p.266) |
| Execution is disabled due to user I/F communication in progress | 89h | An exception response (exception code 04h) was detected. (Ref. ⇨ p.266) |
| Execution disabled due to Non-volatile memory processing in progress | 8Ah | |
| Outside setting range | 8Ch | An exception response (exception code 03h, 04h) was detected. (Ref. ⇨ p.266) |
| Command execute disable | 8Dh | An exception response (exception code 04h) was detected. (Ref. ⇨ p.266) |

13-2 Alarms related to RS-485 communication

When an alarm related to RS-485 communication is generated, the ALM output is turned OFF and the motor stops. The PWR/ALM LED (or POWER/ALARM LED) of the driver blinks in red.

■ List of alarms related to RS-485 communication

| Alarm code | Alarm type | Cause |
|------------|------------------------------------|--|
| 83h | Communication switch setting error | The setting of the BAUD switch was out of the specification. |
| 84h | RS-485 communication error | The RS-485 communication error occurred in succession for the number of times set in the "Communication error detection (Modbus)" parameter. |
| 85h | RS-485 communication timeout | The time set in the "Communication timeout (Modbus)" parameter has elapsed, and yet the communication could not be established with the master controller. |



6

Method of control via industrial network

This part explains how to control via industrial network.

This product can be controlled via CC-Link communication or EtherCAT communication in combination with a network converter (sold separately).

Table of contents

| | | |
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| 1 | Flow of setting required for control via industrial network | 316 |
| 2 | Setting of switches..... | 317 |
| 3 | Method of control via CC-Link communication | 320 |
| 4 | Method of control via EtherCAT communication | 338 |
| 5 | Group function | 346 |
| 6 | Simple direct data operation..... | 350 |
| 7 | Detection of communication errors | 355 |

1 Flow of setting required for control via industrial network

OPERATING MANUAL Driver

The contents of [] are explained in this manual.

- Install the motor and the driver and arrange wiring.
- Set the home position.

Part Two

- Set the coordinate and the resolution.

Setting of the resolution using the electronic gear, change of the unit of travel amount, wrap function, etc., are introduced.

Part Three

- Assign the remote I/O.

Assignment of remote I/O (R-IN, R-OUT), input and output conditions, output of the current value, functions to help saving of wiring, etc. are introduced.

- Set the protocol, address number, and transmission rate with switches.

The initial setting of the switches can be changed with parameters.

- Select the setting method of the command.

- Input for each operation data number

- Input for each operation data item

- Offset reference input

Set the data number of the starting point (starting data number), specify the offset from the starting data number and send.

Part Two

- Select the operation method and set data.

- Stored data operation + Sequence function

The motor is operated by setting the operation data. Simple sequence functions such as jump and loop can be also executed.

Part Four

- Set parameters.

- Macro operation

In JOG operation, continuous operation, etc., the motor is operated by inputting a specific signal.

Part Nine

- Make settings concerning information and alarms.

- Return-to-home operation

The motor is returned to the home position.

- Simple direct data operation

Rewriting of data, start of operation, and monitoring are executed at the same time.

- Direct data operation

Rewriting of data and start of operation are executed at the same time.

- Completion of setting

2 Setting of switches

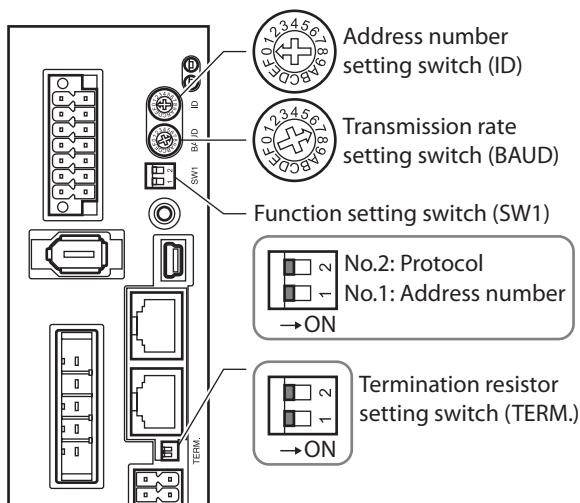
The following figure shows the status of factory setting.

Note

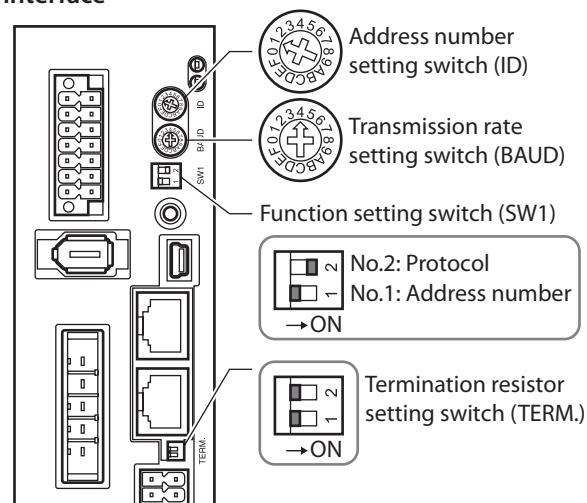
Be sure to turn off the driver power before setting the switches. If the switches are set while the power is still on, the new setting will not become effective.

■ AC power input driver

● Built-in controller type

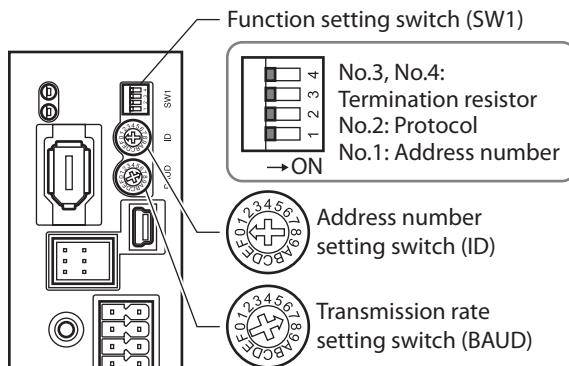


● Pulse input type with RS-485 communication interface

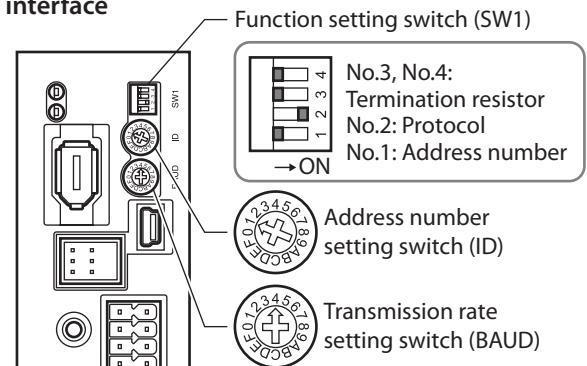


■ DC power input driver

● Built-in controller type



● Pulse input type with RS-485 communication interface



2-1 Protocol

Turn No.2 of the SW1 switch OFF. The network converter is selected.

| | | |
|------------------------|--|-----|
| Factory setting | • Built-in controller type | OFF |
| | • Pulse input type with RS-485 communication interface | ON |

| SW1-No.2 | Protocol |
|----------|----------------------------------|
| ON | Modbus RTU |
| OFF | Connect to the network converter |

2-2 Address number (slave address)

Set the address number (slave address) using the ID switch and No.1 of the SW1 switch. Make sure each address number (slave address) you set for each driver is unique. Up to 16 units can be connected.

| | | |
|------------------------|--|---|
| Factory setting | • Built-in controller type | Address number 0 (ID switch: 0, No.1 of the SW1 switch: OFF) |
| | • Pulse input type with RS-485 communication interface | Address number 1 (ID switch: 1, No.1 of the SW1 switch: OFF) |

| | | | | | | | | | | | | | | | | |
|---------------|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|-----|
| Slave address | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| ID switch | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |
| SW1-No.1 | | | | | | | | | | | | | | | | OFF |

2-3 Transmission rate

To use the motor in the industrial network, setting of the transmission rate (BAUD switch) is not required. It is fixed to 625,000 bps in the "Baudrate (NETC)" parameter.



The BAUD switch can point anywhere.

2-4 Termination resistor

For the driver that is most distant from the network converter (termination), set the termination register (120 Ω) of RS-485 communication.

For the AC power input driver, turn both No.1 and No. 2 of the TERM switch ON.

For the DC power input driver, turn both No. 3 and No. 4 of the SW1 switch ON.

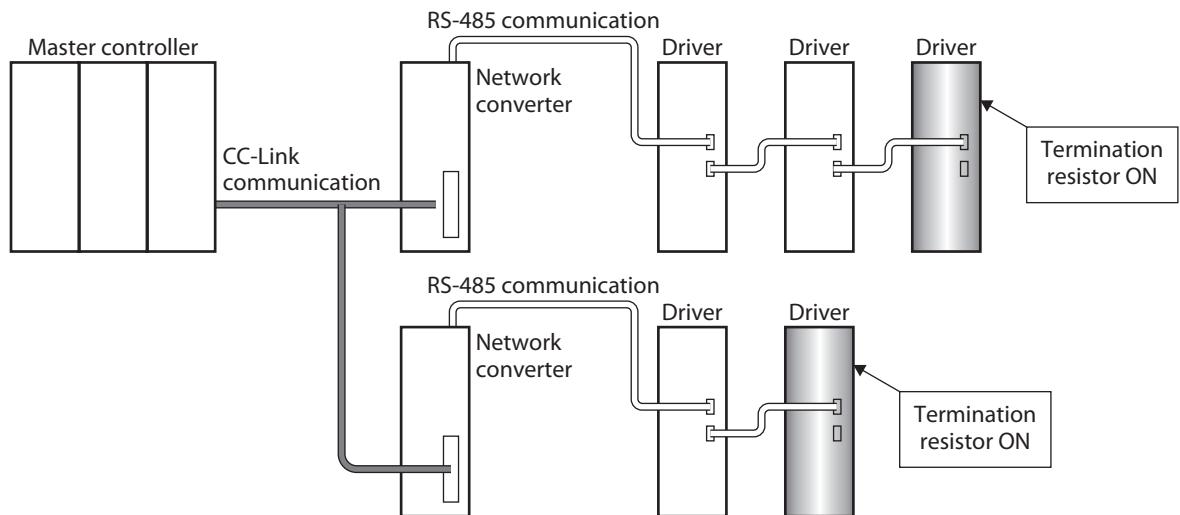
| | | |
|------------------------|--|-----|
| Factory setting | • Built-in controller type | OFF |
| | • Pulse input type with RS-485 communication interface | OFF |

| | |
|---|---------------------------------|
| No.1 and No.2 of the TERM switch or No.3 and No.4 of the SW1 switch | Termination resistor (120 Ω) |
| Both are OFF | Disabled |
| Both are ON | Enabled |



If only one switch is turned ON, a communication error may occur.

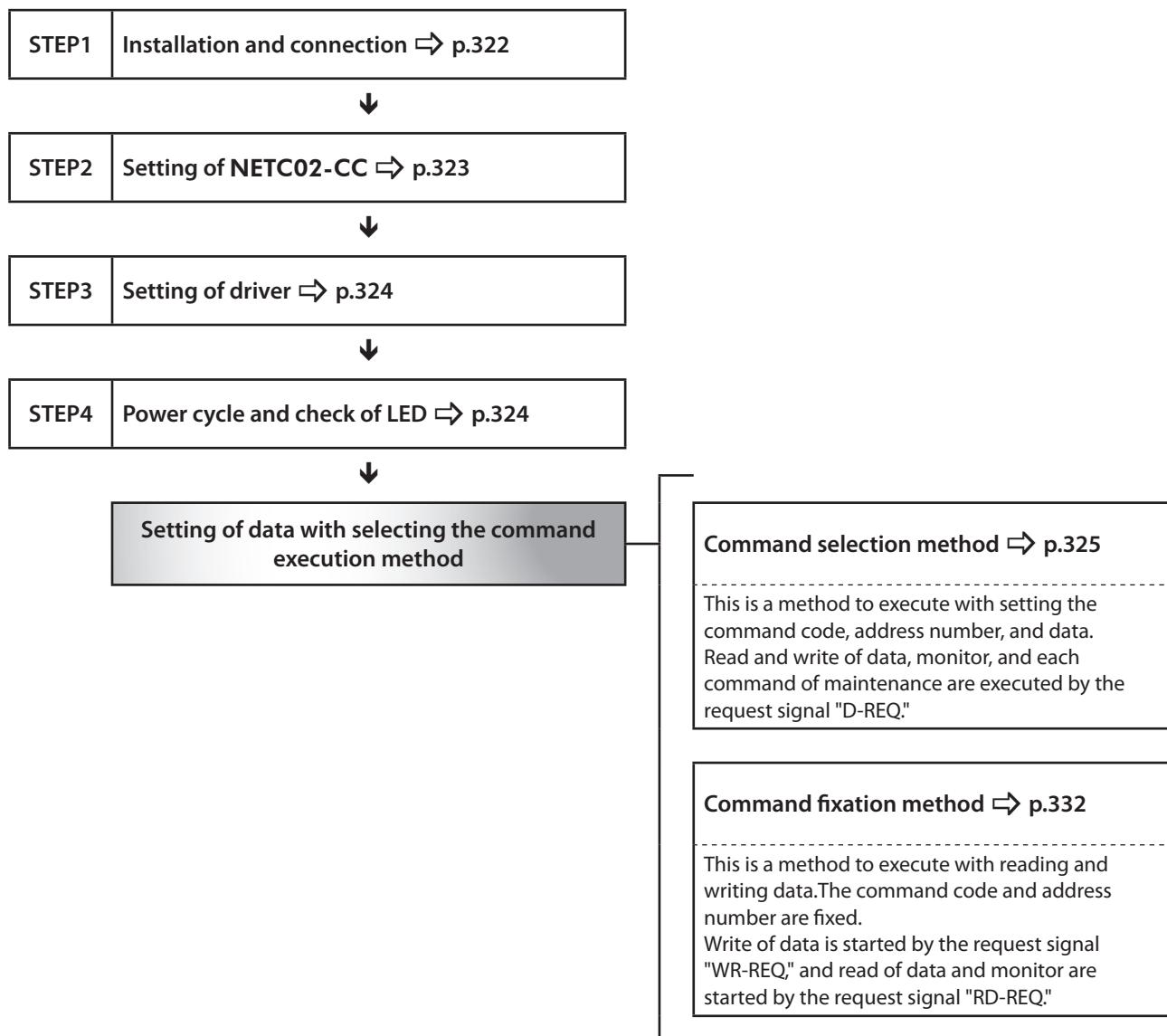
For example, in the case of the following system, the termination resistor should be set to two drivers.



3 Method of control via CC-Link communication

3-1 Guidance

If you are new to the **NETC02-CC**, read this section to understand the operating methods along with the operation flow.



■ Setting condition

● Setting of RS-485 communication compatible product

| | |
|--|-----------------------|
| Address number 0 | AC power input driver |
| Address number 1 | DC power input driver |
| Protocol | Network converter |
| RS-485 communication transmission rate | 625,000 bps |

● Setting of NETC02-CC

| | |
|--|---------------------|
| RS-485 communication compatible product connected unit | 2 units |
| CC-Link baud rate | 10 Mbps |
| STATION No. | No.1 |
| Register arrangement mode | 4 words arrangement |

● Setting of the master device

Setting of network parameters

| | |
|-------------------------|--------------------|
| Remote input (RX) | RX1000 |
| Remote output (RY) | RY1000 |
| Remote register (RWr) | W0 |
| Remote register (RWw) | W100 |
| Extended cyclic setting | x2 |
| Remote device station | 4 station occupied |

Setting of CC-Link master

| | |
|-------------------|---------|
| CC-Link baud rate | 10 Mbps |
| STATION No. | No.0 |

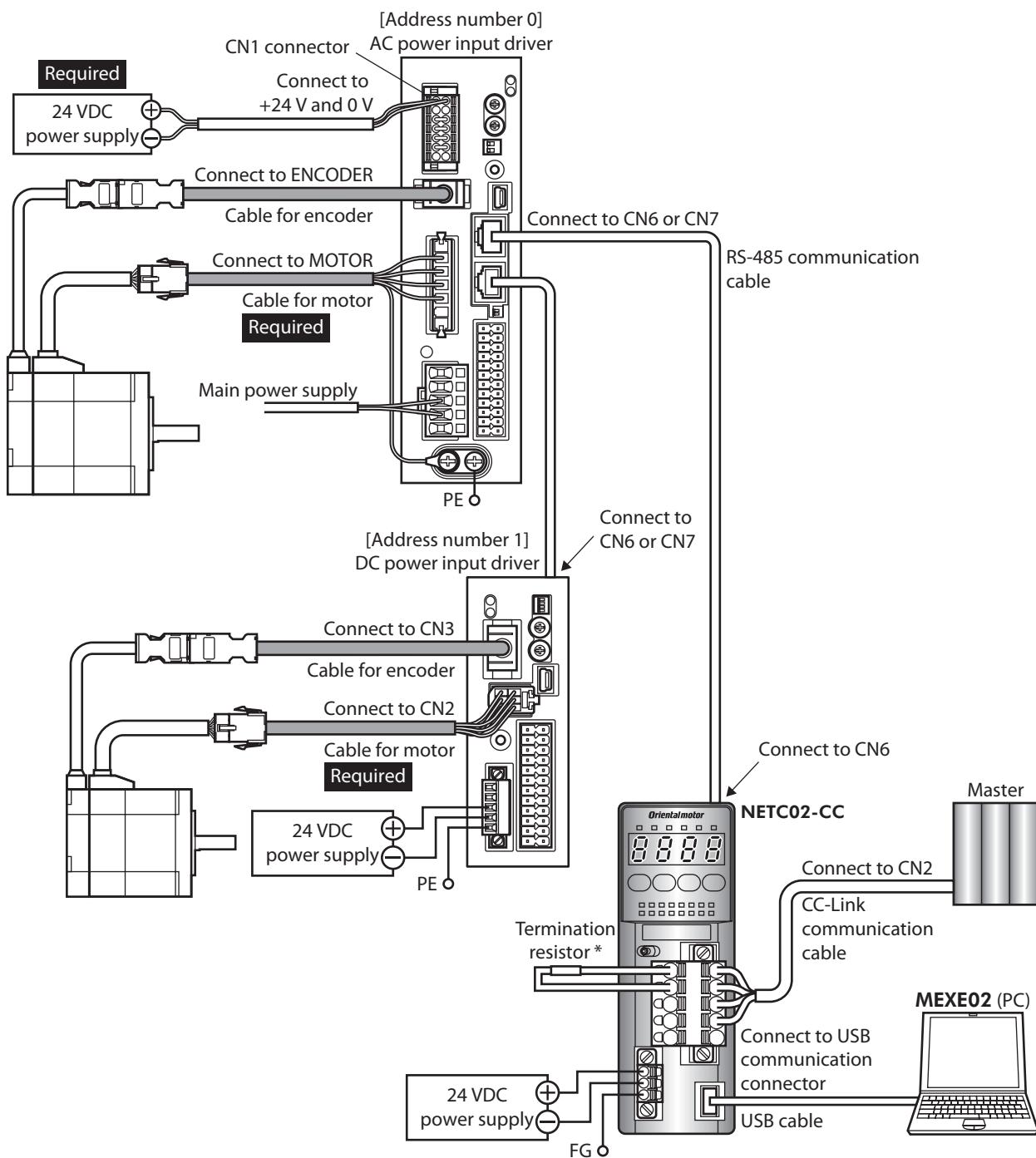


Before operating the motor, check the condition of the surrounding area to ensure safety.



The **NETC02-CC** incorporates a termination resistor for RS-485 communication. This product can be used without setting the termination resistor.

STEP 1 Check the installation and connection



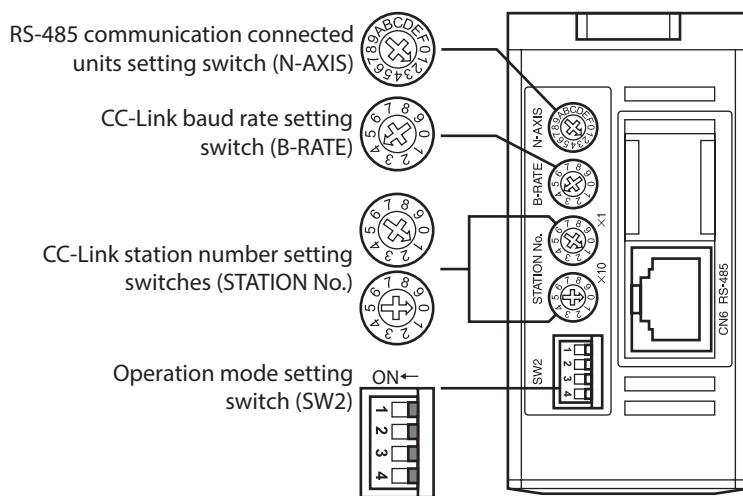
* The termination resistor does not come with the product. (110Ω , $1/2 W$)

Cables represented in gray color are accessories. Use the cable for encoder when the length of the encoder cable of motor is not enough.

STEP 2 Set the switches of the NETC02-CC

Set the switches provided on the upper side of the **NETC02-CC** as follows. The status becomes as shown in the following figures after setting.

| Setting contents | Switch | Factory setting |
|---|---|--------------------------------------|
| RS-485 communication connection unit: 2 | Set N-AXIS to "2" | 1 |
| CC-Link baud rate: 10 Mbps | Set B-RATE to "4" | 0 |
| CC-Link station number: 1 | Set the $\times 1$ to "1" and the $\times 10$ to "0" of the STATION No. | 1 ($\times 1: 1$, $\times 10: 0$) |
| Operation mode: OFF | Set No.1 to No.4 to "OFF" | All OFF |

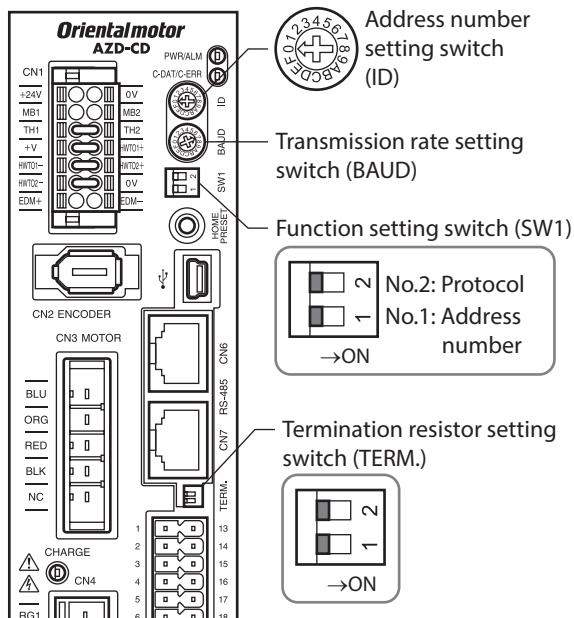


STEP 3 Set the switches of the driver

Set the following with the switches of the driver. The status becomes as shown in the following figures after setting.

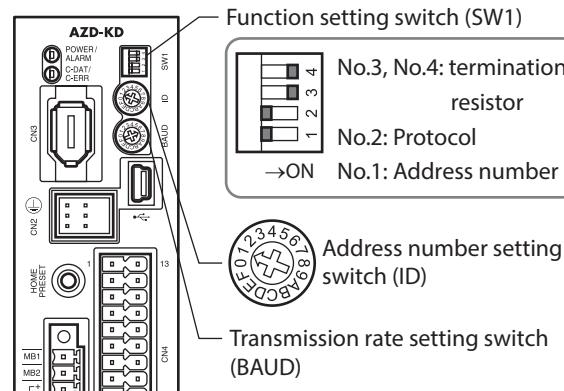
| Setting contents | AC power input driver | DC power input driver |
|---|---------------------------------------|---------------------------------------|
| Protocol: Network converter | Turn No.2 of SW1 "OFF" | Turn No.2 of SW1 "OFF" |
| Address number: AC power input driver is "0", DC power input driver is "1" | Turn No.1 of SW1 "OFF", Set ID to "0" | Turn No.1 of SW1 "OFF", Set ID to "1" |
| Termination resistor: AC power input driver is "OFF", DC power input driver is "ON" | Turn Nos.1 and 2 of TERM. "OFF" | Turn Nos.3 and 4 of SW1 "ON" |

● AC power input driver



Setting of transmission rate is not required. It is fixed to 625,000 bps in the "Baudrate (NETC)" parameter. The BAUD switch can point anywhere.

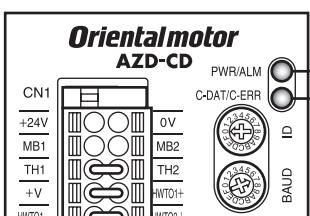
● DC power input driver



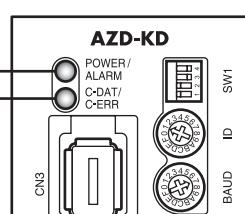
STEP 4 Cycle the power and check the LED

Check that the LED of the driver and NETCO2-CC are as shown in the figure.

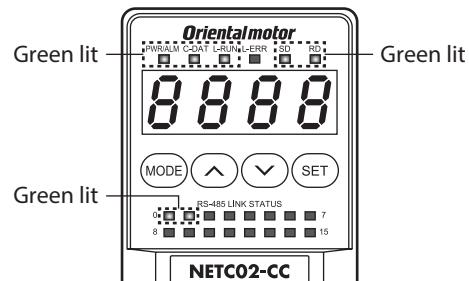
■ AC power input driver



■ DC power input driver

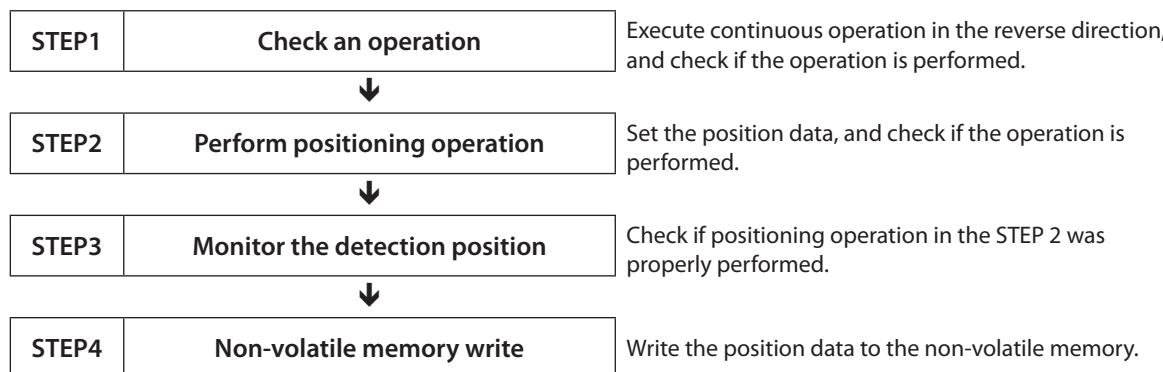


■ Network converter



3-2 Operation example of command selection method

This section explains how to perform the following operations using the command selection method.



■ How to use the request signal

In the operation example, the request signals are used quite differently based on the setting of remote register.

● Operation data, maintenance command

| Request signal | Remote register | |
|----------------|-----------------|------|
| | Write | Read |
| D-REQ0 | RWw100 | RWr0 |
| | RWw101 | RWr1 |
| | RWw102 | RWr2 |
| | RWw103 | RWr3 |
| D-REQ1 | RWw104 | RWr4 |
| | RWw105 | RWr5 |
| | RWw106 | RWr6 |
| | RWw107 | RWr7 |

● Monitor command

| Request signal | Remote register | |
|----------------|-----------------|------|
| | Write | Read |
| D-REQ2 | RWw108 | RWr8 |
| | RWw109 | RWr9 |
| | RWw10A | RWrA |
| | RWw10B | RWrB |
| D-REQ3 | RWw10C | RWrC |
| | RWw10D | RWrD |
| | RWw10E | RWrE |
| | RWw10F | RWrF |

STEP 1 Execute continuous operation in the reverse direction by remote I/O, and check if the operation is performed.

- Start continuous operation in the reverse direction.
Turn the RV-POS ON.

Master to NETC02-CC

| Address number | Remote I/O | Address | Input value | Description |
|----------------|------------|---------|-------------|-----------------------------------|
| 0 | RV-POS | RY100F | 1 | Execution of continuous operation |
| 1 | | RY101F | 1 | |

- Stop continuous operation.
Turn the RV-POS OFF.

Master to NETC02-CC

| Address number | Remote I/O | Address | Input value | Description |
|----------------|------------|---------|-------------|------------------------------|
| 0 | RV-POS | RY100F | 0 | Stop of continuous operation |
| 1 | | RY101F | 0 | |



If not operated, check the setting of the switches, and assignments of remote I/O and remote register.

STEP 2 Perform positioning operation

- In order to make easier to check that the operation was properly performed when positioning operation was performed, set the position information to "0."
 - Set the maintenance command "P-PRESET execution (30C5h)" to remote register.

Master to NETC02-CC

| Address number | Address | Input value | Description |
|----------------|---------|-------------|-----------------------------------|
| 0 | RWw100 | 30C5h | Command code (P-PRESET execution) |
| | RWw101 | 0h | Address number |
| | RWw102 | 1 | Data (lower) |
| | RWw103 | 0 | Data (upper) |
| 1 | RWw104 | 30C5h | Command code (P-PRESET execution) |
| | RWw105 | 1h | Address number |
| | RWw106 | 1 | Data (lower) |
| | RWw107 | 0 | Data (upper) |



Unless "1" is set to the data area, the command is not executed.

- Turn the D-REQ ON to write data to the driver.

Master to NETC02-CC

| Address number | Remote I/O | Address | Input value | Description |
|----------------|------------|---------|-------------|-----------------|
| 0 | D-REQ0 | RY1080 | 1 | Write execution |
| 1 | D-REQ1 | RY1082 | 1 | |

- The response of the D-END is automatically changed to "1" when it is properly processed.

NETC02-CC to master

| Address number | Remote I/O | Address | Response | Description |
|----------------|------------|---------|----------|-----------------|
| 0 | D-END0 | RX1080 | 1 | Write completed |
| 1 | D-END1 | RX1082 | 1 | |

- The value written to the driver is displayed when the response of the D-END is changed to "1." Check the value is matched with the one having set in the above 1).

NETC02-CC to master

| Address number | Address | Response | Description |
|----------------|---------|----------|--|
| 0 | RWr0 | 30C5h | Command code response (P-PRESET execution) |
| | RWr1 | 0h | Address number response |
| | RWr2 | 1 | Data (lower) |
| | RWr3 | 0 | Data (upper) |
| 1 | RWr4 | 30C5h | Command code response (P-PRESET execution) |
| | RWr5 | 1h | Address number response |
| | RWr6 | 1 | Data (lower) |
| | RWr7 | 0 | Data (upper) |

- Check it has been written properly, and turn the D-REQ OFF.

Master to NETC02-CC

| Address number | Remote I/O | Address | Input value | Description |
|----------------|------------|---------|-------------|-----------------|
| 0 | D-REQ0 | RY1080 | 0 | Write completed |
| 1 | D-REQ1 | RY1082 | 0 | |

2. Check the position information is changed to "0" by the "P-PRESET execution" of the maintenance command.

- 1) Set the "Detection position (2066h)" of the monitor command to remote register.

Master to NETC02-CC

| Address number | Address | Input value | Description |
|----------------|---------|-------------|-----------------------------------|
| 0 | RWw108 | 2066h | Command code (detection position) |
| | RWw109 | 0h | Address number |
| | RWw10A | 0 | Data (lower) |
| | RWw10B | 0 | Data (upper) |
| 1 | RWw10C | 2066h | Command code (detection position) |
| | RWw10D | 1h | Address number |
| | RWw10E | 0 | Data (lower) |
| | RWw10F | 0 | Data (upper) |

- 2) Turn the D-REQ ON to write data to the driver.

Master to NETC02-CC

| Address number | Remote I/O | Address | Input value | Description |
|----------------|------------|---------|-------------|------------------|
| 0 | D-REQ2 | RY1084 | 1 | Start of monitor |
| 1 | D-REQ3 | RY1086 | 1 | |

- 3) The response of the D-END is automatically changed to "1" when it is properly processed.

NETC02-CC to master

| Address number | Remote I/O | Address | Response | Description |
|----------------|------------|---------|----------|----------------|
| 0 | D-END2 | RX1084 | 1 | During monitor |
| 1 | D-END3 | RX1086 | 1 | |

- 4) The value written to the driver is displayed when the response of the D-END is changed to "1." Check the data area is changed to "0."

NETC02-CC to master

| Address number | Address | Response | Description |
|----------------|---------|----------|--|
| 0 | RWr8 | 2066h | Command code response (detection position) |
| | RWr9 | 0h | Address number response |
| | RWrA | 0 | Data (lower) |
| | RWrB | 0 | Data (upper) |
| 1 | RWrC | 2066h | Command code response (detection position) |
| | RWrD | 1h | Address number response |
| | RWrE | 0 | Data (lower) |
| | RWrF | 0 | Data (upper) |

- 5) Check it has been written properly, and turn the D-REQ OFF.

Master to NETC02-CC

| Address number | Remote I/O | Address | Input value | Description |
|----------------|------------|---------|-------------|----------------|
| 0 | D-REQ2 | RY1084 | 0 | End of monitor |
| 1 | D-REQ3 | RY1086 | 0 | |

3. Set the operation data of positioning operation.
Set the position No.0 and position data "5000 (1388h)" to remote register.

Master to NETC02-CC

| Address number | Address | Input value | Description |
|----------------|---------|-----------------|------------------------------|
| 0 | RWw100 | 1200h | Command code (position No.0) |
| | RWw101 | 0h | Address number |
| | RWw102 | 5000 (1388h) | Data (lower) |
| | RWw103 | | Data (upper) |
| 1 | RWw104 | 1200h | Command code (position No.0) |
| | RWw105 | 1h | Address number |
| | RWw106 | 5000 (1388h) | Data (lower) |
| | RWw107 | | Data (upper) |

4. Write the set data in the above 3 to the driver to check the response.

- 1) Turn the D-REQ ON.

Master to NETC02-CC

| Address number | Remote I/O | Address | Input value | Description |
|----------------|------------|---------|-------------|-----------------|
| 0 | D-REQ0 | RY1080 | 1 | |
| 1 | D-REQ1 | RY1082 | 1 | Write execution |

- 2) The response of the D-END is automatically changed to "1" when it is properly processed.

NETC02-CC to master

| Address number | Remote I/O | Address | Response | Description |
|----------------|------------|---------|----------|-----------------|
| 0 | D-END0 | RX1080 | 1 | |
| 1 | D-END1 | RX1082 | 1 | Write completed |

- 3) The value written to the driver is displayed when the response of the D-END is changed to "1."
Check the value is matched with the one having set in the above 3.

NETC02-CC to master

| Address number | Address | Response | Description |
|----------------|---------|-----------------|---------------------------------------|
| 0 | RWr0 | 1200h | Command code response (position No.0) |
| | RWr1 | 0h | Address number response |
| | RWr2 | 5000 (1388h) | Data (lower) |
| | RWr3 | | Data (upper) |
| 1 | RWr4 | 1200h | Command code response (position No.0) |
| | RWr5 | 1h | Address number response |
| | RWr6 | 5000 (1388h) | Data (lower) |
| | RWr7 | | Data (upper) |

5. Check it has been written properly, and turn the D-REQ OFF.

Master to NETC02-CC

| Address number | Remote I/O | Address | Input value | Description |
|----------------|------------|---------|-------------|-----------------|
| 0 | D-REQ0 | RY1080 | 0 | |
| 1 | D-REQ1 | RY1082 | 0 | Write completed |

6. Start positioning operation.
Turn the START ON.

Master to NETC02-CC

| Address number | Remote I/O | Address | Input value | Description |
|----------------|------------|---------|-------------|--------------------------------|
| 0 | START | RY1003 | 1 | Start of positioning operation |
| 1 | | RY1013 | 1 | |

7. When positioning operation is started, turn the START OFF.
Even if the START is turned OFF, the operation continues until the command position.

NETC02-CC to master

| Address number | Remote I/O | Address | Input value | Description |
|----------------|------------|---------|-------------|--------------------|
| 0 | START | RY1003 | 0 | Turn the START OFF |
| 1 | | RY1013 | 0 | |

STEP 3 Monitor the detection position

1. Set the "Detection position (2066h)" of the monitor command to remote register.

Master to NETC02-CC

| Address number | Address | Input value | Description |
|----------------|---------|-------------|-----------------------------------|
| 0 | RWw108 | 2066h | Command code (detection position) |
| | RWw109 | 0h | Address number |
| | RWw10A | 0 | Data (lower) |
| | RWw10B | 0 | Data (upper) |
| 1 | RWw10C | 2066h | Command code (detection position) |
| | RWw10D | 1h | Address number |
| | RWw10E | 0 | Data (lower) |
| | RWw10F | 0 | Data (upper) |

2. Write the set data in the above 1 to the driver to check the response.

- 1) Turn the D-REQ ON.

Master to NETC02-CC

| Address number | Remote I/O | Address | Input value | Description |
|----------------|------------|---------|-------------|------------------|
| 0 | D-REQ2 | RY1084 | 1 | Start of monitor |
| 1 | D-REQ3 | RY1086 | 1 | |

- 2) The response of the D-END is automatically changed to "1" when it is properly processed.

NETC02-CC to master

| Address number | Remote I/O | Address | Response | Description |
|----------------|------------|---------|----------|----------------|
| 0 | D-END2 | RX1084 | 1 | During monitor |
| 1 | D-END3 | RX1086 | 1 | |

- 3) The response of the D-END is changed to "1," the monitor of the detection position is started.
The monitor is continued while the D-REQ is ON.

NETC02-CC to master

| Address number | Address | Response | Description |
|----------------|---------|-----------------|--|
| 0 | RWr8 | 2066h | Command code response (detection position) |
| | RWr9 | 0h | Address number response |
| | RWrA | 5000 (1388h) | Data (lower) |
| | RWrB | | Data (upper) |
| 1 | RWrC | 2066h | Command code response (detection position) |
| | RWrD | 1h | Address number response |
| | RWrE | 5000 (1388h) | Data (lower) |
| | RWrF | | Data (upper) |

3. End the monitor.
Turn the D-REQ OFF.

Master to NETC02-CC

| Address number | Remote I/O | Address | Input value | Description |
|----------------|------------|---------|-------------|----------------|
| 0 | D-REQ2 | RY1084 | 0 | |
| 1 | D-REQ3 | RY1086 | 0 | End of monitor |

STEP 4 Write the position information to the non-volatile memory.

The non-volatile memory can be rewritten approximately 100,000 times.

1. Set the maintenance command "Batch non-volatile memory write (30C9h)" to remote register.

Master to NETC02-CC

| Address number | Address | Input value | Description |
|----------------|---------|-------------|---|
| 0 | RWw100 | 30C9h | Command code (batch non-volatile memory write) |
| | RWw101 | 0h | Address number |
| | RWw102 | 1 | Data (lower) |
| | RWw103 | 0 | Data (upper) |
| 1 | RWw104 | 30C9h | Command code (batch non-volatile memory write) |
| | RWw105 | 1h | Address number |
| | RWw106 | 1 | Data (lower) |
| | RWw107 | 0 | Data (upper) |

2. Write the set data in the above 1 to the driver to check the response.

- 1) Turn the D-REQ ON.

Master to NETC02-CC

| Address number | Remote I/O | Address | Input value | Description |
|----------------|------------|---------|-------------|-----------------|
| 0 | D-REQ0 | RY1080 | 1 | |
| 1 | D-REQ1 | RY1082 | 1 | Write execution |

- 2) The response of the D-END is automatically changed to "1" when it is properly processed.

NETC02-CC to master

| Address number | Remote I/O | Address | Response | Description |
|----------------|------------|---------|----------|-----------------|
| 0 | D-END0 | RX1080 | 1 | |
| 1 | D-END1 | RX1082 | 1 | Write completed |

- 3) The value written to the driver is displayed when the response of the D-END is changed to "1." Check the value is matched with the one having set in the above 1).

NETC02-CC to master

| Address number | Address | Response | Description |
|----------------|---------|----------|--|
| 0 | RWr0 | 30C9h | Command code response (batch non-volatile memory write) |
| | RWr1 | 0h | Address number response |
| | RWr2 | 1 | Data (lower) |
| | RWr3 | 0 | Data (upper) |
| 1 | RWr4 | 30C9h | Command code response (batch non-volatile memory write) |
| | RWr5 | 1h | Address number response |
| | RWr6 | 1 | Data (lower) |
| | RWr7 | 0 | Data (upper) |

3. Check it has been written properly, and turn the D-REQ OFF.

Master to NETC02-CC

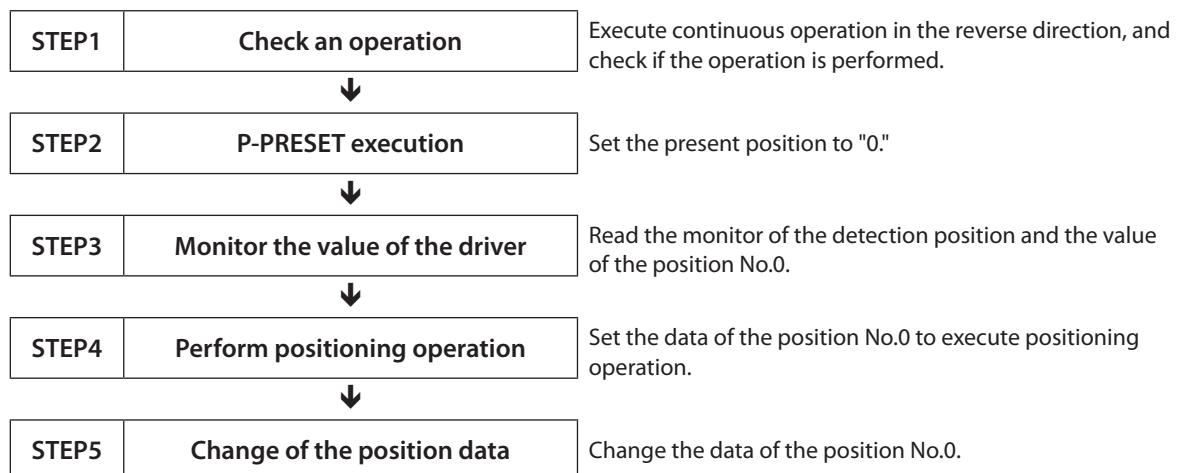
| Address number | Remote I/O | Address | Input value | Description |
|----------------|------------|---------|-------------|-----------------|
| 0 | D-REQ0 | RY1080 | 0 | |
| 1 | D-REQ1 | RY1082 | 0 | Write completed |



Since the data set via CC-Link communication is saved in the RAM, it is erased when the power is turned off. If the "Batch non-volatile memory write" is performed, since the data is saved in the non-volatile memory, it is stored even when the power is turned off.

3-3 Operation example of command fixation method

This section explains how to perform the following operations using the command fixation method.



■ Items of register arrangement (4 words arrangement)

- Arrangement of write

| Address number | Remote register | Description | Request signal |
|----------------|-----------------|-----------------------|----------------|
| 0 | RWw100 | Not used | WR-REQ0 |
| | RWw101 | Not used | |
| | RWw102 | Position No.0 (lower) | |
| | RWw103 | Position No.0 (upper) | |
| 1 | RWw104 | Not used | RD-REQ0 |
| | RWw105 | Not used | |
| | RWw106 | Position No.0 (lower) | |
| | RWw107 | Position No.0 (upper) | |

- Arrangement of read and monitor

| Address number | Remote register | Description | Request signal |
|----------------|-----------------|---------------------------------|----------------|
| 0 | RWr0 | Detection position No.0 (lower) | RD-REQ0 |
| | RWr1 | Detection position No.0 (upper) | |
| | RWr2 | Position No.0 (lower) | |
| | RWr3 | Position No.0 (upper) | |
| 1 | RWr4 | Detection position No.0 (lower) | |
| | RWr5 | Detection position No.0 (upper) | |
| | RWr6 | Position No.0 (lower) | |
| | RWr7 | Position No.0 (upper) | |

STEP 1**Execute continuous operation in the reverse direction by remote I/O, and check if the operation is performed.**

- Start continuous operation in the reverse direction.

Turn the RV-POS ON.

Master to NETC02-CC

| Address number | Remote I/O | Address | Input value | Description |
|----------------|------------|---------|-------------|-----------------------------------|
| 0 | RV-POS | RY100F | 1 | Execution of continuous operation |
| 1 | | RY101F | 1 | |

- Stop continuous operation.

Turn the RV-POS OFF.

Master to NETC02-CC

| Address number | Remote I/O | Address | Input value | Description |
|----------------|------------|---------|-------------|------------------------------|
| 0 | RV-POS | RY100F | 0 | Stop of continuous operation |
| 1 | | RY101F | 0 | |



If not operated, check the setting of the switches, and assignments of remote I/O and remote register.

STEP 2**Execute the P-PRESET (maintenance command)**

- Set the present position to "0" using the maintenance command "P-PRESET execution."



The maintenance command is performed with the command selection method.

- Set the maintenance command "P-PRESET execution (30C5h)" to remote register.

Master to NETC02-CC

| Address number | Address | Input value | Description |
|----------------|---------|-------------|-----------------------------------|
| 0 | RWw100 | 30C5h | Command code (P-PRESET execution) |
| | RWw101 | 0h | Address number |
| | RWw102 | 1 | Data (lower) |
| | RWw103 | 0 | Data (upper) |
| 1 | RWw104 | 30C5h | Command code (P-PRESET execution) |
| | RWw105 | 1h | Address number |
| | RWw106 | 1 | Data (lower) |
| | RWw107 | 0 | Data (upper) |



Unless "1" is set to the data area, the command is not executed.

- Turn the D-REQ ON to write data to the driver.

Master to NETC02-CC

| Address number | Remote I/O | Address | Input value | Description |
|----------------|------------|---------|-------------|-----------------|
| 0 | D-REQ0 | RY1080 | 1 | Write execution |
| 1 | D-REQ1 | RY1082 | 1 | |

- 3) The response of the D-END is automatically changed to "1" when it is properly processed.

NETC02-CC to master

| Address number | Remote I/O | Address | Response | Description |
|----------------|------------|---------|----------|-----------------|
| 0 | D-END0 | RX1080 | 1 | |
| 1 | D-END1 | RX1082 | 1 | Write completed |

- 4) The value written to the driver is displayed when the response of the D-END is changed to "1." Check the value is matched with the one having set in the above 1).

NETC02-CC to master

| Address number | Address | Response | Description |
|----------------|---------|----------|--|
| 0 | RWr0 | 30C5h | Command code response (P-PRESET execution) |
| | RWr1 | 0h | Address number response |
| | RWr2 | 1 | Data (lower) |
| | RWr3 | 0 | Data (upper) |
| 1 | RWr4 | 30C5h | Command code response (P-PRESET execution) |
| | RWr5 | 1h | Address number response |
| | RWr6 | 1 | Data (lower) |
| | RWr7 | 0 | Data (upper) |

- 5) Check it has been written properly, and turn the D-REQ OFF.

Master to NETC02-CC

| Address number | Remote I/O | Address | Input value | Description |
|----------------|------------|---------|-------------|-----------------|
| 0 | D-REQ0 | RY1080 | 0 | |
| 1 | D-REQ1 | RY1082 | 0 | Write completed |

STEP 3 Monitor the value of the driver

Since the register arrangement mode is the 4 words arrangement, the monitor of the detection position and the value of the position No.0 are read.

1. Turn the RD-REQ ON.

Master to NETC02-CC

| Address number | Remote I/O | Address | Input value | Description |
|----------------|------------|---------|-------------|---------------------------|
| 0 | RD-REQ0 | RY1092 | 1 | Start of read and monitor |
| 1 | | | | |

2. When monitor is started, the response of the RD-DAT is automatically changed to "1."

NETC02-CC to master

| Address number | Remote I/O | Address | Response | Description |
|----------------|------------|---------|----------|-------------------------|
| 0 | RD-DAT0 | RX1092 | 1 | During read and monitor |
| 1 | | | | |

3. When the response of the RD-DAT is changed to "1," the monitor of the feedback position and read of the position No.0 are started.

The monitor is continued while the RD-REQ is ON.

NETC02-CC to master

| Address number | Address | Response | Description |
|----------------|---------|----------|----------------------------|
| 0 | RWr0 | 0 | Detection position (lower) |
| | RWr1 | 0 | Detection position (upper) |
| | RWr2 | 0 * | Position No.0 (lower) |
| | RWr3 | 0 * | Position No.0 (upper) |
| 1 | RWr4 | 0 | Detection position (lower) |
| | RWr5 | 0 | Detection position (upper) |
| | RWr6 | 0 * | Position No.0 (lower) |
| | RWr7 | 0 * | Position No.0 (upper) |

* The initial values is "0."

Since the monitor of the detection position and read of the position No.0 are continuously performed, keep the RD-REQ to the ON-state.

STEP 4 Perform positioning operation

1. Set the operation data of positioning operation.
Set the position data "5000 (1388h)" of the position No.0 to remote register.

Master to NETC02-CC

| Address number | Address | Input value | Description |
|----------------|---------|-----------------|-----------------------|
| 0 | RWw100 | 0 | Not used |
| | RWw101 | 0 | Not used |
| | RWw102 | 5000 (1388h) | Position No.0 (lower) |
| | RWw103 | | Position No.0 (upper) |
| 1 | RWw104 | 0 | Not used |
| | RWw105 | 0 | Not used |
| | RWw106 | 5000 (1388h) | Position No.0 (lower) |
| | RWw107 | | Position No.0 (upper) |

2. Write the set data in the above 1 to the driver to check the response.

- 1) Turn the WR-REQ ON.

Master to NETC02-CC

| Address number | Remote I/O | Address | Input value | Description |
|----------------|------------|---------|-------------|----------------|
| 0 | | | | |
| 1 | WR-REQ0 | RY1090 | 1 | Start of write |

- 2) The response of the WR-DAT is automatically changed to "1" when it is properly processed.

NETC02-CC to master

| Address number | Remote I/O | Address | Response | Description |
|----------------|------------|---------|----------|--------------|
| 0 | | | | |
| 1 | WR-DAT0 | RX1090 | 1 | During write |

- 3) Since the RD-REQ is kept to the ON-state in the STEP 3, the write value is displayed at the same time the data of the position No.0 is set.
Check the data of the position No.0 is matched with the set value.

NETC02-CC to master

| Address number | Address | Response | Description |
|----------------|---------|-----------------|----------------------------|
| 0 | RWr0 | 0 | Detection position (lower) |
| | RWr1 | 0 | Detection position (upper) |
| | RWr2 | 5000 (1388h) | Position No.0 (lower) |
| | RWr3 | | Position No.0 (upper) |
| 1 | RWr4 | 0 | Detection position (lower) |
| | RWr5 | 0 | Detection position (upper) |
| | RWr6 | 5000 (1388h) | Position No.0 (lower) |
| | RWr7 | | Position No.0 (upper) |

3. Start positioning operation.
Turn the START ON.

Master to NETC02-CC

| Address number | Remote I/O | Address | Input value | Description |
|----------------|------------|---------|-------------|--------------------------------|
| 0 | START | RY1003 | 1 | Start of positioning operation |
| 1 | | RY1013 | 1 | |



Since the RD-REQ is kept to the ON-state in the STEP 3, the monitor of the detection position is started at the same time that positioning operation is started.

4. When positioning operation is started, turn the START OFF.
Even if the START is turned OFF, the operation continues until the command position.

NETC02-CC to master

| Address number | Remote I/O | Address | Input value | Description |
|----------------|------------|---------|-------------|--------------------|
| 0 | START | RY1003 | 0 | Turn the START OFF |
| 1 | | RY1013 | 0 | |

5. When positioning operation was completed, check the detection position changes to "5000 (1388h)."

NETC02-CC to master

| Address number | Address | Response | Description |
|----------------|---------|-----------------|----------------------------|
| 0 | RWr0 | 5000 (1388h) | Detection position (lower) |
| | RWr1 | | Detection position (upper) |
| | RWr2 | 5000 (1388h) | Position No.0 (lower) |
| | RWr3 | | Position No.0 (upper) |
| 1 | RWr4 | 5000 (1388h) | Detection position (lower) |
| | RWr5 | | Detection position (upper) |
| | RWr6 | 5000 (1388h) | Position No.0 (lower) |
| | RWr7 | | Position No.0 (upper) |

Since the data of the position No.0 is continuously written, keep the WR-REQ to the ON-state.

STEP 5 Change the position data of the operation data No.0

- Set the position data "3000 (BB8h)" of the position No.0 to remote register.

Since the WR-REQ is kept to the ON-state in the STEP 4, the write value is displayed at the same time the data of the position No.0 is set.

Master to NETC02-CC

| Address number | Address | Input value | Description |
|----------------|---------|----------------|-----------------------|
| 0 | RWw100 | 0 | Not used |
| | RWw101 | 0 | Not used |
| | RWw102 | 3000 (BB8h) | Position No.0 (lower) |
| | RWw103 | | Position No.0 (upper) |
| 1 | RWw104 | 0 | Not used |
| | RWw105 | 0 | Not used |
| | RWw106 | 3000 (BB8h) | Position No.0 (lower) |
| | RWw107 | | Position No.0 (upper) |

Also, since the RD-REQ is kept to the ON-state in the STEP 3, the write value is read at the same time the data of the position No.0 is set.

Check the value is matched with the one having set in the above 1.

NETC02-CC to master

| Address number | Address | Response | Description |
|----------------|---------|-----------------|----------------------------|
| 0 | RWr0 | 5000 (1388h) | Detection position (lower) |
| | RWr1 | | Detection position (upper) |
| | RWr2 | 3000 (BB8h) | Position No.0 (lower) |
| | RWr3 | | Position No.0 (upper) |
| 1 | RWr4 | 5000 (1388h) | Detection position (lower) |
| | RWr5 | | Detection position (upper) |
| | RWr6 | 3000 (BB8h) | Position No.0 (lower) |
| | RWr7 | | Position No.0 (upper) |

- Turn the WR-REQ and RD-REQ OFF.

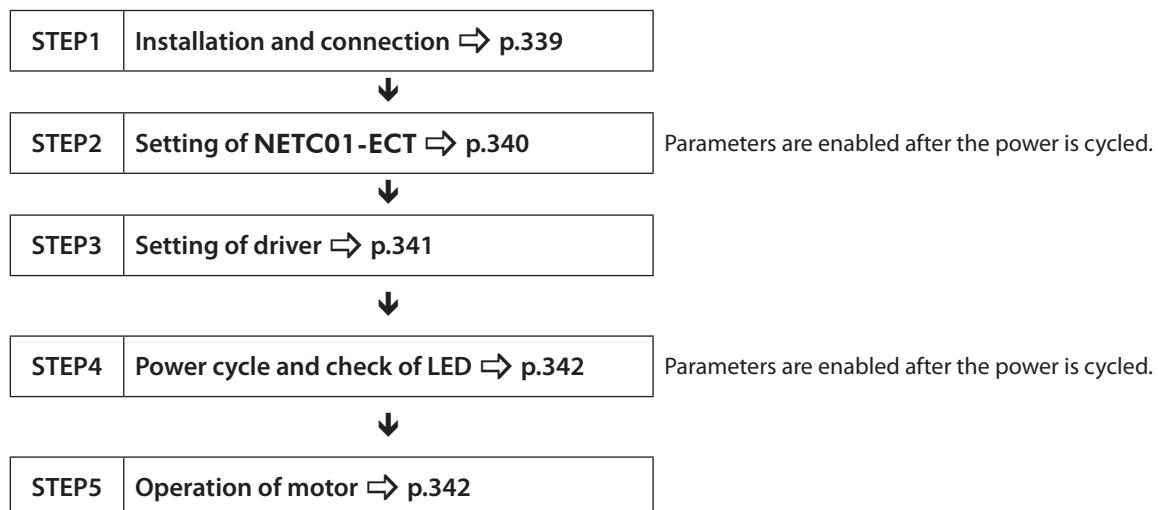
Master to NETC02-CC

| Address number | Remote I/O | Address | Input value | Description |
|----------------|------------|---------|-------------|----------------------------|
| 0 | WR-REQ0 | RY1090 | 0 | Write completed |
| 1 | | | | |
| 0 | RD-REQ0 | RY1092 | 0 | Read and monitor completed |
| 1 | | | | |

4 Method of control via EtherCAT communication

4-1 Guidance

If you are new to the **NETC01-ECT**, read this section to understand the operating methods along with the operation flow.



● Operation condition

Here, the motor is supposed to be operated under the following conditions.

- **NETC01-ECT** node address: 1
- Number of divers connected: One
- Driver address number: 0
- Driver termination resistor: Enabled



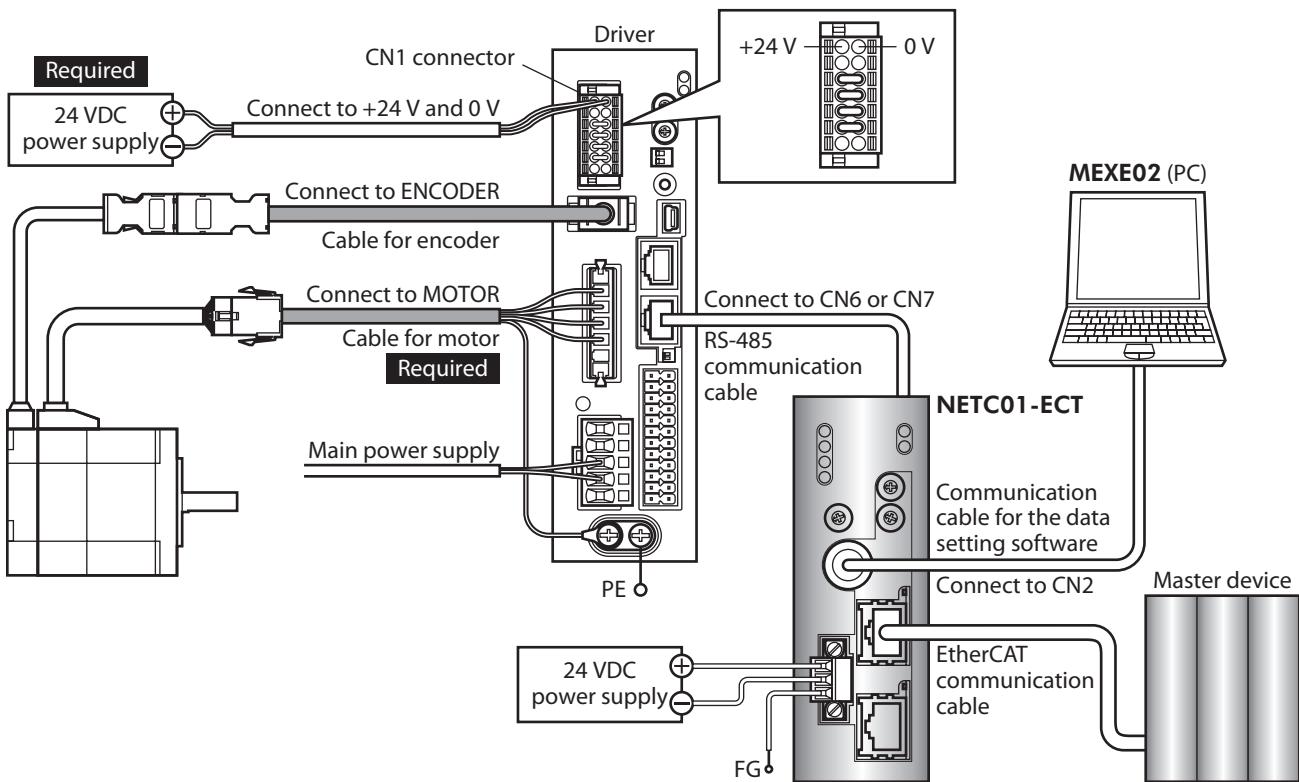
- Before operating the motor, check the condition of the surrounding area to ensure safety.
- Before starting guidance, import the ESI file to the EtherCAT Configuration Tool of the PLC and register the PLC configuration in advance. The ESI file can be downloaded from Oriental Motor Website Download Page.



The termination resistor for the **NETC01-ECT** is built into the product. This product can be used without setting the termination resistor.

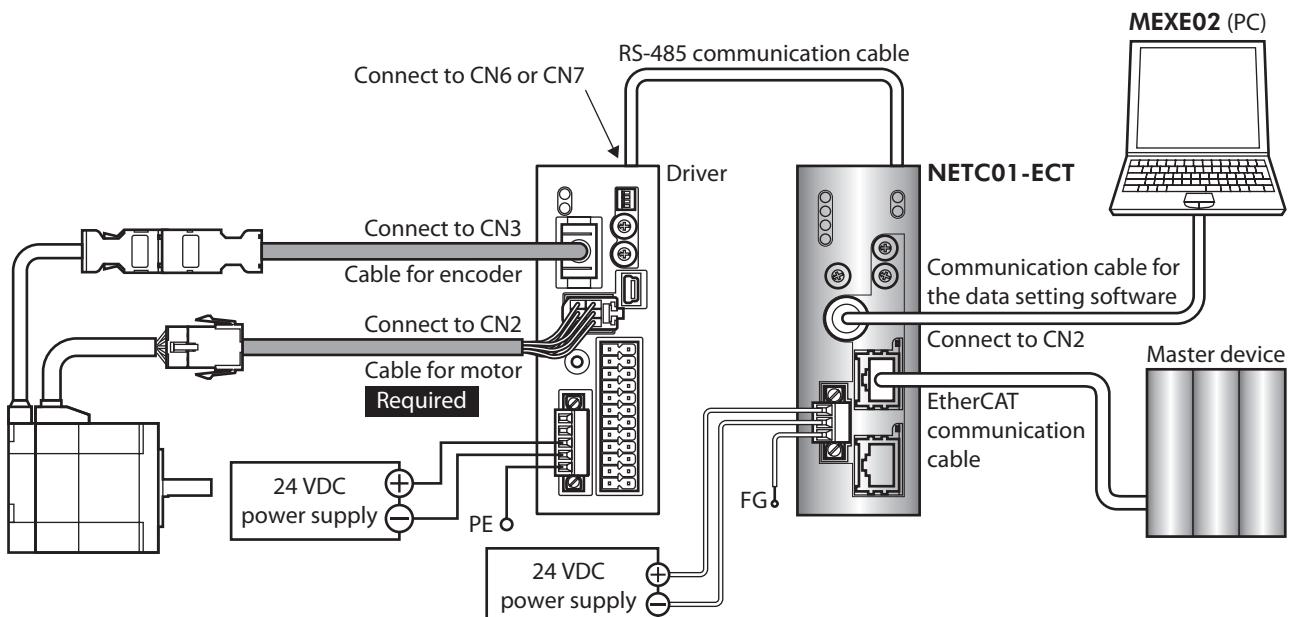
STEP 1 Check the installation and connection

■ AC power input driver



Cables represented in gray color are accessories. Use the cable for encoder when the length of the encoder cable of motor is not enough.

■ DC power input driver



Cables represented in gray color are accessories. Use the cable for encoder when the length of the encoder cable of motor is not enough.

STEP 2 Set the parameters and switches of the NETC01-ECT

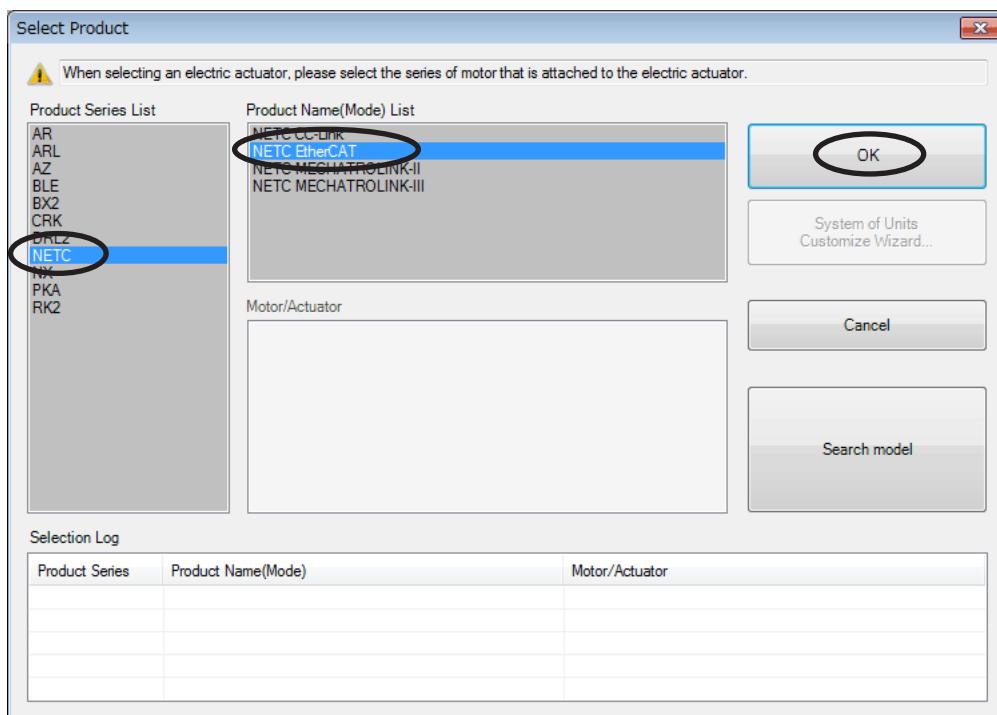
Set the parameters and switches of the **NETC01-ECT**.

- Turn on the power to the **NETC01-ECT**.

At this time, since parameters and switches are not set, the ALARM LED will be lit.
Move on the next procedure, and set parameters and switches.

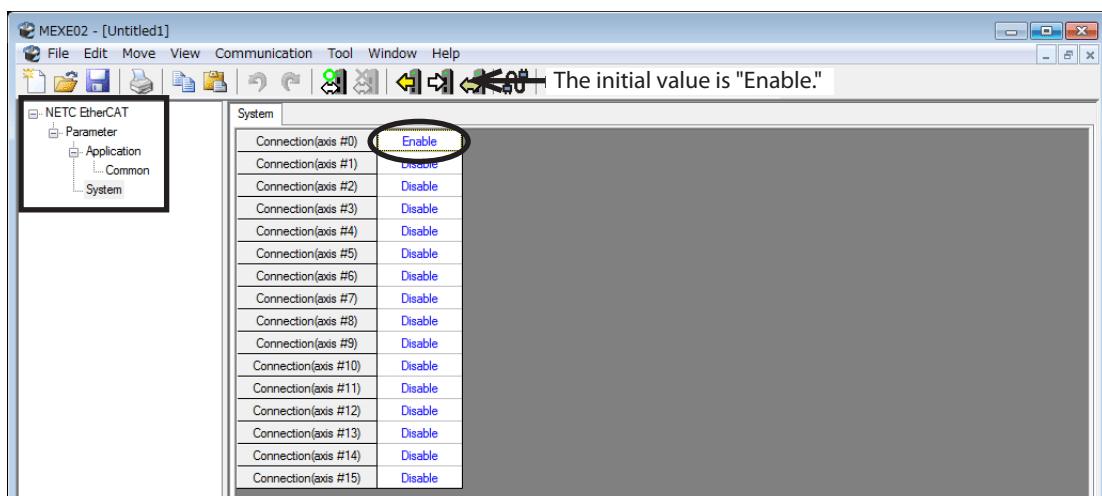
- Start the **MEXE02** and set the parameters.

Select the **NETC01-ECT**.



- Set the "Connection (axis #)" parameter of the driver connected to the **NETC01-ECT** to "Enable" using the **MEXE02**.

The initial value in the "Connection (axis #0)" parameter is set to "Enable." When the connected driver is 1 unit and the address number of the driver is "0," it is not required to set the "Connection (axis #)" parameter.

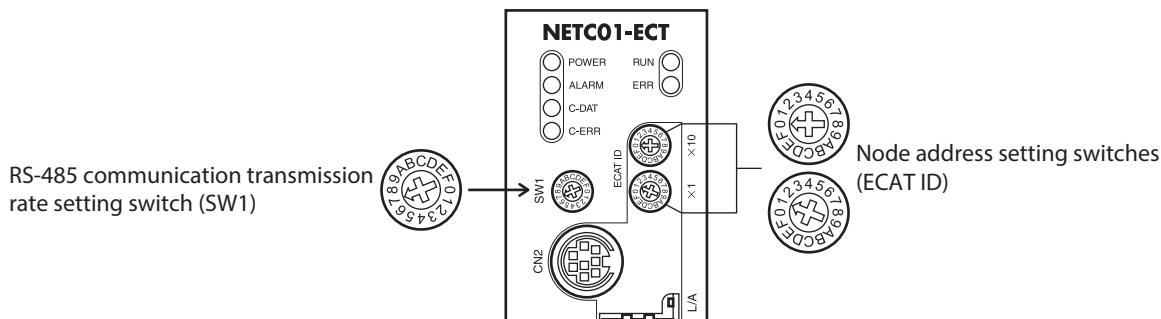


| MEXE02 tree view | Parameter name | Description | Initial value |
|------------------|---|---|---------------|
| System | Connection (axis #0) | Enables the address number of the driver connected to the NETC01-ECT . | Enable |
| | Connection (axis #1) to Connection (axis #15) | Setting range Disable Enable | Disable |

4. Set the switches of the **NETC01-ECT**.

Set as the illustration below.

| Setting contents | Switch | Factory setting |
|---|---|-------------------|
| RS-485 communication transmission: 625 kbps | Set SW1 to "7" | 7 |
| EtherCAT Node address: 1 | Set the x10 to "0" and the x1 to "1" of the ECAT ID | 1 (x10: 0, x1: 1) |

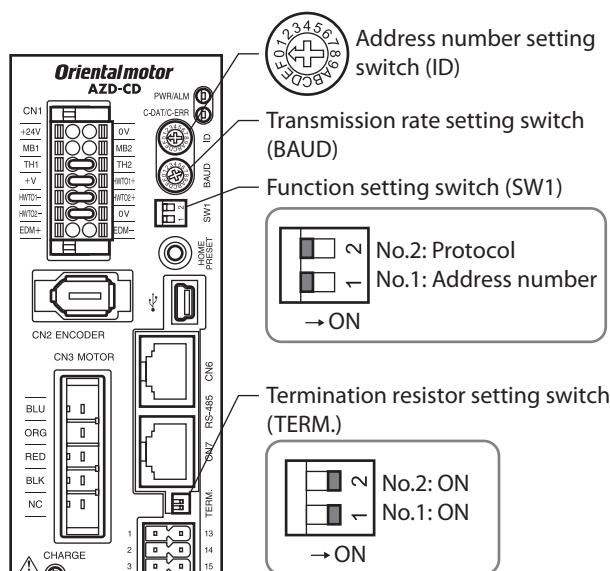
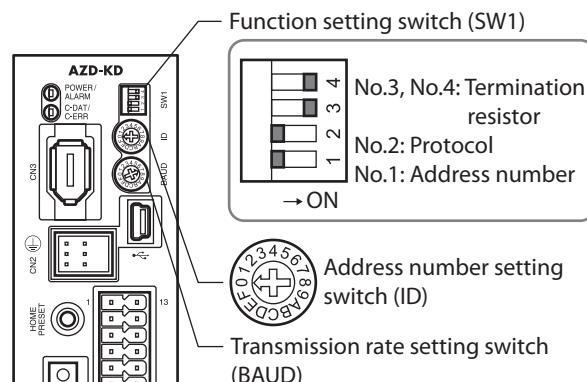
5. Turn off the **NETC01-ECT** power.

