Oriental motor

HM-60262-6

Stepping Motor and Driver Package

αSTEP

AZ Series/
Motorized actuator equipped the AZ Series

Function Edition

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.

1 Before starting operation

2 Operation

3 I/O signals

4 Parameters

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

6 Method of control via industrial network

7 Address/code lists

8 Measures for various cases

9 Alarm and information

10 Extended setting for pulse-input operation

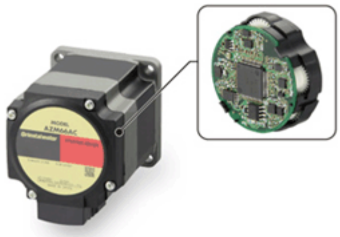
11 Appendix

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.

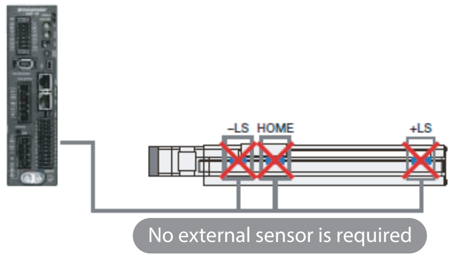
* The motors of frame size 20 mm (0.79 in.) or 28 mm (1.10 in.) are for 900 revolutions.



■ 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**

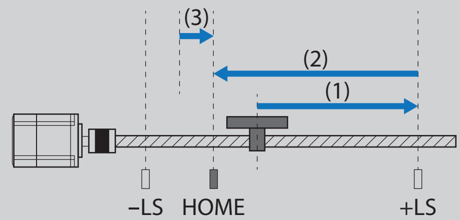
  Since the position information is maintained even if the power is interrupted, positioning operation can be continued without return-to-home operation after emergency stop or power failure.

- **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.

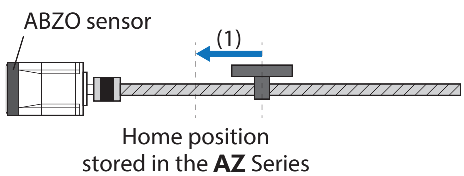
Home position detection of traditional position-control motors

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

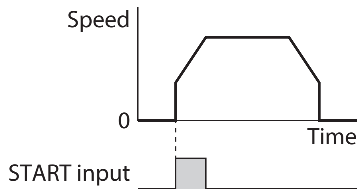
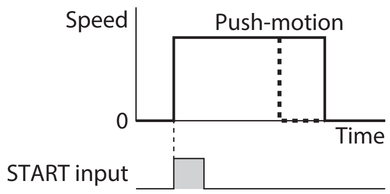
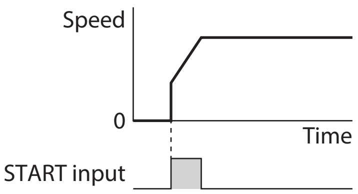
No battery is required because the position information is maintained by the ABZO sensor.

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

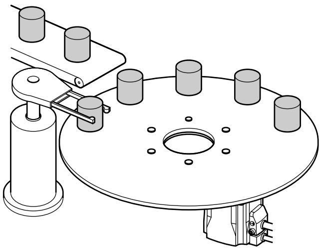
2 Operations possible with the AZ Series

■ 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.	Continuous operation is performed.
		
Positioning SD operation p.66	**Positioning push-motion SD operation** p.75	**Continuous SD operation** p.78

The command position of the rotating mechanism is returned to "0" for every rotation.



Wrap function p.142

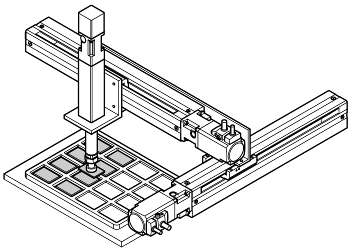
The position and the speed can be set easily with the MEXE02.

Operation data

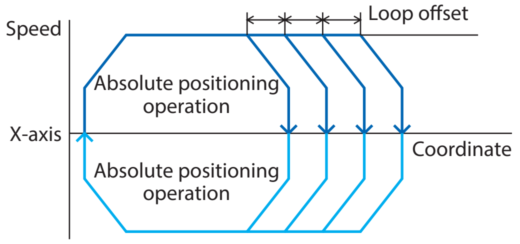
	Name	Operation type	Position [step]	Operating speed [Hz]
#0		Absolute positioning	1000	1000
#1		Incremental positioning (based on command position)	500	1000
#2		Incremental positioning (based on feedback position)	500	1000
#3		Wrap absolute positioning	2000	1000

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.