- When multiple drivers are connected, set connection parameters as many as the drivers.
- To activate the changed "Connection (axis #)" parameter, cycling the power supply is required.
- For the SW1, always set to "7." If the switch is set to the dial of "8" or higher, the communication switch setting error alarm will be generated when turning on the power. And do not set the switch to the dial of "0" to "6" because they cannot be used. (An alarm will not be generated.)

STEP 3 Set the switches of the driver

Set the following with the switches of the driver. For the protocol, select "OFF" (network converter). The status becomes as shown in the following figures after setting.

| Setting contents | Switch |
|-----------------------------|---|
| Protocol: Network converter | Turn No.2 of SW1 OFF |
| Address number: 0 | Turn No.1 of SW1 OFF, set ID to 0 |
| Termination resistor: ON | AC power input driver: Turn Nos.1 and 2 of TERM ON DC power input driver: Turn Nos.3 and 4 of SW1 ON |

■ AC power input driver**■ DC power input driver**

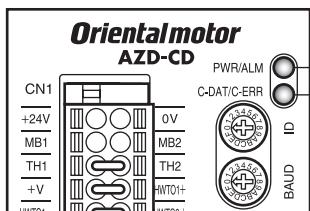


- For the address number, set the one with the "Connection (axis #)" parameter of the **NETC01-ECT** set to "Enable."
- For the **AZ Series**, the transmission rate does not require to set. It is fixed to 625,000 bps in the "Baudrate(NETC)" parameter. The BAUD switch can point anywhere.

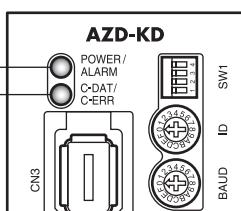
STEP 4 Cycle the power and check the LED

Check that the LED of the driver and **NETC01-ECT** are as shown in the figure.

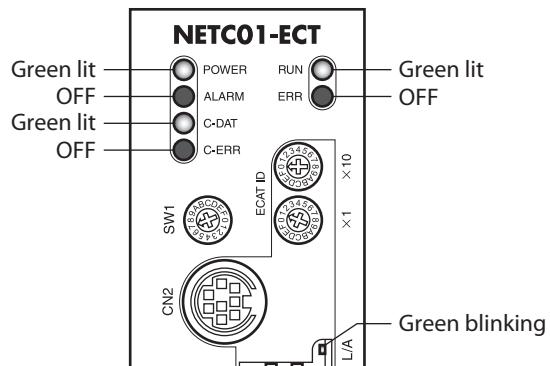
■ AC power input driver



■ DC power input driver



■ Network converter



- When the C-DAT/C-ERR LED (red) of the driver or the C-ERR LED (red) of the **NETC01-ECT** is lit: Check the transmission rate of RS-485 communication or the address number.
- When the ERR LED (red) of the **NETC01-ECT** is blink: An EtherCAT communication error has been occurred. Check the error content.

STEP 5 Perform continuous operation via remote I/O of EtherCAT communication

Turn FW-POS of the address number 0 ON with the remote I/O of EtherCAT communication. Continuous operation for the operation data No.0 is started at the 1000 Hz of starting speed.

Initial values of the remote I/O are as follows.

● Master to NETC01-ECT

| CoE Index | Sub-index | Name | Type | Access | Description | | | | | | | |
|-----------|-----------|---------------------|------|--------|------------------------|--------|----------|----------|--------|--------|--------|--------|
| | 0 | - | U8 | R | Number of Sub-index: 2 | | | | | | | |
| 2600h | 1 | I/O Command (lower) | U8 | RW | bit[7] | bit[6] | bit[5] | bit[4] | bit[3] | bit[2] | bit[1] | bit[0] |
| | | | | | R-IN7 | R-IN6 | R-IN5 | R-IN4 | R-IN3 | R-IN2 | R-IN1 | R-IN0 |
| | 2 | | | | ALM-RST | FREE | STOP | ZHOME | START | M2 | M1 | M0 |
| | 2 | I/O Command (upper) | U8 | RW | bit[7] | bit[6] | bit[5] | bit[4] | bit[3] | bit[2] | bit[1] | bit[0] |
| | | | | | R-IN15 | R-IN14 | R-IN13 | R-IN12 | R-IN11 | R-IN10 | R-IN9 | R-IN8 |
| | | | | | RV-POS | FW-POS | RV-JOG-P | FW-JOG-P | SSTART | D-SEL2 | D-SEL1 | D-SEL0 |

STEP 6 Were you able to operate the motor properly?

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

- Is an alarm generated in the driver or **NETC01-ECT**?
- Are the power supply, motor, and RS-485 communication cable connected securely?
- Are the protocol, address number, transmission rate and termination resistor set correctly?
- Is the "connection (axis #)" parameter of the **NETC01-ECT** set correctly?
- Is the C-DAT LED of **NETC01-ECT** turned off? Or is the C-ERR LED lit in red? (A RS-485 communication error has been occurred.)
- Is the ERR LED of **NETC01-ECT** blinks in red? (An EtherCAT communication error has been occurred.)
- Is the L/A LED of **NETC01-ECT** turnde off? Or is it blinks in green? (An EtherCAT communication error has been occurred.)
- Is the motor excited, or is the setting of the excitation method correct?
- Are the parameters of the driver set correctly?
- Is the operation stop signal input to the driver?

4-2 Basic operating procedures

This section explains how to perform positioning operation and monitor function as basic operating procedures. This is an example of the operating procedure for controlling via EtherCAT communication using the **NETC01-ECT**.

■ Positioning operation

● Setting example

- Driver address number (slave address): 0
- Operation data No.1
- Position (travel amount): 5000 steps
- Setting method of operation data for the **AZ Series**: Compatible command (setting per item)

● Operating procedure

1. Send the following remote register to set the position (travel amount) of the operation data No.1 to 5000 steps.
When the TRIG is turned ON, the data set in the remote register is written.

[Remote register command of **NETC01-ECT**]

| CoE Index | Sub-Index | Item | Type | Access | Description | | | | | | | |
|-----------------------------|-----------|---------|-------|--------|---|--------|--------|--------|--------|--------|--------|--------|
| 2800h (Address number 0) | 0 | — | U8 | R | Sub-index number: 4 | | | | | | | |
| | 1 | Axis | U8 | RW | Reserved (not used) | | | | | | | |
| | 2 | Command | U16 | RW | Command code: 1201h (position of operation data No.1) | | | | | | | |
| | 3 | Data | INT32 | RW | Data: 5000 (travel amount: 5000 steps) | | | | | | | |
| | 4 | TRIG | U8 | RW | bit[7] | bit[6] | bit[5] | bit[4] | bit[3] | bit[2] | bit[1] | bit[0] |
| | | | | | — | — | — | — | — | — | — | TRIG |

2. When the data writing is completed properly, the TRIG_R is turned ON. At this time, the STATUS remains OFF. Turn the TRIG OFF again after writing.

[Remote register response of **NETC01-ECT**]

| CoE Index | Sub-index | Item | Type | Access | Description | | | | | | | |
|-----------------------------|-----------|---------|-------|--------|------------------------------|--------|--------|--------|---------------|------------|--------|--------|
| 2900h (Address number 0) | 0 | — | U8 | R | Sub-index number: 4 | | | | | | | |
| | 1 | Axis | U8 | R | Reserved (not used) | | | | | | | |
| | 2 | Command | U16 | R | Command code response: 1201h | | | | | | | |
| | 3 | Data | INT32 | R | Data response: 5000 | | | | | | | |
| | 4 | Status | U8 | R | bit[7] | bit[6] | bit[5] | bit[4] | bit[3] | bit[2] | bit[1] | bit[0] |
| | | | | | — | — | — | — | Command Error | Axis Error | STATUS | TRIG_R |



- If the TRIG was turned ON, be sure to turn it OFF again.
- When the data is written with the TRIG, the data is saved in the RAM. If the data is saved in the non-volatile memory, execute the "Batch non-volatile memory (3E85h)" of the maintenance command.

3. Send the following remote I/O to turn the M0 and START ON (9h).
Positioning operation is started. If the motor rotates for 5000 steps, the positioning operation was successful.

[Remote I/O of **NETC01-ECT**]

| CoE Index | Sub-Index | Item | Type | Access | Description | | | | | | | |
|-----------------------------|-----------|---------------------|------|--------|---------------------|--------|--------|--------|--------|--------|--------|--------|
| 2600h (Address number 0) | 0 | — | U8 | R | Sub-index number: 2 | | | | | | | |
| | 1 | I/O Command (lower) | U8 | RW | bit[7] | bit[6] | bit[5] | bit[4] | bit[3] | bit[2] | bit[1] | bit[0] |
| | | | | | R-IN7 | R-IN6 | R-IN5 | R-IN4 | R-IN3 | R-IN2 | R-IN1 | R-IN0 |
| | 2 | I/O Command (upper) | U8 | RW | bit[7] | bit[6] | bit[5] | bit[4] | bit[3] | bit[2] | bit[1] | bit[0] |
| | | | | | R-IN15 | R-IN14 | R-IN13 | R-IN12 | R-IN11 | R-IN10 | R-IN9 | R-IN8 |

[R-IN (initial value) of AZ Series]

| CoE Index | Sub-Index | Item | Type | Access | Description | | | | | | | |
|-----------------------------|-----------|---------------------|------|--------|---------------------|--------|----------|----------|--------|--------|--------|--------|
| 2600h (Address number 0) | 0 | – | U8 | R | Sub-index number: 2 | | | | | | | |
| | 1 | I/O Command (lower) | U8 | RW | R-IN7 | R-IN6 | R-IN5 | R-IN4 | R-IN3 | R-IN2 | R-IN1 | R-IN0 |
| | 2 | I/O Command (upper) | U8 | | ALM-RST | FREE | STOP | ZHOME | START | M2 | M1 | M0 |
| | | | | | R-IN15 | R-IN14 | R-IN13 | R-IN12 | R-IN11 | R-IN10 | R-IN9 | R-IN8 |
| | | | | | RV-POS | FW-POS | RV-JOG-P | FW-JOG-P | SSTART | D-SEL2 | D-SEL1 | D-SEL0 |

■ Monitor function**● Setting example**

- Driver address number (slave address): 0
- Operation data No.0 (the speed was set to 1000 [Hz])
- Monitor item: Detection speed [Hz]
- Connected driver: AZ Series

● Operating procedure

1. Send the following remote monitor command to turn the TRIG ON.
The monitor of the detection speed [Hz] of the address number 0 is started.

[Remote monitor command of NETC01-ECT]

| CoE Index | Sub-Index | Item | Type | Access | Description | | | | | | | |
|-----------------------------|-----------|---------|-------|--------|---|--------|--------|--------|--------|--------|--------|--------|
| 2A00h (Address number 0) | 0 | – | U8 | R | Sub-index number: 4 | | | | | | | |
| | 1 | Axis | U8 | RW | Address number: 0 | | | | | | | |
| | 2 | Command | U16 | | Command code: 2068h (monitor of detection speed [Hz]) | | | | | | | |
| | 3 | Data | INT32 | RW | Reserved (not used) | | | | | | | |
| | 4 | TRIG | U8 | | bit[7] | bit[6] | bit[5] | bit[4] | bit[3] | bit[2] | bit[1] | bit[0] |
| | | | | | – | – | – | – | – | – | – | TRIG |

2. Send the following remote I/O to turn the FW-POS (40h) of the address number 0 ON.
Continuous operation in the forward direction is started.

[Remote I/O of NETC01-ECT]

| CoE Index | Sub-Index | Item | Type | Access | Description | | | | | | | |
|-----------------------------|-----------|---------------------|------|--------|---------------------|--------|--------|--------|--------|--------|--------|--------|
| 2600h (Address number 0) | 0 | – | U8 | R | Sub-index number: 2 | | | | | | | |
| | 1 | I/O Command (lower) | U8 | RW | bit[7] | bit[6] | bit[5] | bit[4] | bit[3] | bit[2] | bit[1] | bit[0] |
| | 2 | I/O Command (upper) | U8 | | R-IN7 | R-IN6 | R-IN5 | R-IN4 | R-IN3 | R-IN2 | R-IN1 | R-IN0 |
| | | | | | bit[7] | bit[6] | bit[5] | bit[4] | bit[3] | bit[2] | bit[1] | bit[0] |
| | | | | | R-IN15 | R-IN14 | R-IN13 | R-IN12 | R-IN11 | R-IN10 | R-IN9 | R-IN8 |

[R-IN (initial value) of AZ Series]

| CoE Index | Sub-Index | Item | Type | Access | Description | | | | | | | |
|-----------------------------|-----------|---------------------|------|--------|---------------------|--------|----------|----------|--------|--------|--------|--------|
| 2600h (Address number 0) | 0 | – | U8 | R | Sub-index number: 2 | | | | | | | |
| | 1 | I/O Command (lower) | U8 | RW | R-IN7 | R-IN6 | R-IN5 | R-IN4 | R-IN3 | R-IN2 | R-IN1 | R-IN0 |
| | 2 | I/O Command (upper) | U8 | | ALM-RST | FREE | STOP | ZHOME | START | M2 | M1 | M0 |
| | | | | | R-IN15 | R-IN14 | R-IN13 | R-IN12 | R-IN11 | R-IN10 | R-IN9 | R-IN8 |
| | | | | | RV-POS | FW-POS | RV-JOG-P | FW-JOG-P | SSTART | D-SEL2 | D-SEL1 | D-SEL0 |

3. If the data of the address number 0 is monitored by the remote monitor response, the communication was successful.

The TRIG_R is turned ON while the monitor is performed properly. At this time, the STATUS remains OFF.



The monitor is continued to update while the TRIG of the remote monitor command is being ON.

[Remote monitor response of NETC01-ECT]

| CoE Index | Sub-Index | Item | Type | Access | Description | | | | | | | |
|-----------------------------|-----------|---------|-------|--------|------------------------------|--------|--------|--------|---------------|------------|--------|--------|
| 2B00h (Address number 0) | 0 | – | U8 | R | Sub-index number: 4 | | | | | | | |
| | 1 | Axis | U8 | R | Address number response: 0 | | | | | | | |
| | 2 | Command | U16 | R | Command code response: 2068h | | | | | | | |
| | 3 | Data | INT32 | R | Monitor data: 1000 | | | | | | | |
| | 4 | Status | U8 | R | bit[7] | bit[6] | bit[5] | bit[4] | bit[3] | bit[2] | bit[1] | bit[0] |
| | | | | | – | – | – | – | Command Error | Axis Error | STATUS | TRIG_R |

4. Turn the TRIG OFF again to finish the monitor.

5 Group function

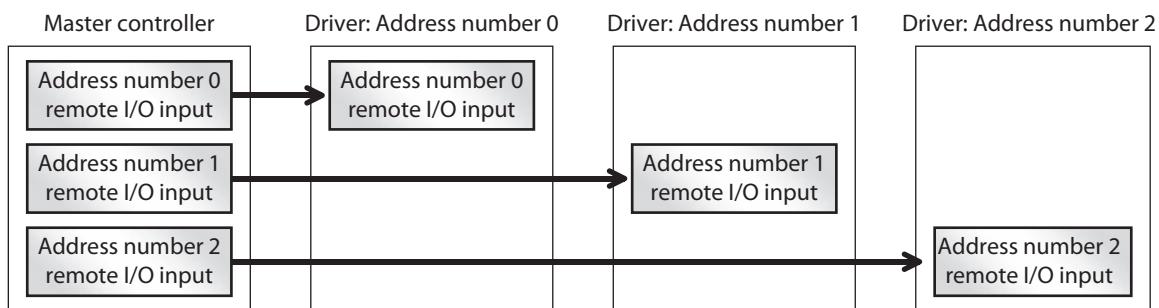
Multiple slaves are made into a group and a query is sent to the group at once.

With the **AZ Series**, groups can be set for each remote I/O. This function allows to control certain remote I/O by group and to control another remote I/O by driver.

For example, it is possible to input the STOP and ALM-RST signals to the group and the ZHOME and SSTART signals to each driver.

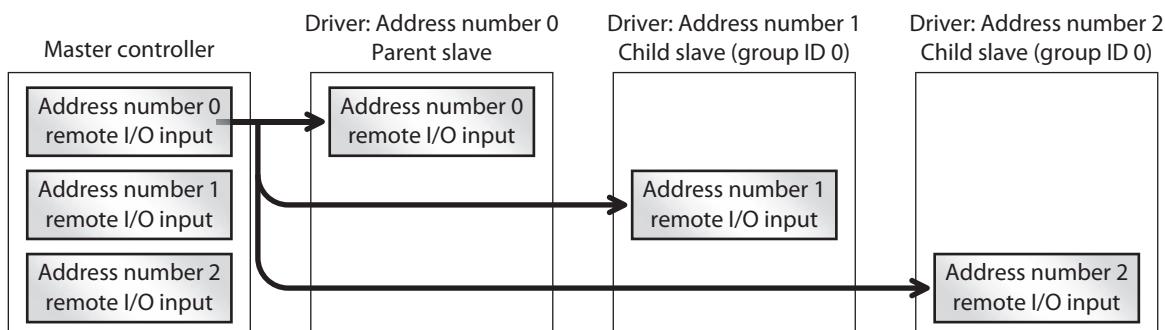
- **Example) When the group function is disabled**

Remote I/O is input separately to all the drivers.



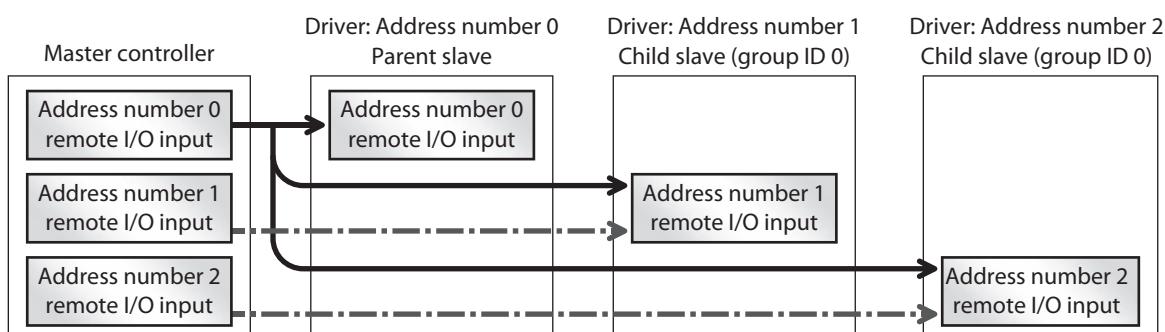
- **Example) When the group function is enabled (all the remote I/O are input collectively)**

Remote I/O can be input collectively to all the drivers.



- **Example) When the group function is enabled (group input and individual input are used concurrently)**

Some remote I/O are input by forming a group and the remaining remote I/O are input to each driver.



Only remote I/O input can be executed with the group function. Reading and writing of commands and parameters cannot be executed. Executes these for each driver regardless of the setting of a group.

5-1 Group address

A group consists of one parent slave and child slaves.

When forming a group, set a group address (address number of the parent slave) to the child slaves to be included in the group. The child slaves to which the group address has been set can receive remote I/O sent to the parent slave.

■ Parent slave

No special setting is required on the parent slave to perform a group send. The address number of the parent slave becomes the group address.

■ Child slave

With the "Group ID" parameter, set a group address (address number of the parent slave) to the child slaves.

Since the "Group ID" parameter is stored in RAM, the value returns to the initial value when the power is turned off, and the group is released. Therefore, the group should be always reset after power-on.

On the other hand, since the "Initial group ID" parameter is stored in the non-volatile memory, if the group is set to this parameter, the group is not released even if the power is turned off. The group function can be used immediately after power-on.

Related parameters

| Command code | | Name | Description | Initial value |
|-----------------|-----------------|----------------------------|---|---------------|
| READ | WRITE | | | |
| 24 (0018h) | 4120 (1018h) | Group ID | Sets the address (address number of the parent slave) of the group. Setting range –1: Individual (no group is set) 0 to 15: Address of group * | -1 |
| 2513 (09D1h) | 6609 (19D1h) | Initial group ID (NETC) | Sets the address (address number of the parent slave) of the group. It is stored even if the power is turned off. Setting range –1: Disable 0 to 31: Address of group | -1 |

* When using the **NETC01-CC**, set in the range of 0 to 11.

5-2 Group action modes

There are two types of input methods (action modes) of remote I/O as shown below, which can be set to each of 16 remote I/O. Set them with the "R-IN Group action mode" parameter.

- Input to the group.
- Input to each driver.

Since the "R-IN Group action mode" parameter is stored in RAM, the input method of remote I/O is returned to the initial value when the power is turned off. Therefore, the input method should be always reset after power-on.

On the other hand, since the "R-IN Group action mode Initial state" parameter is stored in the non-volatile memory, if the input method is set by using this parameter, it is not released even if the power is turned off.



When a signal is input to the group, child slaves operates at the same time as the parent slave. Therefore, the timing differs from the I/O input to each driver.

Related parameters

| Command code | | Name | Description | Initial value |
|-----------------|-----------------|---|--|---------------|
| READ | WRITE | | | |
| 25 (0019h) | 4121 (1019h) | R-IN Group action mode (for NETC) | This is enabled when setting a group. Sets the input method of remote I/O. Specify the remote I/O to be input to the group by bit. (Details of bit arrangement ⇒ p.349) 0: Input to each driver 1: Input to the group Setting range 0 to 65,535 (0 to FFFFh) | 0 * |
| 2336 (0920h) | 6432 (1920h) | R-IN0 group action mode initial state (NETC) | | 0 |
| 2337 (0921h) | 6433 (1921h) | R-IN1 group action mode initial state (NETC) | | 0 |
| 2338 (0922h) | 6434 (1922h) | R-IN2 group action mode initial state (NETC) | | 0 |
| 2339 (0923h) | 6435 (1923h) | R-IN3 group action mode initial state (NETC) | | 0 |
| 2340 (0924h) | 6436 (1924h) | R-IN4 group action mode initial state (NETC) | | 0 |
| 2341 (0925h) | 6437 (1925h) | R-IN5 group action mode initial state (NETC) | | 0 |
| 2342 (0926h) | 6438 (1926h) | R-IN6 group action mode initial state (NETC) | | 0 |
| 2343 (0927h) | 6439 (1927h) | R-IN7 group action mode initial state (NETC) | Sets the input method of remote I/O. It is stored even if the power is turned off. Setting range 0: Input to each driver 1: Input to the group | 0 |
| 2344 (0928h) | 6440 (1928h) | R-IN8 group action mode initial state (NETC) | | 0 |
| 2345 (0929h) | 6441 (1929h) | R-IN9 group action mode initial state (NETC) | | 0 |
| 2346 (092Ah) | 6442 (192Ah) | R-IN10 group action mode initial state (NETC) | | 0 |
| 2347 (092Bh) | 6443 (192Bh) | R-IN11 group action mode initial state (NETC) | | 0 |
| 2348 (092Ch) | 6444 (192Ch) | R-IN12 group action mode initial state (NETC) | | 0 |
| 2349 (092Dh) | 6445 (192Dh) | R-IN13 group action mode initial state (NETC) | | 0 |
| 2350 (092Eh) | 6446 (192Eh) | R-IN14 group action mode initial state (NETC) | | 0 |
| 2351 (092Fh) | 6447 (192Fh) | R-IN15 group action mode initial state (NETC) | | 0 |

* It varies depending on the setting of the "R-IN group action mode initial state" parameter.

- Bit arrangement of R-IN Group action mode (NETC)

| bit15 | bit14 | bit13 | bit12 | bit11 | bit10 | bit9 | bit8 |
|--------|--------|--------|--------|--------|--------|-------|-------|
| R-IN15 | R-IN14 | R-IN13 | R-IN12 | R-IN11 | R-IN10 | R-IN9 | R-IN8 |
| bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
| R-IN7 | R-IN6 | R-IN5 | R-IN4 | R-IN3 | R-IN2 | R-IN1 | R-IN0 |

Setting example

| Dec | Hex | Setting contents |
|--------|-------|---|
| 0 | 0000h | When all bits are set to "0." All of R-IN0 to R-IN15 are input to each driver. (Initial state) |
| 1 | 0001h | When only bit 0 is set to "1," and others are set to "0." R-IN0 is input to the group. R-IN1 to R-IN15 are input to each driver. |
| 2 | 0002h | When only bit 1 is set to "1," and others are set to "0." R-IN1 is input to the group. R-IN0 and R-IN2 to R-IN15 are input to each driver. |
| 65,535 | FFFFh | When all bits are set to "1." All of R-IN0 to R-IN15 are input to the group. |

6 Simple direct data operation

Simple direct data operation is a function to start operation only by writing the "Target position" and the "Operating speed".

At the same time, the current position and operating speed can be monitored by using the response function. The monitoring contents can be set with parameters.

6-1 Types of simple direct data operation

Simple direct data operation has two types: simple direct data operation monitor 0 and simple direct data operation monitor 1.

- **Simple direct data operation monitor 0**

When the "Target position" is written, the selected operation is started, and the "Target position" is written to the "Position" of the operation data at the same time.

For response, the data specified with the parameter is read.

- **Simple direct data operation monitor 1**

When the "Operating speed" is written, the selected operation is started, and the "Operating speed" is written to the "Operating speed" of the operation data at the same time.

For response, the data specified with the parameter is read.

Related commands/parameters

| Command code | | Name | Description | Initial value |
|----------------|-----------------|---|--|---------------|
| READ | WRITE | | | |
| 53 (0035h) | 4149 (1035h) | Simple direct data operation monitor 0 (for NETC) | Sets the "Target position" for simple direct data operation. Setting range -2,147,483,648 to 2,147,483,647 steps | 0 |
| 54 (0036h) | 4150 (1036h) | Simple direct data operation monitor 1 (for NETC) | Sets the "Operating speed" for simple direct data operation. Setting range -4,000,000 to 4,000,000 Hz | 1,000 |
| 280 (0118h) | 4376 (1118h) | Simple direct data operation monitor select 0 | Sets the item that can be monitored in simple direct data operation. Setting range 0: Command position 1: Feedback position 2: Command speed (r/min) 3: Feedback speed (r/min) 4: Command speed (Hz) 5: Feedback speed (Hz) 6: Command position 32 bit counter 7: Feedback position 32 bit counter | 0 |
| 281 (0119h) | 4377 (1119h) | Simple direct data operation monitor select 1 | Sets the command when 0 is written to the "Operating speed" in simple direct data operation. Setting range 0: Deceleration stop command 1: Speed zero command | 0 |
| 272 (0110h) | 4368 (1110h) | Direct data operation zero speed command action | Sets the command when 0 is written to the "Operating speed" in simple direct data operation. Setting range 0: Deceleration stop command 1: Speed zero command | 0 |

6-2 How to use simple direct data operation monitor 0

As an example, write "8,500" to the "Position" of the operation data No.1.

■ Setting example of operation data No.1

In simple direct data operation, the setting items in the following table are used. Items not shown in the table, such as Drive-complete delay time and Link are disabled even if they are set.

| Operation type | Position | Operating speed | Starting/changing speed rate | Stopping deceleration | Operating current |
|----------------------|------------------------|-----------------|------------------------------|-----------------------|-------------------|
| Absolute positioning | 0 step (initial value) | 2,000 Hz | 1.5 kHz/s | 1.5 kHz/s | 100.0% |

■ Operation and monitoring procedures

● Overview

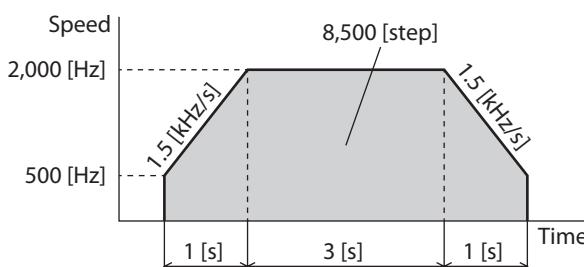
1. Select the operation data No.1 in remote I/O.
When only M0 is turned ON, the operation data No.1 is selected.

2. Turn the write request (D-REQ or TRIG) ON and write data.
 - Command: "Simple direct data operation monitor 0 (for NETC)" command
 - Data: 8,500 steps

Operation based on the operation data No.1 is started at the same time as writing of data.

The item set in the "Simple direct data operation monitor select 0" parameter is continuously monitored while the write request is ON.

The motor operates to the position of 8,500 steps and stops.



3. Finish simple direct data operation.

When the write request (D-REQ or TRIG) is turned OFF, update of the response is stopped. Operation is not affected even if the write request is turned OFF.



Even if simple direct data operation is being executed, the "Position" data can be updated. In this case, turn the write request OFF and then the write request of another target position ON.

● In case of CC-Link communication

Operation is started at the same time as D-REQ of remote I/O is turned ON and the target position is written. The data of response is continuously updated while D-REQ is ON.

| RWw (Master to NETC02-CC) | | | RWr (NETC02-CC to Master) | | |
|---------------------------|----------------|----------------------------------|---------------------------|-------------------------|--|
| Address No. | Description | Setting example | Address No. | Description | Setting example |
| RWw00 | Command code | 4149 (1035h) | RWr00 | Command code response | 4149 (1035h) |
| RWw01 | Address number | 0 | RWr01 | Address number response | 0 |
| RWw02 | Data | 8,500 steps (target position) | RWr02 | Data | 0 to 8,500 steps (monitoring of command position) |
| RWw03 | | | RWr03 | | |



When the network converter **NETC02-CC** is used, execute a command with the command selection method.

- In case of EtherCAT communication

Operation is started at the same time as TRIG of the remote register is turned ON and the target position is written. The data of response is continuously updated while TRIG is ON.

Remote register command

| CoE Index | Sub-Index | Item | Type | Access | Description | | | | | | | | |
|-----------------------------|-----------|---------|-------|--------|-----------------------------------|--------|--------|--------|--------|--------|--------|--------|------|
| 2800h (Address number 0) | 0 | – | U8 | R | Sub-index number: 4 | | | | | | | | |
| | 1 | Axis | U8 | RW | Reserved (not used) | | | | | | | | |
| | 2 | Command | U16 | RW | Command code: 4149 (1035h) | | | | | | | | |
| | 3 | Data | INT32 | RW | Data: 8500 step (target position) | | | | | | | | |
| | 4 | TRIG | U8 | RW | bit[7] | bit[6] | bit[5] | bit[4] | bit[3] | bit[2] | bit[1] | bit[0] | TRIG |
| | | | | | – | – | – | – | – | – | – | – | – |

Remote register response

| CoE Index | Sub-Index | Item | Type | Access | Description | | | | | | | | |
|-----------------------------|-----------|---------|-------|--------|--|--------|--------|--------|---------------|------------|--------|--------|--------|
| 2900h (Address number 0) | 0 | – | U8 | R | Sub-index number: 4 | | | | | | | | |
| | 1 | Axis | U8 | R | Reserved (not used) | | | | | | | | |
| | 2 | Command | U16 | R | Command code response: 4149 (1035h) | | | | | | | | |
| | 3 | Data | INT32 | R | Data response: 0 to 8500 step (monitoring of command position) | | | | | | | | |
| | 4 | Status | U8 | R | bit[7] | bit[6] | bit[5] | bit[4] | bit[3] | bit[2] | bit[1] | bit[0] | TRIG_R |
| | | | | | – | – | – | – | Command Error | Axis Error | STATUS | TRIG_R | |

6-3 How to use simple direct data operation monitor 1

As an example, write "2,000" to the "Operating speed" of the operation data No.1.

■ Setting example of operation data No.1

In simple direct data operation, the setting items in the following table are used. Items not shown in the table, such as Drive-complete delay time and Link are disabled even if they are set.

| Operation type | Position | Operating speed | Starting/changing speed rate | Stopping deceleration | Operating current |
|--|----------|-------------------------|------------------------------|-----------------------|-------------------|
| Continuous operation (Position control) | 0 step | 0 Hz (initial value) | 1.5 kHz/s | 1.5 kHz/s | 100.0% |

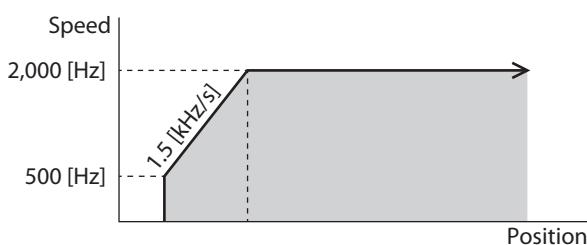
■ Operation and monitoring procedures

● Overview

1. Select the operation data No.1 in remote I/O.
When only M0 is turned ON, the operation data No.1 is selected.

2. Turn the write request (D-REQ or TRIG) ON and write data.
 - Command: "Simple direct data operation monitor 1 (for NETC)" command
 - Data: 2,000 Hz

Operation based on the operation data No.1 is started at the same time as writing of data.
The item set in the "Simple direct data operation monitor select 1" parameter is continuously monitored while the write request is ON.



3. Finish simple direct data operation.

When the write request (D-REQ or TRIG) is turned OFF, update of the response is stopped. Operation is not affected even if the write request is turned OFF.



- Even if simple direct data operation is being executed, the "Operating speed" data can be updated. In this case, turn the write request OFF and then the write request of another speed ON.
- When "0" is written to "Operating speed," the motor stops. It stops according to the setting of the "Direct data operation zero speed command action" parameter.

● In case of CC-Link communication

Operation is started at the same time as D-REQ of remote I/O is turned ON and the target position is written.
The data of response is continuously updated while D-REQ is ON.

| RWw (Master to NETC02-CC) | | | RWr (NETC02-CC to Master) | | |
|---------------------------|----------------|------------------|---------------------------|-------------------------|--|
| Address No. | Description | Setting example | Address No. | Description | Setting example |
| RWw00 | Command code | 4150 (1036h) | RWr00 | Command code response | 4150 (1036h) |
| RWw01 | Address number | 0 | RWr01 | Address number response | 0 |
| RWw02 | Data | 2,000 Hz (speed) | RWr02 | Data | 0 to 2,000 Hz (monitoring of command speed [Hz]) |
| RWw03 | | | RWr03 | | |



When the network converter **NETC02-CC** is used, execute a command with the command selection method.

- In case of EtherCAT communication

Operation is started at the same time as TRIG of the remote register is turned ON and the operating speed is written. The data of response is continuously updated while TRIG is ON.

Remote register command

| CoE Index | Sub-Index | Item | Type | Access | Description | | | | | | | | |
|-----------------------------|-----------|---------|-------|--------|----------------------------|--------|--------|--------|--------|--------|--------|--------|------|
| 2800h (Address number 0) | 0 | – | U8 | R | Sub-index number: 4 | | | | | | | | |
| | 1 | Axis | U8 | RW | Reserved (not used) | | | | | | | | |
| | 2 | Command | U16 | RW | Command code: 4150 (1036h) | | | | | | | | |
| | 3 | Data | INT32 | RW | Data: 2000 step (speed) | | | | | | | | |
| | 4 | TRIG | U8 | RW | bit[7] | bit[6] | bit[5] | bit[4] | bit[3] | bit[2] | bit[1] | bit[0] | TRIG |
| | | | | | – | – | – | – | – | – | – | – | |

Remote register response

| CoE Index | Sub-Index | Item | Type | Access | Description | | | | | | | | |
|-----------------------------|-----------|---------|-------|--------|--|--------|--------|--------|---------------|------------|--------|--------|--------|
| 2900h (Address number 0) | 0 | – | U8 | R | Sub-index number: 4 | | | | | | | | |
| | 1 | Axis | U8 | R | Reserved (not used) | | | | | | | | |
| | 2 | Command | U16 | R | Command code response: 4150 (1036h) | | | | | | | | |
| | 3 | Data | INT32 | R | Data response: 0 to 2000 Hz (monitoring of command speed [Hz]) | | | | | | | | |
| | 4 | Status | U8 | R | bit[7] | bit[6] | bit[5] | bit[4] | bit[3] | bit[2] | bit[1] | bit[0] | TRIG_R |
| | | | | | – | – | – | – | Command Error | Axis Error | STATUS | | |

7 Detection of communication errors

This is a function to detect abnormalities that occurred in communication with the network converter and the industrial network.

It includes two types of detection: communication errors and alarms.

7-1 Communication errors

When the communication error with error code 84h occurs, the C-DAT/C-ERR LED of the driver is lit in red. In addition, the red color and green color on the PWR/ALM LED (POWER/ALARM LED) blink twice at the same time. (Red and green colors may overlap and it may seem to be orange.) For communication errors other than 84h, the LED is not lit and does not blink.

■ Communication error list

| Error code | Communication error type | Cause | Remedial action |
|------------|---|---|--|
| 84h | RS-485 communication error | One of the following errors was detected. - Framing error - BCC error | <ul style="list-style-type: none"> Check the connection with the network converter. Check the setting of RS-485 communication. |
| 88h | Command not yet defined | The command requested by the master could not be executed because of being undefined. | <ul style="list-style-type: none"> Check the set value for the command. Check the frame configuration. |
| 89h | Execution is disabled due to user I/F communication in progress | The command requested by the master could not be executed since the MEXE02 was communicating with the driver. | Wait until the processing for the MEXE02 is complete. |
| 8Ah | Execution is disabled due to non-volatile memory processing in progress | The command could not be executed because the driver was performing the non-volatile memory processing. - Internal processing in progress (SYS-BSY is ON) - An alarm of EEPROM error is present | <ul style="list-style-type: none"> Wait until the internal processing is complete. When the EEPROM error was generated, initialize the parameter by using the MEXE02 or via RS-485 communication. |
| 8Ch | Outside setting range | The setting data requested by the master could not be executed because it was out of the range. | Check the setting data. |
| 8Dh | Command execution is disabled | Execution of the command was attempted, though it was not executable. | Check the driver status. |

■ Communication error records

Up to 10 communication errors are saved in the RAM in order of the latest to oldest. Communication error records saved in the RAM can be read or cleared when performing any of the following.

- Read the communication error records by the monitor command via RS-485 communication.
- Clear the communication error records by the maintenance command via RS-485 communication.
- Read or clear the communication error records by the RS-485 communication monitor of the **MEXE02**.



Since communication error records are saved in the RAM, they are cleared when the driver is turned off.

7-2 Alarms

When an alarm is generated, the ALM-A output is turned OFF, and the motor stops.
At the same time, the PWR/ALM LED (or POWER/ALARM LED) blinks in red.

■ List of alarms related to communication

| Alarm code | Alarm type | Cause |
|------------|------------------------------------|--|
| 81h | Network bus error | When the motor operates, the master controller for the network converter shows a disconnection status. |
| 83h | Communication switch setting error | The BAUD switch was out of the specification. |
| 84h | RS-485 communication error | An error of communication with the network converter occurred three times in succession. |
| 85h | RS-485 communication timeout | Communication with the network converter was not established even though 200 ms or more had passed. |
| 8Eh | Network converter error | An alarm was generated in the network converter. |

7

Address/code lists

This part provides lists of addresses/codes used for Modbus communication and industrial network control.

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1 Update timing of parameters

All data used by the driver is 32-bit wide. Since the register for the Modbus protocol is 16-bit wide, one data is described by two registers.

The parameters are saved in RAM or non-volatile memory. The parameters saved in RAM are erased once the 24 VDC power supply is cut off, however, the parameters saved in the non-volatile memory are saved even if the 24 VDC power supply is cut off.

When the 24 VDC power is applied to the driver, the parameters saved in the non-volatile memory are sent to RAM, and the recalculation and setup for the parameters are executed in RAM.

When a parameter is changed, the timing to enable the new value varies depending on the parameter. See the following four types.

- Effective immediatelyExecutes the recalculation and setup as soon as the parameter is written.
- Effective after stopping the operationExecutes the recalculation and setup after stopping the operation.
- Effective after executing the configurationExecutes the recalculation and setup after executing the configuration.
- Effective after turning the power ON again.....Executes the recalculation and setup after turning on the 24 VDC power supply again.



- The parameters are written in RAM when they are written via RS-485 communication.
- The non-volatile memory can be rewritten approximately 100,000 times.

■ Notation rules

In this document, each update timing is represented in an alphabetical character.

A: Effective immediately

B: Effective after stopping the operation

C: Effective after executing the configuration or turning the power ON again

D: Effective after turning the power ON again

In this document, READ/WRITE may be abbreviated as "R/W."

2 I/O commands

These are commands related to I/O. The set values are stored in RAM.

They are not used in the industrial network. The industrial network uses an area exclusive for I/O.

| Register address | | Name | Description | Initial value | R/W |
|------------------|----------------|--------------------------------------|---|---------------|-----|
| Upper | Lower | | | | |
| 114 (0072h) | 115 (0073h) | NET selection number | Selects the operation data number. Operation data can be sent at the same time as "Driver input command (2nd)." | -1 | R/W |
| 116 (0074h) | 117 (0075h) | Driver input command (2nd) | The input command same as "Driver input command (reference)" is set automatically. | 0 | R/W |
| 118 (0076h) | 119 (0077h) | NET selection number | Selects the operation data number. Operation data can be sent at the same time as "Driver input command (automatic OFF)." | -1 | R/W |
| 120 (0078h) | 121 (0079h) | Driver input command (automatic OFF) | The input command same as "Driver input command (reference)" is set automatically. When the input signal is turned ON with this command, it is turned OFF automatically after 250 µs. | 0 | R/W |
| 122 (007Ah) | 123 (007Bh) | NET selection number | Selects the operation data number. Operation data can be sent at the same time as "Driver input command (reference)." | -1 | R/W |
| 124 (007Ch) | 125 (007Dh) | Driver input command (reference) | Sets the input command to the driver. (Details of bit arrangement⇒Next paragraph) | 0 | R/W |
| 126 (007Eh) | 127 (007Fh) | Driver output status | Acquires the output status of the driver. (Details of bit arrangement⇒p.360) | - | R |

■ Driver input command

These are the driver input signals that can be accessed via Modbus communication. They can be accessed by one register (16 bit).

● Upper

| Register address | Description | | | | | | | |
|------------------|-------------|-------|-------|-------|-------|-------|------|------|
| 124 (007Ch) | bit15 | bit14 | bit13 | bit12 | bit11 | bit10 | bit9 | bit8 |
| | - | - | - | - | - | - | - | - |
| | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
| | - | - | - | - | - | - | - | - |

● Lower

[]: Initial value. They can be changed by parameters. (Parameters⇒p.417, assignment of input signals⇒p.427)

| Register address | Description | | | | | | | |
|------------------|--------------------|--------------------|----------------------|----------------------|--------------------|--------------------|-------------------|-------------------|
| 125 (007Dh) | bit15 | bit14 | bit13 | bit12 | bit11 | bit10 | bit9 | bit8 |
| | R-IN15 [RV-POS] | R-IN14 [FW-POS] | R-IN13 [RV-JOG-P] | R-IN12 [FW-JOG-P] | R-IN11 [SSTART] | R-IN10 [D-SEL2] | R-IN9 [D-SEL1] | R-IN8 [D-SELO] |
| | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
| | R-IN7 [ALM-RST] | R-IN6 [FREE] | R-IN5 [STOP] | R-IN4 [ZHOME] | R-IN3 [START] | R-IN2 [M2] | R-IN1 [M1] | R-IN0 [M0] |

■ Driver output status

These are the driver output signals that can be accessed via Modbus communication. They can be accessed by one register (16 bit).

● Upper

| Register address | Description | | | | | | | |
|------------------|-------------|-------|-------|-------|-------|-------|------|------|
| | bit15 | bit14 | bit13 | bit12 | bit11 | bit10 | bit9 | bit8 |
| 126 (007Eh) | – | – | – | – | – | – | – | – |
| | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
| | – | – | – | – | – | – | – | – |
| | | | | | | | | |

● Lower

[]: Initial value. They can be changed by parameters. (Parameters ⇨ p.417, assignment of output signals ⇨ p.428)

| Register address | Description | | | | | | | |
|------------------|-------------------|---------------------|-------------------|----------------------|---------------------|--------------------|-------------------|---------------------|
| | bit15 | bit14 | bit13 | bit12 | bit11 | bit10 | bit9 | bit8 |
| 127 (007Fh) | R-OUT15 [TLC] | R-OUT14 [IN-POS] | R-OUT13 [MOVE] | R-OUT12 [TIM] | R-OUT11 [AREA2] | R-OUT10 [AREA1] | R-OUT9 [AREA0] | R-OUT8 [SYS-BSY] |
| | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
| | R-OUT7 [ALM-A] | R-OUT6 [INFO] | R-OUT5 [READY] | R-OUT4 [HOME-END] | R-OUT3 [START_R] | R-OUT2 [M2_R] | R-OUT1 [M1_R] | R-OUT0 [M0_R] |
| | | | | | | | | |

3 Group commands

These are commands related to group send. The set values are stored in RAM.

| Modbus communication register address | | Name | Description | Initial value | R/W | Industrial network command code | |
|---------------------------------------|---------------|--------------------------------------|---|---------------|-----|---------------------------------|-----------------|
| Upper | Lower | | | | | READ | WRITE |
| 48 (0030h) | 49 (0031h) | Group ID | Sets a group address. *1 Setting range –1: No group specification (Group send is not executed) 1 to 31: Address of group (Address number of parent slave) | –1 *2 | R/W | 24 (0018h) | 4120 (1018h) |
| – | – | R-IN Group action mode (for NETC) *3 | This is enabled when setting a group. Sets the input method of remote I/O. Specify the remote I/O to be input to the group by bit. (Details of bit arrangement → Following table) 0: Input to each driver 1: Input to the group Setting range 0 to 65,535 (0 to FFFFh) | 0 *4 | R/W | 25 (0019h) | 4121 (1019h) |

*1 In case of Modbus communication: Do not set "0" for the group ID.

*2 In case of Modbus communication: The initial value can be changed with the "Initial group ID (Modbus)" parameter.

In case of industrial network: The initial value can be changed with the "Initial group ID (NETC)" parameter.

*3 It is not used for Modbus communication.

*4 The initial value can be changed with the "R-IN group action mode initial state" parameter.

■ R-IN Group action mode (for NETC)

● Bit arrangement

| Industrial network command code | | Description | | | | | | | |
|---------------------------------|-----------------|-------------|--------|--------|--------|--------|--------|-------|-------|
| READ | WRITE | bit15 | bit14 | bit13 | bit12 | bit11 | bit10 | bit9 | bit8 |
| 25 (0019h) | 4121 (1019h) | – | – | – | – | – | – | – | – |
| | | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
| | | – | – | – | – | – | – | – | – |
| | | bit15 | bit14 | bit13 | bit12 | bit11 | bit10 | bit9 | bit8 |
| | | R-IN15 | R-IN14 | R-IN13 | R-IN12 | R-IN11 | R-IN10 | R-IN9 | R-IN8 |
| | | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
| | | R-IN7 | R-IN6 | R-IN5 | R-IN4 | R-IN3 | R-IN2 | R-IN1 | R-IN0 |

● Setting example

| Dec | Hex | Setting contents |
|--------|-------|---|
| 0 | 0000h | When all bits are set to "0." All of R-IN0 to R-IN15 are input to each driver. (Initial state) |
| 1 | 0001h | When only bit 0 is set to "1," and others are set to "0." R-IN0 is input to the group. R-IN1 to R-IN15 are input to each driver. |
| 2 | 0002h | When only bit 1 is set to "1," and others are set to "0." R-IN1 is input to the group. R-IN0 and R-IN2 to R-IN15 are input to each driver. |
| 65,535 | FFFFh | When all bits are set to "1." All of R-IN0 to R-IN15 are input to the group. |

4 Protect release commands

The key codes for reading/writing of data from/to the backup area and the key codes for release of function limitation by the HMI input are set.

| Modbus communication register address | | Name | Description | Initial value | R/W | Industrial network command code | |
|---------------------------------------|---------------|------------------------|---|---------------|-----|---------------------------------|-----------------|
| Upper | Lower | | | | | READ | WRITE |
| 64 (0040h) | 65 (0041h) | Backup DATA access key | Inputs the key code to access the backup area. (Key code → Following table) | 0 | R/W | 32 (0020h) | 4128 (1020h) |
| 66 (0042h) | 67 (0043h) | Backup DATA write key | Inputs the key code to write to the backup area. (Key code → Following table) | 0 | R/W | 33 (0021h) | 4129 (1021h) |
| 68 (0044h) | 69 (0045h) | HMI release key | Inputs the key code to release the limitation by the HMI input. (Key code → Following table) | 0 | R/W | 34 (0022h) | 4130 (1022h) |

Key code table

| Process that requires protect release | Command name | Key code |
|---------------------------------------|------------------------|------------------------|
| Data writing to backup area | Backup DATA access key | 20519253 (01391955h) |
| | Backup DATA write key | 1977326743 (75DB9C97h) |
| Data reading from backup area | Backup DATA access key | 20519253 (01391955h) |
| Release of limitation by HMI input | HMI release key | 864617234 (33890312h) |

5 Direct data operation commands

These are commands to use when performing direct data operation. The set values are stored in RAM.

| Modbus communication register address | | Name | Description | Initial value | Industrial network command code | |
|---------------------------------------|---------------|--|---|---------------|---------------------------------|-----------------|
| Upper | Lower | | | | READ | WRITE |
| 88 (0058h) | 89 (0059h) | Direct data operation operation data number | Sets the operation data number to be used in direct data operation. Setting range 0 to 255: Operation data No.0 to 255 | 0 | 44 (002Ch) | 4140 (102Ch) |
| 90 (005Ah) | 91 (005Bh) | Direct data operation operation type | Sets the operation type for direct data operation. Setting range 0: No setting 1: Absolute positioning 2: Incremental positioning (based on command position) 3: Incremental positioning (based on feedback position) 7: Continuous operation (Position control) 8: Wrap absolute positioning 9: Wrap proximity positioning 10: Wrap absolute positioning (FWD) 11: Wrap absolute positioning (RVS) 12: Wrap absolute push-motion 13: Wrap proximity push-motion 14: Wrap push-motion (FWD) 15: Wrap push-motion (RVS) 16: Continuous operation (Speed control) 17: Continuous operation (Push motion) 18: Continuous operation (Torque control) 20: Absolute push-motion 21: Incremental push-motion (based on command position) 22: Incremental push-motion (based on feedback position) | 2 | 45 (002Dh) | 4141 (102Dh) |
| 92 (005Ch) | 93 (005Dh) | Direct data operation position | Sets the target position for direct data operation. Setting range -2,147,483,648 to 2,147,483,647 steps | 0 | 46 (002Eh) | 4142 (102Eh) |
| 94 (005Eh) | 95 (005Fh) | Direct data operation operating speed | Sets the operating speed for direct data operation. Setting range -4,000,000 to 4,000,000 Hz | 1,000 | 47 (002Fh) | 4143 (102Fh) |
| 96 (0060h) | 97 (0061h) | Direct data operation starting/changing rate | Sets the acceleration/deceleration rate or acceleration/deceleration time for direct data operation. Setting range 1 to 1,000,000,000 (1=0.001 kHz/s, 1=0.001 s, or 1=0.001 ms/kHz) | 1,000,000 | 48 (0030h) | 4144 (1030h) |
| 98 (0062h) | 99 (0063h) | Direct data operation stopping deceleration | Sets the stopping deceleration or stop time for direct data operation. Setting range 1 to 1,000,000,000 (1=0.001 kHz/s, 1=0.001 s, or 1=0.001 ms/kHz) | 1,000,000 | 49 (0031h) | 4145 (1031h) |

Direct data operation commands

| Modbus communication register address | | Name | Description | Initial value | Industrial network command code | |
|---------------------------------------|----------------|--|--|---------------|---------------------------------|-----------------|
| Upper | Lower | | | | READ | WRITE |
| 100 (0064h) | 101 (0065h) | Direct data operation operating current | Sets the operating current for direct data operation. Setting range 0 to 1,000 (1=0.1%) | 1,000 | 50 (0032h) | 4146 (1032h) |
| 102 (0066h) | 103 (0067h) | Direct data operation trigger | Sets the trigger for direct data operation. Setting range -7: Operation data number -6: Operation type -5: Position -4: Operating speed -3: Starting/changing rate -2: Stopping deceleration -1: Operating current 0: Disable 1: All data reflected | 0 | 51 (0033h) | 4147 (1033h) |
| 104 (0068h) | 105 (0069h) | Direct data operation forwarding destination | Selects the stored area when the next direct data is transmitted during direct data operation. Setting range 0: Execution memory 1: Buffer memory | 0 | 52 (0034h) | 4148 (1034h) |

6 Simple direct data operation commands

These are commands to use when performing simple direct data operation. The set values are stored in RAM. The simple direct data operation commands are exclusive for the industrial network.

| Industrial network command code | | Name | Description | Initial value |
|---------------------------------|-----------------|--|---|---------------|
| READ | WRITE | | | |
| 53 (0035h) | 4149 (1035h) | Simple direct data operation monitor 0 (for NETC) | Sets the target position for simple direct data operation. Setting range –2,147,483,648 to 2,147,483,647 steps | 0 |
| 54 (0036h) | 4150 (1036h) | Simple direct data operation monitor 1 (for NETC) | Sets the operating speed for simple direct data operation. Setting range –4,000,000 to 4,000,000 Hz | 1,000 |

7 Maintenance commands

Release of alarms, clearing of latches and batch processing of the non-volatile memory are executed.



The maintenance commands include processing in which the memory is operated, such as non-volatile memory batch processing and P-PRESET. Be careful not to execute them unnecessarily in succession.

| Modbus communication register address | | Name | Description | Industrial network command code [WRITE] |
|---------------------------------------|----------------|--|--|---|
| Upper | Lower | | | |
| 384 (0180h) | 385 (0181h) | Alarm reset | Resets the alarm that is present. Some alarms cannot be reset. | 12480 (30C0h) |
| 388 (0184h) | 389 (0185h) | Clear alarm records | Clears alarm records. | 12482 (30C2h) |
| 392 (0188h) | 393 (0189h) | Clear communication error records | Clears communication error records. | 12484 (30C4h) |
| 394 (018Ah) | 395 (018Bh) | P-PRESET execute | Presets the command position. | 12485 (30C5h) |
| 396 (018Ch) | 397 (018Dh) | Configuration | Executes the parameter recalculation and the setup. (About configuration → p.367) | 12486 (30C6h) |
| 398 (018Eh) | 399 (018Fh) | Batch data initialization (excluding communication parameters) | Resets the parameters saved in the non-volatile memory to their initial values. (excluding parameters related to communication setting) | 12487 (30C7h) |
| 400 (0190h) | 401 (0191h) | Batch non-volatile memory read | Reads the parameters saved in the non-volatile memory to the RAM. All operation data and parameters saved in the RAM are overwritten. | 12488 (30C8h) |
| 402 (0192h) | 403 (0193h) | Batch non-volatile memory write | Writes the parameters saved in the RAM to the non-volatile memory. The non-volatile memory can be rewritten approximately 100,000 times. | 12489 (30C9h) |
| 404 (0194h) | 405 (0195h) | All data batch initialization (including communication parameters) | Resets all the parameters saved in the non-volatile memory to their initial values. | 12490 (30CAh) |
| 406 (0196h) | 407 (0197h) | Backup data read | Reads all the data from the backup area. | 12491 (30CBh) |
| 408 (0198h) | 409 (0199h) | Backup data write | Writes all the data to the backup area. | 12492 (30CCh) |
| 410 (019Ah) | 411 (019Bh) | Clear latch information | Clears latch information. | 12493 (30CDh) |
| 412 (019Ch) | 413 (019Dh) | Clear sequence records | Clears sequence records. | 12494 (30CEh) |
| 414 (019Eh) | 415 (019Fh) | Clear tripmeter | Clears the tripmeter. | 12495 (30CFh) |
| 416 (01A0h) | 417 (01A1h) | Clear ETO | Resets the ETO-mode. | 12496 (30D0h) |
| 418 (01A2h) | 419 (01A3h) | ZSG-PRESET | Resets the position of the Z-phase. | 12497 (30D1h) |
| 420 (01A4h) | 421 (01A5h) | Clear ZSG-PRESET | Clears the position data of the Z-phase reset by the "ZSG-PRESET" command. | 12498 (30D2h) |
| 422 (01A6h) | 423 (01A7h) | Clear information | Clears information. | 12499 (30D3h) |
| 424 (01A8h) | 425 (01A9h) | Clear information records | Clears information records. | 12500 (30D4h) |

| Modbus communication register address | | Name | Description | Industrial network command code [WRITE] |
|---------------------------------------|----------------|----------------------|--|---|
| Upper | Lower | | | |
| 426 (01AAh) | 427 (01ABh) | Alarm record details | When a record number (1 to 10) is written to this command and the monitor command "Alarm record details" is executed, the detailed items of the specified alarm record can be checked. | 12501 (30D5h) |

■ Configuration

Configuration can be executed when all of the following conditions are satisfied:

- An alarm is not present.
- The motor is not operating.
- I/O test, teaching, remote operation, teaching, and downloading are not executed with the **MEXE02**.

The following table shows the driver status before and after executing the configuration.

| Item | Configuration is ready to execute | Configuration is being executed | After execution of configuration |
|-------------------------------|-----------------------------------|---|----------------------------------|
| PWR/ALM LED (POWER/ALARM LED) | Green lit | The red and green colors blink at the same time (They overlap and may seem to be orange.) | Depends on the driver condition. |
| Electromagnetic brake | Hold/release | Hold | |
| Motor excitation | Excitation/non-excitation | Non-excitation | |
| Output signal | Enable | Disable | |
| Input signal | Enable | Disable | Enable |



The correct monitor value may not be returned even if monitoring is executed during configuration.

7-1 How to execute maintenance commands

■ Via Modbus communication

Reading/writing of data can be executed. Use the following two methods in accordance with your purpose.

● Writing 1 to data (recommended)

When data is changed from 0 to 1 after 1 is written to it, the command is executed.

To execute the same command again, restore the data to 0 and then write 1. It is safe, because the command is not executed in succession even if 1 is written from the master continuously.

● Writing 2 to data

When 2 is written to data, the command is executed. After execution, the data is restored to 1 automatically.

Data does not need to restore to 1, and it can be written consecutively.

If commands which take time to write to the non-volatile memory such as "Batch NV memory write" command are executed consecutively, increase the length of the intervals between commands.

■ Via industrial network

When 1 is written to data, the command is executed.

■ With "Alarm record details" command

To this command, write the number (1 to 10) of the monitor command "Alarm records."

8 Monitor commands

These commands are used to monitor the command position, command speed, alarm and information records, etc.
All commands are used for read (READ).

| Modbus communication register address | | Name | Description | Industrial network command code |
|---------------------------------------|----------------|------------------------------|---|---------------------------------|
| Upper | Lower | | | |
| 128 (0080h) | 129 (0081h) | Present alarm | Shows the present alarm code. | 8256 (2040h) |
| 130 (0082h) | 131 (0083h) | Alarm record 1 | Shows the latest alarm record. When an alarm is generated, the code is displayed also in alarm record 1 at the same time. | 8257 (2041h) |
| 132 (0084h) | 133 (0085h) | Alarm record 2 | Shows the alarm records. | 8258 (2042h) |
| 134 (0086h) | 135 (0087h) | Alarm record 3 | | 8259 (2043h) |
| 136 (0088h) | 137 (0089h) | Alarm record 4 | | 825A (2044h) |
| 138 (008Ah) | 139 (008Bh) | Alarm record 5 | | 825B (2045h) |
| 140 (008Ch) | 141 (008Dh) | Alarm record 6 | | 825C (2046h) |
| 142 (008Eh) | 143 (008Fh) | Alarm record 7 | | 825D (2047h) |
| 144 (0090h) | 145 (0091h) | Alarm record 8 | | 825E (2048h) |
| 146 (0092h) | 147 (0093h) | Alarm record 9 | | 825F (2049h) |
| 148 (0094h) | 149 (0095h) | Alarm record 10 | | 8266 (204Ah) |
| 172 (00ACh) | 173 (00ADh) | Present communication error | Shows the last received communication error code. This is not used in the industrial network because the network converter executes periodic communication automatically. | — |
| 174 (00AEh) | 175 (00AFh) | Communication error record 1 | Shows the latest communication error code record. When a communication error is generated, the code is displayed also in communication error record 1 at the same time. | 8279 (2057h) |
| 176 (00B0h) | 177 (00B1h) | Communication error record 2 | Shows communication error code records. | 8280 (2058h) |
| 178 (00B2h) | 179 (00B3h) | Communication error record 3 | | 8281 (2059h) |
| 180 (00B4h) | 181 (00B5h) | Communication error record 4 | | 8282 (205Ah) |
| 182 (00B6h) | 183 (00B7h) | Communication error record 5 | | 8283 (205Bh) |
| 184 (00B8h) | 185 (00B9h) | Communication error record 6 | | 8284 (205Ch) |
| 186 (00BAh) | 187 (00BBh) | Communication error record 7 | | 8285 (205Dh) |
| 188 (00BCh) | 189 (00BDh) | Communication error record 8 | | 8286 (205Eh) |
| 190 (00BEh) | 191 (00BFh) | Communication error record 9 | | 8287 (205Fh) |

| Modbus communication register address | | Name | Description | Industrial network command code |
|---------------------------------------|----------------|-------------------------------|---|---------------------------------|
| Upper | Lower | | | |
| 192 (00C0h) | 193 (00C1h) | Communication error record 10 | Shows the oldest communication error code record. | 8288 (2060h) |
| 194 (00C2h) | 195 (00C3h) | Present selected data number | Shows the operation data number currently selected. The order of the priority is: NET selection number, direct selection (D-SEL), M0 to M7 inputs. | 8289 (2061h) |
| 196 (00C4h) | 197 (00C5h) | Present operation data number | Shows the operation data number executed in stored data operation or continuous macro operation. In operation not using operation data, -1 is displayed. -1 is displayed also during stop. | 8290 (2062h) |
| 198 (00C6h) | 199 (00C7h) | Command position | Shows the current command position. When the wrap function is enabled, the value on the wrap coordinate is displayed. | 8291 (2063h) |
| 200 (00C8h) | 201 (00C9h) | Command speed (r/min) | Shows the current command speed. (r/min) | 8292 (2064h) |
| 202 (00CAh) | 203 (00CBh) | Command speed (Hz) | Shows the current command speed. (Hz) | 8293 (2065h) |
| 204 (00CCh) | 205 (00CDh) | Detection position | Shows the current detection position. When the wrap function is enabled, the value on the wrap coordinate is displayed. | 8294 (2066h) |
| 206 (00CEh) | 207 (00CFh) | Detection speed (r/min) | Shows the current detection speed. (r/min) | 8295 (2067h) |
| 208 (00D0h) | 209 (00D1h) | Detection speed (Hz) | Shows the current detection speed. (Hz) | 8296 (2068h) |
| 210 (00D2h) | 211 (00D3h) | Remaining dwell time | Shows the remaining time in the drive-complete delay time or dwell. (ms) | 8297 (2069h) |
| 212 (00D4h) | 213 (00D5h) | Direct I/O | Shows the status of direct input and output, extended input, differential output, and virtual input. (Bit arrangement ⇒ p.376) | 8298 (206Ah) |
| 214 (00D6h) | 215 (00D7h) | Torque monitor | Shows the current torque with the ratio against the maximum holding torque. | 8299 (206Bh) |
| 218 (00DAh) | 219 (00DBh) | Cumulative load monitor | Shows the cumulative value of the load in operation. (Internal unit) The load is cumulated regardless of the rotation direction of the motor. (Details of the cumulative load monitor ⇒ p.471) | 8301 (206Dh) |
| 222 (00DEh) | 223 (00DFh) | Target position | <ul style="list-style-type: none"> • Shows the target command position in the following operations in an absolute coordinate. <ul style="list-style-type: none"> – Positioning SD operation, inching operation, high-speed return-to-home operation, return-to-home operation (at the time of offset travel) • Shows the operation starting position in the following operations. <ul style="list-style-type: none"> – Continuous SD operation, continuous macro operation, JOG macro operations other than inching operation, return-to-home operation (when a sensor is used, in push mode) | 8303 (206Fh) |
| 224 (00E0h) | 225 (00E1h) | Next No | Shows the operation data number specified in "Next data No." of the operation data in operation. The value is latched also after the operation is complete. When "Link" is "No Link" or "Next data No." is "Stop," -1 is displayed. | 8304 (2070h) |
| 226 (00E2h) | 227 (00E3h) | Loop origin number | Shows 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. | 8305 (2071h) |

| Modbus communication register address | | Name | Description | Industrial network command code |
|---------------------------------------|----------------|--|--|---------------------------------|
| Upper | Lower | | | |
| 228 (00E4h) | 229 (00E5h) | Loop count | Shows the current number of times of loop in loop operation (extended loop operation). When operation other than loop is executed or loop is stopped, 0 is displayed. | 8306 (2072h) |
| 230 (00E6h) | 231 (00E7h) | Event monitor command position (NEXT) | Latches the command position when an event is generated by NEXT. If the same event is generated again during latch, the value is overwritten. When latch is cleared, 0 is displayed. | 8307 (2073h) |
| 232 (00E8h) | 233 (00E9h) | Event monitor feedback position (NEXT) | Latches the feedback position when an event is generated by NEXT. If the same event is generated again during latch, the value is overwritten. When latch is cleared, 0 is displayed. | 8308 (2074h) |
| 234 (00EAh) | 235 (00EBh) | Event monitor command position (JUMP0 – Low event) | Latches the command position when a low event is generated. If the same event is generated again during latch, the value is overwritten. When latch is cleared, 0 is displayed. | 8309 (2075h) |
| 236 (00EcH) | 237 (00EDh) | Event monitor feedback position (JUMP0 – Low event) | Latches the feedback position when a low event is generated. If the same event is generated again during latch, the value is overwritten. When latch is cleared, 0 is displayed. | 8310 (2076h) |
| 238 (00EEh) | 239 (00EFh) | Event monitor command position (JUMP1 – High event) | Latches the command position when a high event is generated. If the same event is generated again during latch, the value is overwritten. When latch is cleared, 0 is displayed. | 8311 (2077h) |
| 240 (00F0h) | 241 (00F1h) | Event monitor feedback position (JUMP1 – High event) | Latches the feedback position when a high event is generated. If the same event is generated again during latch, the value is overwritten. When latch is cleared, 0 is displayed. | 8312 (2078h) |
| 242 (00F2h) | 243 (00F3h) | Event monitor command position (STOP) | Latches the command position when operation is stopped by the STOP input. If the same event is generated again during latch, the value is overwritten. When latch is cleared, 0 is displayed. | 8313 (2079h) |
| 244 (00F4h) | 245 (00F5h) | Event monitor feedback position (STOP) | Latches the feedback position when operation is stopped by the STOP input. If the same event is generated again during latch, the value is overwritten. When latch is cleared, 0 is displayed. | 8314 (207Ah) |
| 246 (00F6h) | 247 (00F7h) | Information | Shows the present information code. (Details of the Information code → p.376) | 8315 (207Bh) |
| 248 (00F8h) | 249 (00F9h) | Driver temperature | Shows the current driver temperature. [1=0.1 °C] | 8316 (207Ch) |
| 250 (00FAh) | 251 (00FBh) | Motor temperature | Shows the current motor temperature. [1=0.1 °C] | 8317 (207Dh) |
| 252 (00FCb) | 253 (00FDh) | Odometer | Shows the cumulative travel distance of the motor with the number of revolutions. (1=0.1 kRev) It cannot be cleared by the user. | 8318 (207Eh) |
| 254 (00FEh) | 255 (00FFh) | Tripmeter | Shows the travel distance of the motor with the number of revolutions. (1=0.1 kRev) It can be cleared by the user. | 8319 (207Fh) |
| 256 (0100h) | 257 (0101h) | Sequence record 1 | Shows the record of operation data numbers executed previously. -1 is displayed when the motor is stopped. During operation, the value same as the "Current operation data number" is displayed also in sequence record 1. | 8320 (2080h) |
| 258 (0102h) | 259 (0103h) | Sequence record 2 | Shows the records of operation data numbers executed previously. -1 is displayed when the motor is stopped. | 8321 (2081h) |

| Modbus communication register address | | Name | Description | Industrial network command code |
|---------------------------------------|----------------|---|---|---------------------------------|
| Upper | Lower | | | |
| 260 (0104h) | 261 (0105h) | Sequence record 3 | Shows the records of operation data numbers executed previously. –1 is displayed when the motor is stopped. | 8322 (2082h) |
| 262 (0106h) | 263 (0107h) | Sequence record 4 | | 8323 (2083h) |
| 264 (0108h) | 265 (0109h) | Sequence record 5 | | 8324 (2084h) |
| 266 (010Ah) | 267 (010Bh) | Sequence record 6 | | 8325 (2085h) |
| 268 (010Ch) | 269 (010Dh) | Sequence record 7 | | 8326 (2086h) |
| 270 (010Eh) | 271 (010Fh) | Sequence record 8 | | 8327 (2087h) |
| 272 (0110h) | 273 (0111h) | Sequence record 9 | | 8328 (2088h) |
| 274 (0112h) | 275 (0113h) | Sequence record 10 | | 8329 (2089h) |
| 276 (0114h) | 277 (0115h) | Sequence record 11 | | 8330 (208Ah) |
| 278 (0116h) | 279 (0117h) | Sequence record 12 | | 8331 (208Bh) |
| 280 (0118h) | 281 (0119h) | Sequence record 13 | | 8332 (208Ch) |
| 282 (011Ah) | 283 (011Bh) | Sequence record 14 | | 8333 (208Dh) |
| 284 (011Ch) | 285 (011Dh) | Sequence record 15 | | 8334 (208Eh) |
| 286 (011Eh) | 287 (011Fh) | Sequence record 16 | Shows the oldest data number among operation data previously executed. –1 is displayed when the motor is stopped. | 8335 (208Fh) |
| 288 (0120h) | 289 (0121h) | Feedback 32 bit counter | This is a 32 bit counter of the detection position. It counts independently from the wrap function. When the power is cycled, the count returns into the wrap coordinate. | 8336 (2090h) |
| 290 (0122h) | 291 (0123h) | Command 32 bit counter | This is a 32 bit counter of the command position. It counts independently from the wrap function. When the power is cycled, the count returns into the wrap coordinate. | 8337 (2091h) |
| 292 (0124h) | 293 (0125h) | CST operating current | Shows the operating current in a control (CST) mode. (1=0.1%) | 8338 (2092h) |
| 294 (0126h) | 295 (0127h) | Loop count buffer | Shows the current number of times of loop in loop operation (extended loop operation). The value is retained until the operation start signal is turned ON. | 8339 (2093h) |
| 320 (0140h) | 321 (0141h) | Main power supply count | Shows the number of times when the main power supply was turned on. | 8352 (20A0h) |
| 322 (0142h) | 323 (0143h) | Main power supply time | Shows the time that has passed since the main power supply was turned on by minute. | 8353 (20A1h) |
| 324 (0144h) | 325 (0145h) | Control power supply count | Shows the number of times when the 24 VDC power supply was turned on. | 8354 (20A2h) |
| 326 (0146h) | 327 (0147h) | Inverter voltage | Shows the inverter voltage of the driver. (1=0.1 V) | 8355 (20A3h) |
| 328 (0148h) | 329 (0149h) | Power supply voltage (DC power input driver only) | Shows the power supply voltage of the DC power input driver. (1=0.1 V) | 8356 (20A4h) |

| Modbus communication register address | | Name | Description | Industrial network command code | | | | | | | | | | | | | | | |
|---------------------------------------|-----------------|--|---|---------------------------------|----------|----------|---|----|----|---|-----|----|---|----|-----|---|-----|-----|-----------------|
| Upper | Lower | | | | | | | | | | | | | | | | | | |
| 330 (014Ah) | 331 (014Bh) | DIP SW | Shows the input status of the function setting switch (SW1). Shows ON/OFF in order of No.2 and No.1. <table border="1"> <tr> <th>Value of READ</th> <th>SW1-No.2</th> <th>SW1-No.1</th> </tr> <tr> <td>0</td> <td>ON</td> <td>ON</td> </tr> <tr> <td>1</td> <td>OFF</td> <td>ON</td> </tr> <tr> <td>2</td> <td>ON</td> <td>OFF</td> </tr> <tr> <td>3</td> <td>OFF</td> <td>OFF</td> </tr> </table> | Value of READ | SW1-No.2 | SW1-No.1 | 0 | ON | ON | 1 | OFF | ON | 2 | ON | OFF | 3 | OFF | OFF | 8357 (20A5h) |
| Value of READ | SW1-No.2 | SW1-No.1 | | | | | | | | | | | | | | | | | |
| 0 | ON | ON | | | | | | | | | | | | | | | | | |
| 1 | OFF | ON | | | | | | | | | | | | | | | | | |
| 2 | ON | OFF | | | | | | | | | | | | | | | | | |
| 3 | OFF | OFF | | | | | | | | | | | | | | | | | |
| 332 (014Ch) | 333 (014Dh) | ROT SW0 | Shows the input status of the address number setting switch (ID). | 8358 (20A6h) | | | | | | | | | | | | | | | |
| 334 (014Eh) | 335 (014Fh) | ROT SW1 | Shows the input status of the transmission rate setting switch (BAUD). | 8359 (20A7h) | | | | | | | | | | | | | | | |
| 336 (0150h) | 337 (0151h) | RS485 reception counter | Shows the number of times of reception of messages via RS-485 communication (Modbus). | 8360 (20A8h) | | | | | | | | | | | | | | | |
| 338 (0152h) | 339 (0153h) | Elapsed time from Boot | Shows the time that has passed since the power supply (24 VDC for the AC power input driver) was turned on. | 8361 (20A9h) | | | | | | | | | | | | | | | |
| 368 (0170h) | 369 (0171h) | IO status 1 | Shows the ON/OFF status of internal I/O. (Bit arrangement ⇒ p.377) | 8376 (20B8h) | | | | | | | | | | | | | | | |
| 370 (0172h) | 371 (0173h) | IO status 2 | | 8377 (20B9h) | | | | | | | | | | | | | | | |
| 372 (0174h) | 373 (0175h) | IO status 3 | | 8378 (20BAh) | | | | | | | | | | | | | | | |
| 374 (0176h) | 375 (0177h) | IO status 4 | | 8379 (20BBh) | | | | | | | | | | | | | | | |
| 376 (0178h) | 377 (0179h) | IO status 5 | | 8380 (20BCh) | | | | | | | | | | | | | | | |
| 378 (017Ah) | 379 (017Bh) | IO status 6 | | 8381 (20BDh) | | | | | | | | | | | | | | | |
| 380 (017Ch) | 381 (017Dh) | IO status 7 | | 8382 (20BEh) | | | | | | | | | | | | | | | |
| 382 (017Eh) | 383 (017Fh) | IO status 8 | | 8383 (20BFh) | | | | | | | | | | | | | | | |
| 2560 (0A00h) | 2561 (0A01h) | Alarm record details (Alarm code) | Shows the contents of the alarm record specified in the maintenance command "Alarm record details". | 9472 (2500h) | | | | | | | | | | | | | | | |
| 2562 (0A02h) | 2563 (0A03h) | Alarm record details (Sub code) | | 9473 (2501h) | | | | | | | | | | | | | | | |
| 2564 (0A04h) | 2565 (0A05h) | Alarm record details (Driver temperature) | | 9474 (2502h) | | | | | | | | | | | | | | | |
| 2566 (0A06h) | 2567 (0A07h) | Alarm record details (Motor temperature) | | 9475 (2503h) | | | | | | | | | | | | | | | |
| 2568 (0A08h) | 2569 (0A09h) | Alarm record details (Inverter voltage) | | 9476 (2504h) | | | | | | | | | | | | | | | |
| 2570 (0A0Ah) | 2571 (0A0Bh) | Alarm record details (Physical I/O input) | | 9477 (2505h) | | | | | | | | | | | | | | | |
| 2572 (0A0Ch) | 2573 (0A0Dh) | Alarm record details (R-I/O output) | | 9478 (2506h) | | | | | | | | | | | | | | | |
| 2574 (0A0Eh) | 2575 (0A0Fh) | Alarm record details (Operation information 0) | | 9479 (2507h) | | | | | | | | | | | | | | | |
| 2576 (0A10h) | 2577 (0A11h) | Alarm record details (Operation information 1) | | 9480 (2508h) | | | | | | | | | | | | | | | |

| Modbus communication register address | | Name | Description | Industrial network command code |
|---------------------------------------|-----------------|--|---|---------------------------------|
| Upper | Lower | | | |
| 2578 (0A12h) | 2579 (0A13h) | Alarm record details (Feedback position) | Shows the contents of the alarm record specified in the maintenance command "Alarm record details." | 9481 (2509h) |
| 2580 (0A14h) | 2581 (0A15h) | Alarm record details (Elapsed time from Boot) | | 9482 (250Ah) |
| 2582 (0A16h) | 2583 (0A17h) | Alarm record details (Elapsed time from starting operation) | | 9483 (250Bh) |
| 2584 (0A18h) | 2585 (0A19h) | Alarm record details (Main power supply time) | | 9484 (250Ch) |
| 2592 (0A20h) | 2593 (0A21h) | Information record 1 | Shows the latest information record. When information is generated, the code is displayed also in information record 1 at the same time. | 9488 (2510h) |
| 2594 (0A22h) | 2595 (0A23h) | Information record 2 | Shows the information record. | 9489 (2511h) |
| 2596 (0A24h) | 2597 (0A25h) | Information record 3 | | 9490 (2512h) |
| 2598 (0A26h) | 2599 (0A27h) | Information record 4 | | 9491 (2513h) |
| 2600 (0A28h) | 2601 (0A29h) | Information record 5 | | 9492 (2514h) |
| 2602 (0A2Ah) | 2603 (0A2Bh) | Information record 6 | | 9493 (2515h) |
| 2604 (0A2Ch) | 2605 (0A2Dh) | Information record 7 | | 9494 (2516h) |
| 2606 (0A2Eh) | 2607 (0A2Fh) | Information record 8 | | 9495 (2517h) |
| 2608 (0A30h) | 2609 (0A31h) | Information record 9 | | 9496 (2518h) |
| 2610 (0A32h) | 2611 (0A33h) | Information record 10 | | 9497 (2519h) |
| 2612 (0A34h) | 2613 (0A35h) | Information record 11 | | 9498 (251Ah) |
| 2614 (0A36h) | 2615 (0A37h) | Information record 12 | | 9499 (251Bh) |
| 2616 (0A38h) | 2617 (0A39h) | Information record 13 | | 9500 (251Ch) |
| 2618 (0A3Ah) | 2619 (0A3Bh) | Information record 14 | | 9501 (251Dh) |
| 2620 (0A3Ch) | 2621 (0A3Dh) | Information record 15 | | 9502 (251Eh) |
| 2622 (0A3Eh) | 2623 (0A3Fh) | Information record 16 | Shows the oldest information record. | 9503 (251Fh) |
| 2624 (0A40h) | 2625 (0A41h) | Information generating time record 1 | Shows the record of the time when the latest information was generated. If information is being generated, the generation time of the information is displayed. | 9504 (2520h) |
| 2626 (0A42h) | 2627 (0A43h) | Information generating time record 2 | Shows the records of the time when information was generated. | 9505 (2521h) |
| 2628 (0A44h) | 2629 (0A45h) | Information generating time record 3 | | 9506 (2522h) |
| 2630 (0A46h) | 2631 (0A47h) | Information generating time record 4 | | 9507 (2523h) |

| Modbus communication register address | | Name | Description | Industrial network command code |
|---------------------------------------|-----------------|---|---|---------------------------------|
| Upper | Lower | | | |
| 2632 (0A48h) | 2633 (0A49h) | Information generating time record 5 | | 9508 (2524h) |
| 2634 (0A4Ah) | 2635 (0A4Bh) | Information generating time record 6 | | 9509 (2525h) |
| 2636 (0A4Ch) | 2637 (0A4Dh) | Information generating time record 7 | | 9510 (2526h) |
| 2638 (0A4Eh) | 2639 (0A4Fh) | Information generating time record 8 | | 9511 (2527h) |
| 2640 (0A50h) | 2641 (0A51h) | Information generating time record 9 | | 9512 (2528h) |
| 2642 (0A52h) | 2643 (0A53h) | Information generating time record 10 | Shows the records of the time when information was generated. | 9513 (2529h) |
| 2644 (0A54h) | 2645 (0A55h) | Information generating time record 11 | | 9514 (252Ah) |
| 2646 (0A56h) | 2647 (0A57h) | Information generating time record 12 | | 9515 (252Bh) |
| 2648 (0A58h) | 2649 (0A59h) | Information generating time record 13 | | 9516 (252Ch) |
| 2650 (0A5Ah) | 2651 (0A5Bh) | Information generating time record 14 | | 9517 (252Dh) |
| 2652 (0A5Ch) | 2653 (0A5Dh) | Information generating time record 15 | | 5918 (252Eh) |
| 2654 (0A5Eh) | 2655 (0A5Fh) | Information generating time record 16 | Shows the record of the time when the oldest information was generated. | 9519 (252Fh) |
| 2944 (0B80h) | 2945 (0B81h) | Latch monitor status (NEXT) | | 9664 (25C0h) |
| 2946 (0B82h) | 2947 (0B83h) | Latch monitor command position (NEXT) | | 9665 (25C1h) |
| 2948 (0B84h) | 2949 (0B85h) | Latch monitor feedback position (NEXT) | | 9666 (25C2h) |
| 2950 (0B86h) | 2951 (0B87h) | Latch monitor target position (NEXT) | | 9667 (25C3h) |
| 2952 (0B88h) | 2953 (0B89h) | Latch monitor operation number (NEXT) | | 9668 (25C4h) |
| 2954 (0B8Ah) | 2955 (0B8Bh) | Latch monitor number of loop (NEXT) | | 9669 (25C5h) |
| 2960 (0B90h) | 2961 (0B91h) | Latch monitor status (I/O event – Low event) | Latches the first information in which the event in () was generated. The information is retained until the latch is cleared. * Driver Ver.3.00 and later are supported. | 9672 (25C8h) |
| 2962 (0B92h) | 2963 (0B93h) | Latch monitor command position (I/O event – Low event) | | 9673 (25C9h) |
| 2964 (0B94h) | 2965 (0B95h) | Latch monitor feedback position (I/O event – Low event) | | 9674 (25CAh) |
| 2966 (0B96h) | 2967 (0B97h) | Latch monitor target position (I/O event – Low event) | | 9675 (25CBh) |
| 2968 (0B98h) | 2969 (0B99h) | Latch monitor operation number (I/O event – Low event) | | 9676 (25CCh) |
| 2970 (0B9Ah) | 2971 (0B9Bh) | Latch monitor number of loop (I/O event – Low event) | | 9677 (25CDh) |

| Modbus communication register address | | Name | Description | Industrial network command code |
|---------------------------------------|-----------------|---|---|---------------------------------|
| Upper | Lower | | | |
| 2976 (0BA0h) | 2977 (0BA1h) | Latch monitor status (I/O event – High event) | | 9680 (25D0h) |
| 2978 (0BA2h) | 2979 (0BA3h) | Latch monitor command position (I/O event – High event) | | 9681 (25D1h) |
| 2980 (0BA4h) | 2981 (0BA5h) | Latch monitor feedback position (I/O event – High event) | | 9682 (25D2h) |
| 2982 (0BA6h) | 2983 (0BA7h) | Latch monitor target position (I/O event – High event) | | 9683 (25D3h) |
| 2984 (0BA8h) | 2985 (0BA9h) | Latch monitor operation number (I/O event – High event) | Latches the first information in which the event in () was generated. The information is retained until the latch is cleared. * Driver Ver.3.00 and later are supported. | 9684 (25D4h) |
| 2986 (0BAAh) | 2987 (0BABh) | Latch monitor number of loop (I/O event – High event) | | 9685 (25D5h) |
| 2992 (0BB0h) | 2993 (0BB1h) | Latch monitor status (STOP) | | 9688 (25D8h) |
| 2994 (0BB2h) | 2995 (0BB3h) | Latch monitor command position (STOP) | | 9689 (25D9h) |
| 2996 (0BB4h) | 2997 (0BB5h) | Latch monitor feedback position (STOP) | | 9690 (25DAh) |
| 2998 (0BB6h) | 2999 (0BB7h) | Latch monitor target position (STOP) | | 9691 (25DBh) |
| 3000 (0BB8h) | 3001 (0BB9h) | Latch monitor operation number (STOP) | | 9692 (25DCh) |
| 3002 (0BBAh) | 3003 (0BBBh) | Latch monitor number of loop (STOP) | | 9693 (25DDh) |

■ Information codes

The information codes are represented in a 8-digit hexadecimal number. They can be read also in 32 bit. If multiple information pieces are generated, they are represented in the OR value of the information code.

Example: When information pieces of the position deviation and 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 bit display | Information name |
|------------------|------------------------------------|---|
| 00000001h | 0000 0000 0000 0000 0000 0000 0001 | I/O (user setting) |
| 00000002h | 0000 0000 0000 0000 0000 0000 0010 | Position deviation |
| 00000004h | 0000 0000 0000 0000 0000 0000 0100 | Driver temperature |
| 00000008h | 0000 0000 0000 0000 0000 0000 1000 | Motor temperature |
| 00000010h | 0000 0000 0000 0000 0000 0001 0000 | Overvoltage |
| 00000020h | 0000 0000 0000 0000 0000 0010 0000 | Undervoltage |
| 00000040h | 0000 0000 0000 0000 0000 0100 0000 | Overload time |
| 00000100h | 0000 0000 0000 0000 0001 0000 0000 | Speed |
| 00000200h | 0000 0000 0000 0000 0010 0000 0000 | Operation start error |
| 00000400h | 0000 0000 0000 0000 0100 0000 0000 | ZHOME start error |
| 00000800h | 0000 0000 0000 0000 1000 0000 0000 | Preset being required |
| 00002000h | 0000 0000 0000 0010 0000 0000 0000 | Electronic gear setting error |
| 00004000h | 0000 0000 0000 0100 0000 0000 0000 | Wrap setting error |
| 00008000h | 0000 0000 0000 1000 0000 0000 0000 | RS-485 communication error |
| 00010000h | 0000 0000 0000 0001 0000 0000 0000 | Prohibition for forward direction operation |
| 00020000h | 0000 0000 0000 0010 0000 0000 0000 | Prohibition for reverse direction operation |
| 00040000h | 0000 0000 0000 0100 0000 0000 0000 | Cumulative load 0 |
| 00080000h | 0000 0000 0000 1000 0000 0000 0000 | Cumulative load 1 |
| 00100000h | 0000 0000 0001 0000 0000 0000 0000 | Tripmeter |
| 00200000h | 0000 0000 0010 0000 0000 0000 0000 | Odometer |
| 10000000h | 0001 0000 0000 0000 0000 0000 0000 | Operation start restricted mode |
| 20000000h | 0010 0000 0000 0000 0000 0000 0000 | I/O test mode |
| 40000000h | 0100 0000 0000 0000 0000 0000 0000 | Configuration request |
| 80000000h | 1000 0000 0000 0000 0000 0000 0000 | Reboot request |

■ Direct I/O

The following are the bit arrangements of direct I/O.

| Modbus communication register address | Description | | | | | | | | Industrial network command code |
|---------------------------------------|-------------|---------|---------|---------|-------|--------|-------|-------|---------------------------------|
| 212 (00D4h) | bit15 | bit14 | bit13 | bit12 | bit11 | bit10 | bit9 | bit8 | 8298 (206Ah) |
| | BSG | ASG | — | — | — | — | — | — | |
| | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 | |
| | — | — | DOUT5 | DOUT4 | DOUT3 | DOUT2 | DOUT1 | DOUT0 | |
| 213 (00D5h) | bit15 | bit14 | bit13 | bit12 | bit11 | bit10 | bit9 | bit8 | |
| | VIR-IN3 | VIR-IN2 | VIR-IN1 | VIR-IN0 | — | EXT-IN | DIN9 | DIN8 | |
| | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 | |
| | DIN7 | DIN6 | DIN5 | DIN4 | DIN3 | DIN2 | DIN1 | DIN0 | |

■ I/O status

The following are the bit arrangements of internal I/O.

● Input signals

| Modbus communication register address | Description | | | | | | | | Industrial network command code |
|---------------------------------------|-------------|----------|----------|-----------|-----------|----------|----------|----------|---------------------------------|
| 368 (0170h) | bit15 | bit14 | bit13 | bit12 | bit11 | bit10 | bit9 | bit8 | 8376 (20B8h) |
| | SLIT | HOMES | RV-LS | FW-LS | RV-BLK | FW-BLK | – | – | |
| | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 | |
| | SPD-LMT | CRNT-LMT | T-MODE | PLS-DIS | PLS-XMODE | CCM | – | HMI | |
| 369 (0171h) | bit15 | bit14 | bit13 | bit12 | bit11 | bit10 | bit9 | bit8 | 8377 (20B9h) |
| | – | INFO-CLR | LAT-CLR | ETO-CLR | – | EL-PRST | P-PRESET | ALM-RST | |
| | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 | |
| | BREAK-ATSQ | PAUSE | STOP | STOP-COFF | CLR | C-ON | FREE | Not used | |
| 370 (0172h) | bit15 | bit14 | bit13 | bit12 | bit11 | bit10 | bit9 | bit8 | 8377 (20B9h) |
| | – | – | RV-PSH | FW-PSH | RV-SPD | FW-SPD | RV-POS | FW-POS | |
| | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 | |
| | RV-JOG-C | FW-JOG-C | RV-JOG-P | FW-JOG-P | RV-JOG-H | FW-JOG-H | RV-JOG | FW-JOG | |
| 371 (0173h) | bit15 | bit14 | bit13 | bit12 | bit11 | bit10 | bit9 | bit8 | 8377 (20B9h) |
| | D-SEL7 | D-SEL6 | D-SEL5 | D-SEL4 | D-SEL3 | D-SEL2 | D-SEL1 | D-SEL0 | |
| | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 | |
| | – | – | ZHOME | HOME | NEXT | – | SSTART | START | |
| 372 (0174h) | bit15 | bit14 | bit13 | bit12 | bit11 | bit10 | bit9 | bit8 | 8378 (20BAh) |
| | R15 | R14 | R13 | R12 | R11 | R10 | R9 | R8 | |
| | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 | |
| | R7 | R6 | R5 | R4 | R3 | R2 | R1 | R0 | |
| 373 (0175h) | bit15 | bit14 | bit13 | bit12 | bit11 | bit10 | bit9 | bit8 | 8378 (20BAh) |
| | PLSM-REQ | MON-CLK | MON-REQ1 | MON-REQ0 | TEACH | – | – | – | |
| | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 | |
| | M7 | M6 | M5 | M4 | M3 | M2 | M1 | M0 | |
| 374 (0176h) | bit15 | bit14 | bit13 | bit12 | bit11 | bit10 | bit9 | bit8 | 8379 (20BBh) |
| | – | – | – | – | – | – | – | – | |
| | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 | |
| | – | – | – | – | – | – | – | – | |
| 375 (0177h) | bit15 | bit14 | bit13 | bit12 | bit11 | bit10 | bit9 | bit8 | 8379 (20BBh) |
| | – | – | – | – | – | – | – | – | |
| | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 | |
| | – | – | – | – | – | – | – | – | |

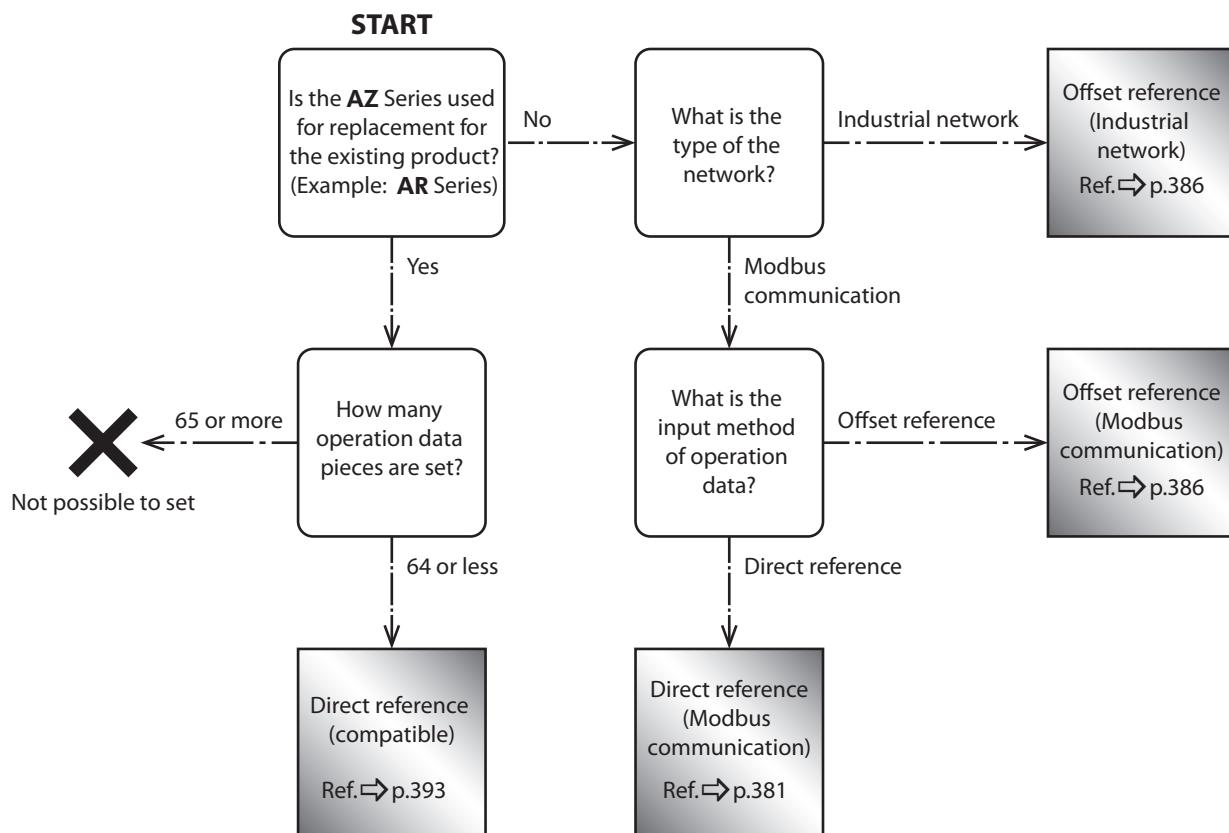
● Output signals

| Modbus communication register address | Description | | | | | | | | Industrial network command code |
|---------------------------------------|-------------|-------------|-------------|-------------|-------------|--------------|-------------|------------|---------------------------------|
| 376 (0178h) | bit15 | bit14 | bit13 | bit12 | bit11 | bit10 | bit9 | bit8 | 8380 (20BCh) |
| | MAREA | – | TIM | RND-ZERO | ZSG | RV-SLS | FW-SLS | RND-OVF | |
| | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 | |
| | ORGN-STLD | PRST-STLD | PRST-DIS | – | – | ELPRST-MON | ABSPEN | HOME-END | |
| 377 (0179h) | bit15 | bit14 | bit13 | bit12 | bit11 | bit10 | bit9 | bit8 | 8380 (20BCh) |
| | AUTO-CD | CRNT | VA | TLC | – | IN-POS | ETO-MON | SYS-BSY | |
| | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 | |
| | INFO | MOVE | PLS-RDY | READY | SYS-RDY | ALM-B | ALM-A | CONST-OFF | |
| 378 (017Ah) | bit15 | bit14 | bit13 | bit12 | bit11 | bit10 | bit9 | bit8 | 8381 (20BDh) |
| | – | – | – | – | – | – | – | – | |
| | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 | |
| | – | – | USR-OUT1 | USR-OUT0 | – | – | PLS-OUTR | MON-OUT | |
| 379 (017Bh) | bit15 | bit14 | bit13 | bit12 | bit11 | bit10 | bit9 | bit8 | 8381 (20BDh) |
| | – | – | HWTOIN-MON | EDM | – | RG | MBC | MPS | |
| | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 | |
| | AREA7 | AREA6 | AREA5 | AREA4 | AREA3 | AREA2 | AREA1 | AREA0 | |
| 380 (017Ch) | bit15 | bit14 | bit13 | bit12 | bit11 | bit10 | bit9 | bit8 | 8382 (20BEh) |
| | D-END7 | D-END6 | D-END5 | D-END4 | D-END3 | D-END2 | D-END1 | D-END0 | |
| | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 | |
| | M-ACT7 | M-ACT6 | M-ACT5 | M-ACT4 | M-ACT3 | M-ACT2 | M-ACT1 | M-ACT0 | |
| 381 (017Dh) | bit15 | bit14 | bit13 | bit12 | bit11 | bit10 | bit9 | bit8 | 8382 (20BEh) |
| | M-CHG | – | DCMD-FULL | DCMD-RDY | PLS-LOST | NEXT-LAT | JUMP1-LAT | JUMP0-LAT | |
| | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 | |
| | DELAY-BSY | SEQ-BSY | PAUSE-BSY | OPE-BSY | – | – | SPD-LMTD | CRNT-LMTD | |
| 382 (017Eh) | bit15 | bit14 | bit13 | bit12 | bit11 | bit10 | bit9 | bit8 | 8383 (20BFh) |
| | INFO-RBT | INFO-CFG | INFO-IOTEST | INFO-DSLMTD | – | – | – | – | |
| | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 | |
| | – | – | INFO-ODO | INFO-TRIP | INFO-CULD1 | INFO-CULD0 | INFO-RV-OT | INFO-FW-OT | |
| 383 (017Fh) | bit15 | bit14 | bit13 | bit12 | bit11 | bit10 | bit9 | bit8 | 8383 (20BFh) |
| | INFO-NET-E | INFO-RND-E | INFO-EGR-E | – | INFO-PR-REQ | INFO-ZHOME | INFO-START | INFO-SPD | |
| | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 | |
| | – | INFO-OLTIME | INFO-UVOLT | INFO-OVOLT | INFO-MTRTMP | INFO-DRV TMP | INFO-POSERR | INFO-USRIO | |

9 Overview of operation data R/W command address arrangement

With the operation data R/W commands, operation data is set.

There are two methods to set the operation data: "direct reference" and "offset reference." The stored areas are the same even if the addresses are different. Use them respectively in accordance with your purpose.



9-1 Overview of direct reference

Direct reference is a method in which the register address (base address) of the base operation data number is specified to input data.

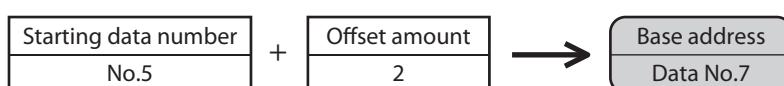
Use direct reference in Modbus communication. (Details of addresses → p.381)



9-2 Overview of offset reference

Offset reference is a method in which the operation data number of the starting point (starting data number) is set and the offset from the starting data number is specified to input data. The starting data number is set with the "DATA offset reference origin" parameter.

Offset reference can be used both in Modbus communication and industrial network. (Details of addresses → p.386)



- Up to 32 pieces of operation data can be specified in offset reference. (The offset value is up to 31)
- The set value of the "DATA offset reference origin" parameter is stored in RAM.

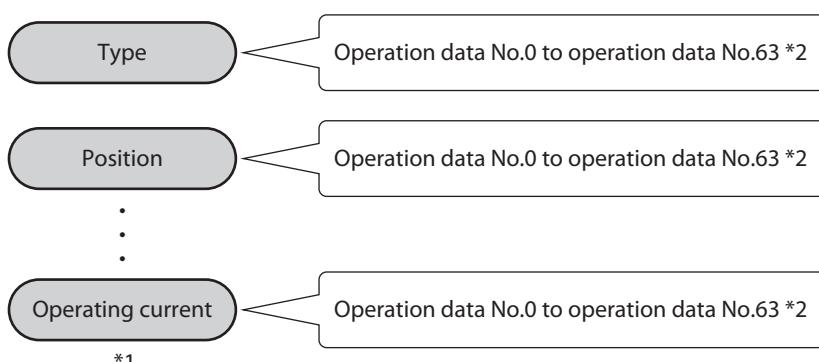
9-3 Overview of direct reference (compatible)

This is a convenient input method to replace our existing product with the **AZ Series**.

It includes addresses grouped by setting items such as type, position, and operating speed. Since the addresses, etc. are the same as those of the existing product, it can be used without special setting. (Details of addresses → p.393)



- Up to 64 operation data can be set (operation data No. 0 to 63). The operation data No.64 and later cannot be set (65 data pieces or more).
- Settable items are the following six types. Other items such as link and loop cannot be set.
Type, position, operating speed, starting/changing rate, stop, operating current



*1

*1 Drive-complete delay time, link, area, loop, and event cannot be set.

*2 The operation data No.64 and later cannot be set.

10 Operation data R/W commands

This is a method in which input is made by operation data number. To input all the setting items included in operation data in succession, use the following addresses.

10-1 Direct reference (Modbus communication)

Direct reference is a method in which the register address (base address) of the base operation data number is specified to input data.

■ Base address of each operation data number

| Modbus Communication Base address | | Operation data No. |
|-----------------------------------|------|--------------------|
| Dec | Hex | |
| 6144 | 1800 | No.0 |
| 6208 | 1840 | No.1 |
| 6272 | 1880 | No.2 |
| 6336 | 18C0 | No.3 |
| 6400 | 1900 | No.4 |
| 6464 | 1940 | No.5 |
| 6528 | 1980 | No.6 |
| 6592 | 19C0 | No.7 |
| 6656 | 1A00 | No.8 |
| 6720 | 1A40 | No.9 |
| 6784 | 1A80 | No.10 |
| 6848 | 1AC0 | No.11 |
| 6912 | 1B00 | No.12 |
| 6976 | 1B40 | No.13 |
| 7040 | 1B80 | No.14 |
| 7104 | 1BC0 | No.15 |
| 7168 | 1C00 | No.16 |
| 7232 | 1C40 | No.17 |
| 7296 | 1C80 | No.18 |
| 7360 | 1CC0 | No.19 |
| 7424 | 1D00 | No.20 |
| 7488 | 1D40 | No.21 |
| 7552 | 1D80 | No.22 |
| 7616 | 1DC0 | No.23 |
| 7680 | 1E00 | No.24 |
| 7744 | 1E40 | No.25 |
| 7808 | 1E80 | No.26 |
| 7872 | 1EC0 | No.27 |
| 7936 | 1F00 | No.28 |
| 8000 | 1F40 | No.29 |
| 8064 | 1F80 | No.30 |

| Modbus Communication Base address | | Operation data No. |
|-----------------------------------|------|--------------------|
| Dec | Hex | |
| 8128 | 1FC0 | No.31 |
| 8192 | 2000 | No.32 |
| 8256 | 2040 | No.33 |
| 8320 | 2080 | No.34 |
| 8384 | 20C0 | No.35 |
| 8448 | 2100 | No.36 |
| 8512 | 2140 | No.37 |
| 8576 | 2180 | No.38 |
| 8640 | 21C0 | No.39 |
| 8704 | 2200 | No.40 |
| 8768 | 2240 | No.41 |
| 8832 | 2280 | No.42 |
| 8896 | 22C0 | No.43 |
| 8960 | 2300 | No.44 |
| 9024 | 2340 | No.45 |
| 9088 | 2380 | No.46 |
| 9152 | 23C0 | No.47 |
| 9216 | 2400 | No.48 |
| 9280 | 2440 | No.49 |
| 9344 | 2480 | No.50 |
| 9408 | 24C0 | No.51 |
| 9472 | 2500 | No.52 |
| 9536 | 2540 | No.53 |
| 9600 | 2580 | No.54 |
| 9664 | 25C0 | No.55 |
| 9728 | 2600 | No.56 |
| 9792 | 2640 | No.57 |
| 9856 | 2680 | No.58 |
| 9920 | 26C0 | No.59 |
| 9984 | 2700 | No.60 |
| 10048 | 2740 | No.61 |

| Modbus Communication Base address | | Operation data No. |
|-----------------------------------|------|--------------------|
| Dec | Hex | |
| 10112 | 2780 | No.62 |
| 10176 | 27C0 | No.63 |
| 10240 | 2800 | No.64 |
| 10304 | 2840 | No.65 |
| 10368 | 2880 | No.66 |
| 10432 | 28C0 | No.67 |
| 10496 | 2900 | No.68 |
| 10560 | 2940 | No.69 |
| 10624 | 2980 | No.70 |
| 10688 | 29C0 | No.71 |
| 10752 | 2A00 | No.72 |
| 10816 | 2A40 | No.73 |
| 10880 | 2A80 | No.74 |
| 10944 | 2AC0 | No.75 |
| 11008 | 2B00 | No.76 |
| 11072 | 2B40 | No.77 |
| 11136 | 2B80 | No.78 |
| 11200 | 2BC0 | No.79 |
| 11264 | 2C00 | No.80 |
| 11328 | 2C40 | No.81 |
| 11392 | 2C80 | No.82 |
| 11456 | 2CC0 | No.83 |
| 11520 | 2D00 | No.84 |
| 11584 | 2D40 | No.85 |
| 11648 | 2D80 | No.86 |
| 11712 | 2DC0 | No.87 |
| 11776 | 2E00 | No.88 |
| 11840 | 2E40 | No.89 |
| 11904 | 2E80 | No.90 |
| 11968 | 2EC0 | No.91 |
| 12032 | 2F00 | No.92 |

| Modbus Communication Base address | | Operation data No. | Modbus Communication Base address | | Operation data No. | Modbus Communication Base address | | Operation data No. |
|-----------------------------------|------|--------------------|-----------------------------------|------|--------------------|-----------------------------------|------|--------------------|
| Dec | Hex | | Dec | Hex | | Dec | Hex | |
| 12096 | 2F40 | No.93 | 14976 | 3A80 | No.138 | 17856 | 45C0 | No.183 |
| 12160 | 2F80 | No.94 | 15040 | 3AC0 | No.139 | 17920 | 4600 | No.184 |
| 12224 | 2FC0 | No.95 | 15104 | 3B00 | No.140 | 17984 | 4640 | No.185 |
| 12288 | 3000 | No.96 | 15168 | 3B40 | No.141 | 18048 | 4680 | No.186 |
| 12352 | 3040 | No.97 | 15232 | 3B80 | No.142 | 18112 | 46C0 | No.187 |
| 12416 | 3080 | No.98 | 15296 | 3BC0 | No.143 | 18176 | 4700 | No.188 |
| 12480 | 30C0 | No.99 | 15360 | 3C00 | No.144 | 18240 | 4740 | No.189 |
| 12544 | 3100 | No.100 | 15424 | 3C40 | No.145 | 18304 | 4780 | No.190 |
| 12608 | 3140 | No.101 | 15488 | 3C80 | No.146 | 18368 | 47C0 | No.191 |
| 12672 | 3180 | No.102 | 15552 | 3CC0 | No.147 | 18432 | 4800 | No.192 |
| 12736 | 31C0 | No.103 | 15616 | 3D00 | No.148 | 18496 | 4840 | No.193 |
| 12800 | 3200 | No.104 | 15680 | 3D40 | No.149 | 18560 | 4880 | No.194 |
| 12864 | 3240 | No.105 | 15744 | 3D80 | No.150 | 18624 | 48C0 | No.195 |
| 12928 | 3280 | No.106 | 15808 | 3DC0 | No.151 | 18688 | 4900 | No.196 |
| 12992 | 32C0 | No.107 | 15872 | 3E00 | No.152 | 18752 | 4940 | No.197 |
| 13056 | 3300 | No.108 | 15936 | 3E40 | No.153 | 18816 | 4980 | No.198 |
| 13120 | 3340 | No.109 | 16000 | 3E80 | No.154 | 18880 | 49C0 | No.199 |
| 13184 | 3380 | No.110 | 16064 | 3EC0 | No.155 | 18944 | 4A00 | No.200 |
| 13248 | 33C0 | No.111 | 16128 | 3F00 | No.156 | 19008 | 4A40 | No.201 |
| 13312 | 3400 | No.112 | 16192 | 3F40 | No.157 | 19072 | 4A80 | No.202 |
| 13376 | 3440 | No.113 | 16256 | 3F80 | No.158 | 19136 | 4AC0 | No.203 |
| 13440 | 3480 | No.114 | 16320 | 3FC0 | No.159 | 19200 | 4B00 | No.204 |
| 13504 | 34C0 | No.115 | 16384 | 4000 | No.160 | 19264 | 4B40 | No.205 |
| 13568 | 3500 | No.116 | 16448 | 4040 | No.161 | 19328 | 4B80 | No.206 |
| 13632 | 3540 | No.117 | 16512 | 4080 | No.162 | 19392 | 4BC0 | No.207 |
| 13696 | 3580 | No.118 | 16576 | 40C0 | No.163 | 19456 | 4C00 | No.208 |
| 13760 | 35C0 | No.119 | 16640 | 4100 | No.164 | 19520 | 4C40 | No.209 |
| 13824 | 3600 | No.120 | 16704 | 4140 | No.165 | 19584 | 4C80 | No.210 |
| 13888 | 3640 | No.121 | 16768 | 4180 | No.166 | 19648 | 4CC0 | No.211 |
| 13952 | 3680 | No.122 | 16832 | 41C0 | No.167 | 19712 | 4D00 | No.212 |
| 14016 | 36C0 | No.123 | 16896 | 4200 | No.168 | 19776 | 4D40 | No.213 |
| 14080 | 3700 | No.124 | 16960 | 4240 | No.169 | 19840 | 4D80 | No.214 |
| 14144 | 3740 | No.125 | 17024 | 4280 | No.170 | 19904 | 4DC0 | No.215 |
| 14208 | 3780 | No.126 | 17088 | 42C0 | No.171 | 19968 | 4E00 | No.216 |
| 14272 | 37C0 | No.127 | 17152 | 4300 | No.172 | 20032 | 4E40 | No.217 |
| 14336 | 3800 | No.128 | 17216 | 4340 | No.173 | 20096 | 4E80 | No.218 |
| 14400 | 3840 | No.129 | 17280 | 4380 | No.174 | 20160 | 4EC0 | No.219 |
| 14464 | 3880 | No.130 | 17344 | 43C0 | No.175 | 20224 | 4F00 | No.220 |
| 14528 | 38C0 | No.131 | 17408 | 4400 | No.176 | 20288 | 4F40 | No.221 |
| 14592 | 3900 | No.132 | 17472 | 4440 | No.177 | 20352 | 4F80 | No.222 |
| 14656 | 3940 | No.133 | 17536 | 4480 | No.178 | 20416 | 4FC0 | No.223 |
| 14720 | 3980 | No.134 | 17600 | 44C0 | No.179 | 20480 | 5000 | No.224 |
| 14784 | 39C0 | No.135 | 17664 | 4500 | No.180 | 20544 | 5040 | No.225 |
| 14848 | 3A00 | No.136 | 17728 | 4540 | No.181 | 20608 | 5080 | No.226 |
| 14912 | 3A40 | No.137 | 17792 | 4580 | No.182 | 20672 | 50C0 | No.227 |

| Modbus Communication Base address | | Operation data No. |
|---|------|-----------------------|
| Dec | Hex | |
| 20736 | 5100 | No.228 |
| 20800 | 5140 | No.229 |
| 20864 | 5180 | No.230 |
| 20928 | 51C0 | No.231 |
| 20992 | 5200 | No.232 |
| 21056 | 5240 | No.233 |
| 21120 | 5280 | No.234 |
| 21184 | 52C0 | No.235 |
| 21248 | 5300 | No.236 |
| 21312 | 5340 | No.237 |
| 21376 | 5380 | No.238 |
| 21440 | 53C0 | No.239 |
| 21504 | 5400 | No.240 |
| 21568 | 5440 | No.241 |
| 21632 | 5480 | No.242 |
| 21696 | 54C0 | No.243 |
| 21760 | 5500 | No.244 |
| 21824 | 5540 | No.245 |
| 21888 | 5580 | No.246 |
| 21952 | 55C0 | No.247 |
| 22016 | 5600 | No.248 |
| 22080 | 5640 | No.249 |
| 22144 | 5680 | No.250 |
| 22208 | 56C0 | No.251 |
| 22272 | 5700 | No.252 |
| 22336 | 5740 | No.253 |
| 22400 | 5780 | No.254 |
| 22464 | 57C0 | No.255 |

■ Register address

The setting items of operation data are set with the operation data R/W command.

The register addresses of the setting items are arranged based on the base addresses of the operation data numbers.

(Base address \Rightarrow p.381)

For example, in the case of the setting item "Position," if 2 and 3 are added to the base address, they become the upper and lower addresses respectively.

| Modbus communication register address | Name | Setting range | Initial value | Effective |
|---------------------------------------|---------------------------|--|---------------|-----------|
| Base address + 0 (upper) | Operation type | 1: Absolute positioning 2: Incremental positioning (based on command position) 3: Incremental positioning (based on feedback position) 7: Continuous operation (Position control) 8: Wrap absolute positioning 9: Wrap proximity positioning 10: Wrap absolute positioning (FWD) 11: Wrap absolute positioning (RVS) 12: Wrap absolute push-motion 13: Wrap proximity push-motion 14: Wrap push-motion (FWD) 15: Wrap push-motion (RVS) 16: Continuous operation (Speed control) 17: Continuous operation (Push motion) 18: Continuous operation (Torque control) 20: Absolute push-motion 21: Incremental push-motion (based on command position) 22: Incremental push-motion (based on feedback position) | 2 | B |
| Base address + 1 (lower) | | | | |
| Base address + 2 (upper) | Position | -2,147,483,648 to 2,147,483,647 steps | 0 | B |
| Base address + 3 (lower) | | | | |
| Base address + 4 (upper) | Operating speed | -4,000,000 to 4,000,000 Hz | 1,000 | B |
| Base address + 5 (lower) | | | | |
| Base address + 6 (upper) | Starting/changing rate | 1 to 1,000,000,000 (1=0.001 kHz/s, 1=0.001 s, or 1=0.001 ms/kHz) | 1,000,000 | B |
| Base address + 7 (lower) | | | | |
| Base address + 8 (upper) | Stop | 1 to 1,000,000,000 (1=0.001 kHz/s, 1=0.001 s, or 1=0.001 ms/kHz) | 1,000,000 | B |
| Base address + 9 (lower) | | | | |
| Base address + 10 (upper) | Operating current | 0 to 1,000 (1=0.1%) | 1,000 | B |
| Base address + 11 (lower) | | | | |
| Base address + 12 (upper) | Drive-complete delay time | 0 to 65,535 (1=0.001 s) | 0 | B |
| Base address + 13 (lower) | | | | |
| Base address + 14 (upper) | Link | 0: No link 1: Manual sequential 2: Automatic sequential 3: Continuous form connection | 0 | B |
| Base address + 15 (lower) | | | | |
| Base address + 16 (upper) | Next data No. | -256: Stop -2: $\downarrow\downarrow$ (+2) -1: \downarrow (+1) 0 to 255: Operation data number | -1 | B |
| Base address + 17 (lower) | | | | |
| Base address + 18 (upper) | Area offset | -2,147,483,648 to 2,147,483,647 steps | 0 | B |
| Base address + 19 (lower) | | | | |
| Base address + 20 (upper) | Area width | -1: Disable 0 to 4,194,303: Set by 1 step | -1 | B |
| Base address + 21 (lower) | | | | |

| Modbus communication register address | Name | Setting range | Initial value | Effective |
|---------------------------------------|----------------------|--|---------------|-----------|
| Base address + 22 (upper) | Loop count | 0: None (-) 2 to 255: Number of loop (loop 2 { to loop 255 {)} | 0 | B |
| Base address + 23 (lower) | | | | |
| Base address + 24 (upper) | Loop offset | -4,194,304 to 4,194,303 steps | 0 | B |
| Base address + 25 (lower) | | | | |
| Base address + 26 (upper) | Loop end No. | 0: None (-) 1: } L-End | 0 | B |
| Base address + 27 (lower) | | | | |
| Base address + 28 (upper) | (Low) I/O event No. | -1: None (-) 0 to 31: Operation I/O event number (0 to 31) | -1 | B |
| Base address + 29 (lower) | | | | |
| Base address + 30 (upper) | (High) I/O event No. | -1: None (-) 0 to 31: Operation I/O event number (0 to 31) | -1 | B |
| Base address + 31 (lower) | | | | |

■ Setting example

As an example, here is a description 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 |
| Operating speed [Hz] | 1,000 | 1,000 | 1,000 |
| Operating current [%] | 50.0 | 70.0 | 100.0 |

● Setting of operation data No.0

From the table on p.381, we can find that the base address of the operation data No.0 is "6144 (1800h)."

Based on this base address, the register addresses of the setting items are calculated from the table on p.384.

| Base address 6144 (1800h) | Setting item | Modbus communication register address | | | Set value |
|------------------------------|-------------------|---------------------------------------|------------------|-------|-----------|
| | | Calculation method | Dec | Hex | |
| | Operation type | Upper: Base address + 0 | 6144 + 0 = 6144 | 1800h | 1 |
| | | Lower: Base address + 1 | 6144 + 1 = 6145 | 1801h | |
| | Position | Upper: Base address + 2 | 6144 + 2 = 6146 | 1802h | 1,000 |
| | | Lower: Base address + 3 | 6144 + 3 = 6147 | 1803h | |
| | Operating speed | Upper: Base address + 4 | 6144 + 4 = 6148 | 1804h | 1,000 |
| | | Lower: Base address + 5 | 6144 + 5 = 6149 | 1805h | |
| | Operating current | Upper: Base address + 10 | 6144 + 10 = 6154 | 180Ah | 500 |
| | | Lower: Base address + 11 | 6144 + 11 = 6155 | 180Bh | |

● Setting of operation data No.1

From the table on p.381, we can find that the base address of the operation data No.1 is "6208 (1840h)."

Based on this base address, the register addresses of the setting items are calculated from the table on p.384.

| Base address 6208 (1840h) | Setting item | Modbus communication register address | | | Set value |
|------------------------------|-------------------|---------------------------------------|------------------|-------|-----------|
| | | Calculation method | Dec | Hex | |
| | Operation type | Upper: Base address + 0 | 6208 + 0 = 6208 | 1840h | 2 |
| | | Lower: Base address + 1 | 6208 + 1 = 6209 | 1841h | |
| | Position | Upper: Base address + 2 | 6208 + 2 = 6210 | 1842h | 1,000 |
| | | Lower: Base address + 3 | 6208 + 3 = 6211 | 1843h | |
| | Operating speed | Upper: Base address + 4 | 6208 + 4 = 6212 | 1844h | 1,000 |
| | | Lower: Base address + 5 | 6208 + 5 = 6213 | 1845h | |
| | Operating current | Upper: Base address + 10 | 6208 + 10 = 6218 | 184Ah | 700 |
| | | Lower: Base address + 11 | 6208 + 11 = 6219 | 184Bh | |

- Setting example of operation data No.2

From the table on p.381, we can find that the base address of the operation data No.2 is "6272 (1880h)." Based on this base address, the register addresses of the setting items are calculated from the table on p.384.

| Base address 6272 (1880h) | Setting item | Modbus communication register address | | | Set value |
|------------------------------|-------------------|---------------------------------------|------------------|-------|-----------|
| | | Calculation method | Dec | Hex | |
| | Operation type | Upper: Base address + 0 | 6272 + 0 = 6272 | 1880h | 3 |
| | | Lower: Base address + 1 | 6272 + 1 = 6273 | 1881h | |
| | Position | Upper: Base address + 2 | 6272 + 2 = 6274 | 1882h | 1,000 |
| | | Lower: Base address + 3 | 6272 + 3 = 6275 | 1883h | |
| | Operating speed | Upper: Base address + 4 | 6272 + 4 = 6276 | 1884h | 1,000 |
| | | Lower: Base address + 5 | 6272 + 5 = 6277 | 1885h | |
| | Operating current | Upper: Base address + 10 | 6272 + 10 = 6282 | 188Ah | 1,000 |
| | | Lower: Base address + 11 | 6272 + 11 = 6283 | 188Bh | |

10-2 Offset reference (Modbus communication)

With Modbus communication, offset reference is not necessary because up to the operation data No.255 can be directly input.

However, offset reference can be used conveniently also in Modbus communication because the addresses of the setting items do not need to be changed if just the starting data number is changed. Use it to edit a large volume of operation data, on the touch panel, for example.

Related parameters

| Modbus communication register address | | Name | Description | Initial value | R/W |
|---------------------------------------|-----------------|------------------------------|---|---------------|-----|
| Upper | Lower | | | | |
| 6142 (17FEh) | 6143 (17FFh) | DATA offset reference origin | Sets the operation data number that is the starting point of offset reference. Setting range 0 to 255: Operation data number | 0 | R/W |



The set value of the "DATA offset reference origin" parameter is stored in RAM.

10-3 Offset reference (industrial network)

Offset reference is a method in which the data number of the starting point (starting data number) is set and the offset from the starting data number is specified to input data. The starting data number is set with the "DATA offset reference origin" parameter.

Related parameters

| Industrial network command code | | Name | Description | Initial value | R/W |
|---------------------------------|-----------------|------------------------------|---|---------------|-----|
| READ | WRITE | | | | |
| 3071 (0BFFh) | 7167 (1BFFh) | DATA offset reference origin | Sets the operation data number that is the starting point of offset reference. Setting range 0 to 255: Operation data number | 0 | R/W |



The set value of the "DATA offset reference origin" parameter is stored in RAM.

■ Base command codes

The following are the command codes (base command codes) of the base operation data numbers in setting with offset reference.

The base command codes are fixed. The base command codes of the starting data number are always "READ: 3072 (C00h), WRITE: 7168 (1C00h)."

Since up to only 32 pieces of operation data can be specified in offset reference, change the starting data number if you want to input to the operation data No.32 or more.



Up to 32 pieces of operation data can be specified in offset reference. (The offset value is up to 31.)

| Industrial network base command code | | Operation data No. | Industrial network base command code | | Operation data No. |
|---|-----------------|------------------------|---|-----------------|------------------------|
| READ | WRITE | | READ | WRITE | |
| 3072 (C00h) | 7168 (1C00h) | Starting data No. + 0 | 3584 (E00h) | 7680 (1E00h) | Starting data No. + 16 |
| 3104 (C20h) | 7200 (1C20h) | Starting data No. + 1 | 3616 (E20h) | 7712 (1E20h) | Starting data No. + 17 |
| 3136 (C40h) | 7232 (1C40h) | Starting data No. + 2 | 3648 (E40h) | 7744 (1E40h) | Starting data No. + 18 |
| 3168 (C60h) | 7264 (1C60h) | Starting data No. + 3 | 3680 (E60h) | 7776 (1E60h) | Starting data No. + 19 |
| 3200 (C80h) | 7296 (1C80h) | Starting data No. + 4 | 3712 (E80h) | 7808 (1E80h) | Starting data No. + 20 |
| 3232 (CA0h) | 7328 (1CA0h) | Starting data No. + 5 | 3744 (EA0h) | 7840 (1EA0h) | Starting data No. + 21 |
| 3264 (CC0h) | 7360 (1CC0h) | Starting data No. + 6 | 3776 (EC0h) | 7872 (1EC0h) | Starting data No. + 22 |
| 3296 (CE0h) | 7392 (1CE0h) | Starting data No. + 7 | 3808 (EE0h) | 7904 (1EE0h) | Starting data No. + 23 |
| 3328 (D00h) | 7424 (1D00h) | Starting data No. + 8 | 3840 (F00h) | 7936 (1F00h) | Starting data No. + 24 |
| 3360 (D20h) | 7456 (1D20h) | Starting data No. + 9 | 3872 (F20h) | 7968 (1F20h) | Starting data No. + 25 |
| 3392 (D40h) | 7488 (1D40h) | Starting data No. + 10 | 3904 (F40h) | 8000 (1F40h) | Starting data No. + 26 |
| 3424 (D60h) | 7520 (1D60h) | Starting data No. + 11 | 3936 (F60h) | 8032 (1F60h) | Starting data No. + 27 |
| 3456 (D80h) | 7552 (1D80h) | Starting data No. + 12 | 3968 (F80h) | 8064 (1F80h) | Starting data No. + 28 |
| 3488 (DA0h) | 7584 (1DA0h) | Starting data No. + 13 | 4000 (FA0h) | 8096 (1FA0h) | Starting data No. + 29 |
| 3520 (DC0h) | 7616 (1DC0h) | Starting data No. + 14 | 4032 (FC0h) | 8128 (1FC0h) | Starting data No. + 30 |
| 3552 (DE0h) | 7648 (1DE0h) | Starting data No. + 15 | 4064 (FE0h) | 8160 (1FE0h) | Starting data No. + 31 |

■ Command codes

The setting items of operation data are set with the operation data R/W command.

The command codes of setting items are arranged based on the base command code. (Base command code → p.387)

For example, in the case of the setting item "Position," if 1 is added to the base address, it becomes a command code.

| Industrial network base command code | Name | Setting range | Initial value | Effective |
|---|---------------------------|--|---------------|-----------|
| Base command code + 0 | Operation type | 1: Absolute positioning 2: Incremental positioning (based on command position) 3: Incremental positioning (based on feedback position) 7: Continuous operation (Position control) 8: Wrap absolute positioning 9: Wrap proximity positioning 10: Wrap absolute positioning (FWD) 11: Wrap absolute positioning (RVS) 12: Wrap absolute push-motion 13: Wrap proximity push-motion 14: Wrap push-motion (FWD) 15: Wrap push-motion (RVS) 16: Continuous operation (Speed control) 17: Continuous operation (Push motion) 18: Continuous operation (Torque control) 20: Absolute push-motion 21: Incremental push-motion (based on command position) 22: Incremental push-motion (based on feedback position) | 2 | B |
| Base command code + 1 | Position | -2,147,483,648 to 2,147,483,647 steps | 0 | B |
| Base command code + 2 | Operating speed | -4,000,000 to 4,000,000 Hz | 1,000 | B |
| Base command code + 3 | Starting/changing rate | 1 to 1,000,000,000 (1=0.001 kHz/s, 1=0.001 s, or 1=0.001 ms/kHz) | 1,000,000 | B |
| Base command code + 4 | Stop | 1 to 1,000,000,000 (1=0.001 kHz/s, 1=0.001 s, or 1=0.001 ms/kHz) | 1,000,000 | B |
| Base command code + 5 | Operating current | 0 to 1,000 (1=0.1%) | 1,000 | B |
| Base command code + 6 | Drive-complete delay time | 0 to 65,535 (1=0.001 s) | 0 | B |
| Base command code + 7 | Link | 0: No link 1: Manual sequential 2: Automatic sequential 3: Continuous form connection | 0 | B |
| Base command code + 8 | Next data No. | -256: Stop -2: ↓ (+2) -1: ↓ (+1) 0 to 255: Operation data number | -1 | B |
| Base command code + 9 | Area offset | -2,147,483,648 to 2,147,483,647 steps | 0 | B |
| Base command code + 10 | Area width | -1: Disable 0 to 4,194,303: Set by 1 step | -1 | B |
| Base command code + 11 | Loop count | 0: None (-) 2 to 255: Number of loop (loop 2 { to loop 255 {) | 0 | B |
| Base command code + 12 | Loop offset | -4,194,304 to 4,194,303 steps | 0 | B |
| Base command code + 13 | Loop end No. | 0: None (-) 1: } L-End | 0 | B |
| Base command code + 14 | (Low) I/O event No. | -1: None (-) 0 to 31: Operation I/O event number (0 to 31) | -1 | B |
| Base command code + 15 | (High) I/O event No. | -1: None (-) 0 to 31: Operation I/O event number (0 to 31) | -1 | B |

■ Example of command codes

The command codes of setting items are arranged based on the base command code of the operation data number.
(Base command code⇒p.387, command code⇒p.388)

As examples, here is a description of the command codes of the setting items when the operation data No.0, No.32, and No.255 are the starting data.

● When the "DATA offset reference origin" parameter is 0 (starting operation data No.0)

- From the table on p.387, we can find that the base command codes of the operation data No.0 are "READ: 3072 (C00h), WRITE: 7168 (1C00h)." Based on these base command codes, calculate the command codes of each item from the table on p.388.
- The operation data No.1 has a value of the operation data No.0 with offset 1 added. From the table on p.387, we can find that the base command codes of the operation data No.1 are "READ: 3104 (C20h), WRITE: 7200 (1C20h)." As in the case of the operation data No.0, calculate the command codes of each item from the table on p.388.
- When the starting data is the operation data No.0, the data that can be specified in offset reference is up to the operation data No.31. Calculate also the command codes of the operation data No.31 as in the case of the operation data No.1.

| Setting item | Calculation method | Base address (operation data No.0) | | Offset=1 (operation data No.1) | | Offset=31 (operation data No.31) | |
|------------------------------|--------------------|--|-----------------|--------------------------------------|-----------------|--|-----------------|
| | | Industrial network command code | | Industrial network command code | | Industrial network command code | |
| READ | WRITE | READ | WRITE | READ | WRITE | READ | WRITE |
| Operation type | Base address + 0 | 3072 (C00h) | 7168 (1C00h) | 3104 (C20h) | 7200 (1C20h) | 4064 (FE0h) | 8160 (1FE0h) |
| Position | Base address + 1 | 3073 (C01h) | 7169 (1C01h) | 3105 (C21h) | 7201 (1C21h) | 4065 (FE1h) | 8161 (1FE1h) |
| Operating speed | Base address + 2 | 3074 (C02h) | 7170 (1C02h) | 3106 (C22h) | 7202 (1C22h) | 4066 (FE2h) | 8162 (1FE2h) |
| Starting/changing rate | Base address + 3 | 3075 (C03h) | 7171 (1C03h) | 3107 (C23h) | 7203 (1C23h) | 4067 (FE3h) | 8163 (1FE3h) |
| Stop | Base address + 4 | 3076 (C04h) | 7172 (1C04h) | 3108 (C24h) | 7204 (1C24h) | 4068 (FE4h) | 8164 (1FE4h) |
| Operating current | Base address + 5 | 3077 (C05h) | 7173 (1C05h) | 3109 (C25h) | 7205 (1C25h) | 4069 (FE5h) | 8165 (1FE5h) |
| Drive-complete delay time | Base address + 6 | 3078 (C06h) | 7174 (1C06h) | 3110 (C26h) | 7206 (1C26h) | 4070 (FE6h) | 8166 (1FE6h) |
| Link | Base address + 7 | 3079 (C07h) | 7175 (1C07h) | 3111 (C27h) | 7207 (1C27h) | 4071 (FE7h) | 8167 (1FE7h) |
| Next data No. | Base address + 8 | 3080 (C08h) | 7176 (1C08h) | 3112 (C28h) | 7208 (1C28h) | 4072 (FE8h) | 8168 (1FE8h) |
| Area offset | Base address + 9 | 3081 (C09h) | 7177 (1C09h) | 3113 (C29h) | 7209 (1C29h) | 4073 (FE9h) | 8169 (1FE9h) |
| Area width | Base address + 10 | 3082 (C0Ah) | 7178 (1C0Ah) | 3114 (C2Ah) | 7210 (1C2Ah) | 4074 (FEAh) | 8170 (1FEAh) |
| Loop count | Base address + 11 | 3083 (C0Bh) | 7179 (1C0Bh) | 3115 (C2Bh) | 7211 (1C2Bh) | 4075 (FEBh) | 8171 (1FEBh) |
| Loop offset | Base address + 12 | 3084 (C0Ch) | 7180 (1C0Ch) | 3116 (C2Ch) | 7212 (1C2Ch) | 4076 (FECh) | 8172 (1FECh) |
| Loop end No. | Base address + 13 | 3085 (C0Dh) | 7181 (1C0Dh) | 3117 (C2Dh) | 7213 (1C2Dh) | 4077 (FEDh) | 8173 (1FEDh) |
| (Low) I/O event No. | Base address + 14 | 3086 (C0Eh) | 7182 (1C0Eh) | 3118 (C2Eh) | 7214 (1C2Eh) | 4078 (FEEh) | 8174 (1FEEh) |
| (High) I/O event No. | Base address + 15 | 3087 (C0Fh) | 7183 (1C0Fh) | 3119 (C2Fh) | 7215 (1C2Fh) | 4079 (FEFh) | 8175 (1FEFh) |

- When the "DATA offset reference origin" parameter is 32 (starting operation data No.32)

Set the operation data No.32 as the starting point with the "DATA offset reference origin" parameter. Then, data from the operation data No.32 to No.63 can be specified.

From the table on p.387, we can find that the base command codes of the operation data No.32 are "READ: 3072 (C00h), WRITE: 7168 (1C00h)." Based on these base command codes, calculate the command codes of each item from the table on p.388.

Similarly, calculate the command codes of the operation data No.33 to No.63.

| Setting item | Calculation method | Base address (operation data No.32) | | Offset=1 (operation data No.33) | | Offset=31 (operation data No.63) | |
|------------------------------|--------------------|---|-----------------|---------------------------------------|-----------------|--|-----------------|
| | | Industrial network command code | | Industrial network command code | | Industrial network command code | |
| READ | WRITE | READ | WRITE | READ | WRITE | READ | WRITE |
| Operation type | Base address + 0 | 3072 (C00h) | 7168 (1C00h) | 3104 (C20h) | 7200 (1C20h) | 4064 (FE0h) | 8160 (1FE0h) |
| Position | Base address + 1 | 3073 (C01h) | 7169 (1C01h) | 3105 (C21h) | 7201 (1C21h) | 4065 (FE1h) | 8161 (1FE1h) |
| Operating speed | Base address + 2 | 3074 (C02h) | 7170 (1C02h) | 3106 (C22h) | 7202 (1C22h) | 4066 (FE2h) | 8162 (1FE2h) |
| Starting/changing rate | Base address + 3 | 3075 (C03h) | 7171 (1C03h) | 3107 (C23h) | 7203 (1C23h) | 4067 (FE3h) | 8163 (1FE3h) |
| Stop | Base address + 4 | 3076 (C04h) | 7172 (1C04h) | 3108 (C24h) | 7204 (1C24h) | 4068 (FE4h) | 8164 (1FE4h) |
| Operating current | Base address + 5 | 3077 (C05h) | 7173 (1C05h) | 3109 (C25h) | 7205 (1C25h) | 4069 (FE5h) | 8165 (1FE5h) |
| Drive-complete delay time | Base address + 6 | 3078 (C06h) | 7174 (1C06h) | 3110 (C26h) | 7206 (1C26h) | 4070 (FE6h) | 8166 (1FE6h) |
| Link | Base address + 7 | 3079 (C07h) | 7175 (1C07h) | 3111 (C27h) | 7207 (1C27h) | 4071 (FE7h) | 8167 (1FE7h) |
| Next data No. | Base address + 8 | 3080 (C08h) | 7176 (1C08h) | 3112 (C28h) | 7208 (1C28h) | 4072 (FE8h) | 8168 (1FE8h) |
| Area offset | Base address + 9 | 3081 (C09h) | 7177 (1C09h) | 3113 (C29h) | 7209 (1C29h) | 4073 (FE9h) | 8169 (1FE9h) |
| Area width | Base address + 10 | 3082 (C0Ah) | 7178 (1C0Ah) | 3114 (C2Ah) | 7210 (1C2Ah) | 4074 (FEAh) | 8170 (1FEAh) |
| Loop count | Base address + 11 | 3083 (C0Bh) | 7179 (1C0Bh) | 3115 (C2Bh) | 7211 (1C2Bh) | 4075 (FEBh) | 8171 (1FEBh) |
| Loop offset | Base address + 12 | 3084 (C0Ch) | 7180 (1C0Ch) | 3116 (C2Ch) | 7212 (1C2Ch) | 4076 (FECh) | 8172 (1FECh) |
| Loop end No. | Base address + 13 | 3085 (C0Dh) | 7181 (1C0Dh) | 3117 (C2Dh) | 7213 (1C2Dh) | 4077 (FEDh) | 8173 (1FEDh) |
| (Low) I/O event No. | Base address + 14 | 3086 (C0Eh) | 7182 (1C0Eh) | 3118 (C2Eh) | 7214 (1C2Eh) | 4078 (FEEh) | 8174 (1FEEh) |
| (High) I/O event No. | Base address + 15 | 3087 (C0Fh) | 7183 (1C0Fh) | 3119 (C2Fh) | 7215 (1C2Fh) | 4079 (FEFh) | 8175 (1FEFh) |

- When the "DATA offset reference origin" parameter is 255 (starting operation data No.255)

Set the operation data No.255 as the starting point with the "DATA offset reference origin" parameter. When offset 1 is added to the operation data No.255, the operation data No.0 is accessed.

| Setting item | Calculation method | Base address (operation data No.255) | | Offset=1 (operation data No.0) | | ... | Offset=31 (operation data No.30) | |
|---------------------------|--------------------|--|-----------------|--------------------------------------|-----------------|-----|--|-----------------|
| | | Industrial network command code | | Industrial network command code | | | Industrial network command code | |
| | | READ | WRITE | READ | WRITE | | READ | WRITE |
| Operation type | Base address + 0 | 3072 (C00h) | 7168 (1C00h) | 3104 (C20h) | 7200 (1C20h) | | 4064 (FE0h) | 8160 (1FE0h) |
| Position | Base address + 1 | 3073 (C01h) | 7169 (1C01h) | 3105 (C21h) | 7201 (1C21h) | | 4065 (FE1h) | 8161 (1FE1h) |
| Operating speed | Base address + 2 | 3074 (C02h) | 7170 (1C02h) | 3106 (C22h) | 7202 (1C22h) | | 4066 (FE2h) | 8162 (1FE2h) |
| Starting/changing rate | Base address + 3 | 3075 (C03h) | 7171 (1C03h) | 3107 (C23h) | 7203 (1C23h) | | 4067 (FE3h) | 8163 (1FE3h) |
| Stop | Base address + 4 | 3076 (C04h) | 7172 (1C04h) | 3108 (C24h) | 7204 (1C24h) | | 4068 (FE4h) | 8164 (1FE4h) |
| Operating current | Base address + 5 | 3077 (C05h) | 7173 (1C05h) | 3109 (C25h) | 7205 (1C25h) | | 4069 (FE5h) | 8165 (1FE5h) |
| Drive-complete delay time | Base address + 6 | 3078 (C06h) | 7174 (1C06h) | 3110 (C26h) | 7206 (1C26h) | | 4070 (FE6h) | 8166 (1FE6h) |
| Link | Base address + 7 | 3079 (C07h) | 7175 (1C07h) | 3111 (C27h) | 7207 (1C27h) | | 4071 (FE7h) | 8167 (1FE7h) |
| Next data No. | Base address + 8 | 3080 (C08h) | 7176 (1C08h) | 3112 (C28h) | 7208 (1C28h) | | 4072 (FE8h) | 8168 (1FE8h) |
| Area offset | Base address + 9 | 3081 (C09h) | 7177 (1C09h) | 3113 (C29h) | 7209 (1C29h) | | 4073 (FE9h) | 8169 (1FE9h) |
| Area width | Base address + 10 | 3082 (C0Ah) | 7178 (1C0Ah) | 3114 (C2Ah) | 7210 (1C2Ah) | | 4074 (FEAh) | 8170 (1FEAh) |
| Loop count | Base address + 11 | 3083 (C0Bh) | 7179 (1C0Bh) | 3115 (C2Bh) | 7211 (1C2Bh) | | 4075 (FEBh) | 8171 (1FEBh) |
| Loop offset | Base address + 12 | 3084 (C0Ch) | 7180 (1C0Ch) | 3116 (C2Ch) | 7212 (1C2Ch) | | 4076 (FECh) | 8172 (1FECh) |
| Loop end No. | Base address + 13 | 3085 (C0Dh) | 7181 (1C0Dh) | 3117 (C2Dh) | 7213 (1C2Dh) | | 4077 (FEDh) | 8173 (1FEDh) |
| (Low) I/O event No. | Base address + 14 | 3086 (C0Eh) | 7182 (1C0Eh) | 3118 (C2Eh) | 7214 (1C2Eh) | | 4078 (FEEh) | 8174 (1FEEh) |
| (High) I/O event No. | Base address + 15 | 3087 (C0Fh) | 7183 (1C0Fh) | 3119 (C2Fh) | 7215 (1C2Fh) | | 4079 (FEFh) | 8175 (1FEFh) |

■ Setting example

As an example, here is a description 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 |
| Operating speed [Hz] | 1,000 | 1,000 | 1,000 |
| Operating current [%] | 50.0 | 70.0 | 100.0 |

● Setting of operation data No.0

From the table on p.387, we can find that the base command code of the operation data No.0 is "WRITE: 7168 (1C00h)." Based on this base command code, calculate the command code of each item from the table on p.388.

| Base command code 7168 (1C00h) | Setting item | Command code | | | Set value |
|-----------------------------------|-------------------|-----------------------|-----------------|-------|-----------|
| | | Calculation method | Dec | Hex | |
| | Operation type | Base command code + 0 | 7168 + 0 = 7168 | 1C00h | 1 |
| | Position | Base command code + 1 | 7168 + 1 = 7169 | 1C01h | 1,000 |
| | Operating speed | Base command code + 2 | 7168 + 2 = 7170 | 1C02h | 1,000 |
| | Operating current | Base command code + 5 | 7168 + 5 = 7173 | 1C05h | 500 |

● Setting of operation data No.1

From the table on p.387, we can find that the base command code of the operation data No.1 is "WRITE: 7200 (1C20h)." Based on this base command code, calculate the command code of each item from the table on p.388.

| Base command code 7200 (1C20h) | Setting item | Command code | | | Set value |
|-----------------------------------|-------------------|-----------------------|-----------------|------|-----------|
| | | Calculation method | Dec | Hex | |
| | Operation type | Base command code + 0 | 7200 + 0 = 7200 | 1C20 | 2 |
| | Position | Base command code + 1 | 7200 + 1 = 7201 | 1C21 | 1,000 |
| | Operating speed | Base command code + 2 | 7200 + 2 = 7202 | 1C22 | 1,000 |
| | Operating current | Base command code + 5 | 7200 + 5 = 7205 | 1C25 | 700 |

● Setting of operation data No.2

From the table on p.387, we can find that the base command code of the operation data No.2 is "WRITE: 7232 (1C40h)." Based on this base command code, calculate the command code of each item from the table on p.388.

| Base command code 7232 (1C40h) | Setting item | Command code | | | Set value |
|-----------------------------------|-------------------|-----------------------|-----------------|------|-----------|
| | | Calculation method | Dec | Hex | |
| | Operation type | Base command code + 0 | 7232 + 0 = 7232 | 1C40 | 3 |
| | Position | Base command code + 1 | 7232 + 1 = 7233 | 1C41 | 1,000 |
| | Operating speed | Base command code + 2 | 7232 + 2 = 7234 | 1C42 | 1,000 |
| | Operating current | Base command code + 5 | 7232 + 5 = 7237 | 1C45 | 1,000 |

11 Operation data R/W commands (compatible)

These commands include addresses grouped by setting items such as type, position, and operating speed. Use these addresses when our existing product has been replaced with the **AZ Series** or to input to a certain setting item in succession.