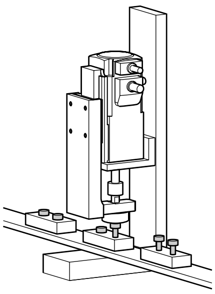


Loop function p.93

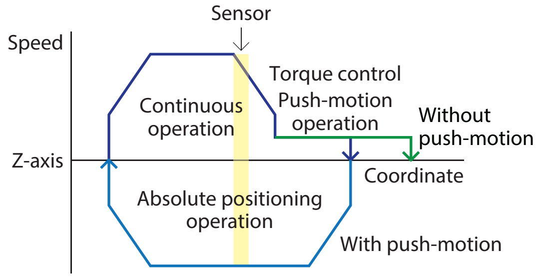


Loop offset function

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.

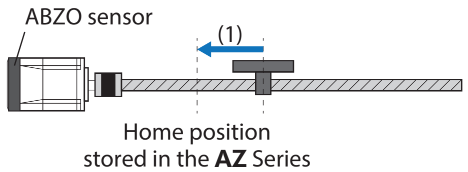


Event jump function p.95



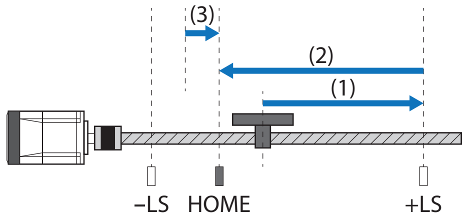
■ Return to the home position

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.302)**

  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.481)**

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

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

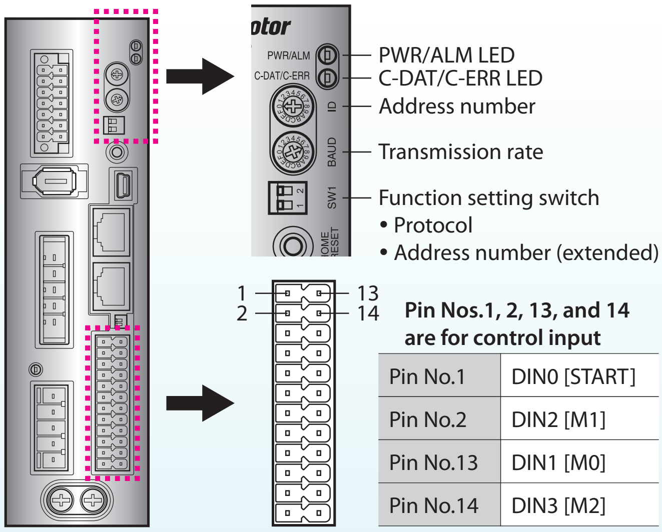
3 Types and overview of driver

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

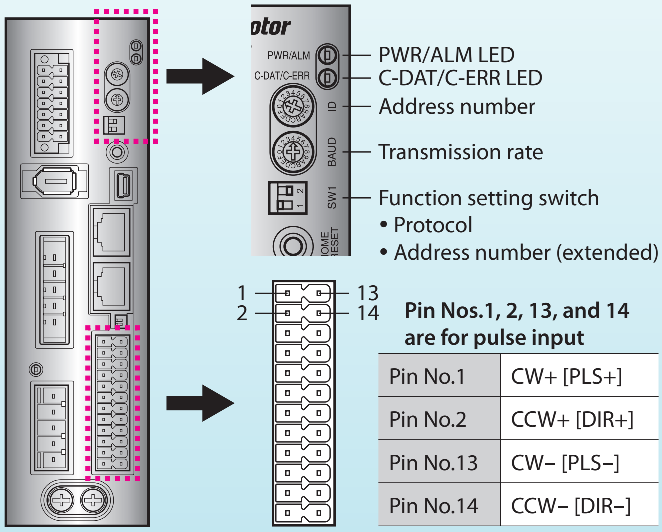


Pin Nos.1, 2, 13, and 14 are for control input

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

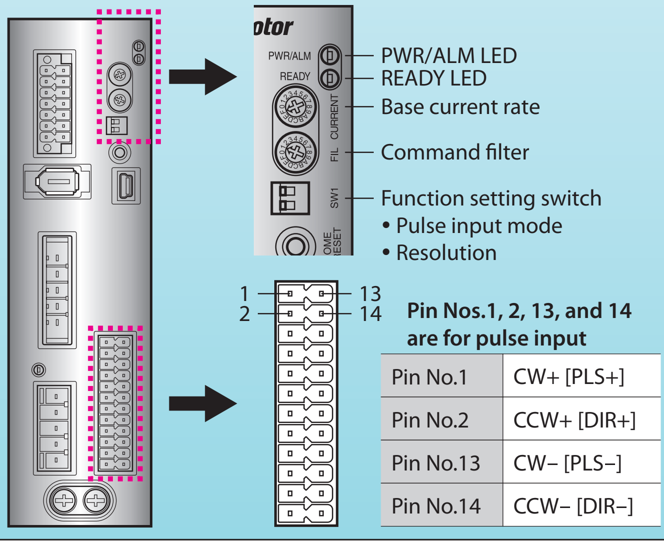


Pin Nos.1, 2, 13, and 14 are for pulse input

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

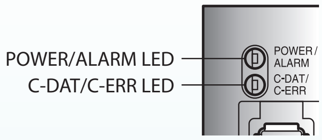


Pin Nos.1, 2, 13, and 14 are for pulse input

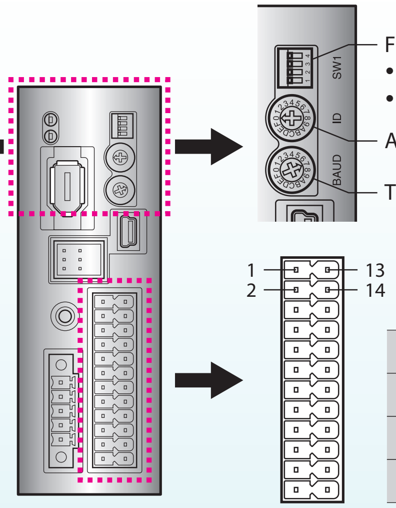
Pin No.1	CW+ [PLS+]