- The settable operation data are the operation data No.0 to No.63. The operation data No.64 or more cannot be set.
- Settable items are the following six types. Other items such as link and loop cannot be set.
Type, position, operating speed, starting/changing rate, stop, operating current

11-1 Direct reference (Modbus communication)

| Modbus communication base address | | Name | Setting range | Initial value | Effective |
|-----------------------------------|-----------------|-----------------------|--|---------------|-----------|
| Upper | Lower | | | | |
| 1024 (0400h) | 1025 (0401h) | Position No.0 | -2,147,483,648 to 2,147,483,647 steps | 0 | B |
| 1026 (0402h) | 1027 (0403h) | Position No.1 | | | |
| to | to | to | | | |
| 1150 (047Eh) | 1151 (047Fh) | Position No.63 | | | |
| 1152 (0480h) | 1153 (0481h) | Operating speed No.0 | | | |
| 1154 (0482h) | 1155 (0483h) | Operating speed No.1 | | | |
| to | to | to | | | |
| 1278 (04FEh) | 1279 (04FFh) | Operating speed No.63 | | | |
| 1280 (0500h) | 1281 (0501h) | Type No.0 | 1: Absolute positioning 2: Incremental positioning (based on command position) 3: Incremental positioning (based on feedback position) 7: Continuous operation (Position control) 8: Wrap absolute positioning 9: Wrap proximity positioning 10: Wrap absolute positioning (FWD) 11: Wrap absolute positioning (RVS) 12: Wrap absolute push-motion 13: Wrap proximity push-motion 14: Wrap push-motion (FWD) 15: Wrap push-motion (RVS) 16: Continuous operation (Speed control) 17: Continuous operation (Push motion) 18: Continuous operation (Torque control) 20: Absolute push-motion 21: Incremental push-motion (based on command position) 22: Incremental push-motion (based on feedback position) | 2 | B |
| 1282 (0502h) | 1283 (0503h) | Type No.1 | | | |
| to | to | to | | | |
| 1406 (057Eh) | 1407 (057Fh) | Type No.63 | | | |

| Modbus communication base address | | Name | Setting range | Initial value | Effective |
|-----------------------------------|-----------------|------------------------------|---|---------------|-----------|
| Upper | Lower | | | | |
| 1536 (0600h) | 1537 (0601h) | Starting/changing rate No.0 | 1 to 1,000,000,000 (1=0.001 kHz/s, 1=0.001 s, or 1=0.001 ms/kHz) | 1,000,000 | B |
| 1538 (0602h) | 1539 (0603h) | Starting/changing rate No.1 | | | |
| to | to | to | | | |
| 1662 (067Eh) | 1663 (067Fh) | Starting/changing rate No.63 | 1 to 1,000,000,000 (1=0.001 kHz/s, 1=0.001 s, or 1=0.001 ms/kHz) | 1,000,000 | B |
| 1664 (0680h) | 1665 (0681h) | Stop No.0 | | | |
| 1666 (0682h) | 1667 (0683h) | Stop No.1 | | | |
| to | to | to | 0 to 1,000 (1=0.1%) | 1,000 | B |
| 1790 (06FEh) | 1791 (06FFh) | Stop No.63 | | | |
| 1792 (0700h) | 1793 (0701h) | Operating current No.0 | | | |
| 1794 (0702h) | 1795 (0703h) | Operating current No.1 | -2,147,483,648 to 2,147,483,647 steps | 0 | B |
| to | to | to | | | |
| 1918 (077Eh) | 1919 (077Fh) | Operating current No.63 | | | |

11-2 Direct reference (industrial network)

| Industrial network command code | | Name | Setting range | Initial value | Effective |
|---------------------------------|-----------------|-----------------------|---------------------------------------|---------------|-----------|
| READ | WRITE | | | | |
| 512 (0200h) | 4608 (1200h) | Position No.0 | -2,147,483,648 to 2,147,483,647 steps | 0 | B |
| 513 (0201h) | 4609 (1201h) | Position No.1 | | | |
| to | to | to | | | |
| 575 (023Fh) | 4671 (123Fh) | Position No.63 | -4,000,000 to 4,000,000 Hz | 1,000 | B |
| 576 (0240h) | 4672 (1240h) | Operating speed No.0 | | | |
| 577 (0241h) | 4673 (1241h) | Operating speed No.1 | | | |
| to | to | to | | | |
| 639 (027Fh) | 4735 (127Fh) | Operating speed No.63 | | | |

| Industrial network command code | | Name | Setting range | Initial value | Effective |
|---------------------------------|-----------------|------------------------------|--|---------------|-----------|
| READ | WRITE | | | | |
| 640 (0280h) | 4736 (1280h) | Type No.0 | 1: Absolute positioning 2: Incremental positioning (based on command position) 3: Incremental positioning (based on feedback position) 7: Continuous operation (Position control) 8: Wrap absolute positioning 9: Wrap proximity positioning 10: Wrap absolute positioning (FWD) 11: Wrap absolute positioning (RVS) 12: Wrap absolute push-motion 13: Wrap proximity push-motion 14: Wrap push-motion (FWD) 15: Wrap push-motion (RVS) 16: Continuous operation (Speed control) 17: Continuous operation (Push motion) 18: Continuous operation (Torque control) 20: Absolute push-motion 21: Incremental push-motion (based on command position) 22: Incremental push-motion (based on feedback position) | | |
| 641 (0281h) | 4737 (1281h) | Type No.1 | to | to | to |
| | | | 1: Absolute positioning 2: Incremental positioning (based on command position) 3: Incremental positioning (based on feedback position) 7: Continuous operation (Position control) 8: Wrap absolute positioning 9: Wrap proximity positioning 10: Wrap absolute positioning (FWD) 11: Wrap absolute positioning (RVS) 12: Wrap absolute push-motion 13: Wrap proximity push-motion 14: Wrap push-motion (FWD) 15: Wrap push-motion (RVS) 16: Continuous operation (Speed control) 17: Continuous operation (Push motion) 18: Continuous operation (Torque control) 20: Absolute push-motion 21: Incremental push-motion (based on command position) 22: Incremental push-motion (based on feedback position) | 2 | B |
| 703 (02BFh) | 4799 (12BFh) | Type No.63 | | | |
| 768 (0300h) | 4864 (1300h) | Starting/changing rate No.0 | | | |
| 769 (0301h) | 4865 (1301h) | Starting/changing rate No.1 | 1 to 1,000,000,000 (1=0.001 kHz/s, 1=0.001 s, or 1=0.001 ms/kHz) | 1,000,000 | B |
| to | to | to | | | |
| 831 (033Fh) | 4927 (133Fh) | Starting/changing rate No.63 | | | |
| 832 (0340h) | 4928 (1340h) | Stop No.0 | | | |
| 833 (0341h) | 4929 (1341h) | Stop No.1 | 1 to 1,000,000,000 (1=0.001 kHz/s, 1=0.001 s, or 1=0.001 ms/kHz) | 1,000,000 | B |
| to | to | to | | | |
| 895 (037Fh) | 4991 (137Fh) | Stop No.63 | | | |
| 896 (0380h) | 4992 (1380h) | Operating current No.0 | | | |
| 897 (0381h) | 4993 (1381h) | Operating current No.1 | 0 to 1,000 (1=0.1%) | 1,000 | B |
| to | to | to | | | |
| 959 (03BFh) | 5055 (13BFh) | Operating current No.63 | | | |

12 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 addresses to execute operation I/O events.

12-1 Setting method

As with the setting of operation data, operation I/O event has also "direct reference" and "offset reference." Direct reference is a method in which the address (base address) of the base event number is specified to access the event. (Ref. \Rightarrow Next paragraph)

Offset reference is a method in which the event number of the starting point (starting event number) is set and the offset from the starting event number is specified to access the event. The starting event number is set with the "Event offset reference origin" parameter. (Ref. \Rightarrow p.398)

Both direct reference and offset reference can be used both in Modbus communication and industrial network.



The set value of the "Event offset reference origin" parameter is stored in RAM.

12-2 Direct reference

Direct reference is a method in which the address (base address) of the base operation I/O event number is specified to access the event.

■ Base address of operation I/O event

| Modbus communication base address | Operation I/O event No. | Industrial network base command code | |
|-----------------------------------|-------------------------|--------------------------------------|-----------------|
| | | READ | WRITE |
| 5120 (1400h) | 0 | 2560 (A00h) | 6656 (1A00h) |
| 5136 (1410h) | 1 | 2568 (A08h) | 6664 (1A08h) |
| 5152 (1420h) | 2 | 2576 (A10h) | 6672 (1A10h) |
| 5168 (1430h) | 3 | 2584 (A18h) | 6680 (1A18h) |
| 5184 (1440h) | 4 | 2592 (A20h) | 6688 (1A20h) |
| 5200 (1450h) | 5 | 2600 (A28h) | 6696 (1A28h) |
| 5216 (1460h) | 6 | 2608 (A30h) | 6704 (1A30h) |
| 5232 (1470h) | 7 | 2616 (A38h) | 6712 (1A38h) |
| 5248 (1480h) | 8 | 2624 (A40h) | 6720 (1A40h) |
| 5264 (1490h) | 9 | 2632 (A48h) | 6728 (1A48h) |
| 5280 (14A0h) | 10 | 2640 (A50h) | 6736 (1A50h) |
| 5296 (14B0h) | 11 | 2648 (A58h) | 6744 (1A58h) |

| Modbus communication base address | Operation I/O event No. | Industrial network base command code | |
|-----------------------------------|-------------------------|--------------------------------------|-----------------|
| | | READ | WRITE |
| 5312 (14C0h) | 12 | 2656 (A60h) | 6752 (1A60h) |
| 5328 (14D0h) | 13 | 2664 (A68h) | 6760 (1A68h) |
| 5344 (14E0h) | 14 | 2672 (A70h) | 6768 (1A70h) |
| 5360 (14F0h) | 15 | 2680 (A78h) | 6776 (1A78h) |
| 5376 (1500h) | 16 | 2688 (A80h) | 6784 (1A80h) |
| 5392 (1510h) | 17 | 2696 (A88h) | 6792 (1A88h) |
| 5408 (1520h) | 18 | 2704 (A90h) | 6800 (1A90h) |
| 5424 (1530h) | 19 | 2712 (A98h) | 6808 (1A98h) |
| 5440 (1540h) | 20 | 2720 (AA0h) | 6816 (1AA0h) |
| 5456 (1550h) | 21 | 2728 (AA8h) | 6824 (1AA8h) |
| 5472 (1560h) | 22 | 2736 (AB0h) | 6832 (1AB0h) |
| 5488 (1570h) | 23 | 2744 (AB8h) | 6840 (1AB8h) |

| Modbus communication base address | Operation I/O event No. | Industrial network base command code | |
|-----------------------------------|-------------------------|--------------------------------------|--------------|
| | | READ | WRITE |
| 5504 (1580h) | 24 | 2752 (AC0h) | 6848 (1AC0h) |
| 5520 (1590h) | 25 | 2760 (AC8h) | 6856 (1AC8h) |
| 5536 (15A0h) | 26 | 2768 (AD0h) | 6864 (1AD0h) |
| 5552 (15B0h) | 27 | 2776 (AD8h) | 6872 (1AD8h) |

| Modbus communication base address | Operation I/O event No. | Industrial network base command code | |
|-----------------------------------|-------------------------|--------------------------------------|--------------|
| | | READ | WRITE |
| 5568 (15C0h) | 28 | 2784 (AE0h) | 6880 (1AE0h) |
| 5584 (15D0h) | 29 | 2792 (AE8h) | 6888 (1AE8h) |
| 5600 (15E0h) | 30 | 2800 (AF0h) | 6896 (1AF0h) |
| 5616 (15F0h) | 31 | 2808 (AF8h) | 6904 (1AF8h) |

■ Addresses of operation I/O event R/W commands

The setting items of operation I/O event are set with the operation I/O event R/W commands.

The addresses of the setting items are arranged based on the base address (base command code) of the operation I/O event. (Base address of operation I/O event → p.396)

For example, in the case of Modbus communication, if 4 and 5 are added to the base address, they become the upper and lower addresses respectively for the setting item "Event waiting time".

| Modbus communication register address | Name | Setting range | Initial value | Effective | Industrial network command code |
|---------------------------------------|------------------------|--|---------------|-----------|---------------------------------|
| Base address + 0 (upper) | Event link | 0: No link 1: Manual sequential 2: Automatic sequential 3: Continuous form connection | 0 | B | Base command code + 0 |
| Base address + 1 (lower) | | | | | |
| Base address + 2 (upper) | Event jump destination | -256: Stop -2: ↓↓ (+2) -1: ↓ (+1) 0 to 255: Operation data number | -256 | B | Base command code + 1 |
| Base address + 3 (lower) | | | | | |
| Base address + 4 (upper) | Event waiting time | 0 to 65,535 (1=0.001 s) | 0 | B | Base command code + 2 |
| Base address + 5 (lower) | | | | | |
| Base address + 6 (upper) | Event trigger I/O | Input signal list → p.427 Output signal list → p.428 | 0: Not used | B | Base command code + 3 |
| Base address + 7 (lower) | | | | | |
| Base address + 8 (upper) | Event trigger type | 0: 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 command code + 4 |
| Base address + 9 (lower) | | | | | |
| Base address + 10 (upper) | Event trigger counter | 0 to 65,535 (1=1 msec or 1=Once) | 0 | B | Base command code + 5 |
| Base address + 11 (lower) | | | | | |

12-3 Offset reference

Offset reference is a method in which the I/O event number of the starting point (starting event number) is set and the offset from the starting event number is specified to access the event. The starting event number is set with the "Event offset reference origin" parameter.

■ Parameter to set starting event number

| Modbus communication register address | | Name | Description | Initial value | R/W | Industrial network command code | |
|---------------------------------------|-----------------|-------------------------------|--|---------------|-----|---------------------------------|-----------------|
| Upper | Lower | | | | | READ | WRITE |
| 5118 (13FEh) | 5119 (13FFh) | Event offset reference origin | Sets the I/O event number that is the starting point of offset reference. Setting range 0 to 32: I/O event number | 0 | R/W | 2559 (09FFh) | 6655 (19FFh) |



The set value of the "Event offset reference origin" parameter is stored in RAM.

■ Addresses of setting items (command codes)

| Modbus communication register address | | Setting item | Industrial network command code | |
|---------------------------------------|--------------|------------------------|---------------------------------|--------------|
| Upper | Lower | | READ | WRITE |
| 5120 (1400h) | 5121 (1401h) | Event link | 2560 (A00h) | 6656 (1A00h) |
| 5122 (1402h) | 5123 (1403h) | Event jump destination | 2561 (A01h) | 6657 (1A01h) |
| 5124 (1404h) | 5125 (1405h) | Event waiting time | 2562 (A02h) | 6658 (1A02h) |
| 5126 (1406h) | 5127 (1407h) | Event trigger I/O | 2563 (A03h) | 6659 (1A03h) |
| 5128 (1408h) | 5129 (1409h) | Event trigger type | 2564 (A04h) | 6660 (1A04h) |
| 5130 (140Ah) | 5131 (140Bh) | Event trigger counter | 2565 (A05h) | 6661 (1A05h) |

■ Setting example

As examples, here is a description of set addresses when event No.0, No.1, and No.10 are set to the starting events. In offset reference, the addresses of the setting items do not need to be changed if just the event number of the starting point is changed.

It is a convenient access method when editing a large volume of operation data, on a touch panel, for example.

● In case of starting event No.0 (initial value)

| Modbus communication base address | Operation I/O event No. | Industrial network base command code | |
|-----------------------------------|------------------------------|--------------------------------------|--------------|
| | | READ | WRITE |
| 5120 (1400h) | Starting event No. + 0 = 0 | 2560 (A00h) | 6656 (1A00h) |
| 5136 (1410h) | Starting event No. + 1 = 1 | 2568 (A08h) | 6664 (1A08h) |
| ... | ... | ... | ... |
| 5376 (1500h) | Starting event No. + 16 = 16 | 2688 (A80h) | 6784 (1A80h) |
| 5392 (1510h) | Starting event No. + 17 = 17 | 2696 (A88h) | 6792 (1A88h) |

- In case of starting event No.1

| Modbus communication base address | Operation I/O event No. | Industrial network base command code | |
|-----------------------------------|------------------------------|--------------------------------------|--------------|
| | | READ | WRITE |
| 5120 (1400h) | Starting event No. + 0 = 1 | 2560 (A00h) | 6656 (1A00h) |
| 5136 (1410h) | Starting event No. + 1 = 2 | 2568 (A08h) | 6664 (1A08h) |
| ... | ... | ... | ... |
| 5376 (1500h) | Starting event No. + 16 = 17 | 2688 (A80h) | 6784 (1A80h) |
| 5392 (1510h) | Starting event No. + 17 = 18 | 2696 (A88h) | 6792 (1A88h) |

- In case of starting event No.10

| Modbus communication base address | Operation I/O event No. | Industrial network base command code | |
|-----------------------------------|------------------------------|--------------------------------------|--------------|
| | | READ | WRITE |
| 5120 (1400h) | Starting event No. + 0 = 10 | 2560 (A00h) | 6656 (1A00h) |
| 5136 (1410h) | Starting event No. + 1 = 11 | 2568 (A08h) | 6664 (1A08h) |
| ... | ... | ... | ... |
| 5376 (1500h) | Starting event No. + 16 = 26 | 2688 (A80h) | 6784 (1A80h) |
| 5392 (1510h) | Starting event No. + 17 = 27 | 2696 (A88h) | 6792 (1A88h) |

13 Extended operation data setting R/W commands

Parameters for extended operation data setting can be set.

| Modbus communication register address | | Name | Setting range | Initial value | Effective | Industrial network command code | |
|---------------------------------------|-----------------|----------------------------------|---|---------------|-----------|---------------------------------|-----------------|
| Upper | Lower | | | | | READ | WRITE |
| 640 (0280h) | 641 (0281h) | Common acceleration rate or time | 1 to 1,000,000,000 (1=0.001 kHz/s, 1=0.001 s, or 1=0.001 ms/kHz) | 1,000,000 | A | 320 (0140h) | 4416 (1140h) |
| 642 (0282h) | 643 (0283h) | Common stopping deceleration | | | A | 321 (0141h) | 4417 (1141h) |
| 652 (028Ch) | 653 (028Dh) | Rate selection | 0: Common 1: Separate | 1 | A | 326 (0146h) | 4422 (1146h) |
| 4096 (1000h) | 4097 (1001h) | Repeat start operation data No. | -1: Disable 0 to 255: Operation data number | -1 | A | 2048 (0800h) | 6144 (1800h) |
| 4098 (1002h) | 4099 (1003h) | Repeat end operation data No. | | | A | 2049 (0801h) | 6145 (1801h) |
| 4100 (1004h) | 4101 (1005h) | Repeat time | -1: Disable 0 to 100,000,000 | -1 | A | 2050 (0802h) | 6146 (1802h) |



Rewrite the extended operation data setting parameters while operation is stopped.

14 Parameter R/W commands

These commands are used to write or read parameters. All commands are used for read/write (READ/WRITE).
(Details of parameters → p.229)

14-1 Driver action simulation setting parameter

| Modbus communication register address | | Name | Description | Initial value | Effective | Industrial network command code | |
|---------------------------------------|-----------------|------------------------|--|---------------|-----------|---------------------------------|-----------------|
| Upper | Lower | | | | | READ | WRITE |
| 1022 (03FEh) | 1023 (03FFh) | Driver simulation mode | <p>Operation can be simulated by using a virtual motor without connecting the motor.</p> <p>Setting range</p> <p>0: The motor is actually connected</p> <p>1: A virtual motor is used (When ABZO not connected = no ABZO sensor information)</p> <p>2: A virtual motor is used (When ABZO not connected = a wrap function with up to 1800 revolutions is enabled)</p> <p>3: A virtual motor is used (When ABZO not connected = a wrap function with up to 900 revolutions is enabled) *</p> | 0 | D | 511 (01FFh) | 4607 (11FFh) |

* It is effective for drivers Ver.4.00 or later. Setting to the drivers older than Ver.4.00 will be the same action as "1: A virtual motor is used (No ABZO sensor information)."

14-2 Base setting parameters

| Modbus communication register address | | Name | Setting range | Initial value | Effective | Industrial network command code | |
|---------------------------------------|----------------|--|--|---------------|-----------|---------------------------------|-----------------|
| Upper | Lower | | | | | READ | WRITE |
| 588 (024Ch) | 589 (024Dh) | Base current | 0 to 1,000 (1=0.1%) | 1,000 | A | 294 (0126h) | 4390 (1126h) |
| 590 (024Eh) | 591 (024Fh) | Base current setting source (only for pulse input type) | <p>0: The parameter setting is followed</p> <p>1: The switch setting is followed</p> | 1 | A | 295 (0127h) | 4391 (1127h) |
| 592 (0250h) | 593 (0251h) | Stop current | 0 to 1,000 (1=0.1%) | 500 | A | 296 (0128h) | 4392 (1128h) |
| 594 (0252h) | 595 (0253h) | Command filter setting | <p>1: LPF (speed filter)</p> <p>2: Moving average filter</p> | 1 | B | 297 (0129h) | 4393 (1129h) |
| 596 (0254h) | 597 (0255h) | Command filter time constant | 0 to 200 ms | 1 | B | 298 (012Ah) | 4394 (112Ah) |
| 598 (0256h) | 599 (0257h) | Command filter time constant setting source (only for pulse input type) | <p>0: The parameter setting is followed</p> <p>1: The switch setting is followed</p> | 1 | B | 299 (012Bh) | 4395 (112Bh) |
| 600 (0258h) | 601 (0259h) | Smooth drive function | <p>0: Disable</p> <p>1: Enable</p> | 1 | C | 300 (012Ch) | 4396 (112Ch) |

| Modbus communication register address | | Name | Setting range | Initial value | Effective | Industrial network command code | |
|---------------------------------------|----------------|--|---|---------------|-----------|---------------------------------|-----------------|
| Upper | Lower | | | | | READ | WRITE |
| 602 (025Ah) | 603 (025Bh) | Current control mode | 0: The setting of the CCM input is followed 1: a control mode (CST) 2: Servo emulation mode (SVE) | 0 | A | 301 (012Dh) | 4397 (112Dh) |
| 604 (025Ch) | 605 (025Dh) | Servo emulation (SVE) ratio | 0 to 1,000 (1=0.1%) | 1,000 | A | 302 (012Eh) | 4398 (112Eh) |
| 606 (025Eh) | 607 (025Fh) | SVE position loop gain | 1 to 50 | 10 | A | 303 (012Fh) | 4399 (112Fh) |
| 608 (0260h) | 609 (0261h) | SVE speed loop gain | 10 to 200 | 180 | A | 304 (0130h) | 4400 (1130h) |
| 610 (0262h) | 611 (0263h) | SVE speed loop integral time constant | 100 to 2,000 (1=0.1 ms) | 1,000 | A | 305 (0131h) | 4401 (1131h) |
| 612 (0264h) | 613 (0265h) | Automatic current cutback function | 0: Disable 1: Enable | 1 | A | 306 (0132h) | 4402 (1132h) |
| 614 (0266h) | 615 (0267h) | Automatic current cutback switching time | 0 to 1,000 ms | 100 | A | 307 (0133h) | 4403 (1133h) |
| 616 (0268h) | 617 (0269h) | Operating current ramp up rate | 0 to 100 ms/100% | 0 | A | 308 (0134h) | 4404 (1134h) |
| 618 (026Ah) | 619 (026Bh) | Operating current ramp down rate | 0 to 100 ms/100% | 0 | A | 309 (0135h) | 4405 (1135h) |
| 622 (026Eh) | 623 (026Fh) | Resonance suppression control frequency | 100 to 2,000 Hz | 1,000 | A | 311 (0137h) | 4407 (1137h) |
| 624 (0270h) | 625 (0271h) | Resonance suppression control gain | -500 to 500 | 0 | A | 312 (0138h) | 4408 (1138h) |
| 626 (0272h) | 627 (0273h) | Deviation acceleration suppressing gain | 0 to 500 | 45 | A | 313 (0139h) | 4409 (1139h) |

14-3 Position coordinate parameters

| Modbus communication register address | | Name | Setting range | Initial value | Effective | Industrial network command code | |
|---------------------------------------|----------------|-------------------------|---|----------------|-----------|---------------------------------|-----------------|
| Upper | Lower | | | | | READ | WRITE |
| 902 (0386h) | 903 (0387h) | Software overtravel | -1: Disable 0: Immediate stop 1: Deceleration stop 2: Immediate stop with alarm 3: Deceleration stop with alarm | 3 | A | 451 (01C3h) | 4547 (11C3h) |
| 904 (0388h) | 905 (0389h) | Positive software limit | -2,147,483,648 to 2,147,483,647 steps | 2,147,483,647 | A | 452 (01C4h) | 4548 (11C4h) |
| 906 (038Ah) | 907 (038Bh) | Negative software limit | -2,147,483,648 to 2,147,483,647 steps | -2,147,483,648 | A | 453 (01C5h) | 4549 (11C5h) |
| 908 (038Ch) | 909 (038Dh) | Preset position | -2,147,483,648 to 2,147,483,647 steps | 0 | A | 454 (01C6h) | 4550 (11C6h) |

14-4 Operation parameters

| Modbus communication register address | | Name | Setting range | Initial value | Effective | Industrial network command code | |
|---------------------------------------|----------------|---|-------------------------------|---------------|-----------|---------------------------------|-----------------|
| Upper | Lower | | | | | READ | WRITE |
| 644 (0284h) | 645 (0285h) | Starting speed | 0 to 4,000,000 Hz | 500 | B | 322 (0142h) | 4418 (1142h) |
| 654 (028Eh) | 655 (028Fh) | Acceleration/deceleration unit | 0: kHz/s 1: s 2: ms/kHz | 0 | C | 327 (0147h) | 4423 (1147h) |
| 656 (0290h) | 657 (0291h) | Permission of absolute positioning without setting absolute coordinates | 0: Disable 1: Enable | 0 | B | 328 (0148h) | 4424 (1148h) |

14-5 Direct data operation parameters

| Modbus communication register address | | Name | Setting range | Initial value | Effective | Industrial network command code | |
|---------------------------------------|----------------|--|---|---------------|-----------|---------------------------------|-----------------|
| Upper | Lower | | | | | READ | WRITE |
| 544 (0220h) | 545 (0221h) | Direct data operation zero speed command action | 0: Deceleration stop command 1: Speed zero command | 0 | B | 272 (0110h) | 4368 (1110h) |
| 546 (0222h) | 547 (0223h) | Direct data operation trigger initial value | -7: Operation data number update -6: Operation type update -5: Position update -4: Speed update -3: Acceleration/deceleration rate update -2: Stopping deceleration update -1: Operating current update 0: The trigger is used | 0 | C | 273 (0111h) | 4369 (1111h) |
| 548 (0224h) | 549 (0225h) | Direct data operation data destination initial value | 0: Execution memory 1: Buffer memory | 0 | C | 274 (0112h) | 4370 (1112h) |
| 550 (0226h) | 551 (0227h) | Direct data operation operation parameter initial value reference data No. | 0 to 255: Operation data number | 0 | C | 275 (0113h) | 4371 (1113h) |
| - | - | Simple direct data operation monitor select 0 (for NETC) | 0: Command position 1: Feedback position 2: Command speed (r/min) 3: Feedback speed (r/min) 4: Command speed (Hz) 5: Feedback speed (Hz) 6: Command 32 bit counter 7: Feedback 32 bit counter | 0 | A | 280 (0118h) | 4376 (1118h) |
| - | - | Simple direct data operation monitor select 1 (for NETC) | 0: Command position 1: Feedback position 2: Command speed (r/min) 3: Feedback speed (r/min) 4: Command speed (Hz) 5: Feedback speed (Hz) 6: Command 32 bit counter 7: Feedback 32 bit counter | 0 | A | 281 (0119h) | 4377 (1119h) |
| 574 (023Eh) | 575 (023Fh) | Command data access area (for AR FLEX operation data address) | This parameter is a reserved function. Not possible to use. | 0 | B | 287 (011Fh) | 4383 (111Fh) |

14-6 ABZO sensor setting parameters

| Modbus communication register address | | Name | Setting range | Initial value | Effective | Industrial network command code | |
|---------------------------------------|-----------------|---|--|---------------|-----------|---------------------------------|-----------------|
| Upper | Lower | | | | | READ | WRITE |
| 4064 (0FE0h) | 4065 (0FE1h) | Mechanism settings | 0: ABZO setting is prioritized 1: Manual setting | 0 | D | 2032 (07F0h) | 6128 (17F0h) |
| 4066 (0FE2h) | 4067 (0FE3h) | Setting of gear ratio | 0: ABZO setting is prioritized 1 to 32,767: Gear ratio (1=0.01) | 0 | D | 2033 (07F1h) | 6129 (17F1h) |
| 4068 (0FE4h) | 4069 (0FE5h) | Initial coordinate generation/wrap coordinate setting | 0: ABZO setting is prioritized 1: Manual setting | 0 | D | 2034 (07F2h) | 6130 (17F2h) |
| 4070 (0FE6h) | 4071 (0FE7h) | Mechanism limit parameter setting | 0: ABZO setting is followed 1: Disable | 0 | D | 2035 (07F3h) | 6131 (17F3h) |
| 4072 (0FE8h) | 4073 (0FE9h) | Mechanism protection parameter setting | 0: ABZO setting is followed 1: Disable | 0 | D | 2036 (07F4h) | 6132 (17F4h) |
| 4074 (0FEAh) | 4075 (0FEBh) | JOG/HOME/ZHOME operation setting | 0: ABZO setting is prioritized 1: Manual setting | 0 | D | 2037 (07F5h) | 6133 (17F5h) |

14-7 Mechanism settings parameters

| Modbus communication register address | | Name | Setting range | Initial value | Effective | Industrial network command code | |
|---------------------------------------|-----------------|--------------------------|---|---------------|-----------|---------------------------------|-----------------|
| Upper | Lower | | | | | READ | WRITE |
| 896 (0380h) | 897 (0381h) | Electronic gear A | 1 to 65,535 | 1 | C | 448 (01C0h) | 4544 (11C0h) |
| 898 (0382h) | 899 (0383h) | Electronic gear B | 1 to 65,535 | 1 | C | 449 (01C1h) | 4545 (11C1h) |
| 900 (0384h) | 901 (0385h) | Motor rotation direction | 0: Positive side=Counterclockwise 1: Positive side=Clockwise | 1 | C | 450 (01C2h) | 4546 (11C2h) |
| 4032 (0FC0h) | 4033 (0FC1h) | Mechanism type | This parameter is a reserved function. Not possible to use. | 0 | A | 2016 (07E0h) | 6112 (17E0h) |
| 4034 (0FC2h) | 4035 (0FC3h) | Mechanical lead | 1 to 32,767 mm | 1 | A | 2017 (07E1h) | 6113 (17E1h) |

14-8 Initial coordinate generation & wrap coordinate parameters

| Modbus communication register address | | Name | Setting range | Initial value | Effective | Industrial network command code | |
|---------------------------------------|----------------|---|-----------------------------------|---------------|-----------|---------------------------------|-----------------|
| Upper | Lower | | | | | READ | WRITE |
| 910 (038Eh) | 911 (038Fh) | Wrap setting | 0: Disable 1: Enable | 1 | C | 455 (01C7h) | 4551 (11C7h) |
| 914 (0392h) | 915 (0393h) | Initial coordinate generation & wrap setting range | 5 to 655,360 (1=0.1 rev) | 10 | C | 457 (01C9h) | 4553 (11C9h) |
| 918 (0396h) | 919 (0397h) | Initial coordinate generation & wrap range offset ratio | 0 to 10,000 (1=0.01%) | 5,000 | C | 459 (01CBh) | 4555 (11CBh) |
| 920 (0398h) | 921 (0399h) | Initial coordinate generation & wrap range offset value | -536,870,912 to 536,870,911 steps | 0 | C | 460 (01CCh) | 4556 (11CCh) |
| 922 (039Ah) | 923 (039Bh) | The number of the RND-ZERO output in wrap range | 1 to 536,870,911 divisions | 1 | C | 461 (01CDh) | 4557 (11CDh) |

14-9 JOG/HOME/ZHOME operation information setting parameters

| Modbus communication register address | | Name | Setting range | Initial value | Effective | Industrial network command code | |
|---------------------------------------|----------------|---|---|---------------|-----------|---------------------------------|-----------------|
| Upper | Lower | | | | | READ | WRITE |
| 672 (02A0h) | 673 (02A1h) | (JOG) Travel amount | 1 to 8,388,607 steps | 1 | B | 336 (0150h) | 4432 (1150h) |
| 674 (02A2h) | 675 (02A3h) | (JOG) Operating speed | 1 to 4,000,000 Hz | 1,000 | B | 337 (0151h) | 4433 (1151h) |
| 676 (02A4h) | 677 (02A5h) | (JOG) Acceleration/ deceleration | 1 to 1,000,000,000 (1=0.001 kHz/s, 1=0.001 s, or 1=0.001 ms/kHz) | 1,000,000 | B | 338 (0152h) | 4434 (1152h) |
| 678 (02A6h) | 679 (02A7h) | (JOG) Starting speed | 0 to 4,000,000 Hz | 500 | B | 339 (0153h) | 4435 (1153h) |
| 680 (02A8h) | 681 (02A9h) | (JOG) Operating speed (high) | 1 to 4,000,000 Hz | 5,000 | B | 340 (0154h) | 4436 (1154h) |
| 688 (02B0h) | 689 (02B1h) | (ZHOME) Operation speed | 1 to 4,000,000 Hz | 5,000 | B | 344 (0158h) | 4440 (1158h) |
| 690 (02B2h) | 691 (02B3h) | (ZHOME) Acceleration/ deceleration | 1 to 1,000,000,000 (1=0.001 kHz/s, 1=0.001 s, or 1=0.001 ms/kHz) | 1,000,000 | B | 345 (0159h) | 4441 (1159h) |
| 692 (02B4h) | 693 (02B5h) | (ZHOME) Starting speed | 0 to 4,000,000 Hz | 500 | B | 346 (015Ah) | 4442 (115Ah) |
| 700 (02BCh) | 701 (02BDh) | JOG/HOME/ZHOME command filter time constant | 1 to 200 ms | 1 | B | 350 (015Eh) | 4446 (115Eh) |
| 702 (02BEh) | 703 (02BFh) | JOG/HOME/ZHOME operating current | 0 to 1,000 (1=0.1%) | 1,000 | B | 351 (015Fh) | 4447 (115Fh) |
| 704 (02C0h) | 705 (02C1h) | (HOME) Home-seeking mode | 0: 2-sensor 1: 3-sensor 2: One-way rotation 3: Push-motion | 1 | B | 352 (0160h) | 4448 (1160h) |
| 706 (02C2h) | 707 (02C3h) | (HOME) Starting direction | 0: Negative side 1: Positive side | 1 | B | 353 (0161h) | 4449 (1161h) |
| 708 (02C4h) | 709 (02C5h) | (HOME) Acceleration/ deceleration | 1 to 1,000,000,000 (1=0.001 kHz/s, 1=0.001 s, or 1=0.001 ms/kHz) | 1,000,000 | B | 354 (0162h) | 4450 (1162h) |

| Modbus communication register address | | Name | Setting range | Initial value | Effective | Industrial network command code | |
|---------------------------------------|----------------|---|--|---------------|-----------|---------------------------------|-----------------|
| Upper | Lower | | | | | READ | WRITE |
| 710 (02C6h) | 711 (02C7h) | (HOME) Starting speed | 1 to 4,000,000 Hz | 500 | B | 355 (0163h) | 4451 (1163h) |
| 712 (02C8h) | 713 (02C9h) | (HOME) Operating speed | 1 to 4,000,000 Hz | 1,000 | B | 356 (0164h) | 4452 (1164h) |
| 714 (02CAh) | 715 (02CBh) | (HOME) Last speed | 1 to 10,000 Hz | 500 | B | 357 (0165h) | 4453 (1165h) |
| 716 (02CCh) | 717 (02CDh) | (HOME) SLIT detection | 0: Disable 1: Enable | 0 | B | 358 (0166h) | 4454 (1166h) |
| 718 (02CEh) | 719 (02CFh) | (HOME) TIM/ZSG signal detection | 0: Disable 1: TIM output 2: ZSG output | 0 | B | 359 (0167h) | 4455 (1167h) |
| 720 (02D0h) | 721 (02D1h) | (HOME) Position offset | -2,147,483,647 to 2,147,483,647 steps | 0 | B | 360 (0168h) | 4456 (1168h) |
| 722 (02D2h) | 723 (02D3h) | (HOME) Backward steps in 2 sensor home-seeking | 0 to 8,388,607 steps | 500 | B | 361 (0169h) | 4457 (1169h) |
| 724 (02D4h) | 725 (02D5h) | (HOME) Operating amount in uni-directional home-seeking | 0 to 8,388,607 steps | 500 | B | 362 (016Ah) | 4458 (116Ah) |
| 726 (02D6h) | 727 (02D7h) | (HOME) Operating current for push motion home-seeking | 0 to 1,000 (1=0.1%) | 1,000 | B | 363 (016Bh) | 4459 (116Bh) |
| 728 (02D8h) | 729 (02D9h) | (HOME) Backward steps after first entry in push motion home-seeking | 0 to 8,388,607 steps | 0 | B | 364 (016Ch) | 4460 (116Ch) |
| 730 (02DAh) | 731 (02DBh) | (HOME) Pushing time in push motion home-seeking | 1 to 65,535 ms | 200 | B | 365 (016Dh) | 4461 (116Dh) |
| 732 (02DCh) | 733 (02DDh) | (HOME) Backward steps in push motion home-seeking | 0 to 8,388,607 steps | 500 | B | 366 (016Eh) | 4462 (116Eh) |

14-10 Power removal function setting parameters

| Modbus communication register address | | Name | Setting range | Initial value | Effective | Industrial network command code | |
|---------------------------------------|----------------|---|---|---------------|-----------|---------------------------------|-----------------|
| Upper | Lower | | | | | READ | WRITE |
| 800 (0320h) | 801 (0321h) | HWTO mode selection | 0: ETO-mode (power removal status) 1: Alarm generation | 0 | A | 400 (0190h) | 4496 (1190h) |
| 802 (0322h) | 803 (0323h) | HWTO delay time of checking dual system | 0 to 10: Disable 11 to 100 ms | 0 | A | 401 (0191h) | 4497 (1191h) |
| 816 (0330h) | 817 (0331h) | ETO reset ineffective period | 0 to 100 ms | 0 | A | 408 (0198h) | 4504 (1198h) |
| 818 (0332h) | 819 (0333h) | ETO reset action (ETO-CLR) | 1: Reset at the ON edge 2: Reset at the ON level | 1 | A | 409 (0199h) | 4505 (1199h) |
| 820 (0334h) | 821 (0335h) | ETO reset action (ALM-RST) | 0: ETO-CLR ineffective 1: Reset by the ON edge trigger | 0 | A | 410 (019Ah) | 4506 (119Ah) |
| 822 (0336h) | 823 (0337h) | ETO reset action (C-ON) | 0: ETO-CLR ineffective 1: Reset by the ON edge trigger | 0 | A | 411 (019Bh) | 4507 (119Bh) |
| 824 (0338h) | 825 (0339h) | ETO reset action (STOP) | 0: ETO-CLR ineffective 1: Reset by the ON edge trigger | 1 | A | 412 (019Ch) | 4508 (119Ch) |

14-11 Alarm setting parameters

| Modbus communication register address | | Name | Setting range | Initial value | Effective | Industrial network command code | |
|---------------------------------------|----------------|------------------------------------|--------------------------|---------------|-----------|---------------------------------|-----------------|
| Upper | Lower | | | | | READ | WRITE |
| 768 (0300h) | 769 (0301h) | Overload alarm | 1 to 300 (1=0.1 s) | 50 | A | 384 (0180h) | 4480 (1180h) |
| 770 (0302h) | 771 (0303h) | Excessive position deviation alarm | 1 to 30,000 (1=0.01 rev) | 300 | A | 385 (0181h) | 4481 (1181h) |

14-12 Information setting parameters

| Modbus communication register address | | Name | Setting range | Initial value | Effective | Industrial network command code | |
|---------------------------------------|----------------|--|---------------------------------|---------------|-----------|---------------------------------|-----------------|
| Upper | Lower | | | | | READ | WRITE |
| 832 (0340h) | 833 (0341h) | Driver temperature information (INFO-DRVTMP) | 40 to 85 °C | 85 | A | 416 (01A0h) | 4512 (11A0h) |
| 834 (0342h) | 835 (0343h) | Overload time information (INFO-OLTIME) | 1 to 300 (1=0.1 s) | 50 | A | 417 (01A1h) | 4513 (11A1h) |
| 836 (0344h) | 837 (0345h) | Overspeed information (INFO-SPD) | 0: Disable 1 to 12,000 r/min | 0 | A | 418 (01A2h) | 4514 (11A2h) |
| 842 (034Ah) | 843 (034Bh) | Position deviation information (INFO-POSERR) | 1 to 30,000 (1=0.01 rev) | 300 | A | 421 (01A5h) | 4517 (11A5h) |
| 848 (0350h) | 849 (0351h) | Motor temperature information (INFO-MTRTMP) | 40 to 120 °C | 85 | A | 424 (01A8h) | 4520 (11A8h) |

| Modbus communication register address | | Name | Setting range | Initial value | Effective | Industrial network command code | |
|---------------------------------------|-----------------|--|---|-------------------|-----------|---------------------------------|-----------------|
| Upper | Lower | | | | | READ | WRITE |
| 850 (0352h) | 851 (0353h) | Overvoltage information (INFO-OVOLT) (AC power input type driver) | 120 to 450 V | 435 | A | 425 (01A9h) | 4521 (11A9h) |
| 852 (0354h) | 853 (0355h) | Undervoltage information (INFO-UVOLT) (AC power input type driver) | 120 to 280 V | 120 | A | 426 (01AAh) | 4522 (11AAh) |
| 854 (0356h) | 855 (0357h) | Overvoltage information (INFO-OVOLT) (48VDC input type driver) [V] | 150 to 630 (1=0.1 V) | 630 | A | 427 (01ABh) | 4523 (11ABh) |
| 856 (0358h) | 857 (0359h) | Undervoltage information (INFO-UVOLT) (48VDC input type driver) [V] | 150 to 630 (1=0.1 V) | 180 | A | 428 (01ACh) | 4524 (11ACh) |
| 862 (035Eh) | 863 (035Fh) | Tripmeter information (INFO-TRIP) | 0: Disable 1 to 2,147,483,647 (1=0.1 kRev) | 0 | A | 431 (01AFh) | 4527 (11AFh) |
| 864 (0360h) | 865 (0361h) | Odometer information (INFO-ODO) | 0: Disable 1 to 2,147,483,647 (1=0.1 kRev) | 0 | A | 432 (01B0h) | 4528 (11B0h) |
| 866 (0362h) | 867 (0363h) | Cumulative load 0 information (INFO-CULD0) | 0 to 2,147,483,647 | 0 | A | 433 (01B1h) | 4529 (11B1h) |
| 868 (0364h) | 869 (0365h) | Cumulative load 1 information (INFO-CULD1) | 0 to 2,147,483,647 | 0 | A | 434 (01B2h) | 4530 (11B2h) |
| 870 (0366h) | 871 (0367h) | Cumulative load value auto clear | 0: Does not clear 1: Clear | 1 | A | 435 (01B3h) | 4531 (11B3h) |
| 872 (0368h) | 873 (0369h) | Cumulative load value count divisor | 1 to 32,767 | 1 | A | 436 (01B4h) | 4532 (11B4h) |
| 888 (0378h) | 889 (0379h) | INFO-USRIO output selection | Output signal list → p.428 | 128: CONST-OFF | A | 444 (01BCh) | 4540 (11BCh) |
| 890 (037Ah) | 891 (037Bh) | INFO-USRIO output inversion | 0: Non invert 1: Invert | 0 | A | 445 (01BDh) | 4541 (11BDh) |
| 892 (037Ch) | 893 (037Dh) | INFO-LED display | 0: The LED does not blink 1: The LED blinks | 1 | A | 446 (01BEh) | 4542 (11BEh) |
| 894 (037Eh) | 895 (037Fh) | Information auto clear | 0: Disable (not turned OFF automatically) 1: Enable (turned OFF automatically) | 1 | A | 447 (01BFh) | 4543 (11BFh) |
| 3904 (0F40h) | 3905 (0F41h) | INFO action (Assigned I/O status information (INFO-USRIO)) | 0: Only the bit output is ON * 1: The bit output and the INFO output are ON and the LED blinks | 1 | A | 1952 (07A0h) | 6048 (17A0h) |
| 3906 (0F42h) | 3907 (0F43h) | INFO action (Position deviation information (INFO-POSERR)) | | 1 | A | 1953 (07A1h) | 6049 (17A1h) |
| 3908 (0F44h) | 3909 (0F45h) | INFO action (Driver temperature information (INFO-DRV TMP)) | | 1 | A | 1954 (07A2h) | 6050 (17A2h) |
| 3910 (0F46h) | 3911 (0F47h) | INFO action (Motor temperature information (INFO-MTPTMP)) | | 1 | A | 1955 (07A3h) | 6051 (17A3h) |
| 3912 (0F48h) | 3913 (0F49h) | INFO action (Overvoltage information (INFO-OVOLT)) | | 1 | A | 1956 (07A4h) | 6052 (17A4h) |

| Modbus communication register address | | Name | Setting range | Initial value | Effective | Industrial network command code | |
|---------------------------------------|-----------------|---|---------------|---------------|-----------|---------------------------------|-----------------|
| Upper | Lower | | | | | READ | WRITE |
| 3914 (0F4Ah) | 3915 (0F4Bh) | INFO action (Undervoltage information (INFO-UVOLT)) | | 1 | A | 1957 (07A5h) | 6053 (17A5h) |
| 3916 (0F4Ch) | 3917 (0F4Dh) | INFO action (Overload time information (INFO-OLTIME)) | | 1 | A | 1958 (07A6h) | 6054 (17A6h) |
| 3920 (0F50h) | 3921 (0F51h) | INFO action (Speed information (INFO-SPD)) | | 1 | A | 1960 (07A8h) | 6056 (17A8h) |
| 3922 (0F52h) | 3923 (0F53h) | INFO action (Start operation error information (INFO-START)) | | 1 | A | 1961 (07A9h) | 6057 (17A9h) |
| 3924 (0F54h) | 3925 (0F55h) | INFO action (Start ZHOME error information (INFO-ZHOME)) | | 1 | A | 1962 (07AAh) | 6058 (17AAh) |
| 3926 (0F56h) | 3927 (0F57h) | INFO action (PRESET request information (INFO-PR-REQ)) | | 1 | A | 1963 (07ABh) | 6059 (17ABh) |
| 3930 (0F5Ah) | 3931 (0F5Bh) | INFO action (Electronic gear setting error information (INFO-EGR-E)) | | 1 | A | 1965 (07ADh) | 6061 (17ADh) |
| 3932 (0F5Ch) | 3933 (0F5Dh) | INFO action (Wrap setting error information (INFO-RND-E)) | | 1 | A | 1966 (07AEh) | 6062 (17AEh) |
| 3934 (0F5Eh) | 3935 (0F5Fh) | INFO action (RS-485 communication error information (INFO-NET-E)) | | 1 | A | 1967 (07AFh) | 6063 (17AFh) |
| 3936 (0F60h) | 3937 (0F61h) | INFO action (Forward operation prohibition information (INFO-FW-OT)) | | 1 | A | 1968 (07B0h) | 6064 (17B0h) |
| 3938 (0F62h) | 3939 (0F63h) | INFO action (Reverse operation prohibition information (INFO-RV-OT)) | | 1 | A | 1969 (07B1h) | 6065 (17B1h) |
| 3940 (0F64h) | 3941 (0F65h) | INFO action (Cumulative load 0 information (INFO-CULD0)) | | 1 | A | 1970 (07B2h) | 6066 (17B2h) |
| 3942 (0F66h) | 3943 (0F67h) | INFO action (Cumulative load 1 information (INFO-CULD1)) | | 1 | A | 1971 (07B3h) | 6067 (17B3h) |
| 3944 (0F68h) | 3945 (0F69h) | INFO action (Tripmeter information (INFO-TRIP)) | | 1 | A | 1972 (07B4h) | 6068 (17B4h) |
| 3946 (0F6Ah) | 3947 (0F6Bh) | INFO action (Odometer information (INFO-ODO)) | | 1 | A | 1973 (07B5h) | 6069 (17B5h) |
| 3960 (0F78h) | 3961 (0F79h) | INFO action (Start operation restricted mode information (INFO-DSLMTD)) | | 1 | A | 1980 (07BCh) | 6076 (17BCh) |
| 3962 (0F7Ah) | 3963 (0F7Bh) | INFO action (I/O test mode information (INFO-IOTEST)) | | 1 | A | 1981 (07BDh) | 6077 (17BDh) |
| 3964 (0F7Ch) | 3965 (0F7Dh) | INFO action (Configuration request information (INFO-CFG)) | | 1 | A | 1982 (07BEh) | 6078 (17BEh) |
| 3966 (0F7Eh) | 3967 (0F7Fh) | INFO action (Reboot request information (INFO-RBT)) | | 1 | A | 1983 (07BFh) | 6079 (17BFh) |

* Even if the "INFO action" parameter is set to "0," this remains in the information record of the **MEXE02**.

14-13 I/O parameter

| Modbus communication register address | | Name | Setting range | Initial value | Effective | Industrial network command code | |
|---------------------------------------|-----------------|---|---|---------------|-----------|---------------------------------|-----------------|
| Upper | Lower | | | | | READ | WRITE |
| 3584 (0E00h) | 3585 (0E01h) | STOP/STOP-COFF input action | 0: Immediate stop for both STOP input and STOP-COFF input 1: Deceleration stop for the STOP input and immediate stop for the STOP-COFF input 2: Immediate stop for the STOP input and deceleration stop for the STOP-COFF input 3: Deceleration stop for both STOP input and STOP-COFF input | 3 | A | 1792 (0700h) | 5888 (1700h) |
| 3586 (0E02h) | 3587 (0E03h) | FW-LS, RV-LS input action | -1: Used as a return-to-home sensor 0: Immediate stop 1: Deceleration stop 2: Immediate stop with alarm 3: Deceleration stop with alarm | 2 | A | 1793 (0701h) | 5889 (1701h) |
| 3588 (0E04h) | 3589 (0E05h) | FW-BLK, RV-BLK input action | 0: Immediate stop 1: Deceleration stop | 1 | A | 1794 (0702h) | 5890 (1702h) |
| 3590 (0E06h) | 3591 (0E07h) | IN-POS positioning completion signal range | 0 to 180 (1=0.1°) | 18 | A | 1795 (0703h) | 5891 (1703h) |
| 3592 (0E08h) | 3593 (0E09h) | IN-POS positioning completion signal offset | -18 to 18 (1=0.1°) | 0 | A | 1796 (0704h) | 5892 (1704h) |
| 3594 (0E0Ah) | 3595 (0E0Bh) | D-SEL drive start function | 0: Only operation data number selection 1: Operation data number selection + START function | 1 | A | 1797 (0705h) | 5893 (1705h) |
| 3596 (0E0Ch) | 3597 (0E0Dh) | TEACH operation type setting | -1: The operation type is not set 1: Absolute positioning 8: Wrap absolute positioning | 1 | A | 1798 (0706h) | 5894 (1706h) |
| 3598 (0E0Eh) | 3599 (0E0Fh) | ZSG signal width | 1 to 1,800 (1=0.1°) | 18 | A | 1799 (0707h) | 5895 (1707h) |
| 3600 (0E10h) | 3601 (0E11h) | RND-ZERO signal width | 1 to 10,000 steps | 10 | A | 1800 (0708h) | 5896 (1708h) |
| 3602 (0E12h) | 3603 (0E13h) | RND-ZERO signal source | 0: Based on feedback position 1: Based on command position | 0 | A | 1801 (0709h) | 5897 (1709h) |
| 3604 (0E14h) | 3605 (0E15h) | MOVE minimum ON time | 0 to 255 ms | 0 | A | 1802 (070Ah) | 5898 (170Ah) |
| 3606 (0E16h) | 3607 (0E17h) | PAUSE standby condition selection | 0: Standstill mode (current cutback) 1: Operating status waiting (operating current is retained) | 0 | A | 1803 (070Bh) | 5899 (170Bh) |
| 5108 (13F4h) | 5109 (13F5h) | Current setting during motor standstill at T-MODE | 0: Stop current 1: Operating current | 0 | A | 2554 (09FAh) | 6650 (19FAh) |
| 3608 (0E18h) | 3609 (0E19h) | PLS-XMODE pulse multiplying factor | 2 to 30 times | 10 | A | 1804 (070Ch) | 5900 (170Ch) |
| 3610 (0E1Ah) | 3611 (0E1Bh) | CRNT-LMT operating current limit value | 0 to 1,000 (1=0.1%) | 500 | A | 1805 (070Dh) | 5901 (170Dh) |
| 3612 (0E1Ch) | 3613 (0E1Dh) | SPD-LMT speed limit type selection | 0: Ratio 1: Value | 0 | A | 1806 (070Eh) | 5902 (170Eh) |

| Modbus communication register address | | Name | Setting range | Initial value | Effective | Industrial network command code | |
|---------------------------------------|-----------------|---|--|---------------|-----------|---------------------------------|-----------------|
| Upper | Lower | | | | | READ | WRITE |
| 3614 (0E1Eh) | 3615 (0E1Fh) | SPD-LMT speed limit ratio | 1 to 100% | 50 | A | 1807 (070Fh) | 5903 (170Fh) |
| 3616 (0E20h) | 3617 (0E21h) | SPD-LMT speed limit value | 1 to 4,000,000 Hz | 1,000 | A | 1808 (0710h) | 5904 (1710h) |
| 3618 (0E22h) | 3619 (0E23h) | JOG-C time from JOG-P to JOG | 1 to 5,000 (1=0.001 s) | 500 | B | 1809 (0711h) | 5905 (1711h) |
| 3620 (0E24h) | 3621 (0E25h) | JOG-C time from JOG to JOG-H | 1 to 5,000 (1=0.001 s) | 1,000 | B | 1810 (0712h) | 5906 (1712h) |
| 3622 (0E26h) | 3623 (0E27h) | PLS-LOST check algorithm | 0: Unsigned 1: Signed | 0 | A | 1811 (0713h) | 5907 (1713h) |
| 3624 (0E28h) | 3625 (0E29h) | MON-REQ0 output data selection | 1: Feedback position 2: Feedback position (32 bit counter) 3: Command position 4: Command position (32 bit counter) 8: Alarm code (8 bit) 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 | 1812 (0714h) | 5908 (1714h) |
| 3626 (0E2Ah) | 3627 (0E2Bh) | MON-REQ1 output data selection | 10: Feedback position (32 bit counter) and alarm code 11: Command position and alarm code 12: Command position (32 bit counter) and alarm code | 8 | B | 1813 (0715h) | 5909 (1715h) |
| 3628 (0E2Ch) | 3629 (0E2Dh) | PLS-OUT output data selection | 0: Command position 1: Command position (32 bit counter) 2: Feedback position 3: Feedback position (32 bit counter) | 0 | B | 1814 (0716h) | 5910 (1716h) |
| 3630 (0E2Eh) | 3631 (0E2Fh) | PLS-OUT maximum frequency | 1 to 10,000 (1=0.1 kHz) | 100 | B | 1815 (0717h) | 5911 (1717h) |
| 3632 (0E30h) | 3633 (0E31h) | VA mode selection | 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 | 1816 (0718h) | 5912 (1718h) |
| 3634 (0E32h) | 3635 (0E33h) | VA detection speed range | 1 to 200 r/min | 30 | B | 1817 (0719h) | 5913 (1719h) |
| 3636 (0E34h) | 3637 (0E35h) | MAREA output source | 0: Based on feedback position (ON after operation) 1: Based on command position (ON after operation) 2: Based on feedback position (OFF at completion) 3: Based on command position (OFF at completion) | 0 | A | 1818 (071Ah) | 5914 (171Ah) |
| 3712 (0E80h) | 3713 (0E81h) | AREA0 positive direction position/offset | -2,147,483,648 to 2,147,483,647 steps | 0 | A | 1856 (0740h) | 5952 (1740h) |
| 3714 (0E82h) | 3715 (0E83h) | AREA0 negative direction position/detection range | | 0 | A | 1857 (0741h) | 5953 (1741h) |

| Modbus communication register address | | Name | Setting range | Initial value | Effective | Industrial network command code | |
|---------------------------------------|-----------------|---|--|---------------|-----------|---------------------------------|-----------------|
| | | | | | | READ | WRITE |
| 3716 (0E84h) | 3717 (0E85h) | AREA1 positive direction position/offset | -2,147,483,648 to 2,147,483,647 steps | 0 | A | 1858 (0742h) | 5954 (1742h) |
| 3718 (0E86h) | 3719 (0E87h) | AREA1 negative direction position/detection range | | 0 | A | 1859 (0743h) | 5955 (1743h) |
| 3720 (0E88h) | 3721 (0E89h) | AREA2 positive direction position/offset | | 0 | A | 1860 (0744h) | 5956 (1744h) |
| 3722 (0E8Ah) | 3723 (0E8Bh) | AREA2 negative direction position/detection range | | 0 | A | 1861 (0745h) | 5957 (1745h) |
| 3724 (0E8Ch) | 3725 (0E8Dh) | AREA3 positive direction position/offset | | 0 | A | 1862 (0746h) | 5958 (1746h) |
| 3726 (0E8Eh) | 3727 (0E8Fh) | AREA3 negative direction position/detection range | | 0 | A | 1863 (0747h) | 5959 (1747h) |
| 3728 (0E90h) | 3729 (0E91h) | AREA4 positive direction position/offset | | 0 | A | 1864 (0748h) | 5960 (1748h) |
| 3730 (0E92h) | 3731 (0E93h) | AREA4 negative direction position/detection range | | 0 | A | 1865 (0749h) | 5961 (1749h) |
| 3732 (0E94h) | 3733 (0E95h) | AREA5 positive direction position/offset | | 0 | A | 1866 (074Ah) | 5962 (174Ah) |
| 3734 (0E96h) | 3735 (0E97h) | AREA5 negative direction position/detection range | | 0 | A | 1867 (074Bh) | 5963 (174Bh) |
| 3736 (0E98h) | 3737 (0E99h) | AREA6 positive direction position/offset | | 0 | A | 1868 (074Ch) | 5964 (174Ch) |
| 3738 (0E9Ah) | 3739 (0E9Bh) | AREA6 negative direction position/detection range | | 0 | A | 1869 (074Dh) | 5965 (174Dh) |
| 3740 (0E9Ch) | 3741 (0E9Dh) | AREA7 positive direction position/offset | | 0 | A | 1870 (074Eh) | 5966 (174Eh) |
| 3742 (0E9Eh) | 3743 (0E9Fh) | AREA7 negative direction position/detection range | | 0 | A | 1871 (074Fh) | 5967 (174Fh) |
| 3744 (0EA0h) | 3745 (0EA1h) | AREA0 range setting mode | 0: Range setting with absolute value 1: Offset/width setting from the target position | 0 | A | 1872 (0750h) | 5968 (1750h) |
| 3746 (0EA2h) | 3747 (0EA3h) | AREA1 range setting mode | | 0 | A | 1873 (0751h) | 5969 (1751h) |
| 3748 (0EA4h) | 3749 (0EA5h) | AREA2 range setting mode | | 0 | A | 1874 (0752h) | 5970 (1752h) |
| 3750 (0EA6h) | 3751 (0EA7h) | AREA3 range setting mode | | 0 | A | 1875 (0753h) | 5971 (1753h) |
| 3752 (0EA8h) | 3753 (0EA9h) | AREA4 range setting mode | | 0 | A | 1876 (0754h) | 5972 (1754h) |
| 3754 (0EAAh) | 3755 (0EABh) | AREA5 range setting mode | | 0 | A | 1877 (0755h) | 5973 (1755h) |

| Modbus communication register address | | Name | Setting range | Initial value | Effective | Industrial network command code | |
|---------------------------------------|------------------|-----------------------------------|--|---------------|-----------|---------------------------------|-----------------|
| Upper | Lower | | | | | READ | WRITE |
| 3756 (0EACH) | 3757 (0EADh) | AREA6 range setting mode | 0: Range setting with absolute value 1: Offset/width setting from the target position | 0 | A | 1878 (0756h) | 5974 (1756h) |
| 3758 (0EA Eh) | 3759 (0EA Fh) | AREA7 range setting mode | | 0 | A | 1879 (0757h) | 5975 (1757h) |
| 3760 (0EB0h) | 3761 (0EB1h) | AREA0 positioning standard | 0: Based on feedback position 1: Based on command position | 0 | A | 1880 (0758h) | 5976 (1758h) |
| 3762 (0EB2h) | 3763 (0EB3h) | AREA1 positioning standard | | 0 | A | 1881 (0759h) | 5977 (1759h) |
| 3764 (0EB4h) | 3765 (0EB5h) | AREA2 positioning standard | 0: Based on feedback position 1: Based on command position | 0 | A | 1882 (075Ah) | 5978 (175Ah) |
| 3766 (0EB6h) | 3767 (0EB7h) | AREA3 positioning standard | | 0 | A | 1883 (075Bh) | 5979 (175Bh) |
| 3768 (0EB8h) | 3769 (0EB9h) | AREA4 positioning standard | 0: Based on feedback position 1: Based on command position | 0 | A | 1884 (075Ch) | 5980 (175Ch) |
| 3770 (0EBAh) | 3771 (0EBBh) | AREA5 positioning standard | | 0 | A | 1885 (075Dh) | 5981 (175Dh) |
| 3772 (0EBCh) | 3773 (0EBDh) | AREA6 positioning standard | 0: Based on feedback position 1: Based on command position | 0 | A | 1886 (075Eh) | 5982 (175Eh) |
| 3774 (0EBEh) | 3775 (0EBFh) | AREA7 positioning standard | | 0 | A | 1887 (075Fh) | 5983 (175Fh) |
| 3776 (0EC0h) | 3777 (0EC1h) | D-SEL0 operation number selection | 0 to 255: Operation data number | 0 | A | 1888 (0760h) | 5984 (1760h) |
| 3778 (0EC2h) | 3779 (0EC3h) | D-SEL1 operation number selection | | 1 | A | 1889 (0761h) | 5985 (1761h) |
| 3780 (0EC4h) | 3781 (0EC5h) | D-SEL2 operation number selection | 0 to 255: Operation data number | 2 | A | 1890 (0762h) | 5986 (1762h) |
| 3782 (0EC6h) | 3783 (0EC7h) | D-SEL3 operation number selection | | 3 | A | 1891 (0763h) | 5987 (1763h) |
| 3784 (0EC8h) | 3785 (0EC9h) | D-SEL4 operation number selection | 0 to 255: Operation data number | 4 | A | 1892 (0764h) | 5988 (1764h) |
| 3786 (0ECAh) | 3787 (0ECBh) | D-SEL5 operation number selection | | 5 | A | 1893 (0765h) | 5989 (1765h) |
| 3788 (0ECCh) | 3789 (0ECDh) | D-SEL6 operation number selection | 0 to 255: Operation data number | 6 | A | 1894 (0766h) | 5990 (1766h) |
| 3790 (0ECEh) | 3791 (0ECFh) | D-SEL7 operation number selection | | 7 | A | 1895 (0767h) | 5991 (1767h) |
| 3792 (0ED0h) | 3793 (0ED1h) | D-END0 operation number selection | 0 to 255: Operation data number | 0 | A | 1896 (0768h) | 5992 (1768h) |
| 3794 (0ED2h) | 3795 (0ED3h) | D-END1 operation number selection | | 1 | A | 1897 (0769h) | 5993 (1769h) |
| 3796 (0ED4h) | 3797 (0ED5h) | D-END2 operation number selection | 0 to 255: Operation data number | 2 | A | 1898 (076Ah) | 5994 (176Ah) |
| 3798 (0ED6h) | 3799 (0ED7h) | D-END3 operation number selection | | 3 | A | 1899 (076Bh) | 5995 (176Bh) |
| 3800 (0ED8h) | 3801 (0ED9h) | D-END4 operation number selection | 0 to 255: Operation data number | 4 | A | 1900 (076Ch) | 5996 (176Ch) |
| 3802 (0EDAh) | 3803 (0EDBh) | D-END5 operation number selection | | 5 | A | 1901 (076Dh) | 5997 (176Dh) |
| 3804 (0EDCh) | 3805 (0EDDh) | D-END6 operation number selection | 0 to 255: Operation data number | 6 | A | 1902 (076Eh) | 5998 (176Eh) |
| 3806 (0EDEh) | 3807 (0EDFh) | D-END7 operation number selection | | 7 | A | 1903 (076Fh) | 5999 (176Fh) |

14-14 Direct I/O setting parameters

| Modbus communication register address | | Name | Setting range | Initial value | Effective | Industrial network command code | |
|---------------------------------------|-----------------|--------------------------------|-------------------------------|---------------|-----------|---------------------------------|-----------------|
| Upper | Lower | | | | | READ | WRITE |
| 4224 (1080h) | 4225 (1081h) | DIN0 input function selection | Input signal list ⇒ p.427 | 32: START | C | 2112 (0840h) | 6208 (1840h) |
| 4226 (1082h) | 4227 (1083h) | DIN1 input function selection | | 64: M0 | C | 2113 (0841h) | 6209 (1841h) |
| 4228 (1084h) | 4229 (1085h) | DIN2 input function selection | | 65: M1 | C | 2114 (0842h) | 6210 (1842h) |
| 4230 (1086h) | 4231 (1087h) | DIN3 input function selection | | 66: M2 | C | 2115 (0843h) | 6211 (1843h) |
| 4232 (1088h) | 4233 (1089h) | DIN4 input function selection | | 37: ZHOME | C | 2116 (0844h) | 6212 (1844h) |
| 4234 (108Ah) | 4235 (108Bh) | DIN5 input function selection | | 1: FREE | C | 2117 (0845h) | 6213 (1845h) |
| 4236 (108Ch) | 4237 (108Dh) | DIN6 input function selection | | 5: STOP | C | 2118 (0846h) | 6214 (1846h) |
| 4238 (108Eh) | 4239 (108Fh) | DIN7 input function selection | | 8: ALM-RST | C | 2119 (0847h) | 6215 (1847h) |
| 4240 (1090h) | 4241 (1091h) | DIN8 input function selection | | 48: FW-JOG | C | 2120 (0848h) | 6216 (1848h) |
| 4242 (1092h) | 4243 (1093h) | DIN9 input function selection | | 49: RV-JOG | C | 2121 (0849h) | 6217 (1849h) |
| 4256 (10A0h) | 4257 (10A1h) | DIN0 inverting mode | 0: Non invert 1: Invert | 0 | C | 2128 (0850h) | 6224 (1850h) |
| 4258 (10A2h) | 4259 (10A3h) | DIN1 inverting mode | | 0 | C | 2129 (0851h) | 6225 (1851h) |
| 4260 (10A4h) | 4261 (10A5h) | DIN2 inverting mode | | 0 | C | 2130 (0852h) | 6226 (1852h) |
| 4262 (10A6h) | 4263 (10A7h) | DIN3 inverting mode | | 0 | C | 2131 (0853h) | 6227 (1853h) |
| 4264 (10A8h) | 4265 (10A9h) | DIN4 inverting mode | | 0 | C | 2132 (0854h) | 6228 (1854h) |
| 4266 (10AAh) | 4267 (10ABh) | DIN5 inverting mode | 0: Non invert 1: Invert | 0 | C | 2133 (0855h) | 6229 (1855h) |
| 4268 (10ACH) | 4269 (10ADh) | DIN6 inverting mode | | 0 | C | 2134 (0856h) | 6230 (1856h) |
| 4270 (10AEh) | 4271 (10AFh) | DIN7 inverting mode | | 0 | C | 2135 (0857h) | 6231 (1857h) |
| 4272 (10B0h) | 4273 (10B1h) | DIN8 inverting mode | | 0 | C | 2136 (0858h) | 6232 (1858h) |
| 4274 (10B2h) | 4275 (10B3h) | DIN9 inverting mode | | 0 | C | 2137 (0859h) | 6233 (1859h) |
| 4288 (10C0h) | 4289 (10C1h) | DOUT0 (Normal) Output function | Output signal list ⇒ p.428 | 144: HOME-END | C | 2144 (0860h) | 6240 (1860h) |
| 4290 (10C2h) | 4291 (10C3h) | DOUT1 (Normal) Output function | | 138: IN-POS | C | 2145 (0861h) | 6241 (1861h) |
| 4292 (10C4h) | 4293 (10C5h) | DOUT2 (Normal) Output function | | 133: PLS-RDY | C | 2146 (0862h) | 6242 (1862h) |
| 4294 (10C6h) | 4295 (10C7h) | DOUT3 (Normal) Output function | | 132: READY | C | 2147 (0863h) | 6243 (1863h) |
| 4296 (10C8h) | 4297 (10C9h) | DOUT4 (Normal) Output function | | 134: MOVE | C | 2148 (0864h) | 6244 (1864h) |

| Modbus communication register address | | Name | Setting range | Initial value | Effective | Industrial network command code | |
|---------------------------------------|-----------------|---------------------------------|-------------------------------|----------------|-----------|---------------------------------|-----------------|
| Upper | Lower | | | | | READ | WRITE |
| 4298 (10CAh) | 4299 (10CBh) | DOUT5 (Normal) Output function | Output signal list ⇒ p.428 | 130: ALM-B | C | 2149 (0865h) | 6245 (1865h) |
| 4320 (10E0h) | 4321 (10E1h) | DOUT0 inverting mode | | 0 | C | 2160 (0870h) | 6256 (1870h) |
| 4322 (10E2h) | 4323 (10E3h) | DOUT1 inverting mode | | 0 | C | 2161 (0871h) | 6257 (1871h) |
| 4324 (10E4h) | 4325 (10E5h) | DOUT2 inverting mode | | 0 | C | 2162 (0872h) | 6258 (1872h) |
| 4326 (10E6h) | 4327 (10E7h) | DOUT3 inverting mode | | 0 | C | 2163 (0873h) | 6259 (1873h) |
| 4328 (10E8h) | 4329 (10E9h) | DOUT4 inverting mode | | 0 | C | 2164 (0874h) | 6260 (1874h) |
| 4330 (10EAh) | 4331 (10EBh) | DOUT5 inverting mode | | 0 | C | 2165 (0875h) | 6261 (1875h) |
| 4352 (1100h) | 4353 (1101h) | DIN0 composite function | Input signal list ⇒ p.427 | 0: Not used | C | 2176 (0880h) | 6272 (1880h) |
| 4354 (1102h) | 4355 (1103h) | DIN1 composite function | | 0: Not used | C | 2177 (0881h) | 6273 (1881h) |
| 4356 (1104h) | 4357 (1105h) | DIN2 composite function | | 0: Not used | C | 2178 (0882h) | 6274 (1882h) |
| 4358 (1106h) | 4359 (1107h) | DIN3 composite function | | 0: Not used | C | 2179 (0883h) | 6275 (1883h) |
| 4360 (1108h) | 4361 (1109h) | DIN4 composite function | | 0: Not used | C | 2180 (0884h) | 6276 (1884h) |
| 4362 (110Ah) | 4363 (110Bh) | DIN5 composite function | | 0: Not used | C | 2181 (0885h) | 6277 (1885h) |
| 4364 (110Ch) | 4365 (110Dh) | DIN6 composite function | | 0: Not used | C | 2182 (0886h) | 6278 (1886h) |
| 4366 (110Eh) | 4367 (110Fh) | DIN7 composite function | | 0: Not used | C | 2183 (0887h) | 6279 (1887h) |
| 4368 (1110h) | 4369 (1111h) | DIN8 composite function | | 0: Not used | C | 2184 (0888h) | 6280 (1888h) |
| 4370 (1112h) | 4371 (1113h) | DIN9 composite function | | 0: Not used | C | 2185 (0889h) | 6281 (1889h) |
| 4384 (1120h) | 4385 (1121h) | DOUT0 composite output function | Output signal list ⇒ p.428 | 128: CONST-OFF | C | 2192 (0890h) | 6288 (1890h) |
| 4386 (1122h) | 4387 (1123h) | DOUT1 composite output function | | 128: CONST-OFF | C | 2193 (0891h) | 6289 (1891h) |
| 4388 (1124h) | 4389 (1125h) | DOUT2 composite output function | | 128: CONST-OFF | C | 2194 (0892h) | 6290 (1892h) |
| 4390 (1126h) | 4391 (1127h) | DOUT3 composite output function | | 128: CONST-OFF | C | 2195 (0893h) | 6291 (1893h) |
| 4392 (1128h) | 4393 (1129h) | DOUT4 composite output function | | 128: CONST-OFF | C | 2196 (0894h) | 6292 (1894h) |
| 4394 (112Ah) | 4395 (112Bh) | DOUT5 composite output function | | 128: CONST-OFF | C | 2197 (0895h) | 6293 (1895h) |
| 4416 (1140h) | 4417 (1141h) | DOUT0 composite inverting mode | 0: Non invert 1: Invert | 0 | C | 2208 (08A0h) | 6304 (18A0h) |
| 4418 (1142h) | 4419 (1143h) | DOUT1 composite inverting mode | | 0 | C | 2209 (08A1h) | 6305 (18A1h) |
| 4420 (1144h) | 4421 (1145h) | DOUT2 composite inverting mode | | 0 | C | 2210 (08A2h) | 6306 (18A2h) |

| Modbus communication register address | | Name | Setting range | Initial value | Effective | Industrial network command code | |
|---------------------------------------|-----------------|-------------------------------------|---|---------------|-----------|---------------------------------|-----------------|
| Upper | Lower | | | | | READ | WRITE |
| 4422 (1146h) | 4423 (1147h) | DOUT3 composite inverting mode | 0: Non invert 1: Invert | 0 | C | 2211 (08A3h) | 6307 (18A3h) |
| 4424 (1148h) | 4425 (1149h) | DOUT4 composite inverting mode | | 0 | C | 2212 (08A4h) | 6308 (18A4h) |
| 4426 (114Ah) | 4427 (114Bh) | DOUT5 composite inverting mode | | 0 | C | 2213 (08A5h) | 6309 (18A5h) |
| 4448 (1160h) | 4449 (1161h) | DOUT0 composite logical combination | 0: AND 1: OR | 1 | C | 2224 (08B0h) | 6320 (18B0h) |
| 4450 (1162h) | 4451 (1163h) | DOUT1 composite logical combination | | 1 | C | 2225 (08B1h) | 6321 (18B1h) |
| 4452 (1164h) | 4453 (1165h) | DOUT2 composite logical combination | | 1 | C | 2226 (08B2h) | 6322 (18B2h) |
| 4454 (1166h) | 4455 (1167h) | DOUT3 composite logical combination | | 1 | C | 2227 (08B3h) | 6323 (18B3h) |
| 4456 (1168h) | 4457 (1169h) | DOUT4 composite logical combination | | 1 | C | 2228 (08B4h) | 6324 (18B4h) |
| 4458 (116Ah) | 4459 (116Bh) | DOUT5 composite logical combination | | 1 | C | 2229 (08B5h) | 6325 (18B5h) |
| 4480 (1180h) | 4481 (1181h) | DIN0 ON signal dead-time | 0 to 250 ms | 0 | C | 2240 (08C0h) | 6336 (18C0h) |
| 4482 (1182h) | 4483 (1183h) | DIN1 ON signal dead-time | | 0 | C | 2241 (08C1h) | 6337 (18C1h) |
| 4484 (1184h) | 4485 (1185h) | DIN2 ON signal dead-time | | 0 | C | 2242 (08C2h) | 6338 (18C2h) |
| 4486 (1186h) | 4487 (1187h) | DIN3 ON signal dead-time | | 0 | C | 2243 (08C3h) | 6339 (18C3h) |
| 4488 (1188h) | 4489 (1189h) | DIN4 ON signal dead-time | | 0 | C | 2244 (08C4h) | 6340 (18C4h) |
| 4490 (118Ah) | 4491 (118Bh) | DIN5 ON signal dead-time | | 0 | C | 2245 (08C5h) | 6341 (18C5h) |
| 4492 (118Ch) | 4493 (118Dh) | DIN6 ON signal dead-time | | 0 | C | 2246 (08C6h) | 6342 (18C6h) |
| 4494 (118Eh) | 4495 (118Fh) | DIN7 ON signal dead-time | | 0 | C | 2247 (08C7h) | 6343 (18C7h) |
| 4496 (1190h) | 4497 (1191h) | DIN8 ON signal dead-time | | 0 | C | 2248 (08C8h) | 6344 (18C8h) |
| 4498 (1192h) | 4499 (1193h) | DIN9 ON signal dead-time | | 0 | C | 2249 (08C9h) | 6345 (18C9h) |
| 4512 (11A0h) | 4513 (11A1h) | DIN0 1 shot signal | 0: The 1 shot signal function is disabled 1: The 1 shot signal function is enabled | 0 | C | 2256 (08D0h) | 6352 (18D0h) |
| 4514 (11A2h) | 4515 (11A3h) | DIN1 1 shot signal | | 0 | C | 2257 (08D1h) | 6353 (18D1h) |
| 4516 (11A4h) | 4517 (11A5h) | DIN2 1 shot signal | | 0 | C | 2258 (08D2h) | 6354 (18D2h) |
| 4518 (11A6h) | 4519 (11A7h) | DIN3 1 shot signal | | 0 | C | 2259 (08D3h) | 6355 (18D3h) |
| 4520 (11A8h) | 4521 (11A9h) | DIN4 1 shot signal | | 0 | C | 2260 (08D4h) | 6356 (18D4h) |
| 4522 (11AAh) | 4523 (11ABh) | DIN5 1 shot signal | | 0 | C | 2261 (08D5h) | 6357 (18D5h) |
| 4524 (11ACh) | 4525 (11ADh) | DIN6 1 shot signal | | 0 | C | 2262 (08D6h) | 6358 (18D6h) |

| Modbus communication register address | | Name | Setting range | Initial value | Effective | Industrial network command code | |
|---------------------------------------|-----------------|----------------------|---|---------------|-----------|---------------------------------|-----------------|
| Upper | Lower | | | | | READ | WRITE |
| 4526 (11AEh) | 4527 (11AFh) | DIN7 1 shot signal | 0: The 1 shot signal function is disabled 1: The 1 shot signal function is enabled | 0 | C | 2263 (08D7h) | 6359 (18D7h) |
| 4528 (11B0h) | 4529 (11B1h) | DIN8 1 shot signal | | 0 | C | 2264 (08D8h) | 6360 (18D8h) |
| 4530 (11B2h) | 4531 (11B3h) | DIN9 1 shot signal | | 0 | C | 2265 (08D9h) | 6361 (18D9h) |
| 4544 (11C0h) | 4545 (11C1h) | DOUT0 OFF delay time | 0 to 250 ms | 0 | C | 2272 (08E0h) | 6368 (18E0h) |
| 4546 (11C2h) | 4547 (11C3h) | DOUT1 OFF delay time | | 0 | C | 2273 (08E1h) | 6369 (18E1h) |
| 4548 (11C4h) | 4549 (11C5h) | DOUT2 OFF delay time | | 0 | C | 2274 (08E2h) | 6370 (18E2h) |
| 4550 (11C6h) | 4551 (11C7h) | DOUT3 OFF delay time | | 0 | C | 2275 (08E3h) | 6371 (18E3h) |
| 4552 (11C8h) | 4553 (11C9h) | DOUT4 OFF delay time | | 0 | C | 2276 (08E4h) | 6372 (18E4h) |
| 4554 (11CAh) | 4555 (11CBh) | DOUT5 OFF delay time | | 0 | C | 2277 (08E5h) | 6373 (18E5h) |

14-15 Remote I/O setting parameters

| Modbus communication register address | | Name | Setting range | Initial value | Effective | Industrial network command code | |
|---------------------------------------|-----------------|---------------------------------|------------------------------|---------------|-----------|---------------------------------|-----------------|
| Upper | Lower | | | | | READ | WRITE |
| 4608 (1200h) | 4609 (1201h) | R-IN0 input function selection | Input signal list ⇒ p.427 | 64: M0 | C | 2304 (0900h) | 6400 (1900h) |
| 4610 (1202h) | 4611 (1203h) | R-IN1 input function selection | | 65: M1 | C | 2305 (0901h) | 6401 (1901h) |
| 4612 (1204h) | 4613 (1205h) | R-IN2 input function selection | | 66: M2 | C | 2306 (0902h) | 6402 (1902h) |
| 4614 (1206h) | 4615 (1207h) | R-IN3 input function selection | | 32: START | C | 2307 (0903h) | 6403 (1903h) |
| 4616 (1208h) | 4617 (1209h) | R-IN4 input function selection | | 37: ZHOME | C | 2308 (0904h) | 6404 (1904h) |
| 4618 (120Ah) | 4619 (120Bh) | R-IN5 input function selection | | 5: STOP | C | 2309 (0905h) | 6405 (1905h) |
| 4620 (120Ch) | 4621 (120Dh) | R-IN6 input function selection | | 1: FREE | C | 2310 (0906h) | 6406 (1906h) |
| 4622 (120Eh) | 4623 (120Fh) | R-IN7 input function selection | | 8: ALM-RST | C | 2311 (0907h) | 6407 (1907h) |
| 4624 (1210h) | 4625 (1211h) | R-IN8 input function selection | | 40: D-SEL0 | C | 2312 (0908h) | 6408 (1908h) |
| 4626 (1212h) | 4627 (1213h) | R-IN9 input function selection | | 41: D-SEL1 | C | 2313 (0909h) | 6409 (1909h) |
| 4628 (1214h) | 4629 (1215h) | R-IN10 input function selection | | 42: D-SEL2 | C | 2314 (090Ah) | 6410 (190Ah) |
| 4630 (1216h) | 4631 (1217h) | R-IN11 input function selection | | 33: SSTART | C | 2315 (090Bh) | 6411 (190Bh) |
| 4632 (1218h) | 4633 (1219h) | R-IN12 input function selection | | 52: FW-JOG-P | C | 2316 (090Ch) | 6412 (190Ch) |

| Modbus communication register address | | Name | Setting range | Initial value | Effective | Industrial network command code | |
|---------------------------------------|-----------------|--|-------------------------------|---------------|-----------|---------------------------------|-----------------|
| Upper | Lower | | | | | READ | WRITE |
| 4634 (121Ah) | 4635 (121Bh) | R-IN13 input function selection | Input signal list ⇒ p.427 | 53: RV-JOG-P | C | 2317 (090Dh) | 6413 (190Dh) |
| 4636 (121Ch) | 4637 (121Dh) | R-IN14 input function selection | | 56: FW-POS | C | 2318 (090Eh) | 6414 (190Eh) |
| 4638 (121Eh) | 4639 (121Fh) | R-IN15 input function selection | | 57: RV-POS | C | 2319 (090Fh) | 6415 (190Fh) |
| 4640 (1220h) | 4641 (1221h) | R-OUT0 output function selection | | 64: M0_R | C | 2320 (0910h) | 6416 (1910h) |
| 4642 (1222h) | 4643 (1223h) | R-OUT1 output function selection | | 65: M1_R | C | 2321 (0911h) | 6417 (1911h) |
| 4644 (1224h) | 4645 (1225h) | R-OUT2 output function selection | | 66: M2_R | C | 2322 (0912h) | 6418 (1912h) |
| 4646 (1226h) | 4647 (1227h) | R-OUT3 output function selection | | 32: START_R | C | 2323 (0913h) | 6419 (1913h) |
| 4648 (1228h) | 4649 (1229h) | R-OUT4 output function selection | | 144: HOME-END | C | 2324 (0914h) | 6420 (1914h) |
| 4650 (122Ah) | 4651 (122Bh) | R-OUT5 output function selection | | 132: READY | C | 2325 (0915h) | 6421 (1915h) |
| 4652 (122Ch) | 4653 (122Dh) | R-OUT6 output function selection | | 135: INFO | C | 2326 (0916h) | 6422 (1916h) |
| 4654 (122Eh) | 4655 (122Fh) | R-OUT7 output function selection | | 129: ALM-A | C | 2327 (0917h) | 6423 (1917h) |
| 4656 (1230h) | 4657 (1231h) | R-OUT8 output function selection | | 136: SYS-BSY | C | 2328 (0918h) | 6424 (1918h) |
| 4658 (1232h) | 4659 (1233h) | R-OUT9 output function selection | | 160: AREA0 | C | 2329 (0919h) | 6425 (1919h) |
| 4660 (1234h) | 4661 (1235h) | R-OUT10 output function selection | Output signal list ⇒ p.428 | 161: AREA1 | C | 2330 (091Ah) | 6426 (191Ah) |
| 4662 (1236h) | 4663 (1237h) | R-OUT11 output function selection | | 162: AREA2 | C | 2331 (091Bh) | 6427 (191Bh) |
| 4664 (1238h) | 4665 (1239h) | R-OUT12 output function selection | | 157: TIM | C | 2332 (091Ch) | 6428 (191Ch) |
| 4666 (123Ah) | 4667 (123Bh) | R-OUT13 output function selection | | 134: MOVE | C | 2333 (091Dh) | 6429 (191Dh) |
| 4668 (123Ch) | 4669 (123Dh) | R-OUT14 output function selection | | 138: IN-POS | C | 2334 (091Eh) | 6430 (191Eh) |
| 4670 (123Eh) | 4671 (123Fh) | R-OUT15 output function selection | | 140: TLC | C | 2335 (091Fh) | 6431 (191Fh) |
| 4672 (1240h) | 4673 (1241h) | R-IN0 group action mode initial state (NETC) | | 0 | C | 2336 (0920h) | 6432 (1920h) |
| 4674 (1242h) | 4675 (1243h) | R-IN1 group action mode initial state (NETC) | | 0 | C | 2337 (0921h) | 6433 (1921h) |
| 4676 (1244h) | 4677 (1245h) | R-IN2 group action mode initial state (NETC) | | 0 | C | 2338 (0922h) | 6434 (1922h) |
| 4678 (1246h) | 4679 (1247h) | R-IN3 group action mode initial state (NETC) | | 0 | C | 2339 (0923h) | 6435 (1923h) |
| 4680 (1248h) | 4681 (1249h) | R-IN4 group action mode initial state (NETC) | | 0 | C | 2340 (0924h) | 6436 (1924h) |
| 4682 (124Ah) | 4683 (124Bh) | R-IN5 group action mode initial state (NETC) | | 0 | C | 2341 (0925h) | 6437 (1925h) |
| 4684 (124Ch) | 4685 (124Dh) | R-IN6 group action mode initial state (NETC) | | 0 | C | 2342 (0926h) | 6438 (1926h) |

| Modbus communication register address | | Name | Setting range | Initial value | Effective | Industrial network command code | |
|---------------------------------------|-----------------|---|---------------|---------------|-----------|---------------------------------|-----------------|
| Upper | Lower | | | | | READ | WRITE |
| 4686 (124Eh) | 4687 (124Fh) | R-IN7 group action mode initial state (NETC) | 0 to 65,535 | 0 | C | 2343 (0927h) | 6439 (1927h) |
| 4688 (1250h) | 4689 (1251h) | R-IN8 group action mode initial state (NETC) | | 0 | C | 2344 (0928h) | 6440 (1928h) |
| 4690 (1252h) | 4691 (1253h) | R-IN9 group action mode initial state (NETC) | | 0 | C | 2345 (0929h) | 6441 (1929h) |
| 4692 (1254h) | 4693 (1255h) | R-IN10 group action mode initial state (NETC) | | 0 | C | 2346 (092Ah) | 6442 (192Ah) |
| 4694 (1256h) | 4695 (1257h) | R-IN11 group action mode initial state (NETC) | | 0 | C | 2347 (092Bh) | 6443 (192Bh) |
| 4696 (1258h) | 4697 (1259h) | R-IN12 group action mode initial state (NETC) | | 0 | C | 2348 (092Ch) | 6444 (192Ch) |
| 4698 (125Ah) | 4699 (125Bh) | R-IN13 group action mode initial state (NETC) | | 0 | C | 2349 (092Dh) | 6445 (192Dh) |
| 4700 (125Ch) | 4701 (125Dh) | R-IN14 group action mode initial state (NETC) | | 0 | C | 2350 (092Eh) | 6446 (192Eh) |
| 4702 (125Eh) | 4703 (125Fh) | R-IN15 group action mode initial state (NETC) | | 0 | C | 2351 (092Fh) | 6447 (192Fh) |
| 4704 (1260h) | 4705 (1261h) | R-OUT0 OFF delay time | 0 to 250 ms | 0 | C | 2352 (0930h) | 6448 (1930h) |
| 4706 (1262h) | 4707 (1263h) | R-OUT1 OFF delay time | | 0 | C | 2353 (0931h) | 6449 (1931h) |
| 4708 (1264h) | 4709 (1265h) | R-OUT2 OFF delay time | | 0 | C | 2354 (0932h) | 6450 (1932h) |
| 4710 (1266h) | 4711 (1267h) | R-OUT3 OFF delay time | | 0 | C | 2355 (0933h) | 6451 (1933h) |
| 4712 (1268h) | 4713 (1269h) | R-OUT4 OFF delay time | | 0 | C | 2356 (0934h) | 6452 (1934h) |
| 4714 (126Ah) | 4715 (126Bh) | R-OUT5 OFF delay time | | 0 | C | 2357 (0935h) | 6453 (1935h) |
| 4716 (126Ch) | 4717 (126Dh) | R-OUT6 OFF delay time | | 0 | C | 2358 (0936h) | 6454 (1936h) |
| 4718 (126Eh) | 4719 (126Fh) | R-OUT7 OFF delay time | | 0 | C | 2359 (0937h) | 6455 (1937h) |
| 4720 (1270h) | 4721 (1271h) | R-OUT8 OFF delay time | | 0 | C | 2360 (0938h) | 6456 (1938h) |
| 4722 (1272h) | 4723 (1273h) | R-OUT9 OFF delay time | | 0 | C | 2361 (0939h) | 6457 (1939h) |
| 4724 (1274h) | 4725 (1275h) | R-OUT10 OFF delay time | | 0 | C | 2362 (093Ah) | 6458 (193Ah) |
| 4726 (1276h) | 4727 (1277h) | R-OUT11 OFF delay time | | 0 | C | 2363 (093Bh) | 6459 (193Bh) |
| 4728 (1278h) | 4729 (1279h) | R-OUT12 OFF delay time | | 0 | C | 2364 (093Ch) | 6460 (193Ch) |
| 4730 (127Ah) | 4731 (127Bh) | R-OUT13 OFF delay time | | 0 | C | 2365 (093Dh) | 6461 (193Dh) |
| 4732 (127Ch) | 4733 (127Dh) | R-OUT14 OFF delay time | | 0 | C | 2366 (093Eh) | 6462 (193Eh) |
| 4734 (127Eh) | 4735 (127Fh) | R-OUT15 OFF delay time | | 0 | C | 2367 (093Fh) | 6463 (193Fh) |

14-16 Extended input setting parameters

| Modbus communication register address | | Name | Setting range | Initial value | Effective | Industrial network command code | |
|---------------------------------------|-----------------|--|--|---------------|-----------|---------------------------------|-----------------|
| Upper | Lower | | | | | READ | WRITE |
| 4832 (12E0h) | 4833 (12E1h) | Extended input (EXT-IN) function selection | Input signal list p.427 | 9: P-PRESET | C | 2416 (0970h) | 6512 (1970h) |
| 4834 (12E2h) | 4835 (12E3h) | Extended input (EXT-IN) inverting mode | 0: Non invert 1: Invert | 0 | C | 2417 (0971h) | 6513 (1971h) |
| 4836 (12E4h) | 4837 (12E5h) | Extended input (EXT-IN) interlock releasing time | 0: Interlock disabled 1 to 50 (1=0.1 s) | 10 | A | 2418 (0972h) | 6514 (1972h) |
| 4838 (12E6h) | 4839 (12E7h) | Extended input (EXT-IN) interlock releasing duration | 0 to 50 (1=0.1 s) | 30 | A | 2419 (0973h) | 6515 (1973h) |
| 4840 (12E8h) | 4841 (12E9h) | Extended input (EXT-IN) ON monitor time | 0 to 50 (1=0.1 s) | 10 | A | 2420 (0974h) | 6516 (1974h) |

14-17 Differential output setting parameters

| Modbus communication register address | | Name | Setting range | Initial value | Effective | Industrial network command code | |
|---------------------------------------|-----------------|---|--|-------------------|-----------|---------------------------------|-----------------|
| Upper | Lower | | | | | READ | WRITE |
| 4848 (12F0h) | 4849 (12F1h) | Differential output mode selection | -1: No output 0: A-phase/B-phase output 8: I/O status output | 0 | C | 2424 (0978h) | 6520 (1978h) |
| 4852 (12F4h) | 4853 (12F5h) | Differential output (EXT-OUTA) function selection on I/O mode | Output signal list p.428 | 128: CONST-OFF | C | 2426 (097Ah) | 6522 (197Ah) |
| 4854 (12F6h) | 4855 (12F7h) | Differential output (EXT-OUTB) function selection on I/O mode | | 128: CONST-OFF | C | 2427 (097Bh) | 6523 (197Bh) |
| 4856 (12F8h) | 4857 (12F9h) | Differential output (EXT-OUTA) inverting mode on I/O mode | 0: Non invert 1: Invert | 0 | C | 2428 (097Ch) | 6524 (197Ch) |
| 4858 (12FAh) | 4859 (12FBh) | Differential output (EXT-OUTB) inverting mode on I/O mode | | 0 | C | 2429 (097Dh) | 6525 (197Dh) |
| 4860 (12FCh) | 4861 (12FDh) | Differential output (EXT-OUTA) OFF delay time on I/O mode | 0 to 250 ms | 0 | C | 2430 (097Eh) | 6526 (197Eh) |
| 4862 (12FEh) | 4863 (12FFh) | Differential output (EXT-OUTB) OFF delay time on I/O mode | | 0 | C | 2431 (097Fh) | 6527 (197Fh) |

14-18 Virtual input parameters

| Modbus communication register address | | Name | Setting range | Initial value | Effective | Industrial network command code | |
|---------------------------------------|-----------------|---|---|-------------------|-----------|---------------------------------|-----------------|
| Upper | Lower | | | | | READ | WRITE |
| 4736 (1280h) | 4737 (1281h) | Virtual input (VIR-IN0) function selection | Input signal list ⇒ p.427 | 0: Not used | C | 2368 (0940h) | 6464 (1940h) |
| 4738 (1282h) | 4739 (1283h) | Virtual input (VIR-IN1) function selection | | 0: Not used | C | 2369 (0941h) | 6465 (1941h) |
| 4740 (1284h) | 4741 (1285h) | Virtual input (VIR-IN2) function selection | | 0: Not used | C | 2370 (0942h) | 6466 (1942h) |
| 4742 (1286h) | 4743 (1287h) | Virtual input (VIR-IN3) function selection | | 0: Not used | C | 2371 (0943h) | 6467 (1943h) |
| 4744 (1288h) | 4745 (1289h) | Virtual input (VIR-IN0) source selection | Output signal list ⇒ p.428 | 128: CONST-OFF | C | 2372 (0944h) | 6468 (1944h) |
| 4746 (128Ah) | 4747 (128Bh) | Virtual input (VIR-IN1) source selection | | 128: CONST-OFF | C | 2373 (0945h) | 6469 (1945h) |
| 4748 (128Ch) | 4749 (128Dh) | Virtual input (VIR-IN2) source selection | | 128: CONST-OFF | C | 2374 (0946h) | 6470 (1946h) |
| 4750 (128Eh) | 4751 (128Fh) | Virtual input (VIR-IN3) source selection | | 128: CONST-OFF | C | 2375 (0947h) | 6471 (1947h) |
| 4752 (1290h) | 4753 (1291h) | Virtual input (VIR-IN0) inverting mode | 0: Non invert 1: Invert | 0 | C | 2376 (0948h) | 6472 (1948h) |
| 4754 (1292h) | 4755 (1293h) | Virtual input (VIR-IN1) inverting mode | | 0 | C | 2377 (0949h) | 6473 (1949h) |
| 4756 (1294h) | 4757 (1295h) | Virtual input (VIR-IN2) inverting mode | | 0 | C | 2378 (094Ah) | 6474 (194Ah) |
| 4758 (1296h) | 4759 (1297h) | Virtual input (VIR-IN3) inverting mode | 0: Non invert 1: Invert | 0 | C | 2379 (094Bh) | 6475 (194Bh) |
| 4760 (1298h) | 4761 (1299h) | Virtual input (VIR-IN0) ON signal dead time | 0 to 250 ms | 0 | C | 2380 (094Ch) | 6476 (194Ch) |
| 4762 (129Ah) | 4763 (129Bh) | Virtual input (VIR-IN1) ON signal dead time | | 0 | C | 2381 (094Dh) | 6477 (194Dh) |
| 4764 (129Ch) | 4765 (129Dh) | Virtual input (VIR-IN2) ON signal dead time | | 0 | C | 2382 (094Eh) | 6478 (194Eh) |
| 4766 (129Eh) | 4767 (129Fh) | Virtual input (VIR-IN3) ON signal dead time | | 0 | C | 2383 (094Fh) | 6479 (194Fh) |
| 4768 (12A0h) | 4769 (12A1h) | Virtual input (VIR-IN0) 1 shot signal mode | 0: The 1 shot signal function is disabled 1: The 1 shot signal function is enabled | 0 | C | 2384 (0950h) | 6480 (1950h) |
| 4770 (12A2h) | 4771 (12A3h) | Virtual input (VIR-IN1) 1 shot signal mode | | 0 | C | 2385 (0951h) | 6481 (1951h) |
| 4772 (12A4h) | 4773 (12A5h) | Virtual input (VIR-IN2) 1 shot signal mode | | 0 | C | 2386 (0952h) | 6482 (1952h) |
| 4774 (12A6h) | 4775 (12A7h) | Virtual input (VIR-IN3) 1 shot signal mode | | 0 | C | 2387 (0953h) | 6483 (1953h) |

14-19 User output setting parameters

| Modbus communication register address | | Name | Setting range | Initial value | Effective | Industrial network command code | |
|---------------------------------------|-----------------|--|-------------------------------|-------------------|-----------|---------------------------------|-----------------|
| Upper | Lower | | | | | READ | WRITE |
| 4800 (12C0h) | 4801 (12C1h) | User output (USER-OUT0) source A function selection | Output signal list ⇒ p.428 | 128: CONST-OFF | C | 2400 (0960h) | 6496 (1960h) |
| 4802 (12C2h) | 4803 (12C3h) | User output (USER-OUT1) source A function selection | | 128: CONST-OFF | C | 2401 (0961h) | 6497 (1961h) |
| 4804 (12C4h) | 4805 (12C5h) | User output (USER-OUT0) source A inverting mode | 0: Non invert 1: Invert | 0 | C | 2402 (0962h) | 6498 (1962h) |
| 4806 (12C6h) | 4807 (12C7h) | User output (USER-OUT1) source A inverting mode | | 0 | C | 2403 (0963h) | 6499 (1963h) |
| 4808 (12C8h) | 4809 (12C9h) | User output (USER-OUT0) source B function selection | Output signal list ⇒ p.428 | 128: CONST-OFF | C | 2404 (0964h) | 6500 (1964h) |
| 4810 (12CAh) | 4811 (12CBh) | User output (USER-OUT1) source B function selection | | 128: CONST-OFF | C | 2405 (0965h) | 6501 (1965h) |
| 4812 (12CCh) | 4813 (12CDh) | User output (USER-OUT0) source B inverting mode | 0: Non invert 1: Invert | 0 | C | 2406 (0966h) | 6502 (1966h) |
| 4814 (12CEh) | 4815 (12CFh) | User output (USER-OUT1) source B inverting mode | | 0 | C | 2407 (0967h) | 6503 (1967h) |
| 4816 (12D0h) | 4817 (12D1h) | User output (USER-OUT0) logical operation | 0: AND 1: OR | 1 | C | 2408 (0968h) | 6504 (1968h) |
| 4818 (12D2h) | 4819 (12D3h) | User output (USER-OUT1) logical operation | | 1 | C | 2409 (0969h) | 6505 (1969h) |

14-20 Driver mode setting parameters

| Modbus communication register address | | Name | Setting range | Initial value | Effective | Industrial network command code | |
|---------------------------------------|----------------|--------------------------|---|---------------|-----------|---------------------------------|-----------------|
| Upper | Lower | | | | | | |
| 992 (03E0h) | 993 (03E1h) | PULSE-I/F mode selection | <ul style="list-style-type: none"> -1: Disable 0: The switch setting of the driver is followed.* 1: 2-pulse input mode 2: 1-pulse input mode 3: Phase difference input mode (x1) 4: Phase difference input mode (x2) 5: Phase difference input mode (x4) <p>* If "0: The switch setting is followed" is selected using the pulse-input type with RS-485 communication interface, the 2-pulse input mode will be set.</p> | 0 | D | 496 (01F0h) | 4592 (11F0h) |
| 994 (03E2h) | 995 (03E3h) | RS485-I/F mode selection | <ul style="list-style-type: none"> -1: Disable 0: The switch setting of the driver is followed. 1: Network converter (NETC) 2: Modbus RTU | 0 | D | 497 (01F1h) | 4593 (11F1h) |
| 996 (03E4h) | 997 (03E5h) | USB-ID enable | <ul style="list-style-type: none"> 0: Disable 1: Enable | 1 | D | 498 (01F2h) | 4594 (11F2h) |
| 998 (03E6h) | 999 (03E7h) | USB-ID | 0 to 999,999,999 | 0 | D | 499 (01F3h) | 4595 (11F3h) |

| Modbus communication register address | | Name | Setting range | Initial value | Effective | Industrial network command code | |
|---------------------------------------|-----------------|---------|---------------|---------------|-----------|---------------------------------|-----------------|
| Upper | Lower | | | | | | |
| 5110 (13F6h) | 5111 (13F7h) | USB-PID | 0 to 31 | 0 | D | 2555 (9FBh) | 6651 (19FBh) |

14-21 LED status indication setting parameters

| Modbus communication register address | | Name | Setting range | Initial value | Effective | Industrial network command code | |
|---------------------------------------|-----------------|--|--|----------------|-----------|---------------------------------|-----------------|
| Upper | Lower | | | | | READ | WRITE |
| 1002 (03EAh) | 1003 (03EBh) | LED-OUT mode | -1: The LED is not lit 0: The status of the output signal is indicated 1: Functions as C-DAT/C-ERR LED with the built-in controller type and pulse-input type with RS-485 communication interface, and indicates the status of the output signal with the pulse-input type | 1 | A | 501 (01F5h) | 4597 (11F5h) |
| 1004 (03ECh) | 1005 (03EDh) | LED-OUT-GREEN function (I/O status output) | Output signal list ⇒ p.428 | 132: READY | A | 502 (01F6h) | 4598 (11F6h) |
| 1006 (03EEh) | 1007 (03EFh) | LED-OUT-GREEN inverting mode (I/O status output) | 0: Non invert 1: Invert | 0 | A | 503 (01F7h) | 4599 (11F7h) |
| 1008 (03F0h) | 1009 (03F1h) | LED-OUT-RED function (I/O status output) | Output signal list ⇒ p.428 | 128: CONST-OFF | A | 504 (01F8h) | 4600 (11F8h) |
| 1010 (03F2h) | 1011 (03F3h) | LED-OUT-RED inverting mode (I/O status output) | 0: Non invert 1: Invert | 0 | A | 505 (01F9h) | 4601 (11F9h) |

14-22 RS-485 communication setting parameters

| Modbus communication register address | | Name | Setting range | Initial value | Effective | Industrial network command code | |
|---------------------------------------|-----------------|------------------------|---|---------------|-----------|---------------------------------|-----------------|
| Upper | Lower | | | | | | |
| 4992 (1380h) | 4993 (1381h) | Slave address (Modbus) | -1: The switch setting of the driver is followed 1 to 31: Slave address 1 to 31 (0 is not used) | -1 | D | 2496 (09C0h) | 6592 (19C0h) |
| 4994 (1382h) | 4995 (1383h) | Baudrate (Modbus) | -1: The switch setting of the driver is followed 0: 9,600 bps 1: 19,200 bps 2: 38,400 bps 3: 57,600 bps 4: 115,200 bps 5: 230,400 bps | -1 | D | 2497 (09C1h) | 6593 (19C1h) |

| Modbus communication register address | | Name | Setting range | Initial value | Effective | Industrial network command code | |
|---------------------------------------|-----------------|--|---|---------------|-----------|---------------------------------|-----------------|
| Upper | Lower | | | | | | |
| 4996 (1384h) | 4997 (1385h) | Byte & word order (Modbus) | 0: EvenAddress-HighWord & Big-Endian 1: Even Address-Low Word & Big-Endian 2: Even Address-High Word & Little-Endian 3: Even Address-Low Word & Little-Endian | 0 | D | 2498 (09C2h) | 6594 (19C2h) |
| 4998 (1386h) | 4999 (1387h) | Communication parity (Modbus) | 0: None 1: Even parity 2: Odd parity | 1 | D | 2499 (09C3h) | 6595 (19C3h) |
| 5000 (1388h) | 5001 (1389h) | Communication stop bit (Modbus) | 0: 1 bit 1: 2 bit | 0 | D | 2500 (09C4h) | 6596 (19C4h) |
| 5002 (138Ah) | 5003 (138Bh) | Communication timeout (Modbus) | 0: Not monitored 1 to 10,000 ms | 0 | A | 2501 (09C5h) | 6597 (19C5h) |
| 5004 (138Ch) | 5005 (138Dh) | Communication error detection (Modbus) | 1 to 10 times | 3 | A | 2502 (09C6h) | 6598 (19C6h) |
| 5006 (138Eh) | 5007 (138Fh) | Transmission waiting time (Modbus) | 0 to 10,000 (1=0.1 ms) | 30 | D | 2503 (09C7h) | 6599 (19C7h) |
| 5008 (1390h) | 5009 (1391h) | Silent interval (Modbus) | 0: Automatically set 1 to 100 (1=0.1 ms) | 0 | D | 2504 (09C8h) | 6600 (19C8h) |
| 5010 (1392h) | 5011 (1393h) | Slave error response mode (Modbus) | 0: Normal response is returned 1: Exception response is returned | 1 | A | 2505 (09C9h) | 6601 (19C9h) |
| 5012 (1394h) | 5013 (1395h) | Initial group ID (Modbus) | -1: Disable (no group transmission) 1 to 31: Group ID1 to 31 * Do not use 0 | -1 | C | 2506 (09CAh) | 6602 (19CAh) |
| 5014 (1396h) | 5015 (1397h) | Test mode timeout (Modbus) | This parameter is a reserved function. Not possible to use. | 300 | A | 2507 (09CBh) | 6603 (19CBh) |
| 5024 (13A0h) | 5025 (13A1h) | Slave ID (NETC) | -1: The switch setting of the driver is followed 1 to 31: Slave address 1 to 31 (0 is not used) | -1 | D | 2512 (09D0h) | 6608 (19D0h) |
| 5026 (13A2h) | 5027 (13A3h) | Initial group ID (NETC) | -1: Disable 0 to 31: Address of group | -1 | C | 2513 (09D1h) | 6609 (19D1h) |
| 5028 (13A4h) | 5029 (13A5h) | Baudrate (NETC) | -1: The switch setting of the driver is followed 0: 9,600 bps 1: 19,200 bps 2: 38,400 bps 3: 57,600 bps 4: 115,200 bps 5: 230,400 bps 6: 312,500 bps 7: 625,000 bps | 7 | D | 2514 (09D2h) | 6610 (19D2h) |
| 5030 (13A6h) | 5031 (13A7h) | Frame time (NETC) | 1 to 10,000 ms | 50 | D | 2515 (09D3h) | 6611 (19D3h) |
| 5032 (13A8h) | 5033 (13A9h) | Communication connection time (NETC) | 0 to 10,000 ms | 80 | D | 2516 (09D4h) | 6612 (19D4h) |
| 5034 (13AAh) | 5035 (13ABh) | Communication timeout(NETC) | 0: Not monitored 1 to 10,000 ms | 0 | D | 2517 (09D5h) | 6613 (19D5h) |

| Modbus communication register address | | Name | Setting range | Initial value | Effective | Industrial network command code | |
|---------------------------------------|-----------------|--------------------------------------|----------------------------------|---------------|-----------|---------------------------------|-----------------|
| Upper | Lower | | | | | | |
| 5036 (13ACh) | 5037 (13ADh) | Communication error detection (NETC) | 1 to 10 times | 3 | D | 2518 (09D6h) | 6614 (19D6h) |
| 5038 (13AEh) | 5039 (13AFh) | Transmission waiting time (NETC) | 0 to 10,000 (1=0.1 ms) | 100 | D | 2519 (09D7h) | 6615 (19D7h) |
| 5040 (13B0h) | 5041 (13B1h) | Connection check (NETC) | 0: Disable 1: Enable | 1 | D | 2520 (09D8h) | 6616 (19D8h) |
| 5056 (13C0h) | 5057 (13C1h) | (RS-485) Receive packet monitor | 0: All 1: Only to own station | 0 | A | 2528 (09E0h) | 6624 (19E0h) |

14-23 Indirect reference setting parameters

| Modbus communication register address | | Name | Setting range | Initial value | Effective | Industrial network command code | |
|---------------------------------------|-----------------|---|---------------|---------------|-----------|---------------------------------|-----------------|
| Upper | Lower | | | | | READ | WRITE |
| 4864 (1300h) | 4865 (1301h) | Indirect reference address setting (0) | 0 to 65,535 | 0 | A | 2432 (0980h) | 6528 (1980h) |
| 4866 (1302h) | 4867 (1303h) | Indirect reference address setting (1) | | 0 | A | 2433 (0981h) | 6529 (1981h) |
| 4868 (1304h) | 4869 (1305h) | Indirect reference address setting (2) | | 0 | A | 2434 (0982h) | 6530 (1982h) |
| 4870 (1306h) | 4871 (1307h) | Indirect reference address setting (3) | | 0 | A | 2435 (0983h) | 6531 (1983h) |
| 4872 (1308h) | 4873 (1309h) | Indirect reference address setting (4) | | 0 | A | 2436 (0984h) | 6532 (1984h) |
| 4874 (130Ah) | 4875 (130Bh) | Indirect reference address setting (5) | | 0 | A | 2437 (0985h) | 6533 (1985h) |
| 4876 (130Ch) | 4877 (130Dh) | Indirect reference address setting (6) | | 0 | A | 2438 (0986h) | 6534 (1986h) |
| 4878 (130Eh) | 4879 (130Fh) | Indirect reference address setting (7) | | 0 | A | 2439 (0987h) | 6535 (1987h) |
| 4880 (1310h) | 4881 (1311h) | Indirect reference address setting (8) | | 0 | A | 2440 (0988h) | 6536 (1988h) |
| 4882 (1312h) | 4883 (1313h) | Indirect reference address setting (9) | | 0 | A | 2441 (0989h) | 6537 (1989h) |
| 4884 (1314h) | 4885 (1315h) | Indirect reference address setting (10) | | 0 | A | 2442 (098Ah) | 6538 (198Ah) |
| 4886 (1316h) | 4887 (1317h) | Indirect reference address setting (11) | | 0 | A | 2443 (098Bh) | 6539 (198Bh) |
| 4888 (1318h) | 4889 (1319h) | Indirect reference address setting (12) | | 0 | A | 2444 (098Ch) | 6540 (198Ch) |
| 4890 (131Ah) | 4891 (131Bh) | Indirect reference address setting (13) | | 0 | A | 2445 (098Dh) | 6541 (198Dh) |
| 4892 (131Ch) | 4893 (131Dh) | Indirect reference address setting (14) | | 0 | A | 2446 (098Eh) | 6542 (198Eh) |
| 4894 (131Eh) | 4895 (131Fh) | Indirect reference address setting (15) | | 0 | A | 2447 (098Fh) | 6543 (198Fh) |
| 4896 (1320h) | 4897 (1321h) | Indirect reference address setting (16) | | 0 | A | 2448 (0990h) | 6544 (1990h) |

| Modbus communication register address | | Name | Setting range | Initial value | Effective | Industrial network command code | |
|---------------------------------------|-----------------|---|---------------|---------------|-----------|---------------------------------|-----------------|
| Upper | Lower | | | | | READ | WRITE |
| 4898 (1322h) | 4899 (1323h) | Indirect reference address setting (17) | 0 to 65,535 | 0 | A | 2449 (0991h) | 6545 (1991h) |
| 4900 (1324h) | 4901 (1325h) | Indirect reference address setting (18) | | 0 | A | 2450 (0992h) | 6546 (1992h) |
| 4902 (1326h) | 4903 (1327h) | Indirect reference address setting (19) | | 0 | A | 2451 (0993h) | 6547 (1993h) |
| 4904 (1328h) | 4905 (1329h) | Indirect reference address setting (20) | | 0 | A | 2452 (0994h) | 6548 (1994h) |
| 4906 (132Ah) | 4907 (132Bh) | Indirect reference address setting (21) | | 0 | A | 2453 (0995h) | 6549 (1995h) |
| 4908 (132Ch) | 4909 (132Dh) | Indirect reference address setting (22) | | 0 | A | 2454 (0996h) | 6550 (1996h) |
| 4910 (132Eh) | 4911 (132Fh) | Indirect reference address setting (23) | | 0 | A | 2455 (0997h) | 6551 (1997h) |
| 4912 (1330h) | 4913 (1331h) | Indirect reference address setting (24) | | 0 | A | 2456 (0998h) | 6552 (1998h) |
| 4914 (1332h) | 4915 (1333h) | Indirect reference address setting (25) | | 0 | A | 2457 (0999h) | 6553 (1999h) |
| 4916 (1334h) | 4917 (1335h) | Indirect reference address setting (26) | | 0 | A | 2458 (099Ah) | 6554 (199Ah) |
| 4918 (1336h) | 4919 (1337h) | Indirect reference address setting (27) | | 0 | A | 2459 (099Bh) | 6555 (199Bh) |
| 4920 (1338h) | 4921 (1339h) | Indirect reference address setting (28) | | 0 | A | 2460 (099Ch) | 6556 (199Ch) |
| 4922 (133Ah) | 4923 (133Bh) | Indirect reference address setting (29) | | 0 | A | 2461 (099Dh) | 6557 (199Dh) |
| 4924 (133Ch) | 4925 (133Dh) | Indirect reference address setting (30) | | 0 | A | 2462 (099Eh) | 6558 (199Eh) |
| 4926 (133Eh) | 4927 (133Fh) | Indirect reference address setting (31) | | 0 | A | 2463 (099Fh) | 6559 (199Fh) |

14-24 Our exclusive parameters for maintenance.

| Modbus communication register address | | Name | Setting range | Initial value | Effective | Industrial network command code | |
|---------------------------------------|-----------------|--------------------------|--|---------------|-----------|---------------------------------|-----------------|
| Upper | Lower | | | | | READ | WRITE |
| 1020 (03FCh) | 1021 (03FDh) | Encoder maintenance mode | 0: Normal operation mode 85: Encoder maintenance mode | 0 | D | 510 (01FEh) | 4606 (11FEh) |

15 I/O signal assignment list

15-1 Input signals

To assign signals via network, use the "Assignment No." in the table instead of the signal names.

| Assignment No. | Signal name |
|----------------|-------------|
| 0 | Not used |
| 1 | FREE |
| 2 | C-ON |
| 3 | CLR |
| 4 | STOP-COFF |
| 5 | STOP |
| 6 | PAUSE |
| 7 | BREAK-ATSQ |
| 8 | ALM-RST |
| 9 | P-PRESET |
| 10 | EL-PRST |
| 12 | ETO-CLR |
| 13 | LAT-CLR |
| 14 | INFO-CLR |
| 16 | HMI |
| 18 | CCM |
| 19 | PLS-XMODE |
| 20 | PLS-DIS |
| 21 | T-MODE |
| 22 | CRNT-LMT |
| 23 | SPD-LMT |
| 26 | FW-BLK |
| 27 | RV-BLK |
| 28 | FW-LS |
| 29 | RV-LS |
| 30 | HOMES |
| 31 | SLIT |
| 32 | START |

| Assignment No. | Signal name |
|----------------|-------------|
| 33 | SSTART |
| 35 | NEXT |
| 36 | HOME |
| 37 | ZHOME |
| 40 | DSEL0 |
| 41 | DSEL1 |
| 42 | DSEL2 |
| 43 | DSEL3 |
| 44 | DSEL4 |
| 45 | DSEL5 |
| 46 | DSEL6 |
| 47 | DSEL7 |
| 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 |
| 58 | FW-SPD |
| 59 | RV-SPD |
| 60 | FW-PSH |
| 61 | RV-PSH |
| 64 | M0 |
| 65 | M1 |

| Assignment No. | Signal name |
|----------------|-------------|
| 66 | M2 |
| 67 | M3 |
| 68 | M4 |
| 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 |

15-2 Output signals

To assign signals via network, use the "Assignment No." in the table instead of the signal names.

| Assignment No. | Signal name |
|----------------|--------------|
| 0 | Not used |
| 1 | FREE_R |
| 2 | C-ON_R |
| 3 | CLR_R |
| 4 | STOP-COFF_R |
| 5 | STOP_R |
| 6 | PAUSE_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 |
| 18 | CCM_R |
| 19 | PLS-XMODE_R |
| 20 | PLS-DIS_R |
| 21 | T-MODE_R |
| 22 | CRNT-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 | DSEL0_R |
| 41 | DSEL1_R |
| 42 | DSEL2_R |
| 43 | DSEL3_R |
| 44 | DSEL4_R |
| 45 | DSEL5_R |
| 46 | DSEL6_R |
| 47 | DSEL7_R |
| 48 | FW-JOG_R |
| 49 | RV-JOG_R |
| 50 | FW-JOG-H_R |
| 51 | RV-JOG-H_R |
| 52 | FW-JOG-P_R |

| Assignment No. | Signal name |
|----------------|-------------|
| 53 | RV-JOG-P_R |
| 54 | FW-JOG-C_R |
| 55 | RV-JOG-C_R |
| 56 | FW-POS_R |
| 57 | RV-POS_R |
| 58 | FW-SPD_R |
| 59 | RV-SPD_R |
| 60 | FW-PSH_R |
| 61 | RV-PSH_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 |
| 133 | PLS-RDY |
| 134 | MOVE |

| Assignment No. | Signal name |
|----------------|-------------|
| 135 | INFO |
| 136 | SYS-BSY |
| 137 | ETO-MON |
| 138 | IN-POS |
| 140 | TLC |
| 141 | VA |
| 142 | CRNT |
| 143 | AUTO-CD |
| 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 |
| 157 | TIM |
| 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 |
| 173 | HWTOIN-MON |
| 176 | MON-OUT |
| 177 | PLS-OUTR |
| 180 | USR-OUT0 |
| 181 | USR-OUT1 |
| 192 | CRNT-LMTD |
| 193 | SPD-LMTD |
| 196 | OPE-BSY |
| 197 | PAUSE-BSY |
| 198 | SEQ-BSY |
| 199 | DELAY-BSY |
| 200 | JUMPO-LAT |

| Assignment No. | Signal name |
|----------------|--------------|
| 201 | JUMP1-LAT |
| 202 | NEXT-LAT |
| 203 | PLS-LOST |
| 204 | DCOM-RDY |
| 205 | DCOM-FULL |
| 207 | M-CHG |
| 208 | M-ACT0 |
| 209 | M-ACT1 |
| 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-DRV TMP |
| 227 | INFO-MTR TMP |
| 228 | INFO-OVOLT |
| 229 | INFO-UVOLT |
| 230 | INFO-OLTIME |
| 232 | INFO-SPD |
| 233 | INFO-START |
| 234 | INFO-ZHOME |
| 235 | INFO-PR-REQ |
| 237 | INFO-EGR-E |
| 238 | INFO-RND-E |
| 239 | INFO-NET-E |
| 240 | INFO-FW-OT |
| 241 | INFO-RV-OT |
| 242 | INFO-CULD0 |
| 243 | INFO-CULD1 |
| 244 | INFO-TRIP |
| 245 | INFO-ODO |
| 252 | INFO-DSLMTD |
| 253 | INFO-IOTEST |
| 254 | INFO-CFG |

| Assignment No. | Signal name |
|----------------|-------------|
| 255 | INFO-RBT |

8

Measures for various cases

This part explains the operation functions and parameters.

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1 Vibration suppression

1-1 LPF (speed filter) and moving average filter

If the command filter to adjust the motor response is used, the vibration of the motor can be suppressed. There are two types of command filters: LPF (speed filter) and moving average filter.

Related parameters

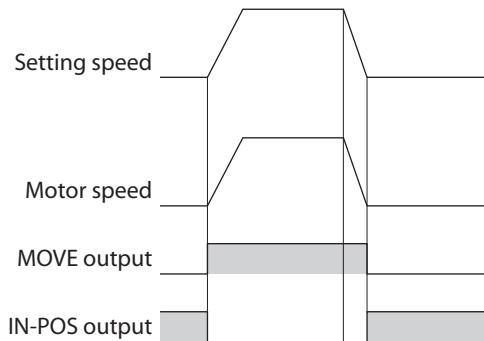
| MEXE02 tree view | Parameter name | Description | Initial value |
|------------------|-------------------------------|---|---------------|
| Base setting | Command filter setting | Setting range 1: LPF (speed filter) is selected 2: The moving average filter is selected | 1 |
| | Command filter time constant | Adjusts the motor response. Setting range 0 to 200 ms | 1 |
| | Command filter setting source | This is enabled with the pulse-input type. Selects the setting method of the command filter. Setting range 0: The parameter setting is followed 1: The switch setting is followed | 1 |

■ LPF (speed filter)

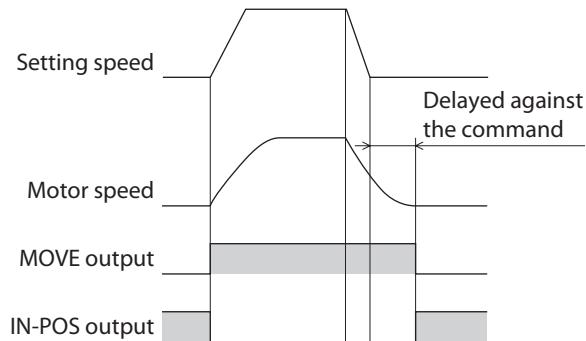
Select "LPF" in the "Command filter" parameter and set the "Command filter time constant" parameter.

When the value of the "Command filter time constant" parameter is increased, vibration can be suppressed during low-speed operation, and starting/stopping of the motor becomes smooth. Note, however, if this setting is too high, it results in lower synchronicity with commands. Set a suitable value according to the load or application.

- When the "Command filter time constant" parameter is 0 ms



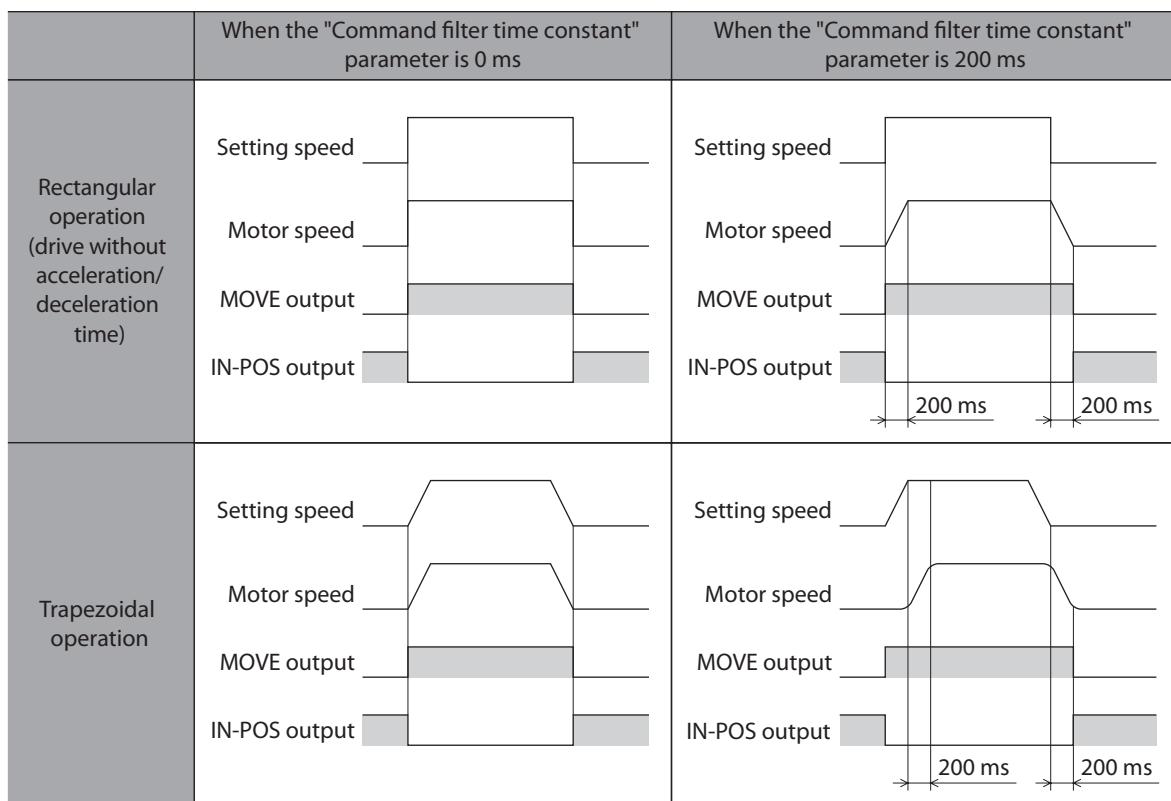
- When the "Command filter time constant" parameter is 200 ms



■ Moving average filter

Select "Moving average filter" in the "Command filter setting" parameter and set the "Command filter time constant" parameter. The motor response can be adjusted. The positioning time can be shortened by suppressing the residual vibration for positioning operation.

Optimum value for the "Command filter time constant" parameter varies depending on the load or operating condition. Set a suitable value according to the load or operating condition.



1-2 Smooth drive function

You can achieve lower vibration and smoother movement using the smooth drive function.

You may feel vibration in the low speed range when this function is set to "Disable." Set the function to "1: Enable" under normal conditions of use.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|------------------|-----------------------|---|---------------|
| Base setting | Smooth drive function | Setting range 0: The smooth drive function is disabled 1: The smooth drive function is enabled | 1 |

1-3 Resonance suppression

Set a filter to suppress resonance.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|------------------|---|--|---------------|
| Base setting | Resonance suppression control frequency | <p>Sets the frequency of the vibration to be controlled.</p> <p>Setting range 100 to 2,000 Hz (With the MEXE02, a value less than 100 Hz can be input. When a value less than 100 Hz is input, it is considered to be 100 Hz and set.)</p> | 1,000 |
| | Resonance suppression control gain | <p>Sets the gain of resonance suppression control. When the value is increased, the response to the deviation is increased.</p> <p>Setting range −500 to 500</p> | 0 |



The optimum value varies depending on the load or operating condition. Check with the actual use condition.

2 Suppression of heat generation and noise

2-1 Automatic current cutback function

The automatic current cutback function is a method in which heat generation of the motor is suppressed by automatically decreasing the motor current to the stop current at the time of stop.

When operation is restarted, the current automatically increases to the operating current.

When the automatic current cutback function is disabled, the motor retains the operating current also during stop.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|------------------|--|---|---------------|
| Base setting | Automatic current cutback function | Setting range 0: The automatic current cutback function is disabled (Heat generation at the time of stop is not decreased) 1: The automatic current cutback function is enabled | 1 |
| | Automatic current cutback switching time | Sets the time from the stop of motor to operation of the automatic current cutback function. Setting range 0 to 1,000 ms | 100 |

2-2 Current control mode

There are two methods to control the current by the driver: the a control mode and the servo emulation mode.

Use in the a control mode (initial setting) under normal conditions.

If there is notable noise or vibration during high-speed rotation, it may be effective to switch to the servo emulation mode. Note, however, that a slight delay may occur in the servo emulation mode, compared to the a control mode, depending on the condition of the load.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|------------------|-----------------------------|---|---------------|
| Base setting | Current control mode | Sets the current control mode. Setting range 0: The setting of the CCM input is followed 1: a control mode (CST) 2: Servo emulation mode (SVE) | 0 |
| | Servo emulation (SVE) ratio | It is enabled in the servo emulation mode. Sets the ratio of the current controlled in servo emulation, among operating current. When it is set to "0," the mode automatically changes to the a control mode. Setting range 0 to 1,000 (1=0.1%) | 1,000 |



- About CCM input

When the "Current control mode" parameter is set to "The setting of the CCM input is followed," select the current control mode with the CCM input. When the CCM input is turned ON, the mode is switched to the servo emulation mode. When it is turned OFF, the mode is switched to the a control mode. Normally, the CCM input is OFF, and the mode is the a control mode.

■ Servo emulation mode

● Difference between a control mode and servo emulation mode

The a control mode is a control method to operate the motor with a constant current.

The motor current increases to the operating current during operation, and it decreases to the stop current by the current cutback function at standstill.

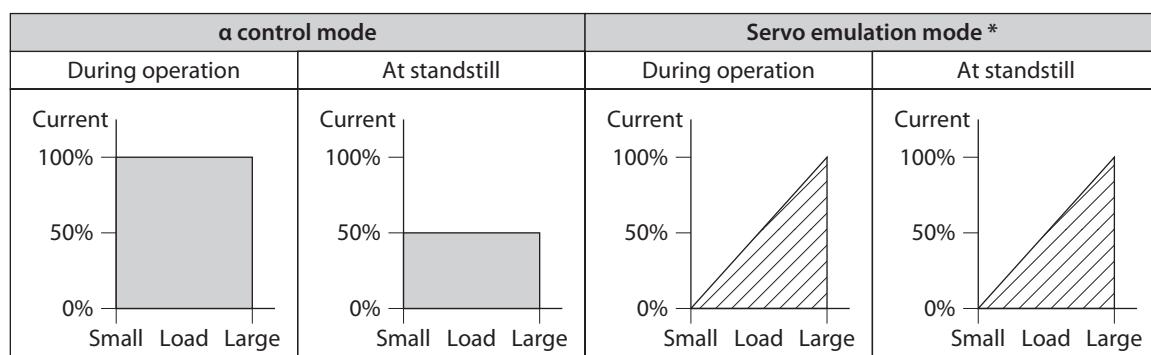
The servo emulation mode is a control method to increase or decrease a current in accordance with a load.

The operating current is the maximum current value under the state of both operation and standstill.

When the servo emulation mode is selected in the current control mode, set the current ratio to control in servo emulation with the "Servo emulation (SVE) ratio" parameter.

Setting the servo emulation ratio to 0% will select the a control mode.

When the operating current is 100% and the stop current is 50%



* The SVE ratio is set to 100%.

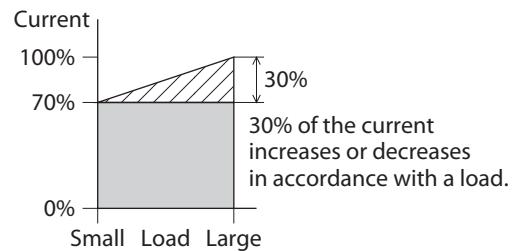
● Setting example of Servo emulation (SVE) ratio

Example 1: When the operating current is 100% and the SVE ratio is 30%

The ratio to be controlled in the servo emulation mode is:

$$\text{Operating current } 100\% \times \text{SVE ratio } 30\% = 30\%$$

Out of 100% of the operating current, 30% is the servo emulation mode and 70% is the a control mode.

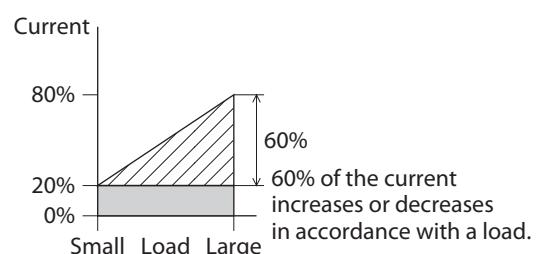


Example 2: When the operating current is 80% and the SVE ratio is 75%

The ratio to be controlled in the servo emulation mode is:

$$\text{Operating current } 80\% \times \text{SVE ratio } 75\% = 60\%$$

Out of 80% of the operating current, 60% is the servo emulation mode and 20% is the a control mode.



Example 3: When the operating current is 100%, the stop current is 50%, and the SVE ratio is 30%

The ratio to be controlled in the servo emulation mode is:

$$\text{Operating current } 100\% \times \text{SVE ratio } 30\% = 30\%$$

Out of 100% of the operating current, 30% is the servo emulation mode and 70% is the α control mode.

30% is the servo emulation mode because the ratio of the servo emulation mode in the operating current is not changed at standstill.

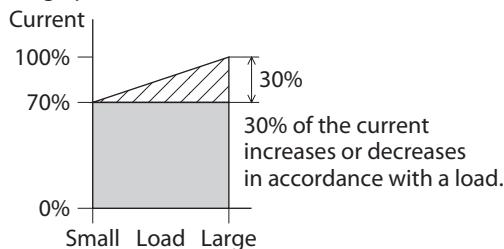
At this time, the current to be controlled in the α control mode is:

$$\text{Stop current } 50\% \times (100\% - \text{SVE ratio } 30\%) = 35\%$$

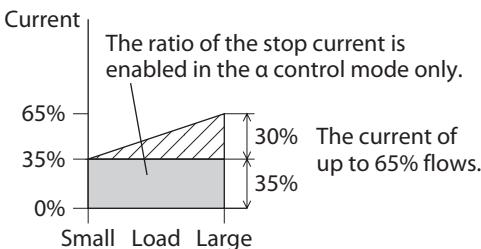
Therefore, the maximum current at standstill is:

The current of 65%, which equals to the servo emulation mode 30% plus the α control mode 35%, flows.

● During operation



● At standstill



■ Loop gain

It is enabled in the servo emulation mode.

Vibration that occurs while the motor is accelerating/decelerating or at standstill can be adjusted to an optimum value. (The optimum value varies depending on the equipment or operating condition.)

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|------------------|--|--|---------------|
| Base setting | SVE position loop gain | Adjusts the motor response in reaction to the position deviation. When this value is increased, the deviation between the command position and actual position becomes smaller. An excessively high value may increase the motor overshooting or cause motor hunting. Setting range 1 to 50 | 10 |
| | SVE speed loop gain | Adjusts the motor response in reaction to the speed deviation. When this value is increased, the deviation between the command speed and actual speed becomes smaller. An excessively high value may increase the motor overshooting or cause motor hunting. Setting range 10 to 200 | 180 |
| | SVE speed loop gain integral time constant | Adjusts the deviation that cannot be adjusted with the speed loop gain. An excessively high value of this may slow the motor response. On the other hand, an excessively low value may cause motor hunting. Setting range 100 to 2,000 (1=0.1 ms) | 1,000 |

2-3 Ramp up/ramp down rate of operating current

Set the rate when the operating current is changed. It is applied when the operating current is changed due to change of the operation data number, etc. However, it is not applied to change of the current due to the current cutback function.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|------------------|----------------------------------|--|---------------|
| Base setting | Operating current ramp up rate | Sets the increasing rate when the operating current increases. Setting range 0 to 100 ms/100% | 0 |
| | Operating current ramp down rate | Sets the decreasing rate when the operating current decreases. Setting range 0 to 100 ms/100% | 0 |

2-4 Deviation acceleration suppression

If sudden position deviation occurs, for example, when a large load is removed, the motor accelerates suddenly or has overspeed to remove deviation. Such phenomenon may cause damage to the load or equipment.

To suppress sudden acceleration and overspeed, set the "Deviation acceleration suppressing gain" parameter.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|------------------|---|--|---------------|
| Base setting | Deviation acceleration suppressing gain | Restrains occurrence of sudden acceleration and overspeed. When the value is increased, the response is decreased. Setting range 0 to 500 | 45 |



Use the initial value as it is if the position deviation is not occurred.