Pin No.2	CCW+ [DIR+]
Pin No.13	CW− [PLS−]
Pin No.14	CCW− [DIR−]

■ DC power input type

■ Built-in controller type



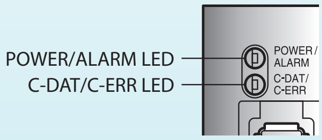
- Operates via industrial network
- Monitors the motor information via a programmable controller or touchscreen
- Operates via RS-485 communication
- Operates via I/O control



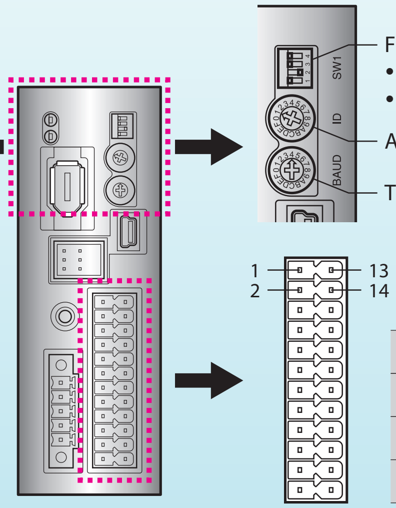
Pin Nos.1, 2, 13, and 14 are for control input

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



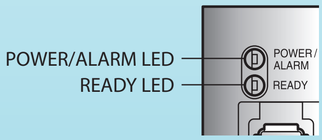
- Operates via industrial network
- Monitors the motor information via a programmable controller or touchscreen
- Operates via RS-485 communication
- Operates via I/O control
- Operates by pulse input



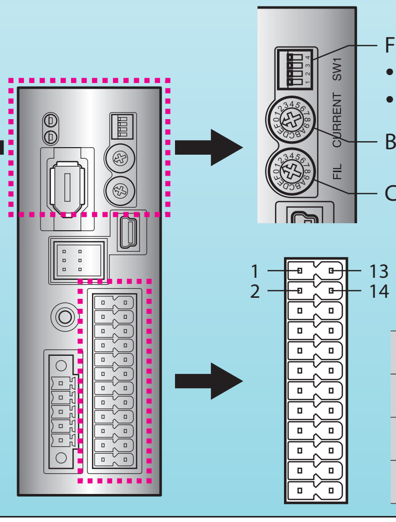
Pin Nos.1, 2, 13, and 14 are for pulse input

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



Pin Nos.1, 2, 13, and 14 are for pulse input

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
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.

Note
- 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.442)

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.