3 Backup of data of MEXE02 in driver

When you use the backup function of the **MEXE02**, data opened in the **MEXE02** can be stored in the backup area of the driver. The data stored by the backup function can be read using the restore function.

- **Use these functions in the following cases.**

- When checking the data of the driver at the shipping destination
- When the data of the **MEXE02** has been restored to the factory setting by mistake
- To restore the changed data of the **MEXE02** to the original

- **Data can be backed up also via RS-485 communication or industrial network.**

Via RS-485 communication or industrial network, the data of the **MEXE02** can be backed up in the driver or restored. Set the key code with the protect release command, then execute backup or restoration of the maintenance commands.

Related commands

| Modbus communication register address | | Name | Description | Initial value | R/W | Industrial network command code | |
|---------------------------------------|----------------|------------------------|--|---------------|-----|---------------------------------|------------------|
| Upper | Lower | | | | | READ | WRITE |
| 64 (0040h) | 65 (0041h) | Backup DATA access key | Inputs the key code to access the backup area. (⇒ Following table) | 0 | R/W | 32 (0020h) | 4128 (1020h) |
| 66 (0042h) | 67 (0043h) | Backup DATA write key | Inputs the key code to write to the backup area. (⇒ Following table) | 0 | R/W | 33 (0021h) | 4129 (1021h) |
| 406 (0196h) | 407 (0197h) | Backup data read | Reads all the data from the backup area. | – | W | – | 12491 (30CBh) |
| 408 (0198h) | 409 (0199h) | Backup data write | Writes all the data to the backup area. | – | W | – | 12492 (30CCh) |

Key code table

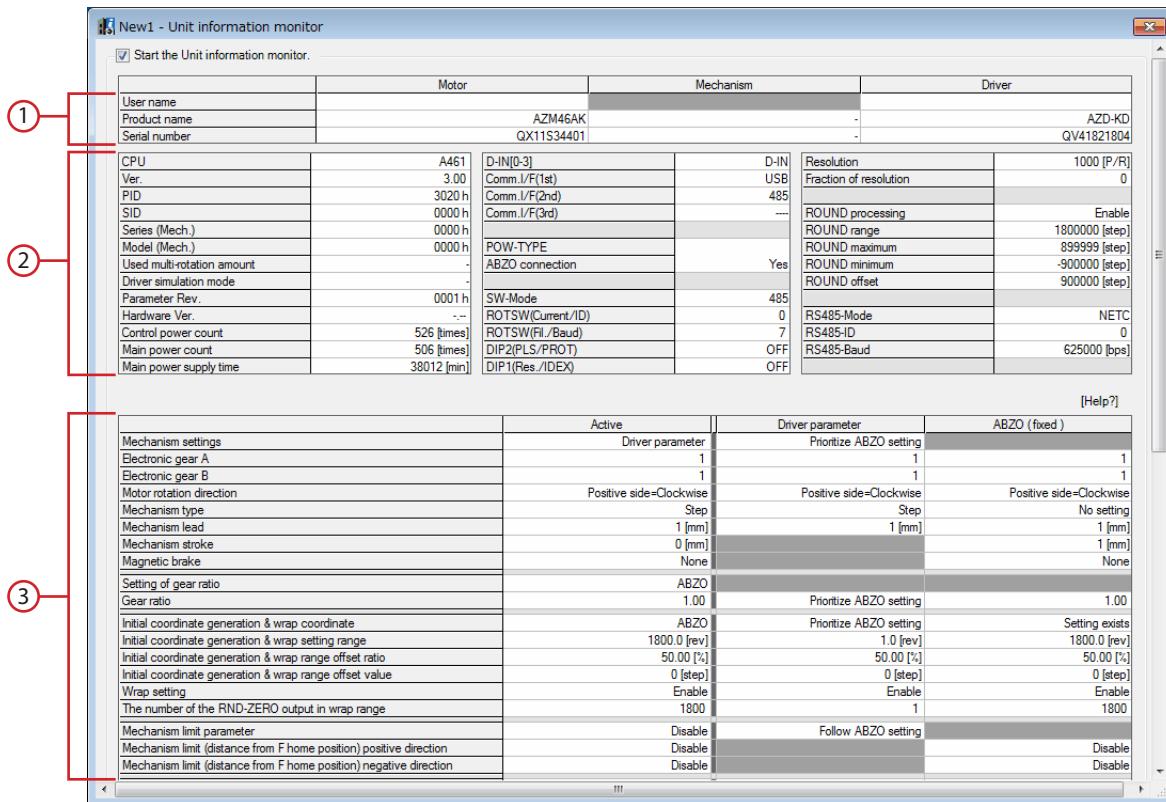
| Process that requires protect release | Command name | Key code |
|---------------------------------------|------------------------|------------------------|
| Data writing to backup area | Backup DATA access key | 20519253 (01391955h) |
| | Backup DATA write key | 1977326743 (75DB9C97h) |
| Data reading from backup area | Backup DATA access key | 20519253 (01391955h) |

4 Check of product information

The **MEXE02** is equipped with the unit information monitor.

This monitor function allows you to check product information such as product name, serial number, and settings of switches.

The set values of parameters can also be checked.



■ How to view the unit information monitor window

| Area | Description | | |
|------|----------------------------|--|--|
| 1 | Product information area | | |
| | Main monitored items | Description | |
| | User name | An arbitrary name can be given with a parameter. | |
| | Product name | The name of the product connected to the MEXE02 is displayed. | |
| | Serial number | This is a serial number assigned to each product. It is written at the time of factory shipment and cannot be changed. | |
| 2 | Driver information area | | |
| | Main monitored items | Description | |
| | Control power supply count | AC power input driver: The number of times when 24 VDC power supply was turned on DC power input driver: The number of times when the main power supply was turned on | |
| | Main power supply count | AC power input driver: The number of times when the rush suppression relay was turned ON DC power input driver: The number of times when the main power supply was turned on with the motor connected | |
| | Main power supply time | The total time while the main power supply was turned on | |

| Area | Description | | |
|--------------|---|--|--|
| 3 | Motor and mechanism information area Gray colored cells represent that the value is not set. | | |
| | Main monitored items | Description | |
| | Active | Parameter value presently used | |
| | Driver parameter | Parameter value set in the driver using the MEXE02 or communication | |
| ABZO (fixed) | Parameter value stored in the ABZO sensor This is the fixed value. It cannot be changed. | | |

| | Active | Driver parameter | ABZO (fixed) | [Help?] |
|---|-------------------------|-------------------------|-------------------------|---------|
| Mechanism settings | | | | |
| Electronic gear A | 1 | 1 | 1 | |
| Electronic gear B | 1 | 1 | 1 | |
| Motor rotation direction | | | | |
| Mechanism type | Positive side=Clockwise | Positive side=Clockwise | Positive side=Clockwise | |
| Mechanism lead | Step | Step | No setting | |
| Mechanism stroke | 1 [mm] | 1 [mm] | 1 [mm] | |
| Magnetic brake | 0 [mm] | 0 [mm] | 1 [mm] | |
| Setting of gear ratio | None | None | None | |
| Gear ratio | ABZO | ABZO | ABZO | |
| Initial coordinate generation & wrap coordinate | 1.00 | Prioritize ABZO setting | 1.00 | |
| Initial coordinate generation & wrap setting range | ABZO | Prioritize ABZO setting | Setting exists | |
| Initial coordinate generation & wrap range offset ratio | 1800.0 [rev] | 1.0 [rev] | 1800.0 [rev] | |
| Initial coordinate generation & wrap range offset value | 50.00 [%] | 50.00 [%] | 50.00 [%] | |
| Wrap setting | 0 [step] | 0 [step] | 0 [step] | |
| The number of the RND-ZERO output in wrap range | Enable | Enable | Enable | |
| Mechanism limit parameter | 1800 | 1 | 1800 | |
| Mechanism limit (distance from F home position) positive direction | Disable | Follow ABZO setting | Disable | |
| Mechanism limit (distance from F home position) negative direction | Disable | Disable | Disable | |
| Mechanism protection parameter | Disable | Follow ABZO setting | No setting | |
| Maximum starting speed | 0 [r/min] | 0 [r/min] | 8000 [r/min] | |
| Maximum Operating speed | 0 [r/min] | 0 [r/min] | 8000 [r/min] | |
| Maximum pushing speed | 0 [r/min] | 0 [r/min] | 8000 [r/min] | |
| Maximum pushing return-to-home speed | 0 [r/min] | 0 [r/min] | 8000 [r/min] | |
| Maximum push current | Pushing not possible | Pushing not possible | 100.0 [%] | |
| JOG/HOME/ZHOME operation setting | | | | |
| (JOG/HOME/ZHOME)Command filter time | Driver parameter | Prioritize ABZO setting | No setting | |
| (JOG/HOME/ZHOME)Operating RUN current | 1 [ms] | 1 [ms] | 1 [ms] | |
| (JOG) Travel amount | 100.0 [%] | 100.0 [%] | 100.0 [%] | |
| (JOG) Operating speed | 1 [step] | 1 [step] | 1 [step] | |
| (JOG) Acceleration/deceleration | 1000 [Hz] | 1000 [Hz] | 60 [r/min] | |
| (JOG) Starting speed | 1000.000 [kHz/s] | 1000.000 [kHz/s] | 1.000 [s] | |
| (JOG) Operating speed (high) | 500 [Hz] | 500 [Hz] | 30 [r/min] | |
| (ZHOME) Operation speed | 5000 [Hz] | 5000 [Hz] | 300 [r/min] | |
| (ZHOME) Acceleration/deceleration | 5000.000 [kHz/s] | 5000.000 [kHz/s] | 3.000 [s] | |
| (ZHOME) Starting speed | 1000 [Hz] | 1000 [Hz] | 30 [r/min] | |
| (HOME) Home-seeking mode | 3-sensor | 3-sensor | 3-sensor | |
| (HOME) Starting direction | Positive side | Positive side | Positive side | |
| (HOME) Acceleration/deceleration | 1000.000 [kHz/s] | 1000.000 [kHz/s] | 1.000 [s] | |
| (HOME) Starting speed | 500 [Hz] | 500 [Hz] | 30 [r/min] | |
| (HOME) Operating speed | 1000 [Hz] | 1000 [Hz] | 60 [r/min] | |
| (HOME) Last speed | 500 [Hz] | 500 [Hz] | 30 [r/min] | |
| (HOME) SLIT detection | Disable | Disable | Disable | |
| (HOME) TIM/ZSG signal detection | Disable | Disable | Disable | |
| (HOME) Position offset | 0 [step] | 0 [step] | 0.000 [rev] | |
| (HOME) Backward steps in 2 sensor home-seeking | 500 [step] | 500 [step] | 0.500 [rev] | |
| (HOME) Operating amount in uni-directional home-seeking | 500 [step] | 500 [step] | 0.500 [rev] | |
| (HOME) Operating current for push motion home-seeking | 100.0 [%] | 100.0 [%] | 100.0 [%] | |
| (HOME) Backward steps after first entry in push motion home-seeking | 0 [step] | 0 [step] | 0.000 [rev] | |
| (HOME) Pushing time in push motion home-seeking | 200 [ms] | 200 [ms] | 200 [ms] | |
| (HOME) Backward steps in push motion home-seeking | 500 [step] | 500 [step] | 0.500 [rev] | |



* About "Mechanism type"

If the value stored in the ABZO sensor is "No setting," the driver parameter is used.

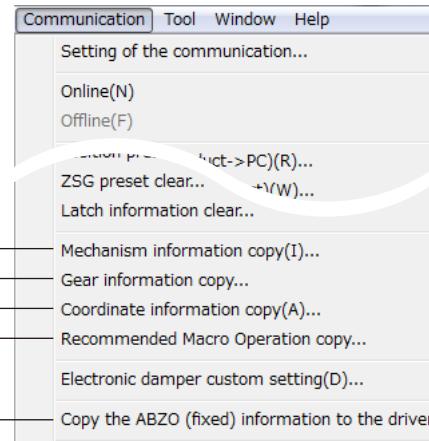
When the value stored in the ABZO sensor is any of "rev," "mm," or "deg," the ABZO (fixed value) is used.

5 Copying the setting value of the ABZO sensor to a driver

If the fixed value stored in the ABZO sensor is copied to the driver in advance, you can restore to the fixed value after changing the parameter by the manual setting. Copy from the ABZO sensor to the driver in the following steps.

■ Changing procedure

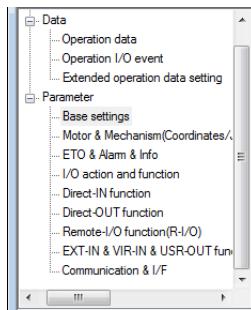
1. Click [Communication] menu of the **MEXE02** and select the parameter to copy from the ABZO sensor to the driver. Refer to the following figure for the information that will be copied. If the "Copy the ABZO (fixed) information to the driver in a lump" is selected, these parameters can be copied collectively.
2. Cycle the driver power after the copy is complete. The copied value is applied.
3. Check whether the copied value is applied on the unit information monitor window.



| | Active | Driver parameter | ABZO (fixed) |
|---|-------------------------|-------------------------|-------------------------|
| Mechanism settings | Driver parameter | Prioritize ABZO setting | |
| Electronic gear A | 1 | 1 | 1 |
| Electronic gear B | 1 | 1 | 1 |
| Motor rotation direction | Positive side=Clockwise | Positive side=Clockwise | Positive side=Clockwise |
| Mechanism type | Step | Step | No setting |
| Mechanism lead | 1 [mm] | 1 [mm] | 1 [mm] |
| Mechanism stroke | 0 [mm] | 0 [mm] | 1 [mm] |
| Magnetic brake | None | None | None |
| Setting of gear ratio | ABZO | | |
| Gear ratio | 1.00 | Prioritize ABZO setting | 1.00 |
| Initial coordinate generation & wrap coordinate | ABZO | Prioritize ABZO setting | |
| Initial coordinate generation & wrap setting range | 1800.0 [rev] | 1.0 [rev] | 1800.0 [rev] |
| Initial coordinate generation & wrap range offset ratio | 50.00 [%] | 50.00 [%] | 50.00 [%] |
| Initial coordinate generation & wrap range offset value | 0 [step] | 0 [step] | 0 [step] |
| Wrap setting | Enable | Enable | Enable |
| The number of the RND-ZERO output in wrap range | 1800 | 1 | 1800 |
| Mechanism limit parameter | Disable | Follow ABZO setting | |
| Mechanism limit (distance from F home position) positive direction | Disable | | Disable |
| Mechanism limit (distance from F home position) negative direction | Disable | | Disable |
| Mechanism protection parameter | Disable | Follow ABZO setting | No setting |
| Maximum starting speed | 0 [r/min] | 8000 [r/min] | 8000 [r/min] |
| Maximum Operating speed | 0 [r/min] | 8000 [r/min] | 8000 [r/min] |
| Maximum pushing speed | 0 [r/min] | 8000 [r/min] | 8000 [r/min] |
| Maximum pushing return-to-home speed | 0 [r/min] | 8000 [r/min] | 8000 [r/min] |
| Maximum push current | Pushing not possible | | 100.0 [%] |
| JOG/HOME/ZHOME operation setting | Driver parameter | Prioritize ABZO setting | No setting |
| (JOG/HOME/ZHOME)Command filter time | 1 [ms] | 1 [ms] | 1 [ms] |
| (JOG/HOME/ZHOME)Operating RUN current | 100.0 [%] | 100.0 [%] | 100.0 [%] |
| (JOG) Travel amount | 1 [step] | 1 [step] | 1 [step] |
| (JOG) Operating speed | 1000 [Hz] | 1000 [Hz] | 60 [r/min] |
| (JOG) Acceleration/deceleration | 1000.000 [kHz/s] | 1000.000 [kHz/s] | 1.000 [s] |
| (JOG) Starting speed | 500 [Hz] | 500 [Hz] | 30 [r/min] |
| (JOG) Operating speed (high) | 5000 [Hz] | 5000 [Hz] | 300 [r/min] |
| (ZHOME) Operation speed | 5000 [Hz] | 5000 [Hz] | 300 [r/min] |
| (ZHOME) Acceleration/deceleration | 1000.000 [kHz/s] | 1000.000 [kHz/s] | 1.000 [s] |
| (ZHOME) Starting speed | 500 [Hz] | 500 [Hz] | 30 [r/min] |
| (HOME) Home-seeking mode | 3-sensor | 3-sensor | 3-sensor |
| (HOME) Starting direction | Positive side | Positive side | Positive side |
| (HOME) Acceleration/deceleration | 1000.000 [kHz/s] | 1000.000 [kHz/s] | 1.000 [s] |
| (HOME) Starting speed | 500 [Hz] | 500 [Hz] | 30 [r/min] |
| (HOME) Operating speed | 1000 [Hz] | 1000 [Hz] | 60 [r/min] |
| (HOME) Last speed | 500 [Hz] | 500 [Hz] | 30 [r/min] |
| (HOME) SLIT detection | Disable | Disable | Disable |
| (HOME) TIM/ZSG signal detection | Disable | Disable | Disable |
| (HOME) Position offset | 0 [step] | 0 [step] | 0.000 [rev] |
| (HOME) Backward steps in 2 sensor home-seeking | 500 [step] | 500 [step] | 0.500 [rev] |
| (HOME) Operating amount in uni-directional home-seeking | 500 [step] | 500 [step] | 0.500 [rev] |
| (HOME) Operating current for push motion home-seeking | 100.0 [%] | 100.0 [%] | 100.0 [%] |
| (HOME) Backward steps after first entry in push motion home-seeking | 0 [step] | 0 [step] | 0.000 [rev] |
| (HOME) Pushing time in push motion home-seeking | 200 [ms] | 200 [ms] | 200 [ms] |
| (HOME) Backward steps in push motion home-seeking | 500 [step] | 500 [step] | 0.500 [rev] |

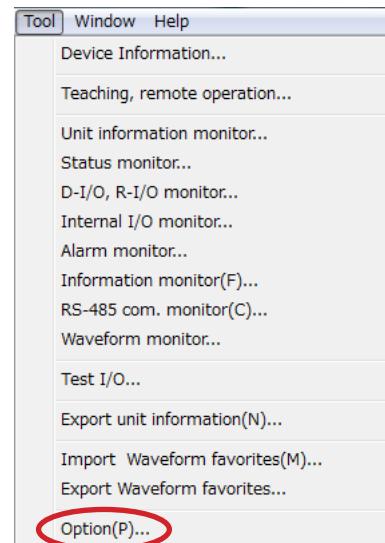
6 Indicating the warning before writing data

A desired name (user name) for the motor or driver can be set using the base setting parameter. If the user name is set, it can prevent from overwriting the data to a wrong product when the **MEXE02** data is written to the driver.

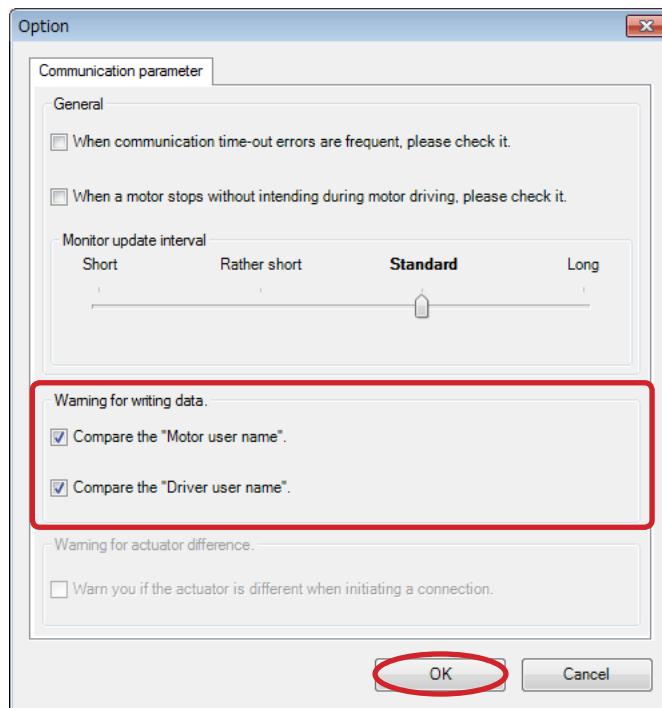


| | Operation data | Base settings |
|----|---|--------------------------------|
| 1 | Motor user name | Axis-01 |
| 2 | Driver user name | Axis-01 |
| 3 | | |
| 4 | Driver simulation mode | Use real motor |
| 5 | | |
| 6 | Base current [%] | 100.0 |
| 7 | Base current setting source (only for pulse input type) | The switch setting is followed |
| 8 | Standstill current [%] | 50.0 |
| 9 | Command filter setting | LPF |
| 10 | Command filter time constant [ms] | 1 |
| 11 | Command filter time constant setting source (only for pulse input type) | The switch setting is followed |

1. Click [Option] from the [Tool] menu.



2. Select the user name to be compared from "Warning for writing data," and click [OK].



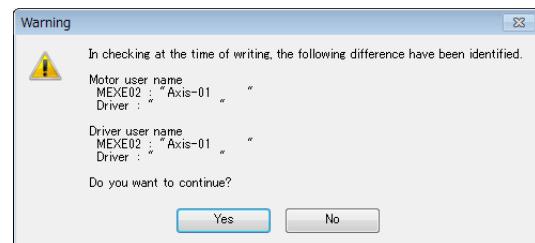
■ When writing data

When data writing is performed, if the user name is not same between the **MEXE02** and the product, the following message is shown.

Click either [Yes] or [No] after checking the product.

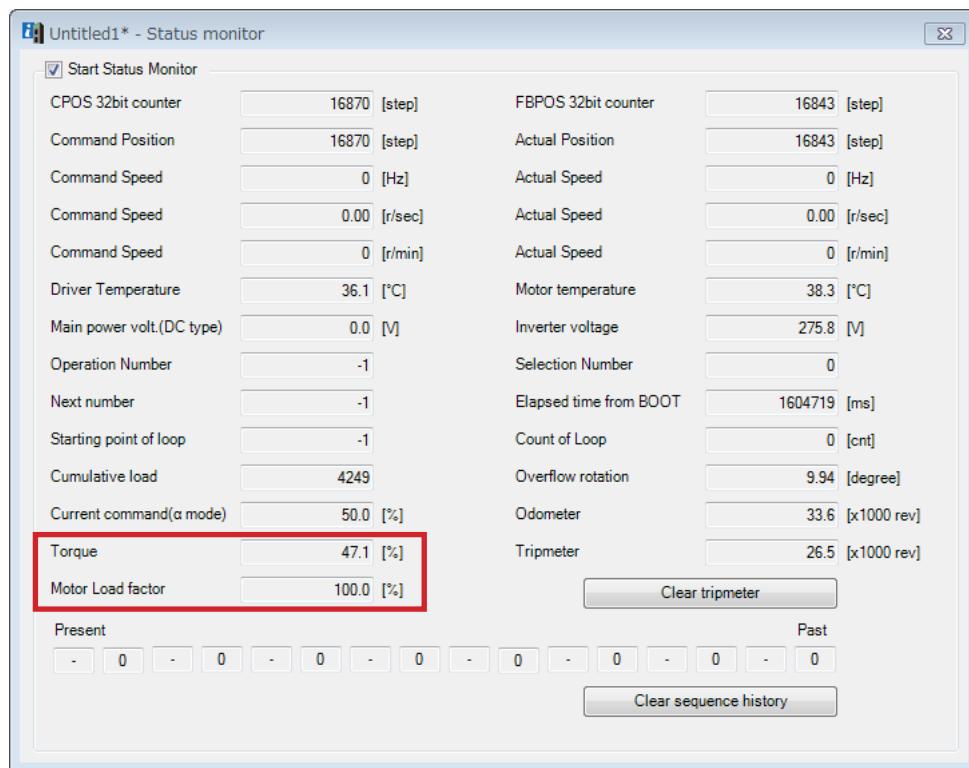
[Yes]: Writing data is executed.

[No]: Writing data is discontinued.



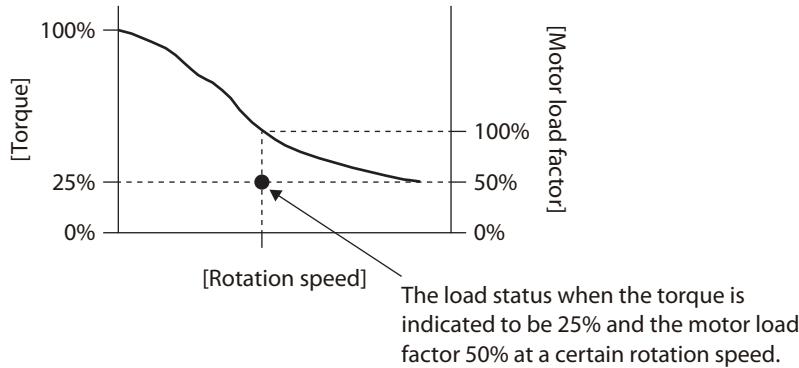
7 Monitoring of load factor

The load factor can be monitored on the status monitor of the **MEXE02**.



There are two methods to display the load factor as shown below.

- Torque: The current torque ratio against the maximum holding torque being 100% is displayed.
- Motor load factor: The current load factor against the output torque at the rotation speed being 100% is displayed.



The value of the motor load factor becomes stable when the load and speed are constant. Since the value varies while the speed is fluctuating, the load factor cannot be monitored in RS-485 communication. Monitor it on the status monitor window of the **MEXE02**.

8 Utilizing the waveform monitor

The waveform monitor is provided as one of the monitor functions of the **MEXE02**.

The waveform monitor is a function to output the output signal as a waveform in addition to the command speed and feedback speed of the motor.

Since each output signal such as READY, MOVE and TLC can be monitored simultaneously according to the operating status of the motor, creating and debugging of ladder programs can be performed efficiently.

This section explains how to use the waveform monitor window.

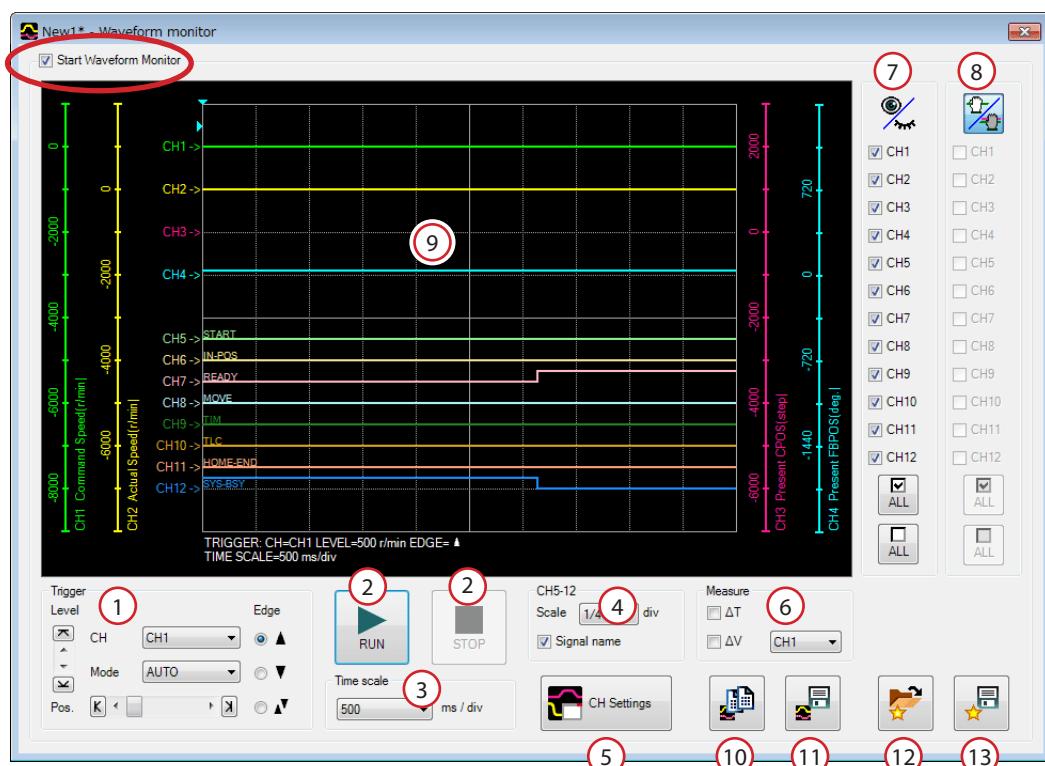
- Click the [Waveform Monitor] icon in the toolbar or click the [Waveform Monitor] short-cut button.



The waveform monitor window appears.

- Click "Start Waveform Monitor."

The buttons on the window are enabled, allowing you to prepare for measurement of the waveform monitor.

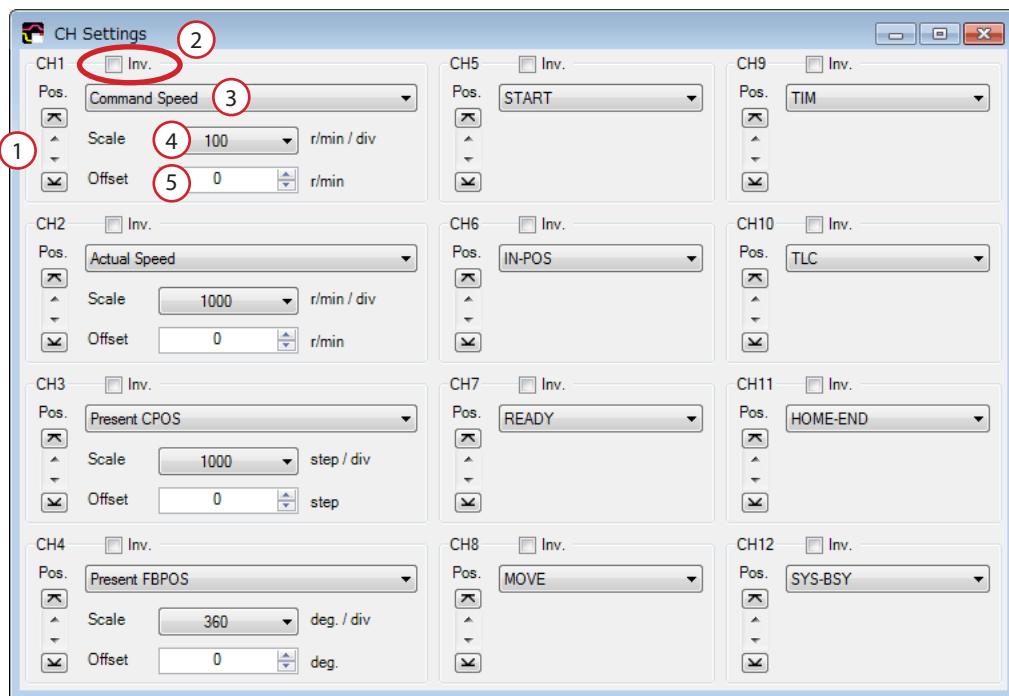


| | |
|----|---|
| 1 | Sets the Level, CH, Mode, Edge (detection condition), and Pos (trigger position) that are used when the waveform is measured. For "CH," only CH shown on ⑨ can be used. |
| 2 | RUN: This button is used to start measurement. STOP: This button is used to stop measurement. |
| 3 | Sets the measurement time range. |
| 4 | Scale: Selects the display size from 1/1 (100%), 1/2 (50%), or 1/4 (25%). Signal name: Switches between show or hide for the signal name. |
| 5 | Shows the CH setting window. |
| 6 | Switches between show or hide for the measure for measurement. Also, selects the CH to be measured. |
| 7 | Switches between show or hide for each CH. |
| 8 | When the display position of the waveform drawn on the screen is moved, CHs selected here can be moved collectively. |
| 9 | This is the area the measurement result is drawn. |
| 10 | Copies the waveform presently shown to the clipboard. |

| | |
|----|---|
| 11 | Saves the waveform presently shown to an external file. |
| 12 | Reads the setting for measurement from "Favorites." |
| 13 | Saves the setting for measurement as "Favorites." |

3. Click [CH Settings].

The CH setting window is shown. Set the measurement condition for each CH.



| | |
|---|--|
| 1 | Moves the display position of the waveform up and down. |
| 2 | Shows the measured item inverted. |
| 3 | Selects the item to be measured. The CH1 to CH4 are items for the command speed, feedback speed and others, and the CH5 to CH12 are items for I/O signals. |
| 4 | Selects the display size (for CH1 to CH4 only). The display size can be enlarged in combination with ⑤. |
| 5 | Adds the set offset value to the measured value (for CH1 to CH4 only). The display size can be enlarged in combination with ④. |

4. Click [RUN].

Waveform measurement starts.

5. If the [STOP] button is clicked during the measurement, the waveform measurement is ended.

If "SINGLE" is selected in the mode of trigger, the measurement is automatically ended when the drawing of the waveform is complete.

6. To end the waveform measurement, unselect "Start waveform monitor."



The following items can be monitored depending on the version of the driver or the **MEXE02**.

- Pulse waveforms (effective for drivers of Ver.4.00 or later)

Pulse waveforms being input externally can be monitored.

– In the case of the 2-pulse input mode: Assign CW to the D-IN0 and CCW to the D-IN2, and select by any of the CH5 to CH12.

– In the case of the 1-pulse input mode: Assign PLS to the D-IN0 and DIR to the D-IN2, and select by any of the CH5 to CH12.

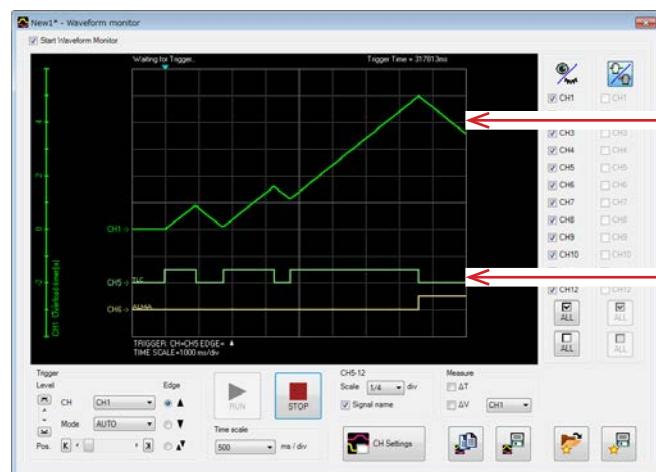
- Overload timer (effective for **MEXE02** of Ver.3.33 or later)

The overload timer is used to count the duration time of the overload status. Since the overload timer is of an analog output, select by any of the CH1 to CH4.

When the motor comes into the overload status, the TLC output is turned ON, and the timer starts counting. When the count value reaches the setting value of the "overload alarm," the overload alarm is generated.

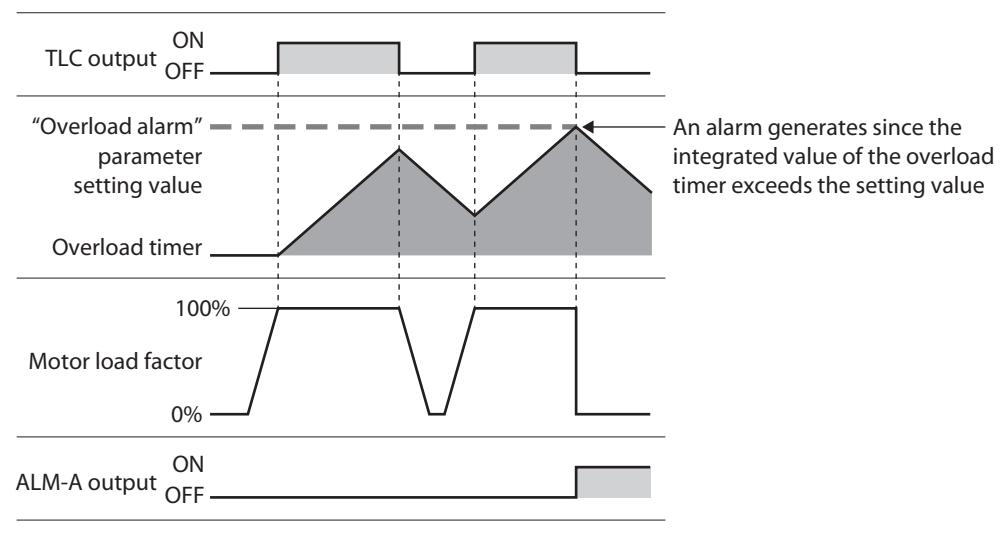
If the overload status is released on the way, the TLC output will be turned OFF. At this time, the timer does not return to 0, and the time at which the overload status was released will be subtracted from the count value. If the motor comes into the overload status again before the count value returns to 0, the overload alarm will generate earlier than the time set in the parameter since the timer starts adding from the middle of the count value.

Use when specifying the cause of the overload alarm.



The overload timer integrates the overload time. If the overload status is released, the time is subtracted.

The TLC output is turned ON when the overload status is occurred, and it is turned OFF when released.



9

Alarm and information

This chapter explains the alarm function and the information function. It also explains functions that help maintenance of the equipment.

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| 3 | Utilization for maintenance of equipment..... | 471 |

1 Alarms

The driver is equipped with an alarm function that protects it from temperature rise, connection failure, erroneous operation, etc.

When an alarm is generated, the ALM-A output is turned ON and the ALM-B output OFF, and the motor stops. At the same time, the PWR/ALM LED (or POWER/ALARM LED) blinks in red.

The cause of the alarm can be checked by counting the number of times the LED blinks, or using the **MEXE02** or RS-485 communication.

1-1 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. (Timing charts \Rightarrow p.462)

- Turn the ALM-RST input ON. (It is enabled at the ON edge.)
- Perform an alarm reset using RS-485 communication.
- Perform an alarm reset using the **MEXE02**.
- Cycle the power.



- Some alarms cannot be reset with the ALM-RST input, the **MEXE02**, or RS-485 communication. Check "1-4 Alarm list" on p. 451 to identify which alarms meet this condition. To reset these alarms, cycle the power.
- The absolute position error alarm can be reset by performing a position preset or return-to-home operation. If it cannot be reset with these methods, the ABZO sensor may be damaged.

1-2 Alarm records

Up to 10 generated alarms are saved in the non-volatile memory in order of the latest to oldest. Alarm records stored in the non-volatile memory can be read or cleared when performing any of the following operations.

- Read the alarm records by the monitor command via RS-485 communication.
- Clear the alarm records by the maintenance command via RS-485 communication.
- Read or clear the alarm records using the **MEXE02**.

1-3 Alarm generation conditions

The alarms in the following table are generated when the generation conditions are exceeded.

| Alarm code | Alarm name | Motor model | Generation condition | |
|------------|---------------------------------|--------------------------------------|-----------------------|-----------------------|
| | | | AC power input driver | DC power input driver |
| 21h | Main circuit overheat [°C (°F)] | – | 85 (185) | 85 (185) |
| 22h | Ovvoltage [V] | – | 430 | 63 |
| 26h | Motor overheat [°C (°F)] | – | 85 (185) | 85 (185) |
| 31h | Overspeed (r/min) | AZM14, AZM15 AZM24, AZM26 | – | 8,000 |
| | | AZM46, AZM48 AZM66 | 8,000 | 4,500 |
| | | AZM69 | 8,000 | 2,500 |
| | | AZM98, AZM911 | 5,000 | – |
| 34h | Command pulse error | – | 38,400 r/min | 38,400 r/min |

1-4 Alarm list

| Alarm code | Number of LED blinks | Alarm type | Cause | Remedial action | Reset using the ALM-RST input | Motor excitation * |
|------------|----------------------|-------------------------------------|---|---|-------------------------------|--------------------|
| 10h | 4 | Excessive position deviation | <ul style="list-style-type: none"> The deviation between the command position and detection position exceeded the value set in the "excessive position deviation alarm" parameter in the motor shaft during current on. The load is large or the acceleration/ deceleration time or the acceleration/ deceleration rate is too short for the load. The operation range of positioning push-motion SD operation was exceeded. | <ul style="list-style-type: none"> Decrease the load. Increase the acceleration/ deceleration time or decrease the acceleration/ deceleration rate. Increase the operating current. Review the operation data. | Possible | Non-excitation |
| 20h | 5 | Overcurrent | The motor, cable, and driver output circuit were short-circuited. | Turn off the power and cycle the power after checking that the motor, cable, and driver are not damaged. If the alarm has still not reset, the motor, the cable, or the driver may be damaged. Contact your nearest Oriental Motor sales office. | Not possible | Non-excitation |
| 21h | 2 | Main circuit overheat | The internal temperature of the driver reached the upper limit of the specified value. | Review the ventilation condition. | Possible | Non-excitation |
| 22h | 3 | Overvoltage (AC power input driver) | <ul style="list-style-type: none"> The power supply voltage exceeded the allowable value. A large inertial load was suddenly stopped. Vertical operation was performed. | <ul style="list-style-type: none"> Check the input voltage of the power supply. Decrease the load. Increase the acceleration/ deceleration time or decrease the acceleration/ deceleration rate. Connect the accessory regeneration unit RGB100 (sold separately). | Not possible | Non-excitation |

Alarms

| Alarm code | Number of LED blinks | Alarm type | Cause | Remedial action | Reset using the ALM-RST input | Motor excitation * |
|------------|----------------------|---------------------------------------|--|--|-------------------------------|--------------------|
| 22h | 3 | Oversupply (DC power input driver) | <ul style="list-style-type: none"> The power supply voltage exceeded the allowable value. A large inertial load was suddenly stopped. Vertical operation was performed. | <ul style="list-style-type: none"> Check the input voltage of the power supply. Decrease the load. Increase the acceleration/ deceleration time or decrease the acceleration/ deceleration rate. | Possible | Non-excitation |
| 23h | 3 | Main power supply OFF | The main power supply was shut off while operating. | Check if the main power supply is applied normally. | Possible | Non-excitation |
| 25h | 3 | Undervoltage | The power was cut off momentarily or the voltage became low. | Check the input voltage of the power supply. | Possible | Non-excitation |
| 26h | 8 | Motor overheating | The detection temperature of the ABZO sensor reached the upper limit of the specified value. | <ul style="list-style-type: none"> Check the heat radiating status of the motor. Review the ventilation condition. | Possible | Non-excitation |
| 28h | 8 | Sensor error | An error of the sensor was detected during operation. | Turn off the power and check the connection of the motor, and then cycle the power. | Not possible | Non-excitation |
| 2Ah | 8 | ABZO sensor communication error | An error occurred in communication between the driver and ABZO sensor. | Turn off the power and check the connection of the ABZO sensor, and then cycle the power. | Not possible | Non-excitation |
| 30h | 2 | Overload | A load exceeding the maximum torque was applied for the time exceeding the value set in the "overload alarm" parameter. | <ul style="list-style-type: none"> Decrease the load. Increase the acceleration/ deceleration time or decrease the acceleration/ deceleration rate. Increase the operating current. | Possible | Non-excitation |
| 31h | 2 | Overspeed | The detection speed of the motor output shaft exceeded the specified value. | <ul style="list-style-type: none"> Review the "electronic gear" parameter and set the speed of the motor output shaft to the specified value or less. If the motor is overshooting at the time of acceleration, change the setting to slow the acceleration. | Possible | Non-excitation |
| 33h | 7 | Absolute position error | The home position information of the ABZO sensor was damaged. | Perform position preset or return-to-home operation to reset the home position. | Not possible | Non-excitation |
| 34h | 2 | Command pulse error | The command pulse frequency exceeded the specified value. | Decrease the command pulse frequency. | Possible | Non-excitation |

| Alarm code | Number of LED blinks | Alarm type | Cause | Remedial action | Reset using the ALM-RST input | Motor excitation * |
|------------|----------------------|---|--|--|-------------------------------|--------------------|
| 41h | 9 | EEPROM error | Data stored in the driver was damaged. | Initialize all parameters. | Not possible | Non-excitation |
| 42h | 8 | Sensor error at power on | An error of the ABZO sensor was detected when the power was turned on. | Turn off the power and check the connection of the ABZO sensor, and then cycle the power. | Not possible | Non-excitation |
| 43h | 8 | Rotation error at power on | The motor was rotating when the power was turned on. | Adjust the load conditions and make sure the motor output shaft does not rotate due to an external force when the power is turned on. | Not possible | Non-excitation |
| 44h | 8 | Encoder EEPROM error | Data stored in the ABZO sensor was damaged. | <p>Execute one of the following operations. If the same alarm is still generated, the ABZO sensor is damaged. Contact the Oriental Motor sales office.</p> <ul style="list-style-type: none"> • Reset the Z-phase with the maintenance command "ZSG-PRESET." • Execute "Clear tripmeter" of the MEXEO2 or "Clear tripmeter" of the maintenance command. | Not possible | Non-excitation |
| 45h | 8 | Motor combination error | A motor not supported by the driver is connected. (⇒ Refer to p.457 for details.) | Check the model names of the motor and driver, and connect the motor and driver in the correct combination. | Not possible | Non-excitation |
| 4Ah | 7 | Return-to-home incomplete | The absolute positioning operation was started when the position coordinate has not been set. | Perform position preset or return-to-home operation. | Possible | Excitation |
| 51h | 2 | Regeneration unit overheat (only AC power input driver) | <ul style="list-style-type: none"> • Regeneration unit is not connected correctly. • Regeneration unit was overheated extraordinarily. | <ul style="list-style-type: none"> • If no regeneration unit is used, short the TH1 and TH2 terminals of CN1. • Connect the regeneration unit correctly. • The allowable regenerative power of the regeneration unit is exceeded. Review the load and operating condition. | Not possible | Non-excitation |

Alarms

| Alarm code | Number of LED blinks | Alarm type | Cause | Remedial action | Reset using the ALM-RST input | Motor excitation * |
|------------|----------------------|--------------------------------|--|--|-------------------------------|--------------------|
| 53h | 2 | Emergency stop circuit error | <ul style="list-style-type: none"> The allowable time from the turn-off of one of the HWTO input to the turn-off of the other 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. | <ul style="list-style-type: none"> Increase the "HWTO delay time of checking dual system" parameter. Check the wiring of the HWTO input. | Not possible | Non-excitation |
| 60h | 7 | ±LS both sides active | When the "FW-LS, RV-LS input action" parameter is set to "Immediate stop with alarm" or "Deceleration stop with alarm," both FW-LS and RV-LS inputs were detected. | Check the sensor logic and the "inverting mode" parameter. | Possible | Excitation |
| 61h | 7 | Reverse ±LS connection | The LS input opposite to the operating direction has been detected while performing return-to-home operation in 2-sensor mode or 3-sensor mode. | Check the wiring of the sensor. | Possible | Excitation |
| 62h | 7 | Return-to-home operation error | <ul style="list-style-type: none"> An unanticipated load was applied during the return-to-home operation. The installation positions of the FW-LS and RV-LS sensors and the HOME sensor are near to each other. Return-to-home operation was executed in a condition where both FW-LS and -RV-LS inputs were detected. Position preset processing upon completion of return-to-home operation failed. In return-to-home operation in one-way rotation mode, the motor passed by the HOME sensor during deceleration stop. | <ul style="list-style-type: none"> Check the load. Review the sensor installation positions and the starting direction of motor operation. Check the sensor logic and the "inverting mode" parameter. See that a load exceeding the maximum torque is not applied upon completion of return-to-home operation. Review the specifications of the HOME sensor and the "(HOME) Acceleration/deceleration" parameter. | Possible | Excitation |

| Alarm code | Number of LED blinks | Alarm type | Cause | Remedial action | Reset using the ALM-RST input | Motor excitation * |
|------------|----------------------|---------------------------------------|---|---|-------------------------------|--------------------|
| 63h | 7 | No HOMES | The HOMES input was not detected at a position between the FW-LS and RV-LS inputs while performing return-to-home operation in 3-sensor mode. | Install the HOME sensor at a position between the FW-LS and RV-LS sensors. | Possible | Excitation |
| 64h | 7 | TIM, Z, SLIT signal error | None of the TIM output, ZSG output, or SLIT input could be detected while performing return-to-home operation. | <ul style="list-style-type: none"> Review 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. Set the "(HOME) TIM/ZSG signal detection" parameter and the "(HOME) SLIT detection" parameter to "Disable" if the signals are not used. | Possible | Excitation |
| 66h | 7 | Hardware overtravel | When the "FW-LS, RV-LS input action" parameter is set to "Immediate stop with alarm" or "Deceleration stop with alarm," FW-LS input or RV-LS input was detected. | After resetting the alarm, escape from the sensor by operation or by manual. | Possible | Excitation |
| 67h | 7 | Software overtravel | When the "software overtravel" parameter is set to "Immediate stop with alarm" or "Deceleration stop with alarm," the motor position reached the set value of the software limit. | <ul style="list-style-type: none"> Review the operation data. After resetting the alarm, escape from the sensor by operation or by manual. | Possible | Excitation |
| 68h | 1 | Emergency stop | When the "HWTO mode selection" parameter is set to "Alarm generation," both HWTO1 and HWTO2 inputs were turned OFF. | Release the emergency stop status. | Possible | Non-excitation |
| 6Ah | 7 | Return-to-home operation offset error | When performing offset movement as part of return-to-home operation, FW-LS or RV-LS input has been detected. | Check the offset value. | Possible | Excitation |
| 6Dh | 7 | Mechanical overtravel | The product having set the home position reached the mechanism limit stored in the ABZO sensor. | <ul style="list-style-type: none"> Check the travel amount (position). After resetting the alarm, escape from the sensor by operation or by manual. | Possible | Excitation |

Alarms

| Alarm code | Number of LED blinks | Alarm type | Cause | Remedial action | Reset using the ALM-RST input | Motor excitation * |
|------------|----------------------|------------------------------------|--|--|-------------------------------|--------------------|
| 70h | 7 | Operation data error | <ul style="list-style-type: none"> • Stored data operation was performed with data whose operating speed was 0. • Wrap operation was executed when wrap setting was disabled. • Operation was performed with an operating speed or operating current exceeding the value set in the "mechanism protection" parameter. | <ul style="list-style-type: none"> • Check the operation data. • Check the wrap setting. (Sub code of the operation data error → p.459) | Possible | Excitation |
| 71h | 7 | Electronic gear setting error | The resolution set by the "electronic gear" parameter was out of the specification. | Review the "electronic gear" parameter and set the resolution within the specified value. | Not possible | Non-excitation |
| 72h | 7 | Wrap setting error | The power was turned on with a value of the "wrap setting" parameter that is inconsistent with the resolution set in the "electronic gear" parameter. | Set the wrap setting correctly and cycle the power. | Not possible | Non-excitation |
| 81h | 7 | Network bus error | During operation, the master controller for the network converter showed a disconnection status. | Check the connector or cable of the master controller. | Possible | Excitation |
| 83h | 7 | Communication switch setting error | Transmission rate setting switch (BAUD) was out of the specification. | Check the BAUD switch. | Not possible | Non-excitation |
| 84h | 7 | RS-485 communication error | <ul style="list-style-type: none"> • The number of consecutive RS-485 communication errors reached the value set in the "communication error alarm" parameter. • An error was detected three times in succession in communication with the network converter. | <ul style="list-style-type: none"> • Check the connection between the master controller and driver. • Check the setting of RS-485 communication. • Check the connection with the network converter. | Possible | Excitation |
| 85h | 7 | RS-485 communication timeout | <ul style="list-style-type: none"> • The time set in the "communication timeout" parameter has elapsed, and yet the communication could not be established with the master controller. • Communication with the network converter was not established for 200 ms or more. | <ul style="list-style-type: none"> • Check the connection between the master controller and driver. • Check the connection with the network converter. | Possible | Excitation |

| Alarm code | Number of LED blinks | Alarm type | Cause | Remedial action | Reset using the ALM-RST input | Motor excitation * |
|------------|----------------------|-------------------------|--|--|-------------------------------|--------------------|
| 8Eh | 7 | Network converter error | An alarm was generated in the network converter. | Check the alarm code of the network converter. | Possible | Non-excitation |
| F0h | Lit | CPU error | CPU malfunctioned. | Cycle the power. | – | – |

* When an alarm is generated, the motor operates as follows.

Non-excitation: When an alarm is generated, the motor current is cut off and the motor loses its holding torque.

The electromagnetic brake automatically actuates and holds the position when using the electromagnetic brake motor.

Excitation: Even when an alarm is generated, the motor current is not cut off and the motor position is held.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|------------------------|------------------------------------|---|---------------|
| ETO and Alarm and Info | Overload alarm | Sets the condition under which the overload alarm is generated. Setting range 1 to 300 (1=0.1 s) | 50 |
| | Excessive position deviation alarm | Sets the condition under which the excessive position deviation alarm is generated. Setting range 1 to 30,000 (1=0.01 rev) | 300 |

■ About causes of the motor combination error (alarm code 45h)

An alarm of the motor combination error is generated in the following conditions.

- When the motor for a DC power supply was connected to the AC power input driver.
- When the motor for an AC power supply was connected to the DC power input driver.
- When the motorized actuator was connected to the driver which version was earlier than Ver.2.02.
- When the motor of frame size 20 mm (0.79 in.) or 28 mm (1.10 in.) was connected to the DC power input driver and 48 VDC was applied.

An alarm is generated in the DC power input driver which version is Ver.3.10 or later.

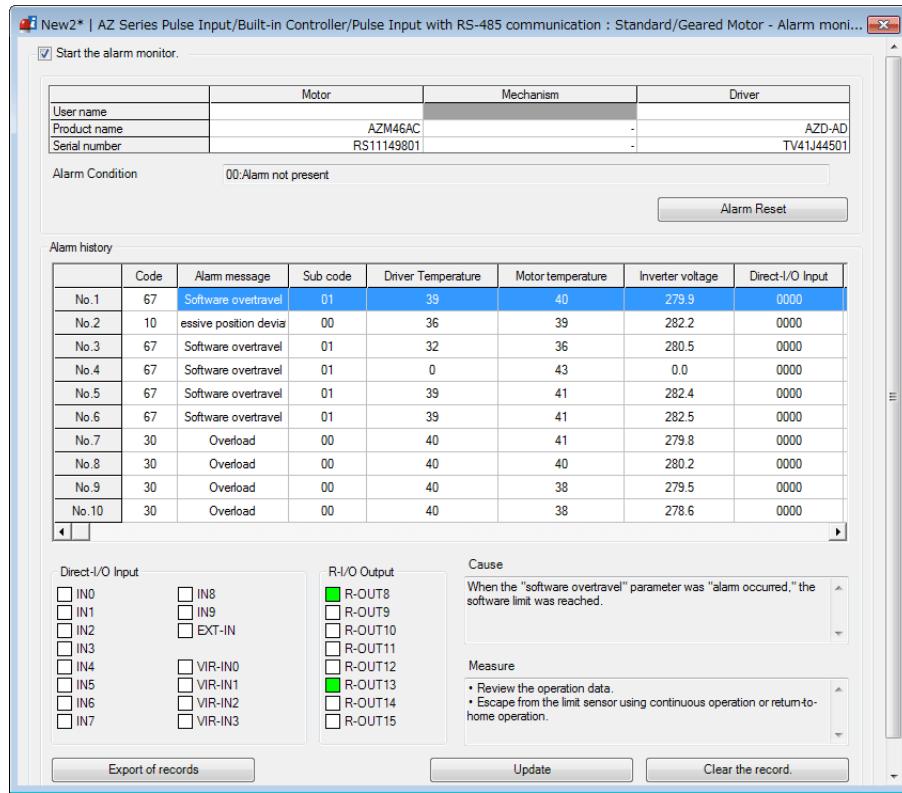
- When the motor of frame size 85 mm (3.35 in.) was connected to the AC power input driver which date of manufacture was earlier than January 2015.

Check the nameplate of the product for the manufacturing date of the driver.

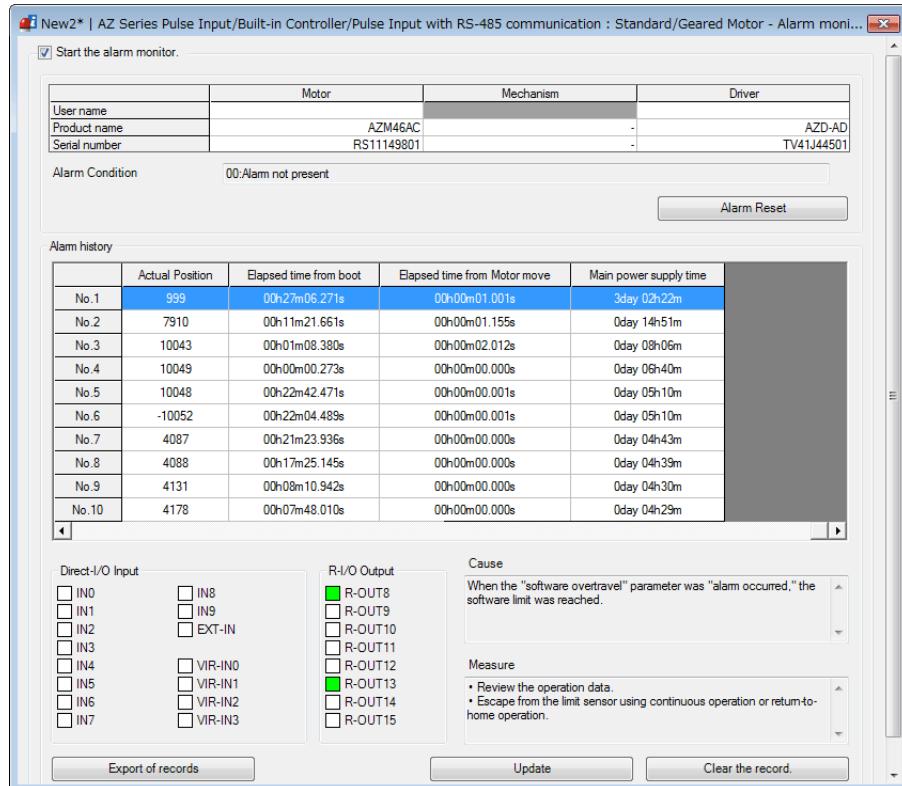
1-5 Monitor of alarm records

The **MEXE02** is equipped with an alarm monitor window.

The alarm monitor window allows you to check alarm records. The operation executed when the alarm was generated and the status of I/O signal are also recorded.



Window in which alarm records are scrolled to the right



■ Items that can be checked in alarm records

| Item | Description |
|------------------------------|--|
| Code | The alarm code. |
| Alarm message | The description of the alarm. |
| Sub code | Our code for checking. However, when the operation data error (alarm code 70h) was generated, you can check the cause of the alarm by yourself using the sub code. (Refer to the following table) |
| Driver temperature | The driver temperature when the alarm was generated. |
| Motor temperature | The motor temperature when the alarm was generated. |
| Inverter voltage | The inverter voltage when the alarm was generated. |
| Direct I/O input | The status of direct I/O when the alarm was generated is represented in a hexadecimal number. The details of bit are shown in "Direct I/O input" on the lower side of the alarm monitor window. |
| R-I/O output | The status of R-OUT when the alarm was generated is represented in a hexadecimal number. The details of bit are shown in "R-I/O output" on the lower side of the alarm monitor window. |
| Operation information 0 | The operation data number executed when the alarm was generated. (➡ Next item) |
| Operation information 1 | The operation executed when the alarm was generated is represented in numerals. (➡ Next item) |
| Actual position | The detection position of the motor when the alarm was generated. |
| Elapsed time from boot | The elapsed time from the input of the 24 VDC power to the generation of the alarm. |
| Elapsed time from Motor move | The elapsed time from the start of the operation to the generation of the alarm. |
| Main power supply time | The elapsed time from the input of the main power supply to the generation of the alarm. |



The R-I/O output is monitored inside even if the network is not used. If the output signal to be monitored is assigned to the R-I/O output, the number of the monitor at the time of alarm generation can be increased.

● Sub codes of the operation data error (alarm code 70h)

| Sub code | Causes of alarm |
|----------|---|
| 01h | Positioning operation was executed with setting the travel amount to "less than -2,147,483,647 steps" or "larger than 2,147,483,647 steps." |
| 02h | The operation to use the wrap function was executed in a state where the wrap function was disabled. |
| 03h | Positioning operation was executed in a state where the travel amount was other than 0 step and the speed was 0 Hz. |
| 04h | When the "Mechanism limit parameter setting" parameter is set to "0: ABZO sensor setting is followed," the operating speed exceeded the maximum operating speed set in the ABZO sensor. |
| 05h | When the "Mechanism limit parameter setting" parameter is set to "0: ABZO sensor setting is followed," the starting speed exceeded the maximum starting speed set in the ABZO sensor. |
| 06h | When the "Mechanism limit parameter setting" parameter is set to "0: ABZO sensor setting is followed," the push-motion maximum speed exceeded the maximum push-motion speed set in the ABZO sensor. |
| 07h | When the "Mechanism limit parameter setting" parameter is set to "0: ABZO sensor setting is followed," the push-motion maximum current exceeded the maximum push-motion current set in the ABZO sensor. |
| 08h | When the "Mechanism limit parameter setting" parameter is set to "0: ABZO sensor setting is followed," the parameter about return-to-home was exceeded the value set in the ABZO sensor. |

Alarms

The value (fixed value) set in the ABZO sensor can be checked on the unit information monitor.

| | Disable | Follow ABZO setting | |
|---|----------------------|-------------------------|---------------|
| Mechanism limit parameter | Disable | | Disable |
| Mechanism limit (distance from F home position) positive direction | Disable | | Disable |
| Mechanism limit (distance from F home position) negative direction | Disable | | Disable |
| Mechanism protection parameter | Disable | Follow ABZO setting | No setting |
| Maximum starting speed | 0 [r/min] | | 8000 [r/min] |
| Maximum Operating speed | 0 [r/min] | | 8000 [r/min] |
| Maximum pushing speed | 0 [r/min] | | 8000 [r/min] |
| Maximum pushing return-to-home speed | 0 [r/min] | | 8000 [r/min] |
| Maximum push current | Pushing not possible | | 100.0 [%] |
| JOG/HOME/ZHOME operation setting | Driver parameter | Prioritize ABZO setting | No setting |
| (JOG/HOME/ZHOME)Command filter time | 1 [ms] | 1 [ms] | 1 [ms] |
| (JOG/HOME/ZHOME)Operating RUN current | 100.0 [%] | 100.0 [%] | 100.0 [%] |
| (JOG) Travel amount | 1 [step] | 1 [step] | 1 [step] |
| (JOG) Operating speed | 1000 [Hz] | 1000 [Hz] | 60 [r/min] |
| (JOG) Acceleration/deceleration | 1000.000 [kHz/s] | 1000.000 [kHz/s] | 1.000 [s] |
| (JOG) Starting speed | 500 [Hz] | 500 [Hz] | 30 [r/min] |
| (JOG) Operating speed (high) | 5000 [Hz] | 5000 [Hz] | 300 [r/min] |
| (ZHOME) Operation speed | 5000 [Hz] | 5000 [Hz] | 300 [r/min] |
| (ZHOME) Acceleration/deceleration | 1000.000 [kHz/s] | 1000.000 [kHz/s] | 1.000 [s] |
| (ZHOME) Starting speed | 500 [Hz] | 500 [Hz] | 30 [r/min] |
| (HOME) Home-seeking mode | 3-sensor | 3-sensor | 3-sensor |
| (HOME) Starting direction | Positive side | Positive side | Positive side |
| (HOME) Acceleration/deceleration | 1000.000 [kHz/s] | 1000.000 [kHz/s] | 1.000 [s] |
| (HOME) Starting speed | 500 [Hz] | 500 [Hz] | 30 [r/min] |
| (HOME) Operating speed | 1000 [Hz] | 1000 [Hz] | 60 [r/min] |
| (HOME) Last speed | 500 [Hz] | 500 [Hz] | 30 [r/min] |
| (HOME) SLIT detection | Disable | Disable | Disable |
| (HOME) TIM/ZSG signal detection | Disable | Disable | Disable |
| (HOME) Position offset | 0 [step] | 0 [step] | 0.000 [rev] |
| (HOME) Backward steps in 2 sensor home-seeking | 500 [step] | 500 [step] | 0.500 [rev] |
| (HOME) Operating amount in uni-directional home-seeking | 500 [step] | 500 [step] | 0.500 [rev] |
| (HOME) Operating current for push motion home-seeking | 100.0 [%] | 100.0 [%] | 100.0 [%] |
| (HOME) Backward steps after first entry in push motion home-seeking | 0 [step] | 0 [step] | 0.000 [rev] |
| (HOME) Pushing time in push motion home-seeking | 200 [ms] | 200 [ms] | 200 [ms] |
| (HOME) Backward steps in push motion home-seeking | 500 [step] | 500 [step] | 0.500 [rev] |

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|---------------------|--|---|---------------|
| Motor and Mechanism | Mechanism protection parameter setting | Disables the ABZO setting of the mechanism protection parameter. Setting range 0: ABZO setting is followed 1: Disable | 0 |

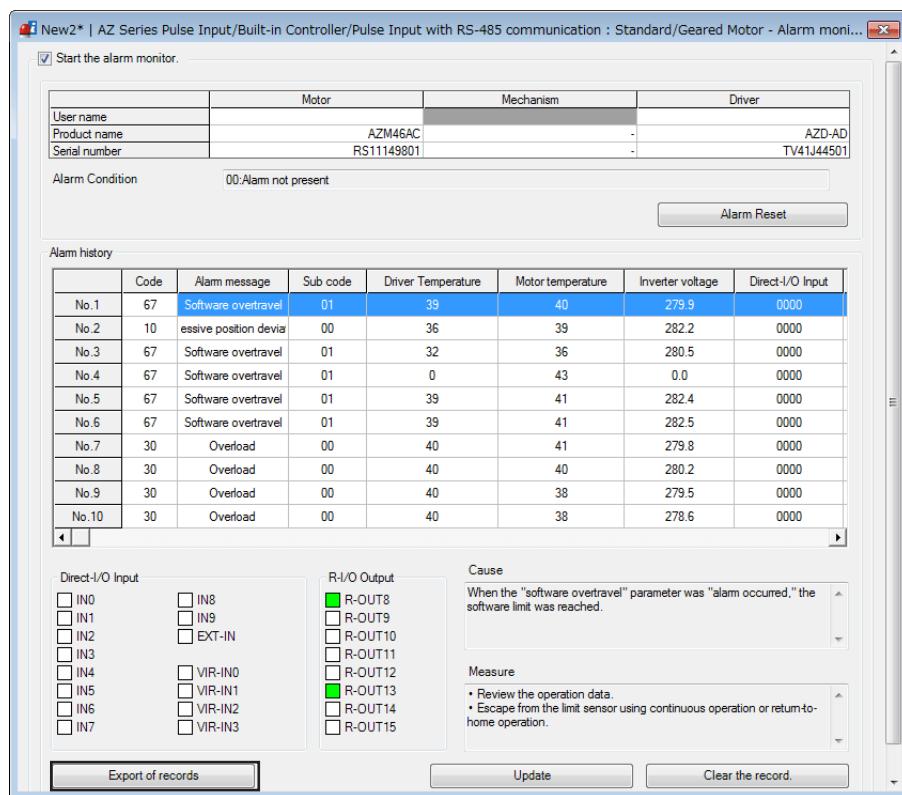
● Information shown in "Operation information 0" and "Operation information 1"

| | |
|-------------------------|--|
| Operation information 0 | -1: Operation data not used (*), or stopped 0 to 255: Operation data number in operation |
| Operation information 1 | 0: No internal oscillation (being stopped or operating by pulse input) 1: Stored data operation 2: Direct data operation 3: Return-to-home operation 4: High-speed return-to-home operation Other: Operation other than the above |

* Operation other than stored data operation or continuous macro operation is being executed.

■ Export of alarm records

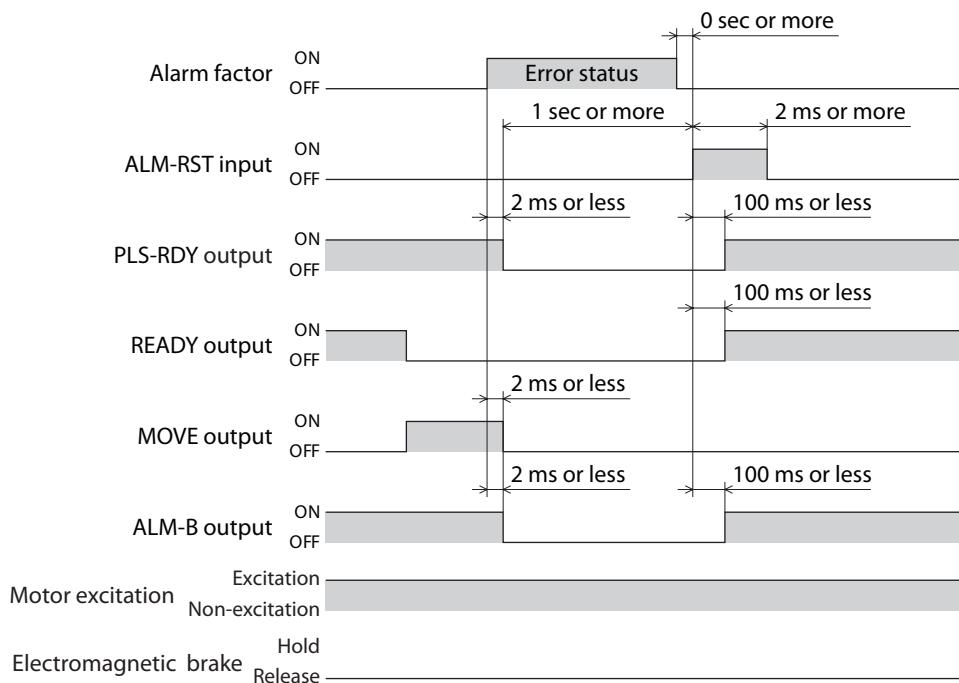
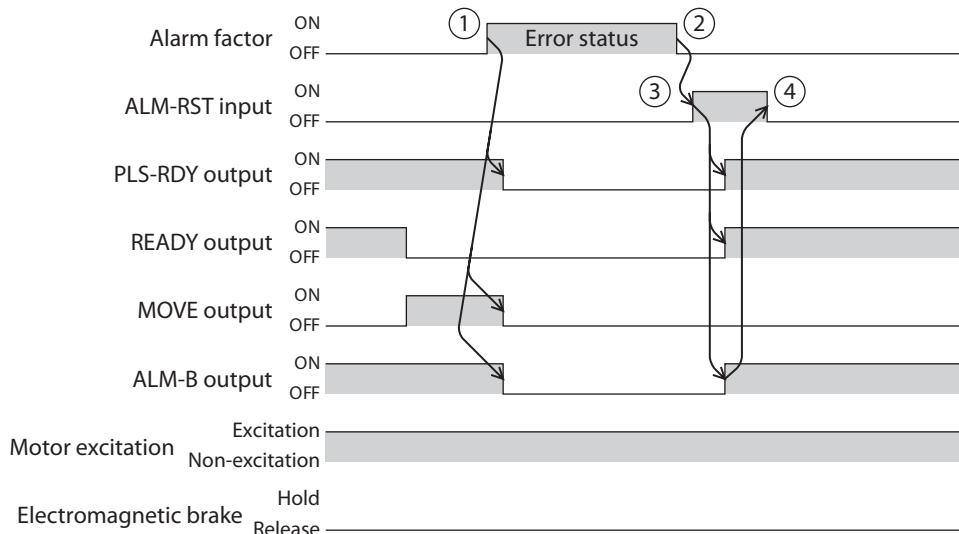
Up to 10 generated alarms in order of the latest to oldest can be exported in CSV format. (effective for **MEXE02** of Ver.3.40 or later)



1-6 Timing charts

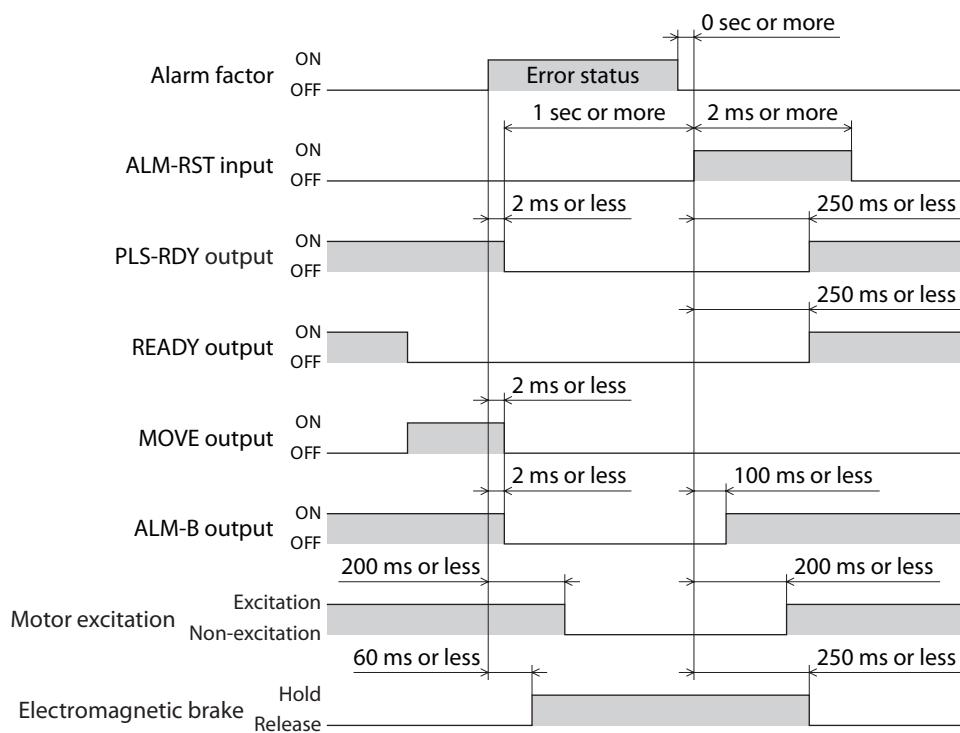
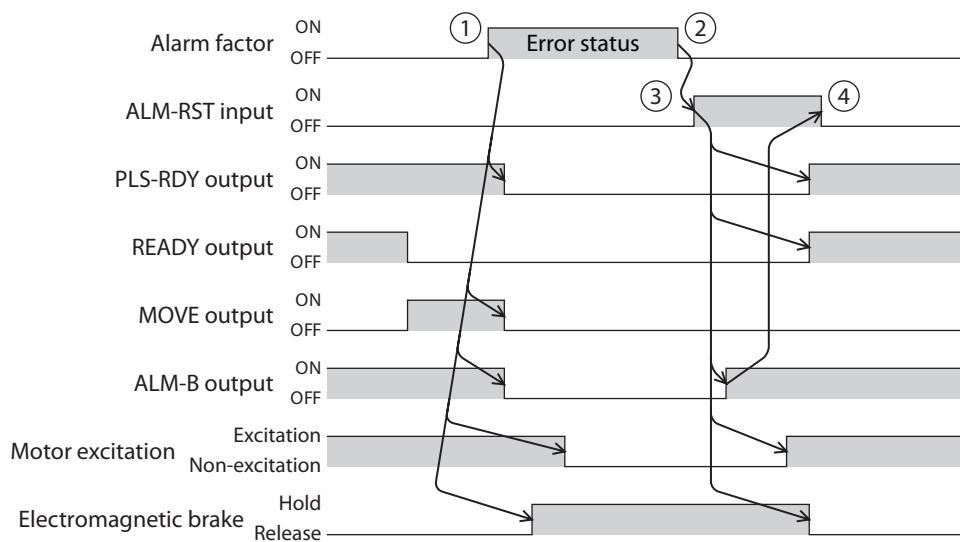
■ When the motor remains excited even if an alarm is generated

- When an error occurs, the ALM-B output, MOVE output, and PLS-RDY output are turned OFF. At the same time, the motor stops immediately.
- When you release the alarm, stop the pulse input. When the alarm is released while inputting pulses, the motor is started suddenly, causing injury or damage to the equipment.
- After eliminating the factor of the alarm, turn the ALM-RST input ON. The alarm is released and the ALM-B output, READY output, and PLS-RDY output are turned ON.
- Check that the ALM-B output has been turned ON and turn the ALM-RST input OFF.



■ When the motor is not excited after an alarm is generated

- When an error occurs, the ALM-B output, MOVE output, and PLS-RDY output are turned OFF. At the same time, the motor stops immediately.
- When you release the alarm, stop the pulse input. When the alarm is released while inputting pulses, the motor is started suddenly, causing injury or damage to the equipment.
- After eliminating the factor of the alarm, turn the ALM-RST input ON. The alarm is released and the ALM-B output, READY output, and PLS-RDY output are turned ON.
- Check that the ALM-B output has been turned ON and turn the ALM-RST input OFF.



2 Information

The driver is equipped with a function to generate information output before an alarm is generated. Setting of appropriate values to the parameter of each information will be a help for periodic maintenance of the equipment.

For example, a failure of the equipment or production stop due to motor overheat can be prevented by using the "motor temperature information" parameter. In addition, the "tripmeter information" parameter will be a reference for maintenance conducted after a certain travel distance is reached.

■ Status when information is generated

- Bit output of information

When information is generated, the bit output (INFO-** output) of the corresponding information is turned ON. Among bit outputs, the INFO-USRIO output can be used by assigning an arbitrary output signal. When the assigned output signal is turned ON, the INFO-USRIO output is also turned ON.
(Details of bit outputs → p.467)

- INFO output

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

- LED indicator

When information is generated, the red light and green light of PWR/ALM LED (POWER/ALARM LED) blink twice at the same time. (Red and green colors may overlap and it may be visible to orange.)

- Operation of motor

Unlike an alarm, even if information is generated, the motor is operated continuously.

- Parameter

Each information has a corresponding "INFO action" parameter. When the parameter is set to "Not reflected," only the bit output of information is turned ON. The INFO output and LED are not changed.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|------------------------|---|---|-------------------|
| ETO and Alarm and Info | 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. Setting range 0: Disable (not turned OFF automatically) 1: Enable (turned OFF automatically) | 1 |
| | Information LED indicator | Setting range 0: LED does not blink when information is generated 1: LED blinks when information is generated | 1 |
| | INFO-USRIO output selection | Selects an output signal to be checked in the INFO-USRIO output. Setting range Output signal → p.428 | 128: CONST-OFF |
| | INFO-USRIO output inversion | Setting range 0: The output logic of the INFO-USRIO output is not inverted 1: The output logic of the INFO-USRIO output is inverted | 0 |
| | Position deviation information (INFO-POSERR) | Sets the generation condition of the position deviation information (INFO-POSERR). Setting range 1 to 30,000 (1=0.01 rev) | 300 |
| | Driver temperature information (INFO-DRV TMP) | Sets the generation condition of the driver temperature information (INFO-DRV TMP). Setting range 40 to 85 °C | 85 |

| MEXE02 tree view | Parameter name | Description | Initial value |
|------------------------|--|--|---------------|
| ETO and Alarm and Info | Motor temperature information (INFO-MTRTMP) | Sets the generation condition of the motor temperature information (INFO-MTRTMP). Setting range 40 to 120 °C | 85 |
| | Ovvoltage information (INFO-OVOLT) (AC power input type driver) | Sets the generation condition of the overvoltage information (INFO-OVOLT). [AC power input driver only] Setting range 120 to 450 V | 435 |
| | Undervoltage information (INFO-UVOLT) (AC power input type driver) | Sets the generation condition of the undervoltage information (INFO-UVOLT). [AC power input driver only] Setting range 120 to 280 V | 120 |
| | Ovvoltage information (INFO-OVOLT) (DC power input type driver) | Sets the generation condition of the overvoltage information (INFO-OVOLT). [DC power input driver only] Setting range 150 to 630 (1=0.1 V) | 630 |
| | Undervoltage information (INFO-UVOLT) (DC power input type driver) | Sets the generation condition of the undervoltage information (INFO-UVOLT). [DC power input driver only] Setting range 150 to 630 (1=0.1 V) | 180 |
| | Overload time information (INFO-OLTIME) | Sets the generation condition of the overload time information (INFO-OLTIME). Setting range 1 to 300 (1=0.1 s) | 50 |
| | Overspeed information (INFO-SPD) | Sets the generation condition of the overspeed information (INFO-SPD). Setting range 0: Disable 1 to 12,000 r/min | 0 |
| | Cumulative load 0 information (INFO-CULD0) | Sets the generation condition of the cumulative load 0 information (INFO-CULD0). Setting range 0 to 2,147,483,647 | 0 |
| | Cumulative load 1 information (INFO-CULD1) | Sets the generation condition of the cumulative load 1 information (INFO-CULD1). Setting range 0 to 2,147,483,647 | 0 |
| | Cumulative load value auto clear | Setting range 0: The cumulative load is not cleared when operation is started (ON edge of the MOVE output) 1: The cumulative load is cleared when operation is started (ON edge of the MOVE output) | 1 |
| | Cumulative load value count divisor | Sets the divisor of the cumulative load. Setting range 1 to 32,767 | 1 |
| | Tripmeter information (INFO-TRIP) | Sets the generation condition of the tripmeter information (INFO-TRIP). Setting range 0: Disable 1 to 2,147,483,647 (1=0.1 kRev) | 0 |

| MEXE02 tree view | Parameter name | Description | Initial value |
|------------------------|--|--|---------------|
| | Odometer information (INFO-ODO) | Sets the generation condition of the odometer information (INFO-ODO). Setting range 0: Disable 1 to 2,147,483,647 (1=0.1 kRev) | 0 |
| | INFO action (Assigned I/O status information (INFO-USRIO)) | | |
| | INFO action (Position deviation information (INFO-POSERR)) | | |
| | INFO action (Driver temperature information (INFO-DRV TMP)) | | |
| | INFO action (Motor temperature information (INFO-MTP TMP)) | | |
| | INFO action (Overvoltage information (INFO-OVOLT)) | | |
| | INFO action (Undervoltage information (INFO-UVOLT)) | | |
| | INFO action (Overload time information (INFO-OLTIME)) | | |
| | INFO action (Speed information (INFO-SPD)) | | |
| | INFO action (Start operation error information (INFO-START)) | | |
| ETO and Alarm and Info | INFO action (Start ZHOME error information (INFO-ZHOME)) | Setting range 0: When information is generated, only the bit output of the corresponding information is turned ON. 1: When information is generated, the INFO output is also turned ON, and LED blinks. | 1 |
| | INFO action (Preset request information (INFO-PR-REQ)) | | |
| | INFO action (Electronic gear setting error information (INFO-EGR-E)) | | |
| | INFO action (Wrap setting error information (INFO-RND-E)) | | |
| | INFO action (RS-485 communication error information (INFO-NET-E)) | | |
| | INFO action (Forward operation prohibition information (INFO-FW-OT)) | | |
| | INFO action (Reverse operation prohibition information (INFO-RV-OT)) | | |
| | INFO action (Cumulative load 0 information (INFO-CULD0)) | | |
| | INFO action (Cumulative load 1 information (INFO-CULD1)) | | |
| | INFO action (Tripmeter information (INFO-TRIP)) | | |

| MEXE02 tree view | Parameter name | Description | Initial value |
|------------------------|---|--|---------------|
| ETO and Alarm and Info | INFO action (Odometer information (INFO-ODO)) | Setting range 0: When information is generated, only the bit output of the corresponding information is turned ON. 1: When information is generated, the INFO output is also turned ON, and LED blinks. | 1 |
| | INFO action (Start operation restricted mode information (INFO-DSLMTD)) | | |
| | INFO action (I/O test mode information (INFO-IOTEST)) | | |
| | INFO action (Configuration request information (INFO-CFG)) | | |
| | INFO action (Reboot request information (INFO-RBT)) | | |

2-1 Information records

Up to 16 generated information pieces are saved in the RAM in order of the latest to oldest. The information items kept as information records are the information code, generation time, and contents of information.

Information records stored in the RAM can be read or cleared when performing any of the following operations.

- Read the information records by the monitor command via RS-485 communication.
- Clear the information records by the maintenance command via RS-485 communication.
- Read or clear information records with the **MEXE02**.



Since information records are saved in the RAM, they are cleared when the driver is turned OFF.

2-2 Information list

| Contents of information | Information bit output signal | Cause | Releasing condition |
|-------------------------|-------------------------------|---|--|
| Assigned I/O status | INFO-USRIO | The I/O signal set in the "INFO-USRIO output selection" parameter was turned ON. | The I/O signal set in the "INFO-USRIO output selection" parameter was turned OFF. |
| Position deviation | INFO-POSERR | The deviation between the command position and detection position exceeded the value set in the "position deviation information" parameter in the motor output shaft. | The deviation between the command position and detection position became lower than the value set in the "position deviation information" parameter in the motor output shaft. |
| Driver temperature | INFO-DRVTEMP | The internal temperature of the driver exceeded the value set in the "driver temperature information" parameter. | The internal temperature of the driver became lower than the value set in the "driver temperature information" parameter. |
| Motor temperature | INFO-MTRTEMP | The detection temperature of the encoder exceeded the value set in the "motor temperature information" parameter. | The detection temperature of the encoder became lower than the value set in the "motor temperature information" parameter. |
| Overvoltage | INFO-OVOLT | <ul style="list-style-type: none"> • The power supply voltage exceeded the value set in the "overvoltage information" parameter. • A large inertial load was suddenly stopped. • Vertical operation was performed. | The power supply voltage became lower than the value set in the "overvoltage information" parameter. |
| Undervoltage | INFO-UVOLT | <ul style="list-style-type: none"> • The power supply voltage became lower than the value set in the "undervoltage information" parameter. • The power was cut off momentarily or the voltage became low. | The power supply voltage exceeded the value set in the "undervoltage information" parameter. |

| Contents of information | Information bit output signal | Cause | Releasing condition |
|-------------------------------|-------------------------------|--|--|
| Overload time | INFO-OLTIME | A load exceeding the maximum torque was applied for the time exceeding the value set in the "overload time information" parameter. | The overload counter became lower than the value set in the "overload time information" parameter. |
| Speed | INFO-SPD | The detection speed of the motor exceeded the value set in the "overspeed information" parameter. | The detection speed of the motor became lower than the value set in the "overspeed information" parameter. |
| Operation start error | INFO-START | <ul style="list-style-type: none"> • With the FW-BLK input or RV-BLK input, the operation start signal in the stop direction was turned ON. • With the FW-LS input or RV-LS input, the operation start signal in the stop direction was turned ON. • With the soft limit, the operation start signal in the stop direction was turned ON. • When operation could not be executed (e.g.: The READY output was OFF), the operation start signal was turned ON. | Operation was started normally. |
| ZHOME start error | INFO-ZHOME | <ul style="list-style-type: none"> • When the position coordinate was not set (the ABSPEN output was OFF), the ZHOME input was turned ON. • When the motor was used with the electrical home position coordinate system (the EL-PRST input was ON), return-to-home operation was performed. | Operation was started normally. |
| Preset request | INFO-PR-REQ | Preset was executed by position preset or return-to-home operation. | Preset was complete. |
| Electronic gear setting error | INFO-EGR-E | The resolution set by the "electronic gear" 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 "wrap setting range" parameter were inconsistent. | The "wrap setting range" parameter was set in the range of the specification. |
| RS-485 communication error | INFO-NET-E | A RS-485 communication error was detected. | RS-485 communication was performed normally. |
| Forward operation prohibition | INFO-FW-OT | <ul style="list-style-type: none"> • The positive software limit was exceeded. • Either the FW-LS input or the FW-BLK input was turned ON. | The positive software limit was not exceeded, and both FW-LS and FW-BLK inputs were turned OFF. |
| Reverse operation prohibition | INFO-RV-OT | <ul style="list-style-type: none"> • The negative software limit was exceeded. • Either the RV-LS input or the RV-BLK input was turned ON. | The negative software limit was not exceeded, and both RV-LS and RV-BLK inputs 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 became lower than 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 became lower than the value set in the "cumulative load 1 information" parameter. |

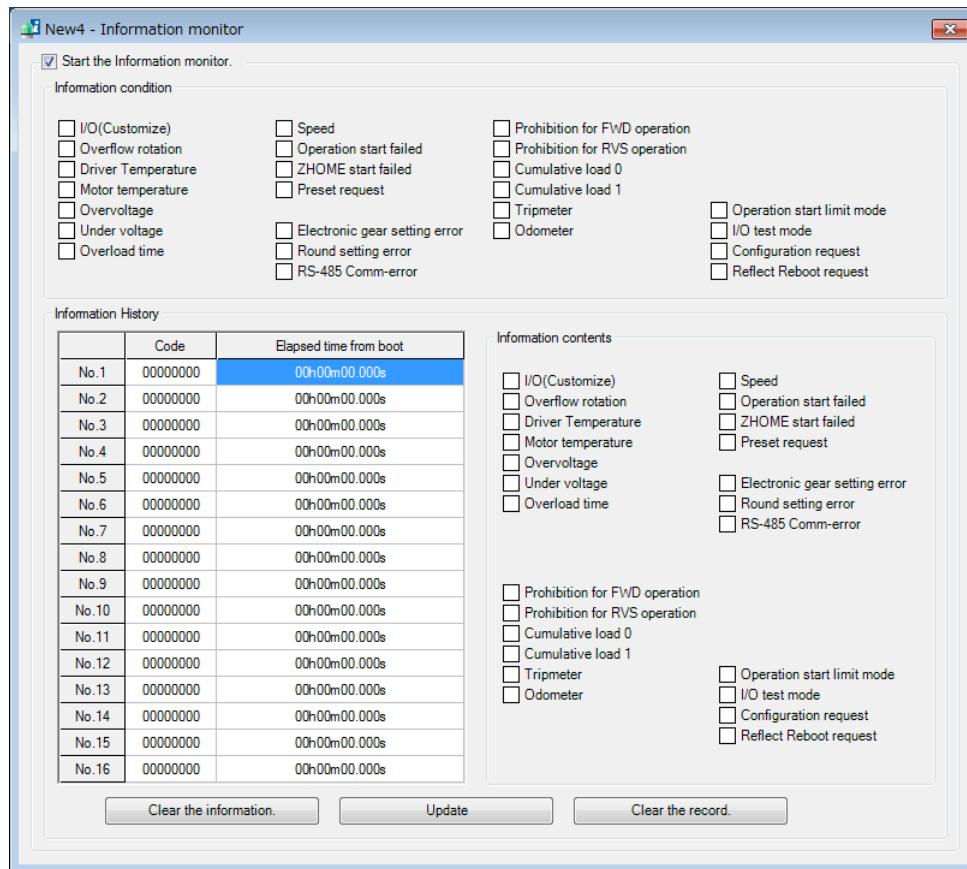
| Contents of information | Information bit output signal | Cause | Releasing condition |
|---------------------------------|-------------------------------|---|---|
| Tripmeter | INFO-TRIP | The travel distance of the motor exceeded the value set in the "tripmeter information" parameter. | After performing one of the following operations, the travel distance (Tripmeter) of the motor became lower than the value set in the "tripmeter information" parameter. – The "tripmeter information" parameter was reset. – Tripmeter was cleared with the MEXE02 or RS-485 communication. |
| Odometer | INFO-ODO | The cumulative travel distance of the motor exceeded the value set in the "odometer information" parameter. | After performing the following operation, the cumulative travel distance (Odometer) of the motor became lower than the value set in the "odometer information" parameter. – The "odometer information" parameter was reset. |
| Operation start restricted mode | INFO-DSLMTD | • "Teaching, remote operation" was executed with the MEXE02 . • Configuration was executed. | • Teaching, remote operation was released. • Configuration was complete. |
| I/O test mode | INFO-IOTEST | • "I/O test" was executed with the MEXE02 . • Configuration was executed. | • The I/O test mode was released. • Configuration was complete. |
| Configuration request | INFO-CFG | Execution of configuration was required. | Configuration is executed. |
| Reboot request | INFO-RBT | Reboot was requested. | Reboot was performed. |



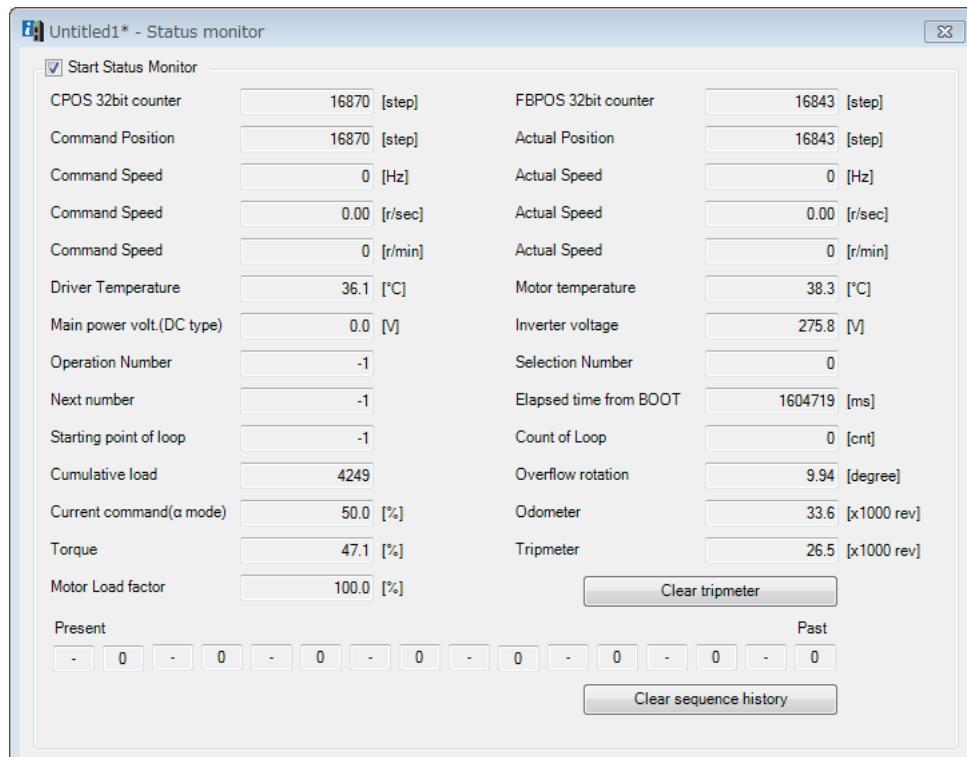
When the "Information auto clear" parameter was disabled and the "preset request" information was generated for 100 ms or more, the preset may have failed.

2-3 Monitor of information function

When you use the information monitor of the **MEXE02**, you can check the status and records of the information function.



The status monitor window of the **MEXE02** displays the operation status. Use it as a reference for checking operation or planning maintenance of the equipment.



3 Utilization for maintenance of equipment

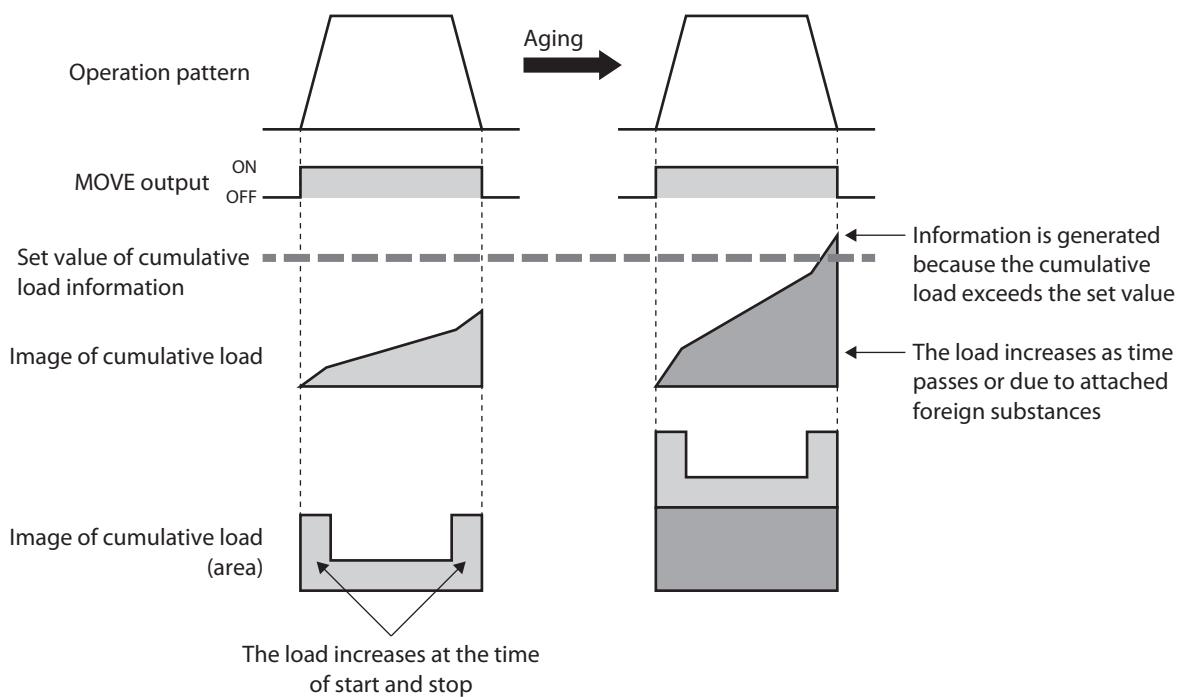
Various functions of the **AZ Series** are also helpful for maintenance of the equipment.

3-1 Cumulative load

The load factor in the operation pattern of the motor can be grasped with the area. When the cumulative area (load) exceeds a certain value, it can be notified with information. It is a convenient function that serves as a reference of the life of the motor and aged deterioration of the equipment.

■ Concept of cumulative load

As operation continues, the equipment gets more friction and load because of rust and foreign substances attached and deterioration. By assuming such increase of load (cumulative load) and setting it as information, stop of the equipment due to aging troubles can be prevented. Since the load increases at the time of start and stop, set a value with a surplus.



■ How to use

1. Open the status monitor window of the **MEXE02** during operation and check the cumulative load in the normal operation pattern.
Allow leeway for this value and presume the maximum value of the cumulative load.

| | | |
|---|--|---|
| The approximate maximum value is presumed to be 5,000 | Starting point of loop -1 Cumulative load 4249 Current command(α mode) 50.0 [%] Torque 47.1 [%] Motor Load factor 100.0 [%] | Count of Loop 0 [cnt] Overflow rotation 9.94 [degree] Odometer 33.6 [x1000 rev] Tripmeter 26.5 [x1000 rev] |
| | <input type="button" value="Clear tripmeter"/> | |

2. Set the maximum value decided in step 1 for information.

| | |
|--|--------|
| Overvoltage information (INFO-OVOLT) (DC input type driver) [V] | 63.0 |
| Undervoltage information (INFO-OVOLT) (DC input type driver) [V] | 18.0 |
| Overload time information (INFO-OLTIME) [s] | 5.0 |
| Overspeed information (INFO-SPD) [r/min] | 4500 |
| Cumulative load 0 information (INFO-CULD0) | 5000 |
| Cumulative load 1 information (INFO-CULD1) | 0 |
| Cumulative load value auto clear | Enable |

3. When operation of the equipment is started and the cumulative load of the motor increases to reach "5,000," information is generated.
Perform maintenance of the equipment.

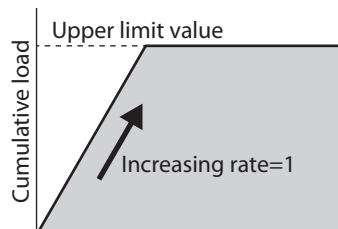
■ About "cumulative load value count divisor" parameter

The upper limit value of cumulative load count is 2,147,483,647.

If linking and loop are repeated or the operating time is long, the cumulative load increases. Control may become difficult or the upper limit value of count may be exceeded.

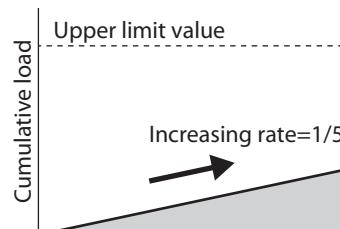
In this case, use the "cumulative load value count divisor" parameter. The "cumulative load value count divisor" parameter is a divisor to divide the count value of the cumulative load. Division by the cumulative load value count divisor makes it easier to control the count value.

- When the "cumulative load value count divisor" parameter is "1"



The upper limit value is reached while operation is continued, and the cumulative load cannot be counted

- When the "cumulative load value count divisor" parameter is "5"

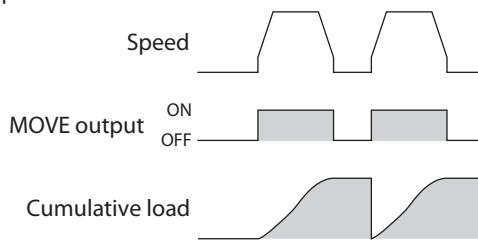


Increase slows down because the count value of the cumulative load is divided by "5"

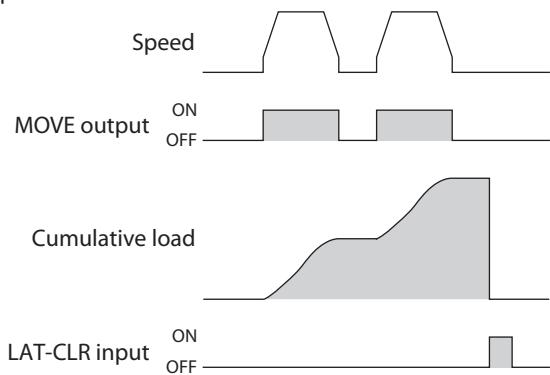
■ About "cumulative load value auto clear" parameter

- When the "cumulative load value auto clear" parameter is set to "Enable," the cumulative load is cleared to be 0 every time the MOVE output is turned ON. You can reset the cumulative load for each operation.
- When the "cumulative load value auto clear" parameter is set to "Disable," the cumulative load is not cleared even if the MOVE output is turned ON, and addition continues. The cumulative load in a certain period or under a certain condition can be monitored. If this parameter is set to "Disable," reset the cumulative load with the LAT-CLR input.

- When the "cumulative load value auto clear" parameter is enabled



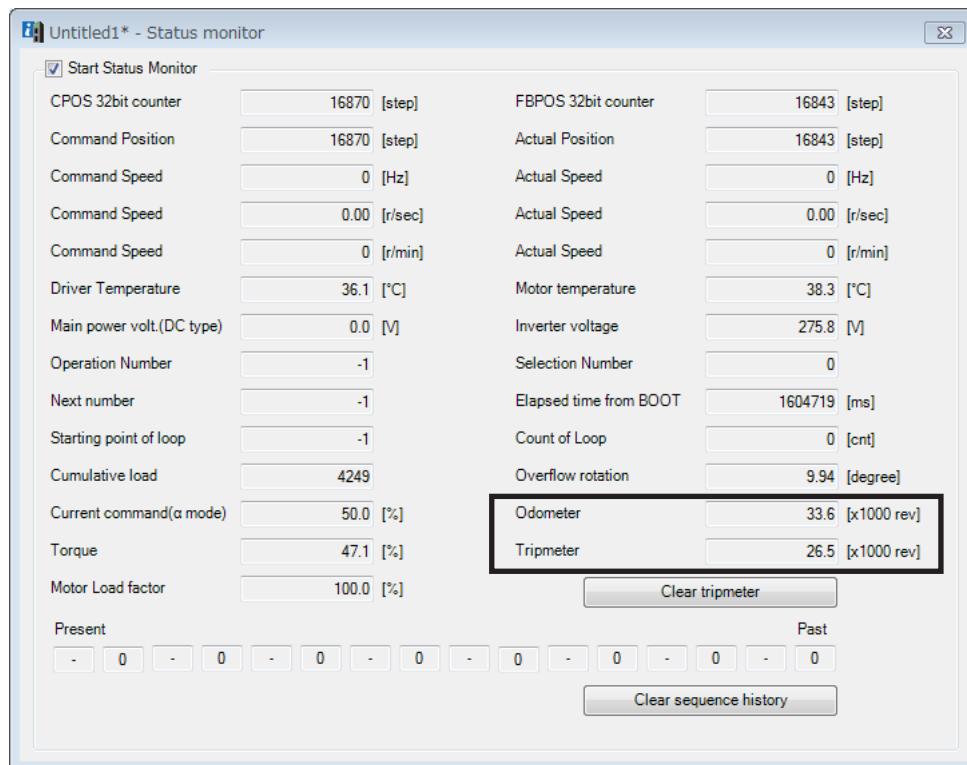
- When the "cumulative load value auto clear" parameter is disabled



3-2 Tripmeter (travel distance) and odometer (cumulative travel distance)

The travel distance and cumulative travel distance of the motor can be utilized for equipment maintenance. Check the values of the tripmeter (travel distance) and odometer (cumulative travel distance) in the status monitor window of the **MEXE02**. If you set the information based on these values, you can perform appropriate maintenance according to the travel distance of the motor.

● Status monitor window



Note

The data of the tripmeter and odometer are saved in the non-volatile memory of the driver at an interval of five minutes. If you turn off the power before saving the data in the driver, the travel distance for five minutes is not reflected.

memo

You can also reset the tripmeter after maintenance of the equipment. Click [Clear tripmeter].

● Setting of information parameter

| | |
|--|---------|
| Tripmeter general information (INFO-TRIP) [kRev] | 1000.0 |
| Odometer general information (INFO-ODO) [kRev] | 10000.0 |

3-3 Latch function

The latch function is a function that saves the instantaneous operation information in the driver for when the operation was switched by an event jump or it was stopped. For example, if an operation was switched to the next operation by the NEXT input during continuous operation, the operation information at the moment when being switched is latched.

A trigger to generate a latch such as an event jump or the NEXT input represents "latch trigger."

The operation information saved by the latch function is maintained until it is cleared.

The operation information latched can be useful for doing maintenance on equipment or checking the operating status.

■ Operation information latched

- Command positionCommand position for when a latch trigger generated
- Actual positionActual position for when a latch trigger generated
- Target positionTarget position in the operation of the transition destination when latched by an event jump or the NEXT input (In the case of continuous operation, command position for when the operation was switched)
Target position in the stopped operation when latched by a stop operation (In the case of continuous operation, command position for when the operation was started)
- Operation data No.Operation data number for when latched
- Loop countWhen latched while performing loop operation or the extended loop function, the number of loops for when latched is saved.



All the operation information latched is cleared if the power is turned on again.

■ Types of latch trigger

● Event jump (high event, low event), NEXT input

- When an operation was switched by generating an event jump (low event, high event) during stored data (SD) operation.
- When an operation was switched by inputting the NEXT input during stored data (SD) operation.



Only stored data (SD) operation is latched by an event jump or the NEXT input. Macro operation, direct data operation, and pulse-input operation are not latched.

● Stop operation

- When an operation was stopped by the C-ON input, the FREE input, the CLR input, the STOP-COFF input, or the STOP input.
- When an operation was temporarily stopped by the PAUSE input.
- When an operation was stopped by the software overtravel, the hardware overtravel, or the mechanical overtravel.
- When an operation was stopped by generating an alarm.
- When an operation was stopped by the FW-BLK input while performing the operation in the forward direction.
- When an operation was stopped by the RV-BLK input while performing the operation in the reverse direction.



Stored data (SD) operation, macro operation, and direct data operation are latched by a stop operation. Pulse-input operation is not latched.

■ Related input/output signals

● LAT-CLR input (⇒ p.204)

If the LAT-CLR input is turned ON, the latch status is cleared, and an operation information will be able to overwrite.

● JUMP0-LAT output, JUMP1-LAT output (⇒ p.217)

Latching by a low event will turn the JUMP0-LAT output ON.

Latching by a high event will turn the JUMP1-LAT output ON.

When the LAT-CLR input is turned ON, the JUMP-LAT output is turned OFF.

● NEXT-LAT output (⇒ p.217)

Latching by the NEXT input will turn the NEXT-LAT output ON.

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

■ Example for latch function

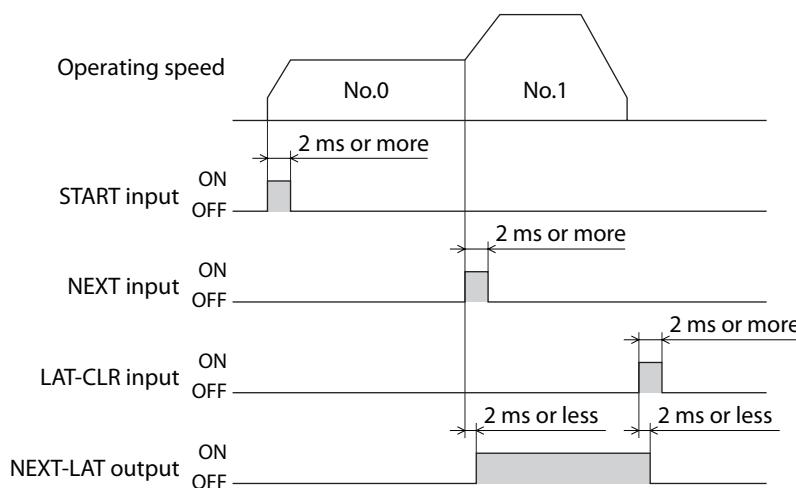
● Latch by the NEXT input

Operation data

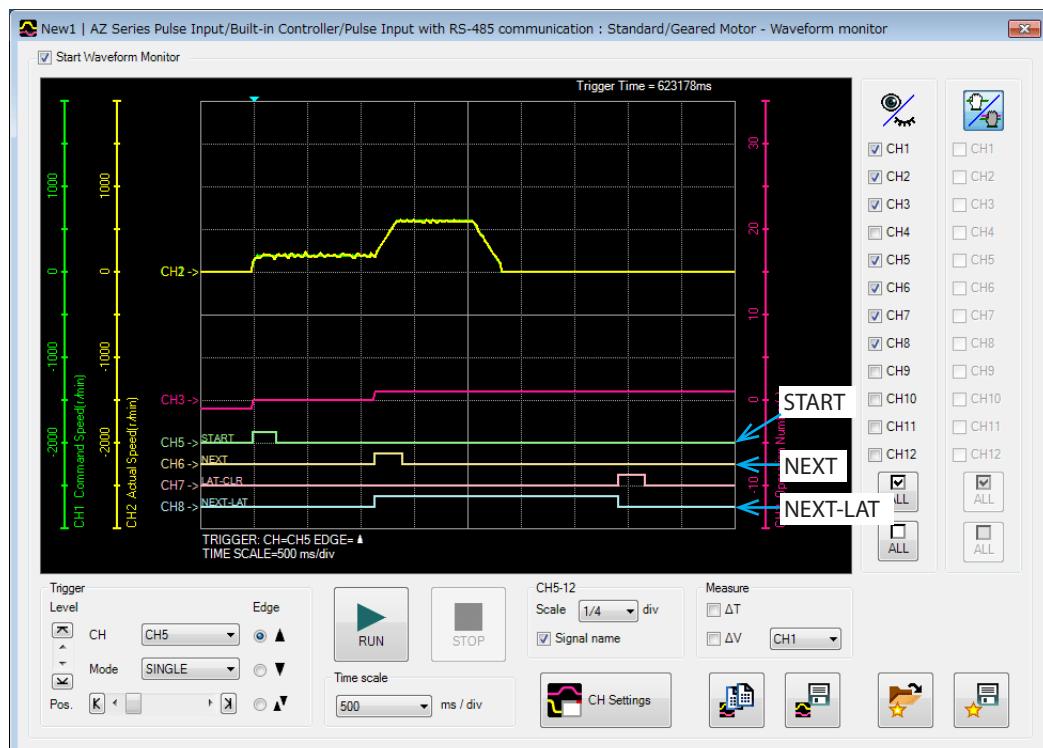
| | Operation type | Position [step] | Speed [Hz] | Acceleration [kHz/s] |
|----|---|-----------------|------------|----------------------|
| #0 | Continuous (Position control) | 0 | 1000 | 1000.000 |
| #1 | Incremental positioning (based on command position) | 3000 | 3000 | 1000.000 |

| Stopping deceleration [kHz/s] | Operating current [%] | Drive-complete delay time [s] | Link | Next data No. |
|-------------------------------|-----------------------|-------------------------------|----------------------------|---------------|
| 1000.000 | 30.0 | 0.000 | Continuous form connection | 1 |
| 1000.000 | 30.0 | 0.000 | No link | Stop |

Operation image



Waveform monitor (MEXE02)



- Latch by the JUMP input

Operation data

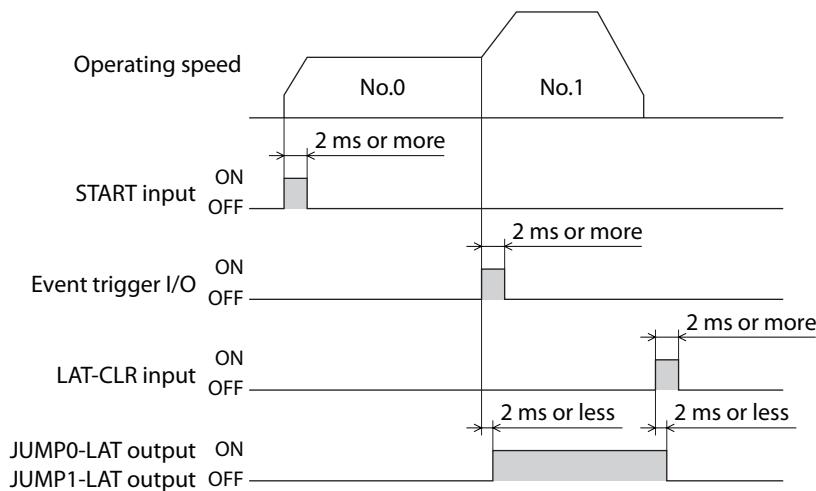
| Operation data | | Operation I/O event | | |
|----------------|---|---------------------|------------|----------------------|
| | Operation type | Position [step] | Speed [Hz] | Acceleration [kHz/s] |
| #0 | Continuous (Position control) | 0 | 1000 | 1000.000 |
| #1 | Continuous (Position control) | 0 | 3000 | 1000.000 |
| #2 | Incremental positioning (based on command position) | 5000 | 5000 | 1000.000 |

| Stopping deceleration [kHz/s] | Operating current [%] | Drive-complete delay time [s] | Link | Next data No. |
|-------------------------------|-----------------------|-------------------------------|---------|---------------|
| 1000.000 | 30.0 | 0.000 | No link | +1 |
| 1000.000 | 30.0 | 0.000 | No link | +1 |
| 1000.000 | 30.0 | 0.000 | No link | Stop |

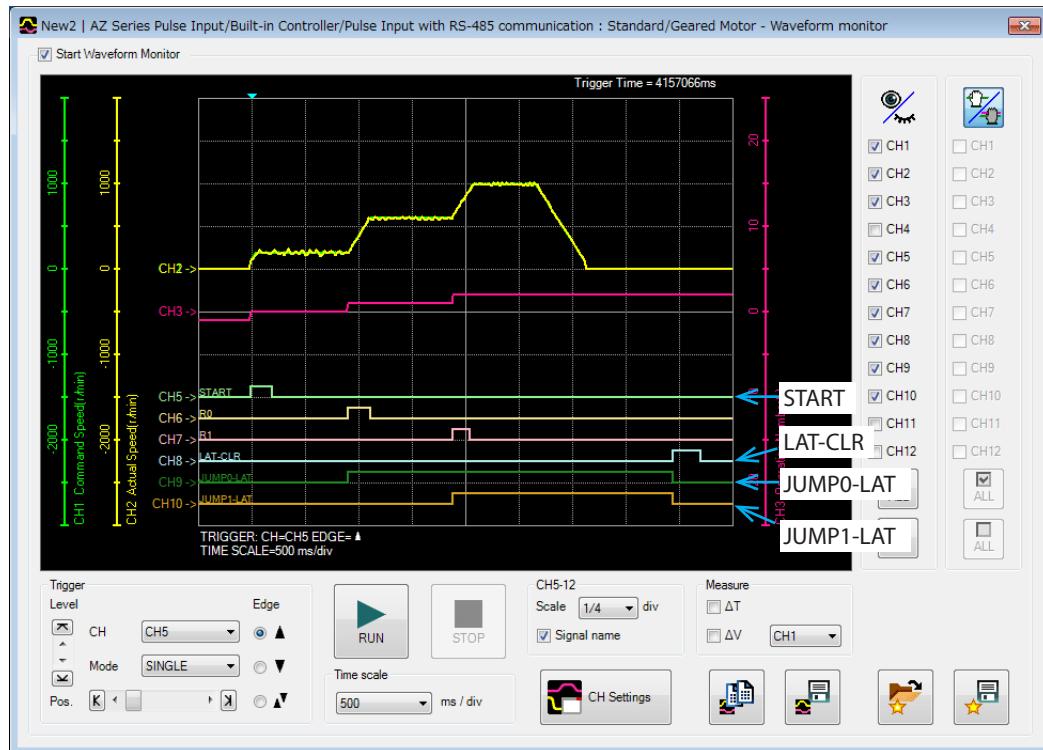
| Area offset [step] | Area width | Loop count | Loop offset | Loop end No. | (Low)I/O event No. | (High)I/O event No. |
|--------------------|------------|------------|-------------|--------------|--------------------|---------------------|
| 0 | -1 | - | 0 | - | 0 | 1 |
| 0 | -1 | - | 0 | - | 0 | 1 |

| Operation data | | Operation I/O event | | | | |
|----------------|----------------------------|---------------------|-----------|-------------------|--------------------|---------------------|
| | Link | Next data | Dwell [s] | Event trigger I/O | Event trigger type | Event trigger count |
| #0 | Continuous form connection | 1 | 0.000 | R0_R | ON edge | 1 |
| #1 | Continuous form connection | 2 | 0.000 | R1_R | ON edge | 1 |

Operation image



Waveform monitor (MEXE02)



■ Monitor of operation information

To monitor the operation information saved, there are two types, event monitor and latch monitor.
The monitor value cannot be checked with the **MEXE02**. Check via RS-485 communication or industrial network.

● Event monitor

The command position and actual position are saved in the event monitor. They are overwritten whenever an event trigger generates.

Turning the LAT-CLR input ON will clear the value to 0.

● Latch monitor

The following operation information is saved in the latch monitor. The value latched first time is continued to retain.
Turning the LAT-CLR input from OFF to ON will enable the operation information to overwrite.

- Status (1 is stored when being in latch status.)
- Command position
- Actual position
- Target position
- Operation data No.
- Loop count



When the "status" in the latch monitor is 1 (in latch status), the operation information will not be overwritten even if a latch trigger generates.

10

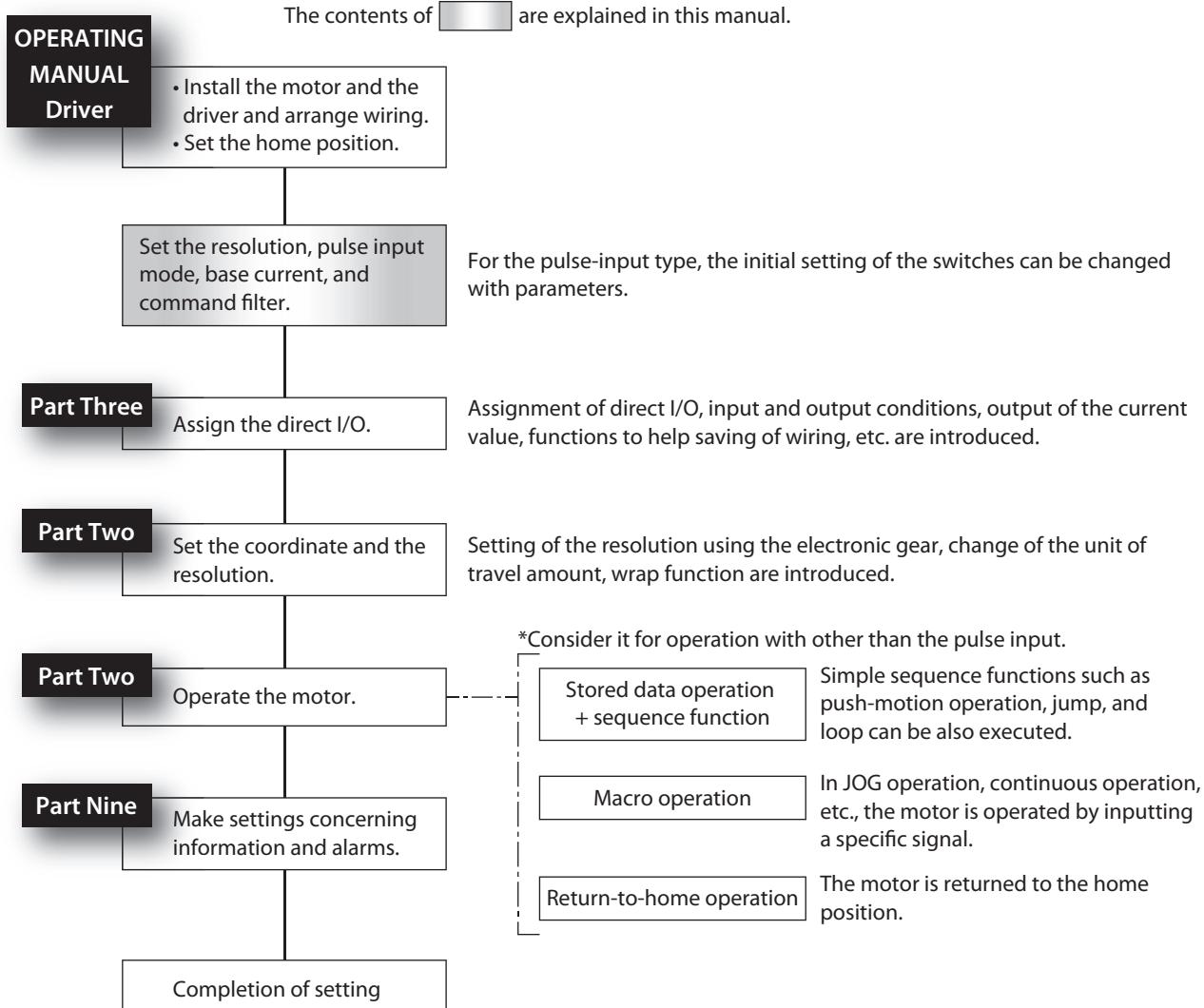
Extended setting for pulse-input operation

This part explains how to extend the function of the pulse-input operation.

Table of contents

| | | |
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| 1 | Flow of operation and extended setting | 480 |
| 2 | Setting with switches (only for pulse-input type) | 481 |
| 3 | Extending settings by parameters | 485 |
| 4 | I/O signals related to pulse-input operation | 489 |
| 5 | Monitor function..... | 493 |
| 6 | Push-motion operation | 497 |

1 Flow of operation and extended setting



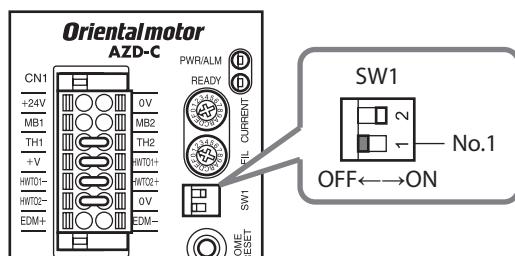
2 Setting with switches (only for pulse-input type)

2-1 Resolution

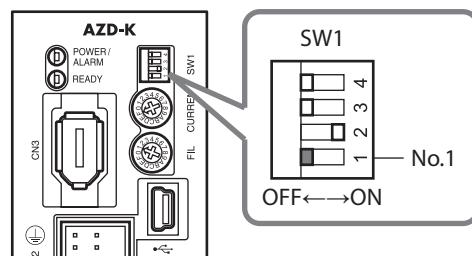
Set the resolution per revolution of the motor output shaft using the SW1-No.1.

Factory setting: OFF

● AC power input driver



● DC power input driver



Note

When motorized actuators are used, do not change the switch (factory setting: OFF). If the switch is set to ON, the actuator may cause an unexpected movement.

memo

Be sure to turn off the driver power before setting the switches. If the switches are set while the power is still on, the new setting will not become effective.

● For the standard motor and geared motor

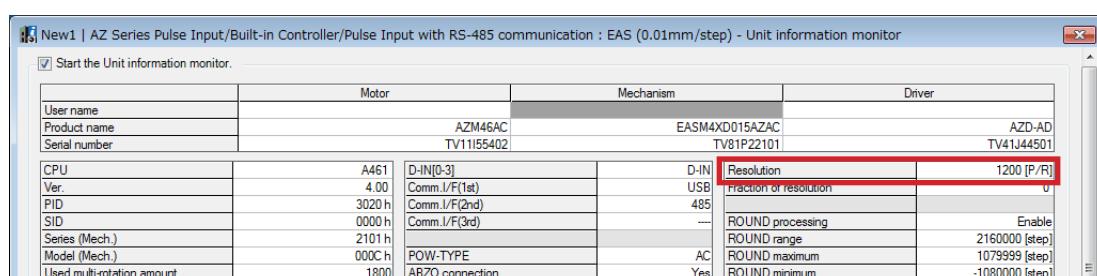
OFF: 1,000 P/R
ON: 10,000 P/R

● For the motorized actuator

OFF: The optimum resolution is set for each product.
ON: 10,000 P/R

memo

The resolution of the motorized actuator can be checked on the Unit information monitor.

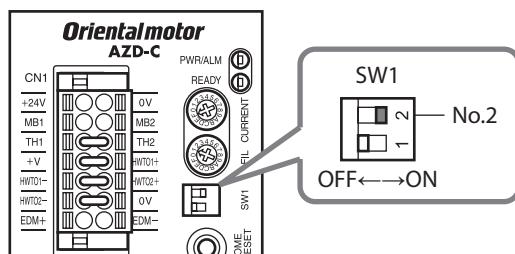


2-2 Pulse input mode

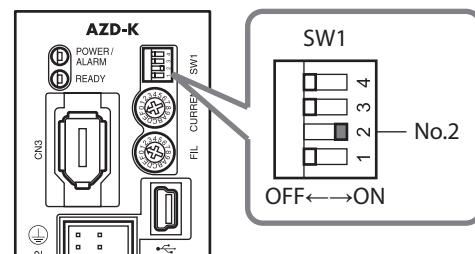
Set a desired pulse input mode of the driver according to the pulse output mode of the controller used with the driver. Set with SW1-No.2

- OFF:** 2-pulse input mode
- ON:** 1-pulse input mode

● AC power input driver



● DC power input driver



- Be sure to turn off the driver power before setting the switches. If the switches are set while the power is still on, the new setting will not become effective.
- The factory setting of the pulse input mode depends on the destination country.

■ Pulse input mode types

The 1-pulse input mode or the 2-pulse input mode can be set using the SW1-No.2. Refer to p.486.

■ Pulse signal

Input a pulse with sharp rising and falling edges as shown in the figures. Refer to p.487.

2-3 Operating current

The motor operating current is calculated based on the base current rate (%).
Set the base current rate using the CURRENT switch.

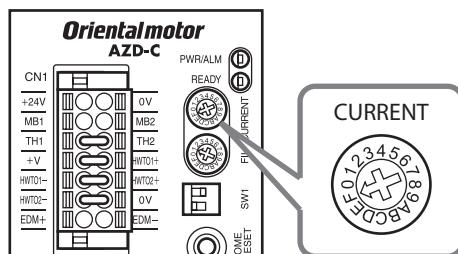
Operating current = CURRENT switch set value × “Operating current” value set for the operation data number

Factory setting: F (100%)

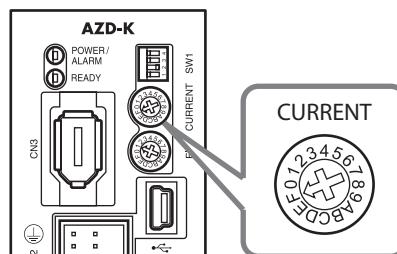


Excessively low base current rate may cause a problem in starting the motor or holding the load in position. Do not reduce the current any more than is necessary.

● AC power input driver



● DC power input driver



The dial settings and corresponding base current rates of the CURRENT switch are listed below.

| Scale | Base current rate (%) |
|-------|-----------------------|
| 0 | 6.3 |
| 1 | 12.5 |
| 2 | 18.8 |
| 3 | 25.0 |
| 4 | 31.3 |
| 5 | 37.5 |
| 6 | 43.8 |
| 7 | 50.0 |

| Scale | Base current rate (%) |
|-------|-----------------------|
| 8 | 56.3 |
| 9 | 62.5 |
| A | 68.8 |
| B | 75.0 |
| C | 81.3 |
| D | 87.5 |
| E | 93.8 |
| F | 100 |

Related operation data

| MEXE02 tree view | Name | Description | Initial value |
|------------------|-------------------|--|---------------|
| Operation data | Operating current | Sets the motor operating current based on the base current rate being 100%. Setting range 0 to 1,000 (1=0.1%) | 1,000 |

Related parameter

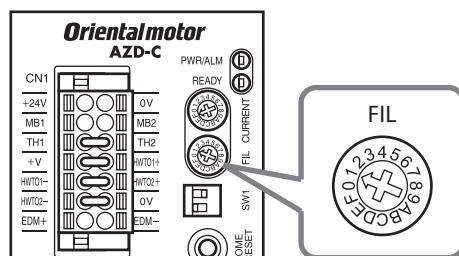
| MEXE02 tree view | Name | Description | Initial value |
|------------------|---|---|---------------|
| Base setting | Base current setting source (only for pulse input type) | Selects the setting method of the base current rate. Setting range 0: The parameter setting is followed 1: The switch setting is followed | 1 |

2-4 Command filter

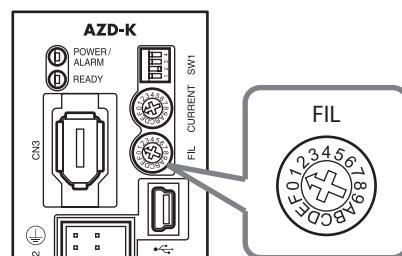
Set the command filter using the FIL switch.

Factory setting: 1 (1 ms)

● AC power input driver



● DC power input driver



The dial settings and corresponding command filter time constants of the FIL switch are listed below.

| Scale | Command filter time constant (ms) |
|-------|-----------------------------------|
| 0 | 0 |
| 1 | 1 |
| 2 | 2 |
| 3 | 3 |
| 4 | 5 |
| 5 | 7 |
| 6 | 10 |
| 7 | 20 |

| Scale | Command filter time constant (ms) |
|-------|-----------------------------------|
| 8 | 30 |
| 9 | 50 |
| A | 70 |
| B | 100 |
| C | 120 |
| D | 150 |
| E | 170 |
| F | 200 |

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|------------------|---|---|---------------|
| Base setting | Command filter time constant setting source (only for pulse input type) | Selects the setting method of the command filter. Setting range 0: The parameter setting is followed 1: The switch setting is followed | 1 |

3 Extending settings by parameters

3-1 Resolution

Set the resolution per revolution of the motor output shaft.

For the pulse-input type, when setting the resolution with parameters, turn SW1-No.1 OFF.



- For the pulse-input type, if SW1-No.1 is ON, the parameters are not enabled.
- When the "Mechanism settings" parameter is changed, cycle the power of the driver.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|---------------------|--------------------|---|---------------|
| Motor and mechanism | Mechanism settings | To change the resolution, select manual setting. Setting range 0: ABZO setting is prioritized 1: Manual setting | 0 |
| | Electronic gear A | Sets the denominator of electronic gear. Setting range 1 to 65,535 | 1 |
| | Electronic gear B | Set the numerator of electronic gear. Setting range 1 to 65,535 | 1 |

3-2 Pulse input mode

Set a desired pulse input mode of the driver according to the pulse output mode of the controller used with the driver.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|---------------------|--------------------------|---|---------------|
| Communication & I/F | PULSE-I/F mode selection | Sets the pulse input mode. The switch is disabled when a value other than 0 is set. Setting range -1: Disable (the pulse input is disabled.) 0: The switch setting of the driver is followed * 1: 2-pulse input mode 2: 1-pulse input mode 3: Phase difference input mode (x1) 4: Phase difference input mode (x2) 5: Phase difference input mode (x4) | 0 |

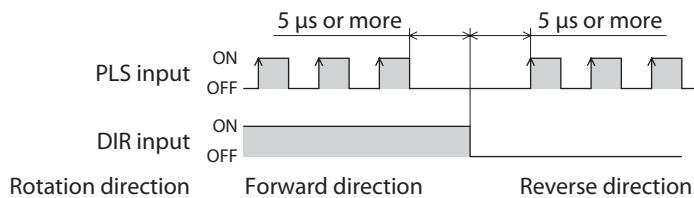
* If "0:The switch setting is followed" is selected using the pulse-input type with RS-485 communication interface, the 2-pulse input mode will be set.

■ Pulse input mode types

There are three types of pulse input modes: 1-pulse input mode, 2-pulse input mode, and phase difference input mode.

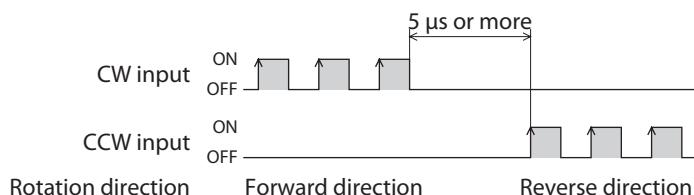
● 1-pulse input mode

Pulses are input via the PLS input and the rotation direction is selected using the DIR input.



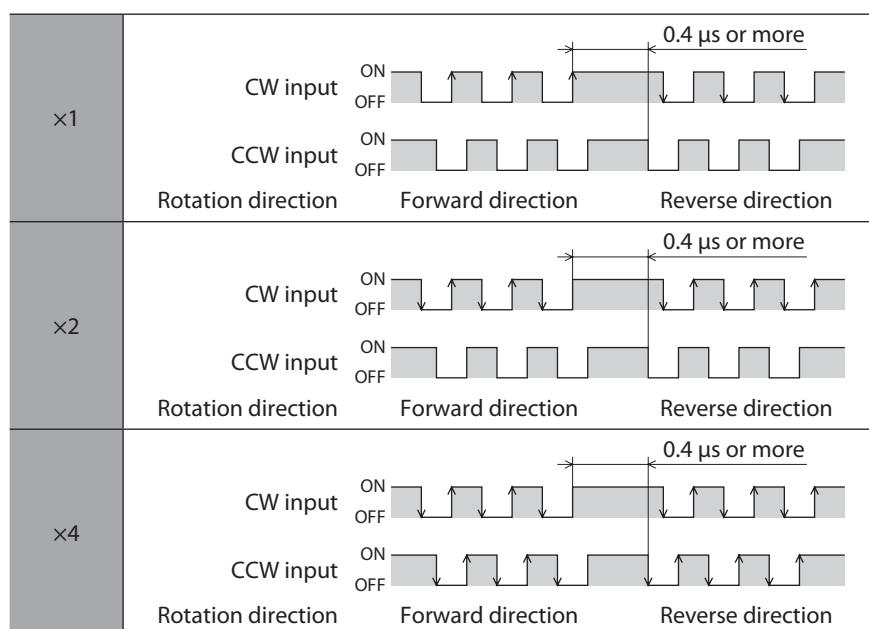
● 2-pulse input mode

When the CW input is input, the motor rotates in the forward direction. When the CCW input is input, the motor rotates in the reverse direction.



● Phase difference input mode (set by a parameter)

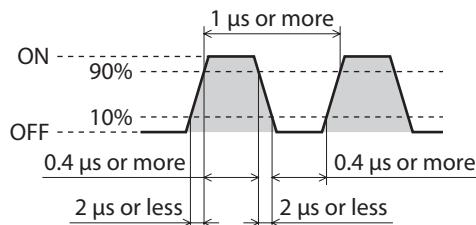
The motor rotates in the forward direction when the CCW input phase is delayed by 90° against the CW input. The motor rotates in the reverse direction when the CCW input phase is advanced by 90° against the CW input.



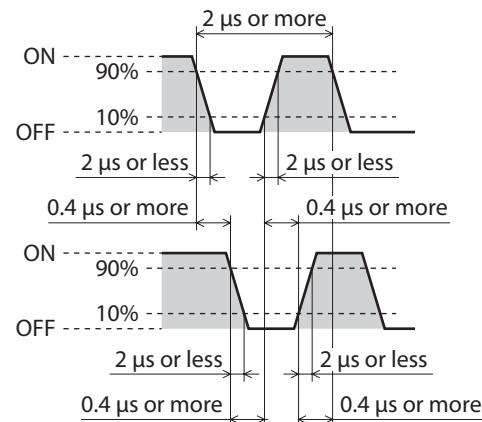
■ Pulse signal

Input a pulse with sharp rising and falling edges as shown in the figures. The figure shows the voltage levels of pulse signals.

● 1-pulse input mode, 2-pulse input mode



● Phase difference mode



3-3 Operating current

The motor operating current is calculated based on the base current rate (%).

Operating current = "Base current" parameter set value × "Operating current" value set for the operation data number

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|------------------|----------------|--|---------------|
| Base setting | Base current | Sets the maximum output current of the motor as a percentage of the rated current, based on the rated current being 100%. Setting range 0 to 1,000 (1=0.1%) | 1,000 |

3-4 Command filter

There are two types of command filters: LPF (speed filter) and moving average filter.

Related parameters

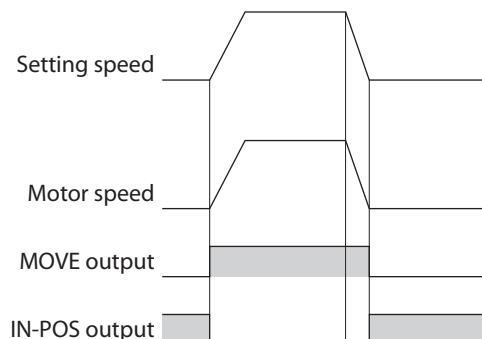
| MEXE02 tree view | Parameter name | Description | Initial value |
|------------------|------------------------------|--|---------------|
| Base setting | Command filter setting | Sets the filter to adjust the motor response. Setting range 1: LPF (speed filter) is selected 2: The moving average filter is selected | 1 |
| | Command filter time constant | Adjusts the motor response. Setting range 0 to 200 ms | 1 |

● LPF (speed filter)

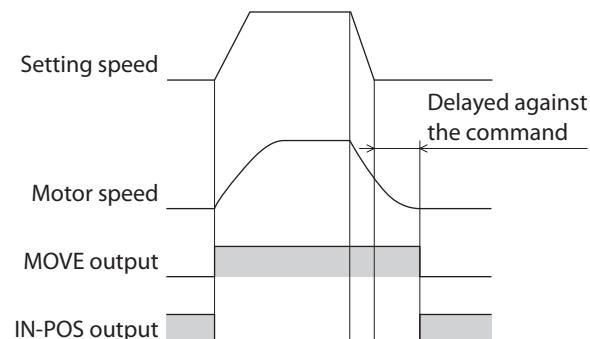
Select "LPF" in the "Command filter" parameter and set the "Command filter time constant" parameter.

When the value of the "Command filter time constant" parameter is increased, vibration can be suppressed during low-speed operation, and starting/stopping of the motor becomes smooth. Note, however, if this setting is too high, it results in lower synchronicity with commands. Set a suitable value according to the load or application.

- When the "Command filter time constant" parameter is 0 ms



- When the "Command filter time constant" parameter is 200 ms



● Moving average filter

Select "Moving average filter" in the "Command filter setting" parameter and set the "Command filter time constant" parameter.

The motor response can be adjusted. The positioning time can be shortened by suppressing the residual vibration for positioning operation.

The optimum value for the "Command filter time constant" parameter varies depending on the load or operating condition. Set a suitable value according to the load or operating condition.

| | When the "Command filter time constant" parameter is 0 ms | When the "Command filter time constant" parameter is 200 ms |
|--|--|---|
| Rectangular operation (drive without acceleration/deceleration time) | <p>This diagram shows the four signals for rectangular operation. The Setting speed signal is a rectangle. The Motor speed signal follows the Setting speed with a very small delay. The MOVE output and IN-POS output signals are identical to the first LPF diagram. The transition times for the motor speed and the output signals are nearly instantaneous.</p> | <p>This diagram shows the four signals for rectangular operation with a 200 ms filter. The Setting speed signal is a rectangle. The Motor speed signal follows the Setting speed with a significant delay. The MOVE output and IN-POS output signals are identical to the first LPF diagram. The total duration of the motor's response is longer than in the 0 ms case due to the filter's effect. Two time intervals of 200 ms are indicated below the signals.</p> |
| Trapezoidal operation | <p>This diagram shows the four signals for trapezoidal operation. The Setting speed signal is a trapezoid. The Motor speed signal follows the Setting speed with a very small delay. The MOVE output and IN-POS output signals are identical to the first LPF diagram. The transition times for the motor speed and the output signals are nearly instantaneous.</p> | <p>This diagram shows the four signals for trapezoidal operation with a 200 ms filter. The Setting speed signal is a trapezoid. The Motor speed signal follows the Setting speed with a significant delay. The MOVE output and IN-POS output signals are identical to the first LPF diagram. The total duration of the motor's response is longer than in the 0 ms case due to the filter's effect. Two time intervals of 200 ms are indicated below the signals.</p> |

4 I/O signals related to pulse-input operation

4-1 LED (only for the pulse-input type)

- **READY LED**

When preparation of operation is complete, the READY output is turned ON, and the READY LED of the driver is lit in green at the same time.