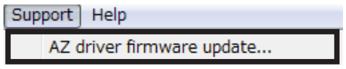
	Motor	Motorized actuator
Term	Torque	Thrust force
	Moment of inertia	Mass
	Rotation	Movement
	CW direction	Forward direction
	CCW direction	Reverse direction
	Rotation speed	Speed
	Resolution	Minimum travel amount
Unit	N·m	N
	kHz/s	m/s^2

5 Expansion of supported contents

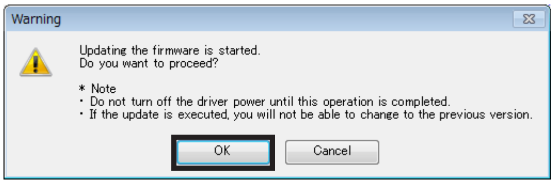
For drivers of the **AZ** Series, the firmware can be updated using the support software **MEXE02** (ver.3.51 or later). Download the latest **MEXE02** from Oriental Motor Website Download Page.

memo
- Stop the motor before starting the update of firmware.
- Check on the Oriental Motor Website for the latest firmware version.

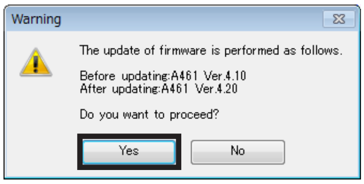
1. Click on [AZ driver firmware update] from the [Support] menu.



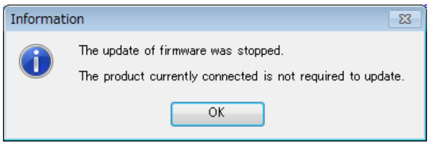
2. Click [OK].



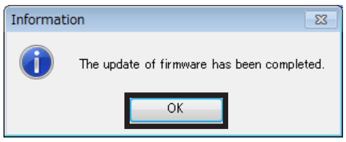
3. Click [Yes].
   Updating the firmware starts.



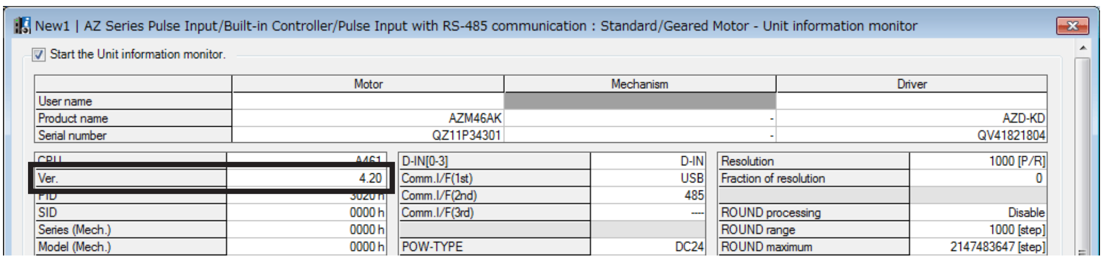
memo
- Do not turn off the driver power until the update of firmware is completed.
- Once the update of firmware is executed, the version cannot be returned to the previous one.
- If the firmware has already been updated, the following dialog box is shown.



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



The firmware version can be checked with the unit information monitor.



memo
Even if the firmware is updated, the settings for the operation data and parameters before updating have been retained.

1

Before starting operation

This chapter explains contents to be performed before starting operation.

Table of contents

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.

Starting the MEXE02 ⇨ **p.21**

↓

Motor (standard type/geared type)

Setting of display unit and resolution ⇨ **p.29**

Set the display unit and resolution with the "User unit setting support wizard" of the **MEXE02**.

↓

Home position setting ⇨ **p.36**

↓

Wrap setting ⇨ **p.39**

Set the wrap function as necessary.

Motorized actuator

Copying the fixed value (parameter) of the ABZO sensor to driver ⇨ **p.22**

Match the fixed value of the ABZO sensor with the setting value of the driver parameter in the **MEXE02**.

↓

Creation of recovery data file and method of recovery ⇨ **p.24**

Save the information of the factory setting.

<u>**Perform before installing to equipment without fail.**</u>

↓

Setting of software limit ⇨ **p.44**

If a sensor is not used, the setting of the software limit is recommended.

↓

Operation check ⇨ **p.47**

Check the set operation with "Teaching, remote operation" of the **MEXE02**.

↓

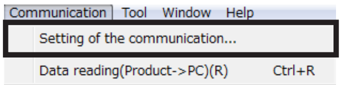
Backup of data ⇨ **p.50**

Back up the set data.