Input the pulse or operation start signal to the driver after the READY output is turned ON.

4-2 Input signals



Signals cannot be assigned to the pulse lines (pin No.1 to No.4).

- **PLS-XMODE input**

When the PLS-XMODE input is turned ON, the number of input pulses and the multiplying factor of the frequency are changed. Set the pulse multiplying factor with the parameter.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|-------------------------|------------------------------------|---|---------------|
| I/O action and function | PLS-XMODE pulse multiplying factor | Sets the pulse multiplying factor when the PLS-XMODE input is turned ON. Setting range 2 to 30 times | 10 |



Set the frequency of the pulse input less than 1 MHz.

- **PLS-DIS input**

When the PLS-DIS input is turned ON, the pulse input is disabled.

- **T-MODE input**

When the T-MODE input is turned ON, the alarm of overload is disabled. This allows to perform push-motion operation in the pulse input.

- **MON-CLK input**

When the MON-CLK input is turned ON, information transmission of the position coordinate information monitor function is started.

In case of I/O position output function

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

In case of pulse request function

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

- **PLSM-REQ input**

The position coordinate information to be sent by the pulse request function is set.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|-------------------------|-------------------------------|--|---------------|
| I/O action and function | PLS-OUT output data selection | <p>Selects the information to be output by the pulse request function.</p> <p>Setting range 0: Command position 1: Command position (32 bit counter) 2: Feedback position 3: Feedback position (32 bit counter)</p> | 0 |
| | PLS-OUT maximum frequency | <p>Sets the frequency of the pulse output when the pulse request function is used.</p> <p>Setting range 1 to 10,000 (1=0.1 kHz)</p> | 100 |

4-3 Output signal

- **PLS-RDY output**

When the driver is ready to execute operation by pulse input, the PLS-RDY output is turned ON. Input pulse signals to the driver after the PLS-RDY output is turned ON.

- **MON-OUT output**

When the I/O position output function is used, position coordinate information or alarm information is output.

- **PLS-OUTR output**

This output is turned ON when preparation of the pulse request function is complete. It is turned OFF when output of position coordinate information by pulse is complete.

- **PLS-LOST output**

If a pulse is input when the PLS-RDY output is OFF (the pulse input is disabled), the PLS-LOST output is turned ON. When the LAT-CLR input is turned from OFF to ON, the PLS-LOST output is turned OFF.

The pulse input is disabled under the following conditions.

The motor is not excited

The operation stop signal is ON

The PLS-DIS input is ON

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|-------------------------|--------------------------|---|---------------|
| I/O action and function | PLS-LOST check algorithm | <p>Selects whether the count is increased or decreased according to the rotation direction when the number of disabled pulses is counted.</p> <p>Setting range 0: Unsigned 1: Signed</p> | 0 |

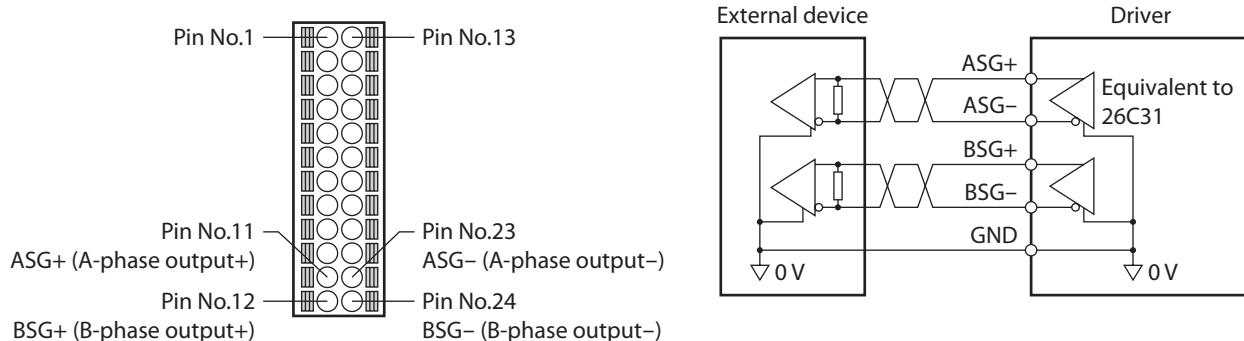
● A-phase/B-phase output

To the I/O connector of the driver, the A-phase (ASG) output and the B-phase (BSG) output are assigned at the time of factory shipment.

The A-phase output and B-phase output are pulse signals output from the ABZO sensor. When the A-phase and B-phase outputs are used, the present position and rotation direction of the motor can be detected.

AC power input driver: CNS

DC power input driver: CN4



The A-phase/B-phase outputs are differential outputs. For the input circuit of the external device, connect the one that supports differential outputs.

Related parameters

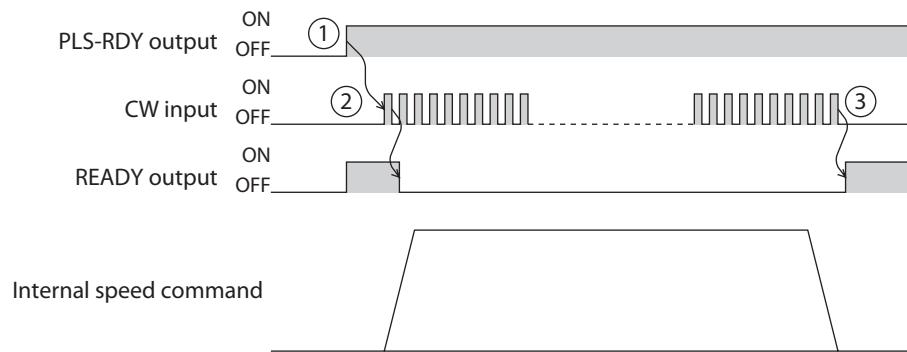
| MEXE02 tree view | Parameter name | Description | Initial value |
|--|---|--|-------------------|
| EXT-IN and VIR-IN and USR-OUT function | Differential output mode selection | Selects the type of the signal output from the differential output. Setting range -1: No output 0: A-phase/B-phase output 8: I/O status output | 0 |
| | Differential output (EXT-OUTA) function selection on I/O mode | This is enabled when the "Differential output mode selection" parameter is set to "I/O status output." Selects the output signal to be assigned to the differential output. | 128: CONST-OFF |
| | Differential output (EXT-OUTB) function selection on I/O mode | Setting range Output signal list ⇒ p.428 | |
| | Differential output (EXT-OUTA) inverting mode on I/O mode | This is enabled when the "Differential output mode selection" parameter is set to "I/O status output." Switches ON/OFF setting of the differential output. | 0 |
| | Differential output (EXT-OUTB) inverting mode on I/O mode | Setting range 0: Non invert 1: Invert | |
| | Differential output (EXT-OUTA) OFF delay time on I/O mode | This is enabled when the "Differential output mode selection" parameter is set to "I/O status output." Sets the OFF delay time of the output signal. | 0 |
| | Differential output (EXT-OUTB) OFF delay time on I/O mode | Setting range 0 to 250 ms | |



When "A-phase/B-phase output" is selected in the "Differential output mode selection" parameter, the present feedback position is output as phase difference. The resolution for the A-phase output and B-phase output is the same as the motor resolution at power-on. If the motor resolution is changed, the resolution for the A-phase and B-phase outputs is also changed.

4-4 Timing chart

1. Check the PLS-RDY output is turned ON
2. Input CW pulses.
The motor will rotate in CW direction.
3. When the operation is completed, the READY output will be turned ON.



5 Monitor function

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

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

5-1 I/O position output function

The I/O position output function is a function to transmit position information or alarm information to the master 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 bit (*) and alarm information 8 bit (*) are transmitted, and checksum is transmitted finally. The checksum is the lower 8 bit obtained by dividing the transmission data by 1 byte and adding each value.

* Data is represented in the two's complement form.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|-------------------------|--------------------------------|---|---------------|
| I/O action and function | MON-REQ0 output data selection | Selects information output when input of each monitor request is turned ON. Setting range 1: Feedback position 2: Feedback position (32 bit counter) 3: Command position 4: Command position (32 bit counter) 8: Alarm code (8 bit) 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 position coordinate

The coordinate of the present position is transmitted in 32 bit data.

Set the position information to be output in the "MON-REQ0 output data selection" and "MON-REQ1 output data selection" parameters.

● Feedback position

The present position detected by the ABZO sensor is output. When the "Wrap setting" parameter is "Enable" (initial value), 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

The command position of the driver is output. When the "Wrap setting" parameter is "Enable" (initial value), 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 below)

| MEXE02 tree view | Parameter name | Setting value |
|---------------------|---|---------------|
| Motor and mechanism | Electronic gear A | 1 |
| | Electronic gear B | 1 |
| | Initial coordinate generation & wrap setting range | 1 rev |
| | Initial coordinate generation & wrap range offset ratio | 50% |
| | Initial coordinate generation & wrap range offset value | 0 step |

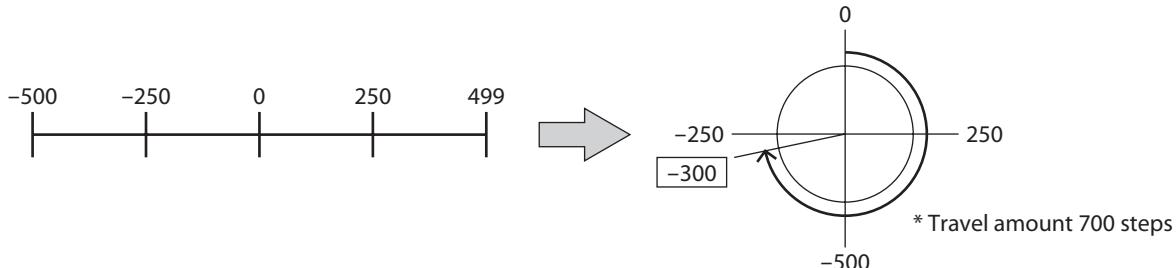
Since the wrap range is -500 to 499 steps, the present position coordinate is output as follows.

Command position (32bit): -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 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 of the alarm currently generated is transmitted in 8 bit data. (Alarm code \Rightarrow p.451)

Output example: When an overload alarm (alarm code 30h) is generated

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

■ Present position + alarm code

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

■ Checksum

The checksum is the lower 8 bit obtained by dividing the transmission data by 1 byte and adding them by 1 byte. It is information to check whether the data are output correctly.

● Output example

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

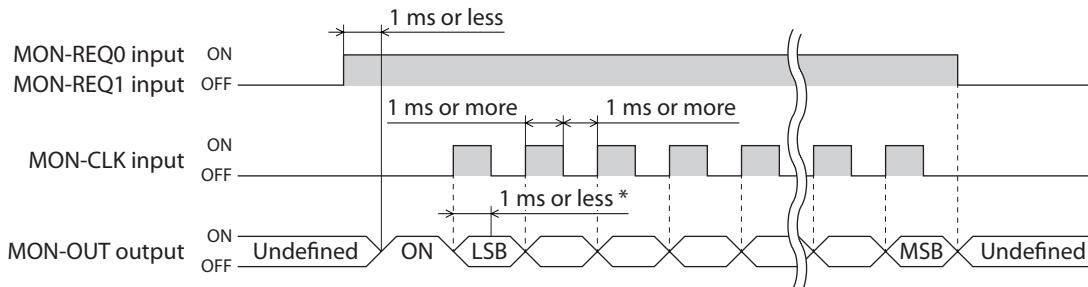
Feedback position : 300 steps = 0000 0000 0000 0000 0001 0010 1100
 Alarm code : 66h = 0110 0110
 Checksum : 0000 0000 + 0000 0000 + 0000 0001 + 0010 1100 + 0110 0110 = 1001 0011

Data output from the driver

| | | |
|---|------------|-----------|
| 0011 0100 1000 0000 0000 0000 0000 0000 | 0110 0110 | 1100 1001 |
| Feedback position | Alarm code | Checksum |

■ Timing chart

- When the MON-REQ0 input or MON-REQ1 input is turned ON, the command position, feedback position and alarm code at that moment are recorded, and the MON-OUT output is turned ON.
- Check that the MON-OUT output is turned ON and input the clock signal to the MON-CLK input.
- Information set in the "MON-REQ0 output data selection" and "MON-REQ1 output data selection" parameters is output from the MON-OUT output by synchronizing the clock signal.
- 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, 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.



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

5-2 Pulse request function

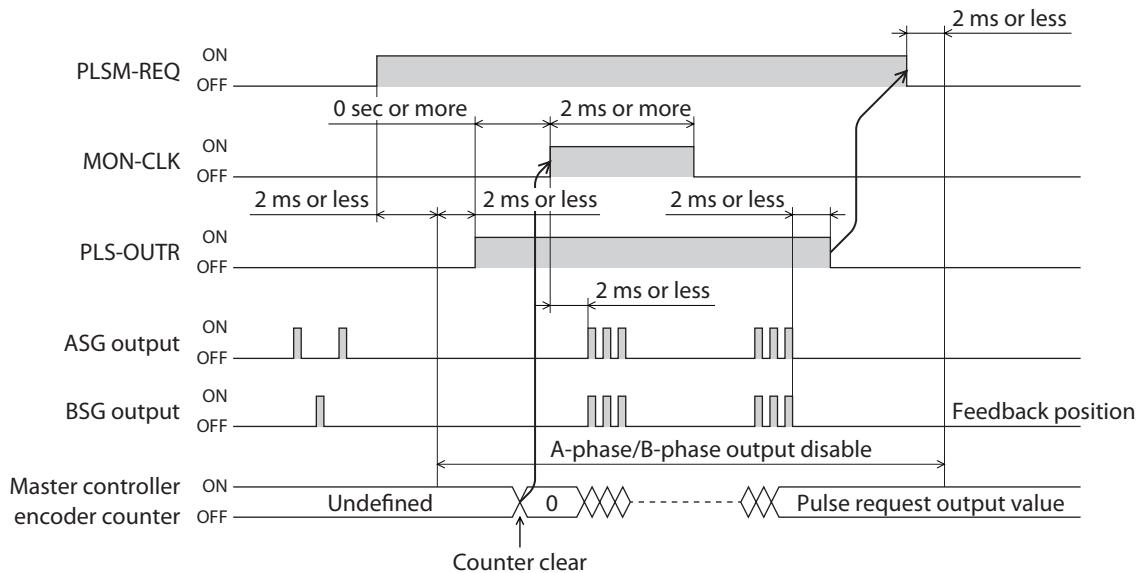
The pulse request function is a function to transmit the present position (absolute position) to the master controller by using the A-phase and B-phase outputs. When the encoder counter of the master controller and the A-phase and B-phase outputs of the driver are connected and the pulse request function is executed, the present position of the driver can be output as A-phase and B-phase pulses. By setting the encoder counter of the master controller to "0" in advance, the coordinate systems of the ABZO sensor and master controller can be synchronized easily.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|-------------------------|-------------------------------|---|---------------|
| I/O action and function | PLS-OUT output data selection | Selects the information to be output by the pulse request function. Setting range 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 pulse output by the pulse request function. Setting range 1 to 10,000 (1=0.1 kHz) | 100 |

■ Timing chart

- When the PLSM-REQ input is turned ON, the ASG output and 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.
- Check that the PLS-OUTR output is turned ON and clear the encoder counter of the master controller to "0."
- 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.
- Check that the PLS-OUTR output has been turned OFF and turn the PLSM-REQ input OFF.



Note

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

6 Push-motion operation

Push-motion operation is a type of operation where pulses are input to pressurize the load continuously. Turning the T-MODE input ON and inputting pulses, push-motion operation will start. Pulses will be continuously input and accumulate even when the load is balanced with the torque.



Note Do not perform push-motion operation with geared type motor. Doing so may cause damage to the motor or gear part.

6-1 Preparation for operation

■ Assignment of input/output signals

Assign signals used in push-motion operation to the direct I/O (DIN, DOUT) of the driver.

● Signals used in push-motion operation

| Signal name | Description |
|----------------|---|
| T-MODE input | When push-motion operation is performed, turn the T-MODE input ON. The overload alarm will be disabled. |
| M0 to M7 input | Select the operation data number. The value of the operating current set in the selected operation data number will be applied. |
| TLC output | If the output torque reaches the set torque limiting value while push-motion operation is performed, this signal is turned ON. |

● Assignment example of direct I/O

Input signals

| DIN | Function |
|------|-------------|
| DIN0 | No function |
| DIN1 | No function |
| DIN2 | No function |
| DIN3 | No function |
| DIN4 | ZHOME |
| DIN5 | FREE |
| DIN6 | T-MODE |
| DIN7 | ALM-RST |
| DIN8 | M0 |
| DIN9 | M1 |

Output signals

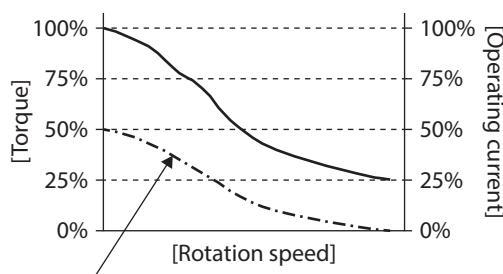
| DOUT | Function |
|-------|----------|
| DOUT0 | HOME-END |
| DOUT1 | IN-POS |
| DOUT2 | PLS-RDY |
| DOUT3 | TLC |
| DOUT4 | MOVE |
| DOUT5 | ALM-B |



Up to 5 signals of the M0 to M7 inputs can be assigned.

■ Setting the current for push-motion operation

If the push-motion current is set, the output torque can be limited. For example, if the push-motion current is set to 50%, the output torque is also limited to 50%.



Torque characteristics when the torque value of the push-motion operation is limited to 50%

The push-motion current can be set in the operating current of the operation data. Set it as a percentage (%) of the rated torque of 100%.

Related operation data

| MEXE02 tree view | Item | Description | Initial value |
|------------------|-------------------|--|---------------|
| Operation data | Operating current | Sets the motor operating current based on the base current rate being 100%. Setting range 0 to 1,000 (1=0.1%) | 1,000 |

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|-------------------------|---|--|---------------|
| Base setting | Automatic current cutback function | Sets the automatic current cutback function to switch to the stop current when the motor stops. Setting range 0: The automatic current cutback function is disabled (Heat generation at the time of stop is not decreased) 1: The automatic current cutback function is enabled | 1 |
| | Automatic current cutback switching time | Sets the time from the stop of motor to operation of the automatic current cutback function. Setting range 0 to 1,000 ms | 100 |
| I/O action and function | Current setting during motor standstill at T-MODE | Selects the command current for when the motor is stopped in a state where the T-MODE input is being ON. Setting range 0: Stop current 1: Operating current | 0 |



Set the parameter as necessary so that the holding force is not decreased even in a standstill state while push-motion operation is performed.

- Automatic current cutback function: If it is set to "enable," the torque is decreased when the motor is in a standstill state.
- Automatic current cutback switching time: If a judgment time is short, the torque is decreased even when the standstill state is a short amount of time.

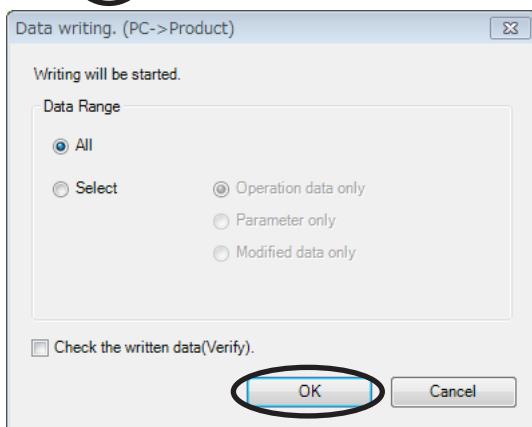
■ Data write

The data or parameter created in the **MEXE02** can be written to the driver.

1. Click the [Data writing] icon in the toolbar.

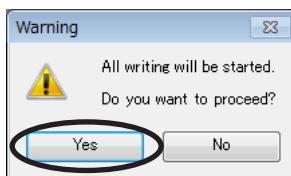


2. Select data to be written and click [OK].

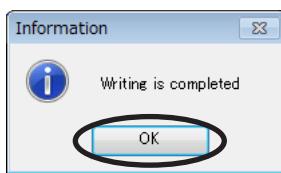


3. Click [Yes].

Data writing starts.



4. After it is completed, click [OK].



6-2 Performing the push-motion operation

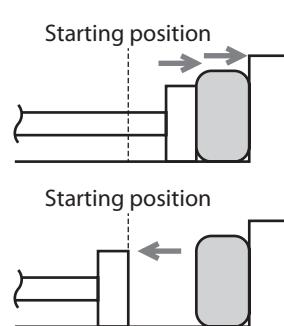
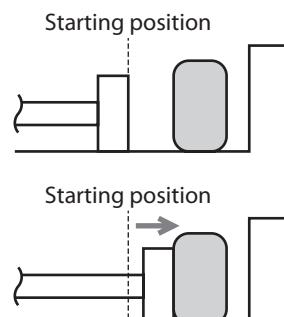
As an example, this section explains how to perform push-motion operation in the positive direction.

● Setting example

- Operation data No.0: Operating current (output torque) 30%
- Operation data No.1: Operating current (output torque) 50%
- Current setting during motor standstill at T-MODE: Operating current
- CW/CCW pulse: 10,000 pulse

● Operation procedure

1. Select the operation data No.1 by turning the M0 input ON.
2. Operate the motor to the starting position of pushing.
3. Turn the T-MODE input ON.
4. Input 10,000 pulses of the CW pulse in the positive direction to start pushing.
When the output torque reaches 50% (the setting value of the operation data No.1), the TLC output is turned ON.
5. Input 10,000 pulses of the CCW pulse in the negative direction to return the motor to the starting position of pushing.
6. If the stopping time is long, turn the M0 input OFF and limit the output torque to 30%.
7. Turn the T-MODE input OFF.

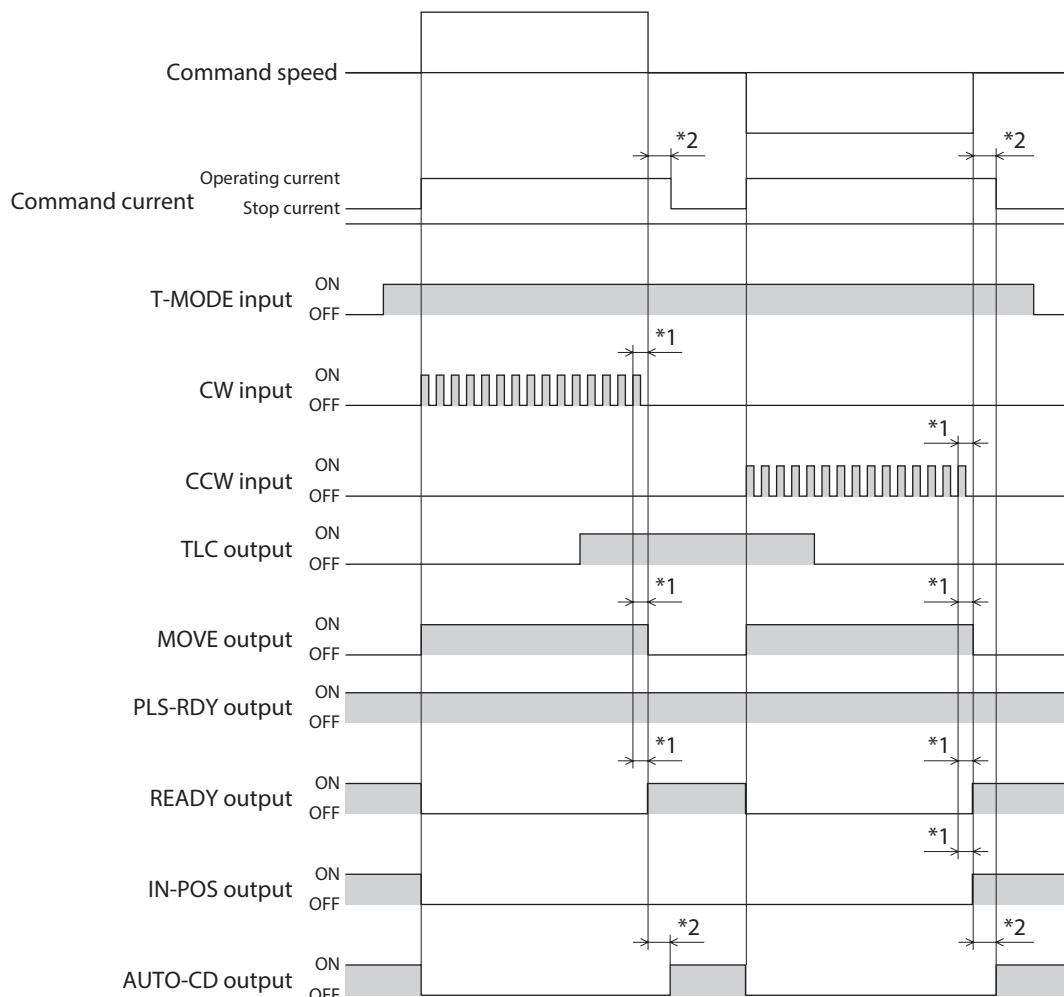


Note

- If the load is removed during push-motion operation, the motor will move at high speed the number accumulated pulses.
- Since pulses are input continuously during push-motion operation, a prolonged push condition may generate an excessive position deviation alarm. If the push condition continues for a prolonged period, stop the pulse input. Whether or not the motor is pushing the load can be determined using the TLC output

6-3 Timing chart

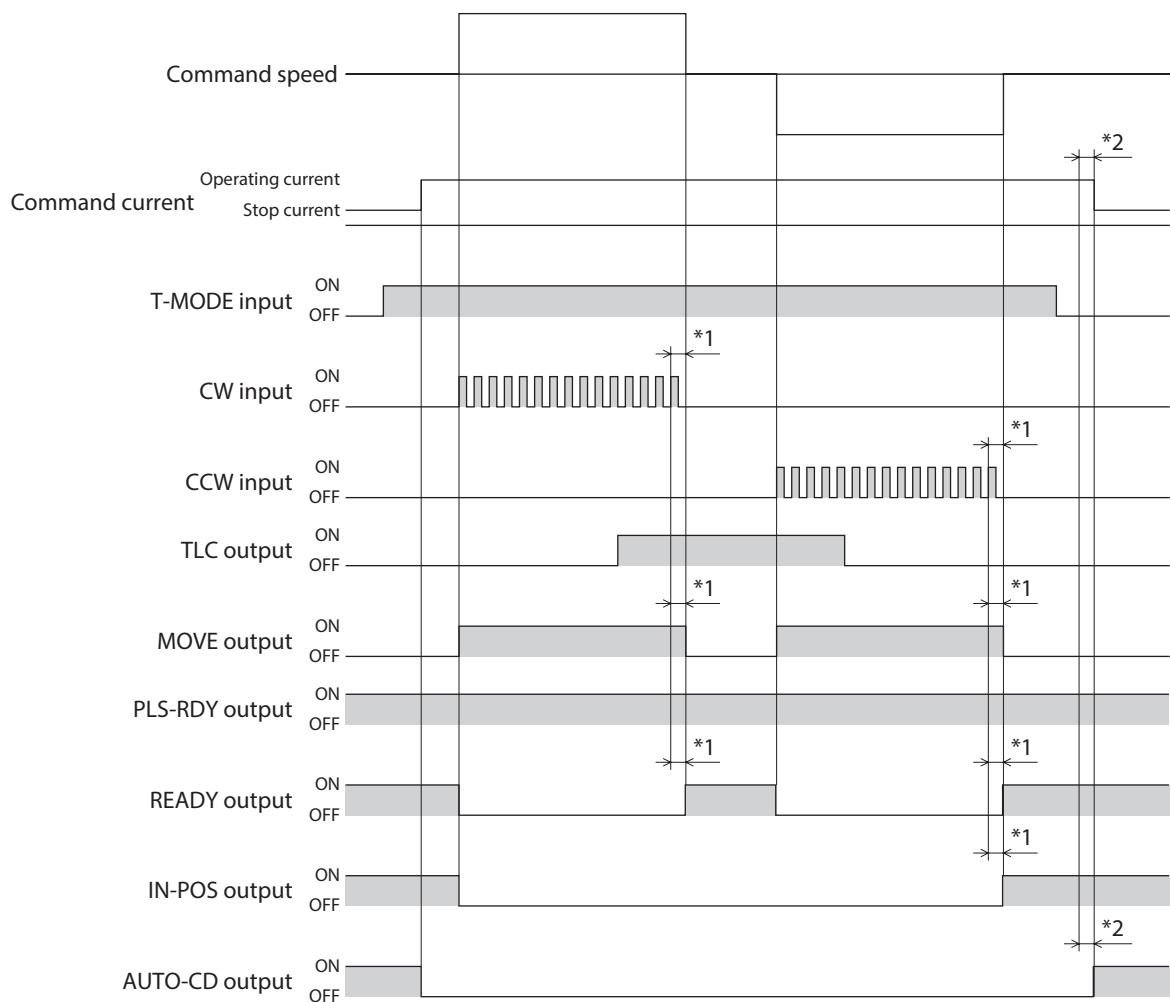
- When the "Current setting during motor standstill at T-MODE" parameter is set to "Stop current"



*1 The specific time varies depending on the load, operating speed, command filter and other.

*2 It switches to the stop current after elapsing the time set in the "Automatic current cutback switching time" parameter.

■ When the "Current setting during motor standstill at T-MODE" parameter is set to "Operating current"



*1 The specific time varies depending on the load, operating speed, command filter and other.

*2 It switches to the stop current after elapsing the time set in the "Automatic current cutback switching time" parameter.

11

Appendix

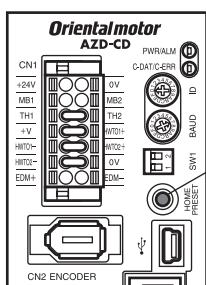
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| 2 | Change of assignments of A-phase/B-phase outputs | 505 |
| 3 | LEDs on the driver | 507 |
| 4 | Simulating the driver operation..... | 509 |
| 5 | Use of general signals | 519 |

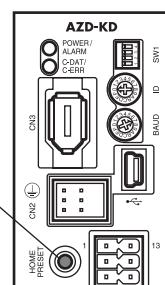
1 Change of function of HOME PRESET switch

In the **AZ** Series, the function of the P-PRESET input is assigned to the HOME PRESET switch. Therefore, just by pressing the HOME PRESET switch, the present position can be set as the home position. However, once the home position is set, the function of the HOME PRESET switch can be disabled so that the home position should not be preset even if the HOME PRESET switch is pressed by mistake. It is also possible to assign the START input instead of the P-PRESET input and start operation just by pressing the HOME PRESET switch.

■ AC power input driver



■ DC power input driver



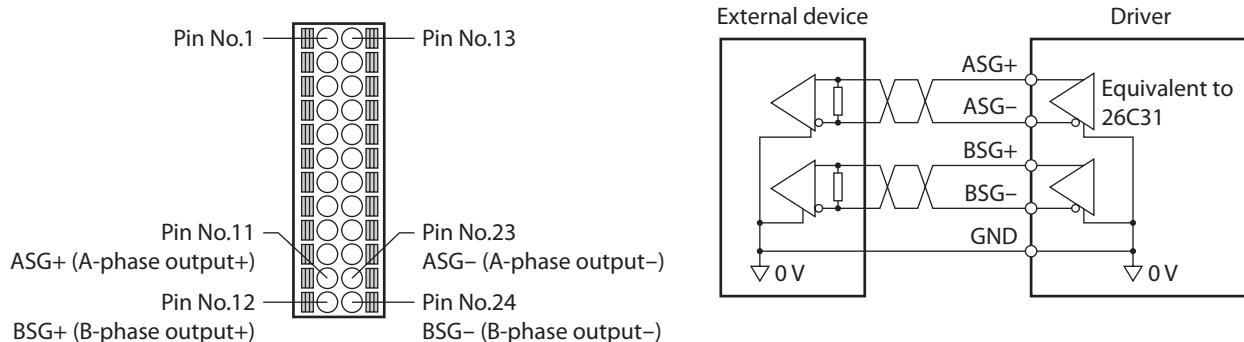
Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|--|--|--|---------------|
| EXT-IN and VIR-IN and USR-OUT function | Extended input (EXT-IN) function selection | Selects the input signal to be assigned to the HOME PRESET switch. Setting range Input signal list ⇒ p.427 | 9: P-PRESET |
| | Extended input (EXT-IN) inverting mode | Setting range 0: ON/OFF of the input signal assigned to the HOME PRESET switch is not inverted 1: ON/OFF of the input signal assigned to the HOME PRESET switch is inverted | 0 |
| | Extended input (EXT-IN) interlock releasing time | Normally, the HOME PRESET switch is interlocked. By holding down the switch for a certain time, interlock is released and the assigned function is enabled. With this parameter, the time to hold down the switch to release interlock is set. Setting range 0: Interlock disabled 1 to 50 (1=0.1 s) | 10 |
| | Extended input (EXT-IN) interlock releasing duration | Sets the time to retain the status in which the interlock is released. Setting range 0 to 50 (1=0.1 s) | 30 |
| | Extended input (EXT-IN) ON monitor time | The LED is lit when the signal assigned to the switch is input. With this parameter, the time to light the LED is set. Setting range 0 to 50 (1=0.1 s) | 10 |

2 Change of assignments of A-phase/ B-phase outputs

To the I/O connector of the driver, the A-phase (ASG) output and the B-phase (BSG) output are assigned at the time of factory shipment. The ASG output and the BSG output are signals output from the ABZO sensor. When the A-phase/B-phase outputs are used, the present position and rotation direction of the motor can be detected. In addition, the A-phase/B-phase outputs can be changed to other output signals with parameters.

**AC power input driver: CN5
DC power input driver: CN4**



The A-phase/B-phase outputs are differential outputs. For the input circuit of the external device, connect the one that supports differential outputs.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|--|---|---|-------------------|
| EXT-IN and VIR-IN and USR-OUT function | Differential output mode selection | Selects the type of the signal output from the differential output. Setting range -1: No output 0: A-phase/B-phase output 8: I/O status output | 0 |
| | Differential output (EXT-OUTA) function selection on I/O mode | This is enabled when the "Differential output mode selection" parameter is set to "I/O status output." Selects the output signal to be assigned to the differential output. | 128: CONST-OFF |
| | Differential output (EXT-OUTB) function selection on I/O mode | Setting range Output signal list → p.428 | |
| | Differential output (EXT-OUTA) inverting mode on I/O mode | This is enabled when the "Differential output mode selection" parameter is set to "I/O status output." Switches ON/OFF setting of the differential output. | 0 |
| | Differential output (EXT-OUTB) inverting mode on I/O mode | Setting range 0: Non invert 1: Invert | |
| | Differential output (EXT-OUTA) OFF delay time on I/O mode | This is enabled when the "Differential output mode selection" parameter is set to "I/O status output." Sets the OFF delay time of the output signal. | 0 |
| | Differential output (EXT-OUTB) OFF delay time on I/O mode | Setting range 0 to 250 ms | |

Change of assignments of A-phase/B-phase outputs



When "A-phase/B-phase output" is selected in the "Differential output mode selection" parameter, the present feedback position is output as phase difference. The resolution of the pulse depends on the resolution of the motor set with the electronic gear A/B.

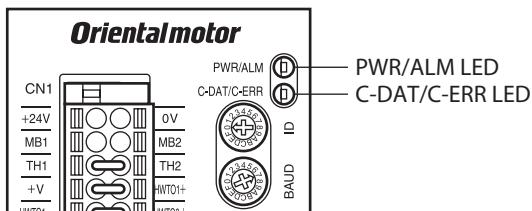
3 LEDs on the driver

You can check various conditions of the driver by the lighting state or the number of blinking of LEDs on the driver.

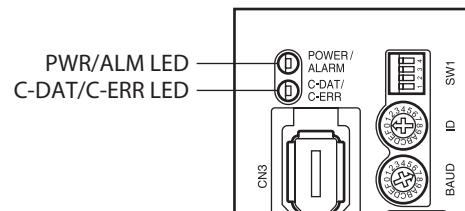
3-1 Lighting state of LEDs

- Built-in controller type, pulse-input type with RS-485 communication interface

[AC power input driver]

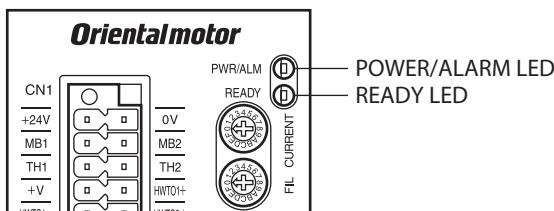


[DC power input driver]

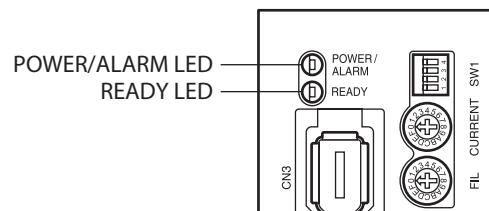


- Pulse-input type

[AC power input driver]



[DC power input driver]



PWR/ALM LED [POWER/ALARM LED]

You can check the driver status.

| Green | Red | Description |
|---|----------|--|
| OFF | OFF | The power supply is not turned on. |
| Lit | OFF | The power supply is turned on. |
| — | Blinking | An alarm is being generated. The cause of the alarm can be checked by counting the number of times the LED blinks. The LED is lit in green when the alarm is reset. |
| Blinking | — | The power removal function is triggered. The LED is lit in green when the power removable function is released. |
| Blinking twice at the same time | | <ul style="list-style-type: none"> An information is being generated. Red and green colors may overlap and it may be visible to orange. The LED is lit in green when the information is reset. Teaching, remote operation is being executed with the MEXE02. Red and green colors may overlap and it may be visible to orange. The LED is lit in green when teaching, remote operation is complete. |
| Blinking at the same time | | <p>The interlock was released by holding down the HOME PRESET switch. Red and green colors may overlap and it may be visible to orange.</p> <p>The LED is lit in green when the time set in the "Extended input (EXT-IN) interlock releasing time" parameter is elapsed.</p> |
| Lit at the same time | | The input signal assigned to the HOME PRESET switch is being executed. The LED is lit in green when it is complete. |
| Repeating "Green → Red → Simultaneously lit → Lighting off" | | This is the driver simulation mode. |

■ C-DAT/C-ERR LED (built-in controller type, pulse-input type with RS-485 communication interface)

You can check the RS-485 communication status.

| Green | Red | Description |
|--------------|-----|---|
| Lit/Blinking | – | The driver is communicating with the master station properly via RS-485 communication. |
| – | Lit | A RS-485 communication error occurs with the master station. The LED is lit or blinks in green when the communication status returns to normal. |

■ READY LED (pulse-input type)

You can check the ON/OFF status of the READY output.

| Green | Description |
|-------|---|
| OFF | The READY output was turned OFF. |
| Lit | The READY output was turned ON. (Ready for operation) |

3-2 Change of lighting condition of LED

It is effective for built-in controller type and pulse-input type with RS-485 communication interface. The function of this C-DAT/C-ERR LED can be changed to ON/OFF indication of the output signal. It can be lit in green when a certain output signal is ON, or lit in red when it is OFF.

Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|---------------------|------------------------------|--|----------------|
| Communication & I/F | LED-OUT mode | Sets the information to be indicated by the C-DAT/C-ERR LED. Setting range –1: The LED is not lit 0: The status of the output signal is indicated 1: Functions as C-DAT/C-ERR LED with the built-in controller type and pulse-input type with RS-485 communication interface, and indicates the status of the output signal with the pulse-input type | 1 |
| | LED-OUT-GREEN function | Selects the output signal to be indicated by the green LED. Setting range Output signal list → p.428 | 132: READY |
| | LED-OUT-GREEN inverting mode | Setting range 0: ON/OFF of the output signal indicated by the green LED is not inverted 1: ON/OFF of the output signal indicated by the green LED is inverted | 0 |
| | LED-OUT-RED function | Selects the output signal to be indicated by the red LED. Setting range Output signal list → p.428 | 128: CONST-OFF |
| | LED-OUT-RED inverting mode | Setting range 0: ON/OFF of the output signal indicated by the red LED is not inverted 1: ON/OFF of the output signal indicated by the red LED is inverted | 0 |

4 Simulating the driver operation

In the driver simulation mode, the status for the coordinate and the I/O can be simulated without connecting the motor. If the motor is connected, a simulation which is closer to an actual operation can be performed using information of the ABZO sensor.



- In the driver simulation mode, regardless of whether the motor is connected or unconnected, the motor does not operate.
- In the driver simulation mode, functions and I/O signals for the driver may vary from those in a normal time.
- When a simulation for a motorized actuators is performed, be sure to connect the actuator to the driver to read the information unique to the product. Failure to do so may result in injury or damage to equipment when the product is actually operated.



- Even if the motor and the driver are connected, the motor is in a non-excitation state during simulation. When an electromagnetic brake motor is used, the output shaft is held in position by the electromagnetic brake.
- The contents for the driver Ver.4.00 or later are described here.
The version of the driver can be checked using the unit information monitor of the **MEXE02**.
(⇒ p.440)

Related parameters

| Modbus communication register address | | Name | Description | Initial value | R/W | Industrial network command code | |
|---------------------------------------|-----------------|------------------------|--|---------------|-----|---------------------------------|-----------------|
| Upper | Lower | | | | | READ | WRITE |
| 1022 (03FEh) | 1023 (03FFh) | Driver simulation mode | Operation can be simulated by using a virtual motor without connecting the motor. Setting range 0: The motor is actually connected 1: A virtual motor is used (When ABZO not connected = no ABZO sensor information) 2: A virtual motor is used (When ABZO not connected = a wrap function with up to 1800 revolutions is enabled) 3: A virtual motor is used * (When ABZO not connected = a wrap function with up to 900 revolutions is enabled) | 0 | R/W | 511 (01FFh) | 4607 (11FFh) |

* It is effective for drivers Ver.4.00 or later. Setting to the drivers older than Ver.4.00 will be the same action as "1: A virtual motor is used (No ABZO sensor information)."

■ Use this function in the following cases:

- Check of driver command information
- Check of wiring
- Check of operation data and parameters
- Check of input signals status
- Check of output signals status
- Verification work when an error occurred in the system

4-1 Preparation and operating procedure of the driver simulation mode

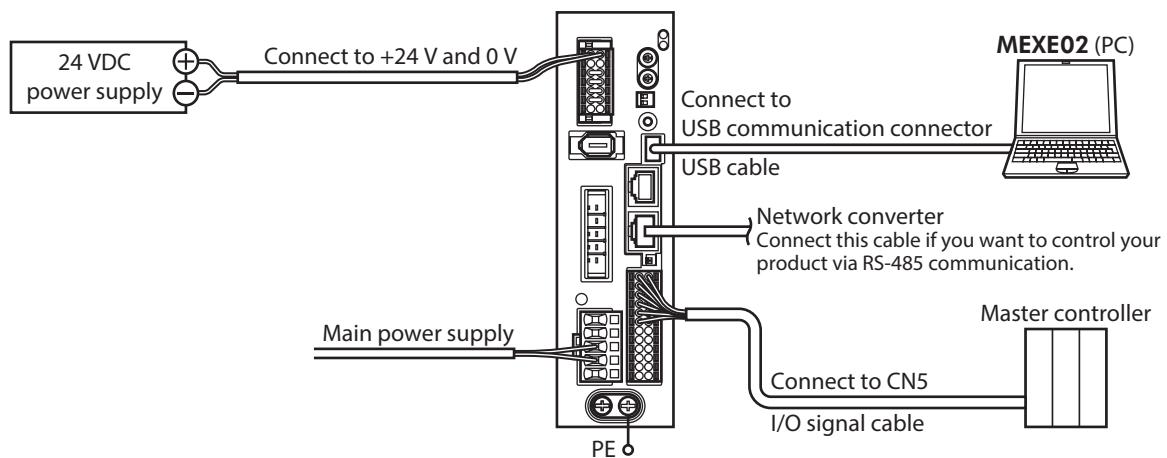
■ preparation

● When the motor is not connected

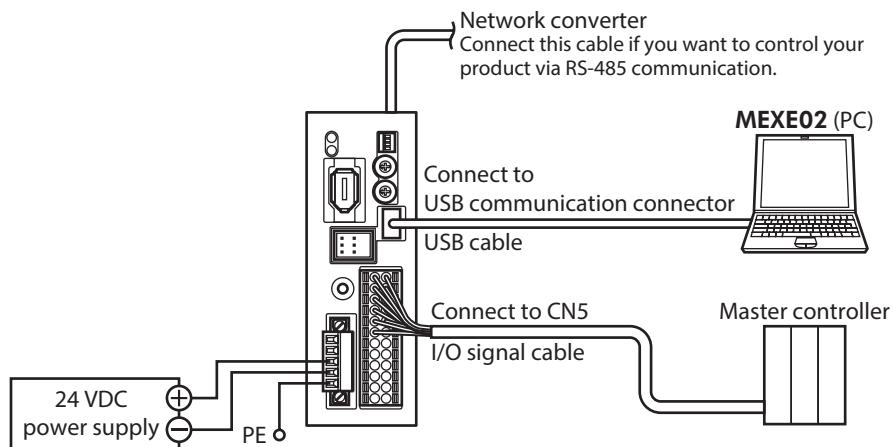


When a simulation for a motorized actuators is performed, be sure to connect the actuator to the driver. (⇒ p.511)

AC power input

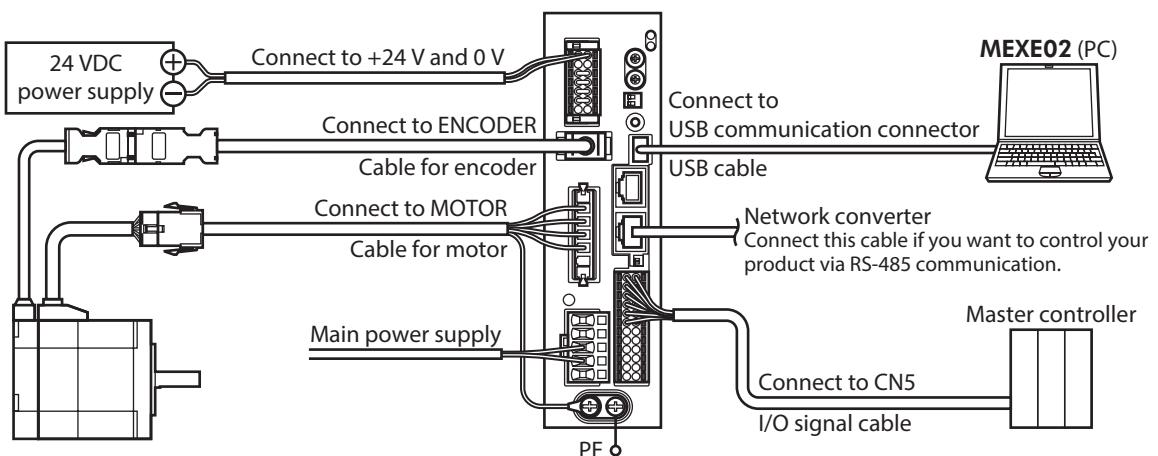


DC power input

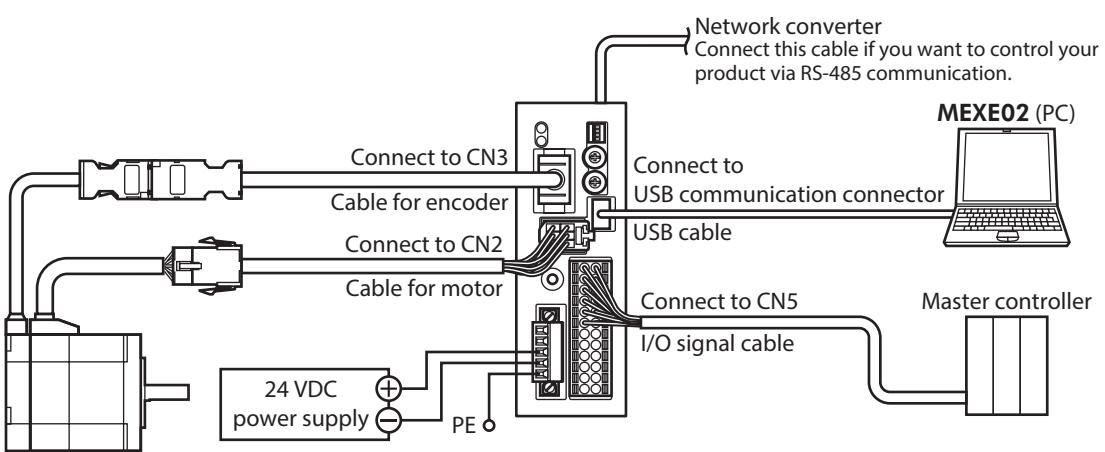


- When the motor is connected

AC power input



DC power input

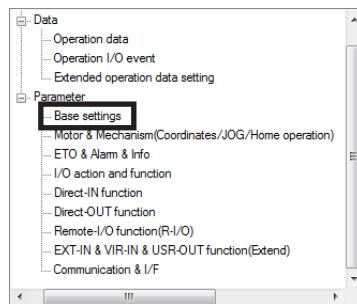


■ Operating procedure

This section explains how to simulate a driver operation without connecting a motor using the **MEXE02**.

1. Turn on the control power supply and main power supply of the driver.

2. Click the "Base settings" under "Parameter" in the tree view.
The base setting parameters are shown.

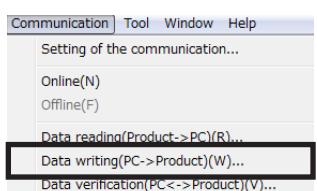


3. Set the "Driver simulation mode" parameter to "Virtual motor".

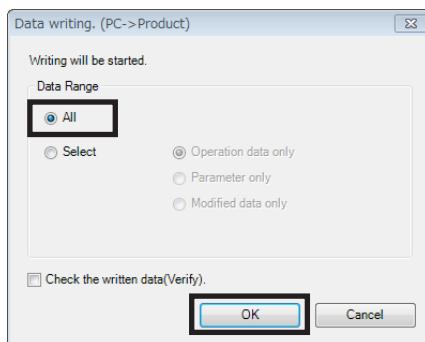
| | | |
|---|------------------------|--|
| 1 | Motor user name | |
| 2 | Driver user name | |
| 3 | | |
| 4 | Driver simulation mode | Virtual motor (when AB20 not connected=>no AB20 information) |
| 5 | | |
| 6 | Base current [%] | 100.0 |

4. Write to the driver in the following steps.

1) Click the [Data writing (PC → Product)] from the [Communication] menu or click the [Data writing (PC → Product)] icon in the toolbar.

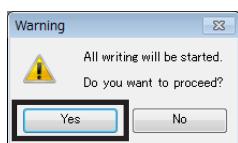


2) Select the [All], and click [OK].

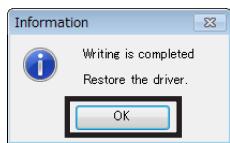


3) Click [Yes].

Writing data is started.



4) After it is completed, click [OK].



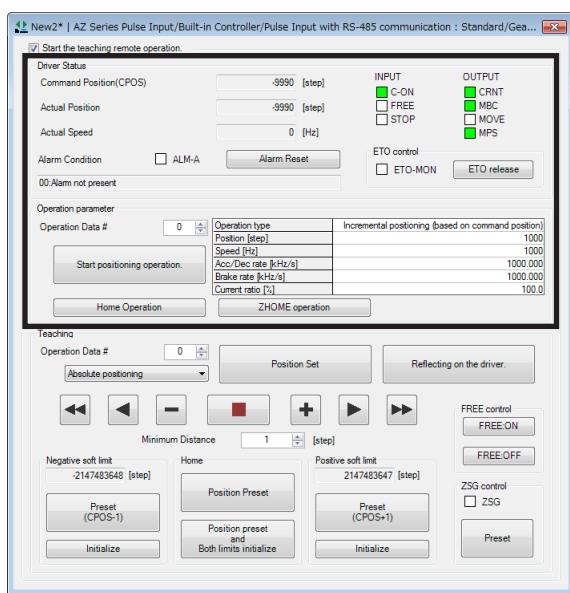
5) Cycle the control power supply and main power supply of the driver.

5. Check whether the "Driver simulation mode" parameter is applied.

Check the PWR/ALM LED (or POWER/ALARM LED) of the driver is repeated the blinking below.

- The green LED is lit → The red LED is lit → The red and green LEDs are lit at the same time (the colors overlap and may seem to be orange) → OFF

6. Execute positioning operation, etc. with "Teaching, remote operation."
The command position and the feedback position are increased/decreased without connecting the motor.
The status can be checked also on the monitor windows of I/O and status.



7. End the driver simulation mode
 - 1) Click the "Base settings" under "Parameter" in the tree view.
The base setting parameters are shown.
- 2) Set the "Driver simulation mode" parameter to "Use real motor."
- 3) Write to the driver according to the STEP 4.
- 4) Turn off the control power supply and the main power supply of the driver.

The screenshot shows the software's parameter configuration interface. On the left, a tree view displays categories like Data, Parameter, and Motor & mechanism. Under Parameter, the 'Base settings' node is expanded, showing sub-options such as Motor & mechanism(Coordinates/JOG/Home operation), ETO & Alarm & Info, I/O action and function, Direct-IN function, Direct-OUT function, Remote-I/O function(R-I/O), EXT-IN & VIR-IN & USR-OUT function(Extend), and Communication & I/F. Below this tree view is a table with six rows, indexed 1 to 6. Row 4, which contains the 'Driver simulation mode' parameter, is highlighted with a yellow background and has the value 'Use real motor' displayed in its cell.

| | | |
|---|------------------------|----------------|
| 1 | Motor user name | |
| 2 | Driver user name | |
| 3 | | |
| 4 | Driver simulation mode | Use real motor |
| 5 | | |
| 6 | Base current [%] | 100.0 |

4-2 Coordinate

■ Home position

In the driver simulation mode, regardless of whether the motor is connected or unconnected, the position for when the power supply was turned on is set as the home position.

The home position can be reset using the position preset or return-to-home operation. However, information of the home position in the ABZO sensor cannot be rewritten.



For drivers older than the driver Ver.4.00, the home position is as follows.

- When the motor is not connected: The position for when the power supply was turned on is set as the home position.
- When the motor is connected: The home position stored in the ABZO sensor is used.

■ Coordinate generation (When the motor is not connected)

The method to generate the coordinate varies depending on the setting of the "Initial coordinate generation/wrap coordinate setting" parameter.

| Parameter name | Setting | Coordinate generation method |
|---|-------------------------|--|
| Initial coordinate generation/wrap coordinate setting | Prioritize ABZO setting | Depends on the "Driver simulation mode" parameter. |
| | Manual setting | Generates the coordinate using the parameter that you have set (user parameter). |

When the "Initial coordinate generation/wrap coordinate setting" parameter is set to "Prioritize ABZO setting," the coordinate generation method is as follows.

| Parameter name | Setting | Coordinate generation method |
|------------------------|---|--|
| Driver simulation mode | Virtual motor (when ABZO not connected: no ABZO information) | Generates the coordinate using the parameter that you have set (user parameter). The following parameter is applied. <ul style="list-style-type: none"> • Initial coordinate generation & wrap setting range • Initial coordinate generation & wrap range offset ratio • Initial coordinate generation & wrap range offset value • Wrap setting • The number of the RND-ZERO output in wrap range |
| | Virtual motor (when ABZO not connected: 1,800 rev wrap enable) | The "Initial coordinate generation/wrap coordinate setting" parameter is set as follows. <ul style="list-style-type: none"> • Initial coordinate generation & wrap setting range: 1,800 • Initial coordinate generation & wrap range offset ratio: 50.0 • Initial coordinate generation & wrap range offset value: 0 • Wrap setting: Effective • The number of the RND-ZERO output in wrap range: 1,800 |
| | Virtual motor (when ABZO not connected: 900 rev wrap enable) | The "Initial coordinate generation/wrap coordinate setting" parameter is set as follows. <ul style="list-style-type: none"> • Initial coordinate generation & wrap setting range: 900 • Initial coordinate generation & wrap range offset ratio: 50.0 • Initial coordinate generation & wrap range offset value: 0 • Wrap setting: Effective • The number of the RND-ZERO output in wrap range: 900 |

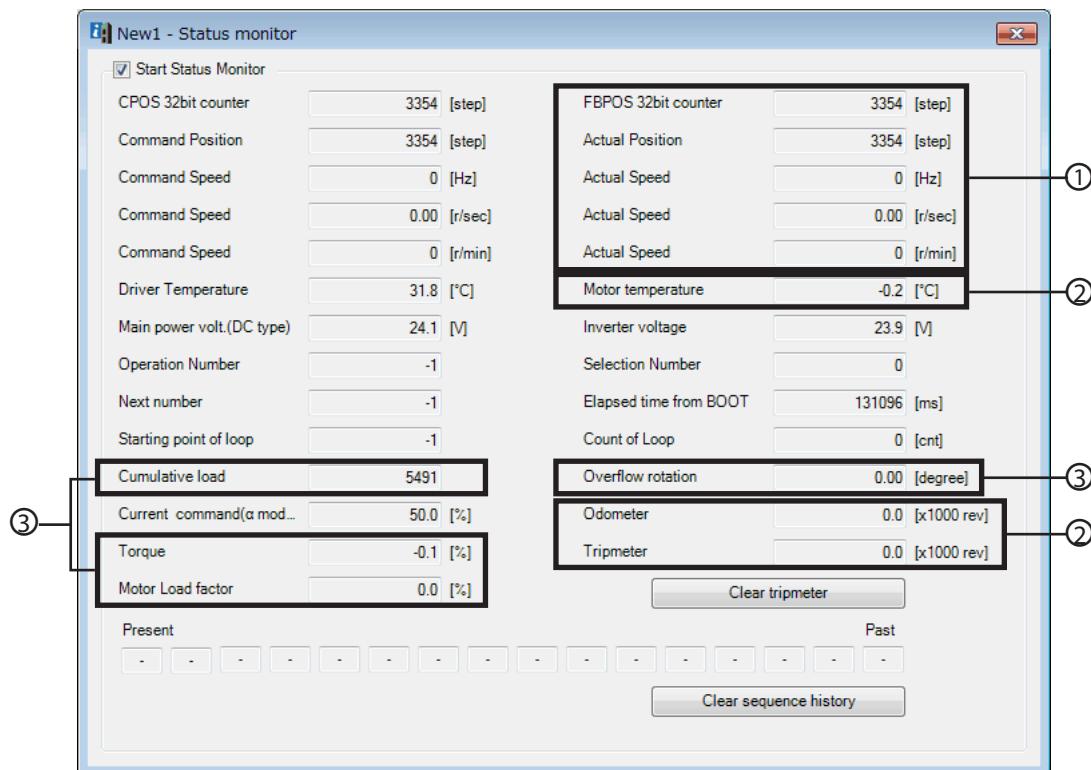
■ Coordinate generation (When the motor is connected)

The coordinate generation method varies depending on the settings of the "Manual setting of the mechanism settings" parameter and "Initial coordinate generation/wrap coordinate setting" parameter.

| Parameter name | Setting | Coordinate generation method |
|---|-------------------------|--|
| • Mechanism settings • Initial coordinate generation/wrap coordinate setting | Prioritize ABZO setting | Uses the setting of the ABZO sensor. |
| | Manual setting | Generates the coordinate using the parameter that you have set (user parameter). |

4-3 Monitor

This section explains the contents that can be checked using the status monitor during simulation. Items that the displayed content is different from a normal time are explained here.



| | | |
|---|------------------------------|---|
| 1 | Motor coordinate information | Monitors the coordinate information detected in the ABZO sensor. Regardless of whether the motor is connected or unconnected, the coordinate information is followed the command. |
| 2 | Motor status information | Monitors Information of the ABZO sensor. Regardless of whether the motor is connected or unconnected, it is always updated even during simulation. |
| 3 | Calculated value information | Monitors the value calculated from the driver command information and the motor detection information. Regardless of whether the motor is connected or unconnected, calculated value information during simulation will be as follows. • Calculative load, torque: Be indeterminate. • Overflow rotation, motor load factor: Always monitors "0." |

4-4 Operation

This section explains about operation of the driver simulation mode.

Since the position deviation and the speed deviation are always 0 in the driver simulation mode, speed control operation and push-motion operation are the same movement as positioning operation or continuous operation.

■ Stored data (SD) operation

When the operation start signal is turned ON, a simulation of the operation data set in the **MEXE02** is started.
(Stored data (SD) operation ⇒ p.55)

● Operation types

| Operation mode | Operation start signal |
|--|----------------------------|
| Absolute positioning | START, SSTART, D-SEL0 to 7 |
| Incremental positioning (based on command position) | |
| Incremental positioning (based on feedback position) | |
| Continuous operation (Position control) | |
| Wrap absolute positioning | |
| Wrap proximity positioning | |
| Wrap forward direction absolute positioning | |
| Wrap reverse direction absolute positioning | |

When any of operation modes other than listed above is selected in the **MEXE02**, it is the same movement as the following corresponding operation mode.

| Operation mode | | Corresponding operation mode |
|---|---|--|
| Wrap absolute push-motion | → | Wrap absolute positioning |
| Wrap proximity push-motion | → | Wrap proximity positioning |
| Wrap forward direction push-motion | → | Wrap forward direction absolute positioning |
| Wrap reverse direction push-motion | → | Wrap reverse direction absolute positioning |
| Continuous operation (Speed control) | → | Continuous operation (Position control) |
| Continuous operation (Push-motion) | → | Continuous operation (Position control) |
| Continuous operation (Torque control) | → | Continuous operation (Position control) |
| Absolute positioning push-motion | → | Absolute positioning |
| Incremental positioning push-motion (based on command position) | → | Incremental positioning (based on command position) |
| Incremental positioning push-motion (based on feedback position) | → | Incremental positioning (based on feedback position) |

■ Macro operation

When the operation start signal is turned ON in the macro operation, a simulation of the operation corresponding to the signal is started.

(Macro operation ⇒ p.121)

| Operation mode | Operation start signal |
|---------------------------------------|------------------------|
| Continuous operation | FW-POS, RV-POS |
| Speed control operation | FW-SPD, RV-SPD |
| Speed control push-motion operation * | FW-PSH, RV-PSH |
| 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 |

* In the driver simulation mode, it is the same movement as speed control operation.

■ Direct data operation

A simulation can be performed with the built-in controller type driver. It operates using the data input from the master controller via RS-485 communication.
(Direct data operation ⇒ p.299)

■ Return-to-home operation

● Return-to-home operation

When the HOME input is turned ON, a simulation of return-to-home operation is started.
In the driver simulation mode, 3 types of return-to-home operation, which are 3-sensor mode, 2-sensor mode, and one-way rotation mode, can be performed.
However, in the driver simulation mode, the external sensor cannot be detected since the rotor does not rotate. When return-to-home operation is simulated, it is required to turn the sensor input ON intentionally.
(Return-to-home operation ⇒ p.107)



- Push-motion return-to-home operation cannot be simulated.
- Even if the operation has completed, the home position of the ABZO sensor cannot be rewritten.

● High-speed return-to-home operation

When the ZHOME input is turned ON, a simulation of high-speed return-to-home operation is started.
(High-speed return-to-home operation ⇒ p.105)



For drivers older than the driver Ver.4.00, execute a simulation of high-speed return-to-home operation in a state where the motor is connected. Without connecting the motor, the simulation of high-speed return-to-home operation cannot be executed.

■ Pulse-input operation

A simulation can be performed with the pulse input type driver. Operation and stop are performed according to the input pulse signals.

4-5 I/O signals

This section explains about I/O signals that specifications and movements in the driver simulation mode are different from those in a normal time.



The following items during simulation vary from those in a normal time. Therefore, the ON/OFF status of I/O signals may vary from that in the normal time.

- The position deviation and the speed deviation are 0 since the motor does not operate.
- Parameters related to I/O signals are disabled even if they are set.
- Regardless of the status of I/O signals, the motor is in a non-excitation state, and the electromagnetic brake is in a holding state.

Example: If the FREE input is turned ON, although the excitation is an OFF state (the CRNT output is OFF) and the electromagnetic brake is released (the MBC output is OFF) on the signal, the motor remains a non-excitation state and the electromagnetic brake remains a holding state.

■ Input signal

| Signal name | Driver simulation mode | Normal time |
|-------------|------------------------|-------------------|
| TEACH | Disable | Execute teaching. |

■ Output signals

| Signal name | Driver simulation mode | Normal time |
|-------------|------------------------|--|
| ABSPEN | Always ON * | Output when the position coordinate is set. |
| PRST-STLD | Always OFF * | Output when the mechanical home position is set. |
| ORGN-STLD | Always OFF * | Output when a mechanical home position suitable to the product is set at the time of factory shipment. |

* For drivers older than the driver Ver.4.00, signals are as follows.

- When the motor is not connected: They are always OFF.
- When the motor is connected: They are the same action as a normal time.

4-6 Alarm

In the driver simulation mode, an alarm of the sensor error at power on does not generate.

5 Use of general signals

The R0 to R15 inputs are general signals. Using the R0 to R15 inputs, I/O signals for the external device can be controlled by the master controller via the driver. Direct I/O of the driver can be used as an I/O unit.

■ Usage example of general signals

● When outputting the signals from the master controller to the external device

Assign the R0 input to the DOUT0 output and R-IN0.

When R-IN0 is set to 1, the DOUT0 output is turned ON. When R-IN0 is set to 0, the DOUT0 output is turned OFF.

● When inputting the output of the external device to the master controller

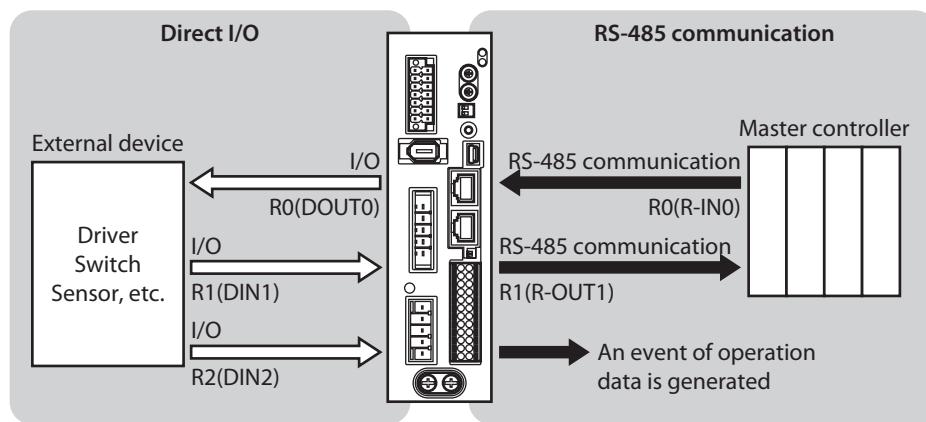
Assign the R1 input to the DIN1 input and R-OUT1.

When the DIN1 input is turned ON by the external device, R-OUT1 becomes 1, and when the DIN1 input is turned OFF, R-OUT1 becomes 0. ON/OFF of the DIN1 input can be set using "IN1 inverting mode" parameter.

● When using as an event trigger I/O to generate an event of operation data

Assign the R2 input to the DIN2 input. Set "Event trigger I/O" of operation data to "R2."

When the DIN2 input is turned ON by the external device, an event of operation data is generated and operation can be branched.



Related parameters

| MEXE02 tree view | Parameter name | Description | Initial value |
|-------------------------------|-----------------|--|----------------------------|
| Direct-IN function selection | Input function | Selects the input signal to be assigned to direct I/O. Setting range Input signal list → p.427 | Varies depending on input |
| | Inverting mode | Setting range 0: ON/OFF of the input signal is not inverted 1: ON/OFF of the input signal is inverted | 0 |
| Direct-OUT function selection | Output function | Selects the output signal to be assigned to direct I/O. Setting range Output signal list → p.428 | Varies depending on output |
| | Inverting mode | Setting range 0: ON/OFF of the output signal is not inverted 1: ON/OFF of the output signal is inverted | 0 |
| Remote-I/O function selection | Input function | Selects the input signal to be assigned to remote I/O. Setting range Input signal list → p.427 | Varies depending on input |
| | Output function | Selects the output signal to be assigned to remote I/O. Setting range Output signal list → p.428 | Varies depending on output |

■ Revision record

| Revision number | Revised contents |
|-----------------|--|
| First edition | |
| Second edition | <ul style="list-style-type: none"> • Amendment for adding models • Amendment for contents of ETO function • Addition of "1 Before starting operation" • Addition of push-motion operation and factory setting of resolution switch to "10 Extended setting for pulse-input type" • Correction of minor erroneous descriptions |
| Third edition | <ul style="list-style-type: none"> • Addition of Mechanism limit in "2 Operation" • Amendment of "6 Industrial Network" • Amendment of "Simulation of operation of driver" in "11 Appendix" • Addition of "Current setting during motor standstill at T-MODE" parameter • Correction of minor erroneous descriptions |
| Fourth edition | <ul style="list-style-type: none"> • Amendment for adding models • Revision of words and terms • Addition of "Export of alarm records" • Correction of minor erroneous descriptions |
| Fifth edition | <ul style="list-style-type: none"> • Amendment for contents of NEXT input and current control mode • Amendment for contents of ETO function and addition of wiring example in "3 I/O signals" • Addition for contents of USB-ID and USB-PID in "4 Parameters" • Addition of latch function in "9 Utilization for maintenance of equipment" • Correction of minor erroneous descriptions |

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