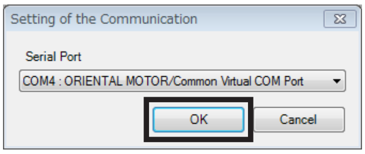
2 Starting the MEXE02

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.

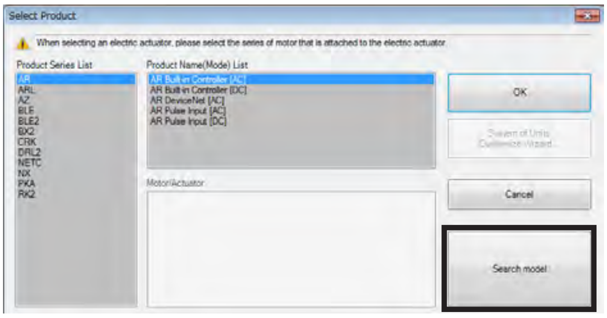


   2) Select the "ORIENTAL MOTOR/Common virtual COM port", and click [OK].

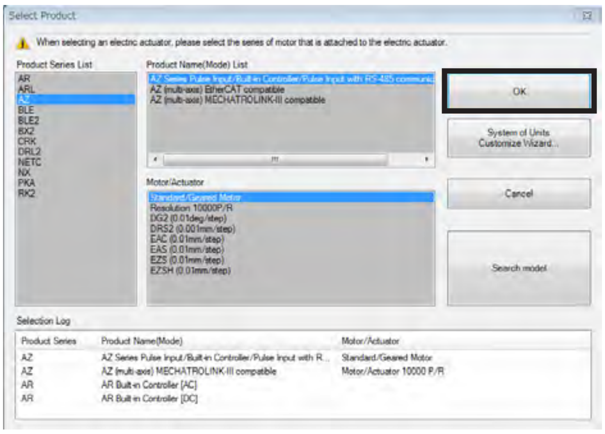


3. Select the product.
   1) Click the [New] icon in the toolbar.

   2) Click [Search model] on the Select product window.



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



memo 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

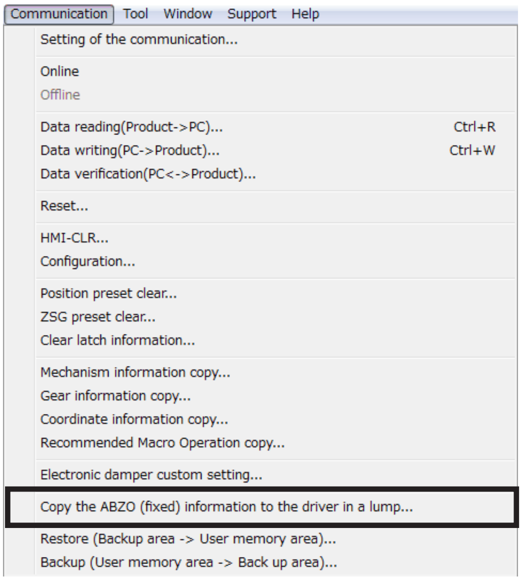
For parameters of the **AZ** Series, the different values are stored in the ABZO sensor and driver.
The values based on the product specifications such as recommended macro operation and position coordinate information are stored in the ABZO sensor. The values stored in the ABZO sensor cannot be changed 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.

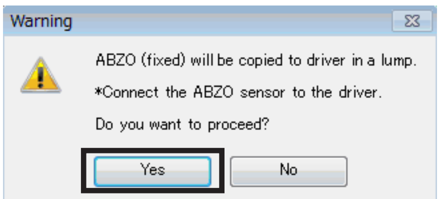
Note After writing the parameter (example: electronic gear, etc.), which was changed to [Manual setting] and set, from the **MEXE02** to the driver, even if the fixed value of the ABZO sensor is copied, the parameter that was changed with the manual setting does not return to the fixed value.

■ Procedure

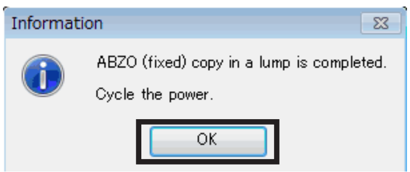
1. Click the [Communication] menu of the **MEXE02**, and select the [Copy the ABZO (fixed) information to the driver in a lump].



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.
5. Check whether the copied value is applied on the unit information monitor window.

● Unit information monitor window

[Help?]

	Active	Driver parameter	ABZO (fixed)
Mechanism settings	Driver parameter	Prioritize ABZO setting	
Electronic gear A	0	0	0
Electronic gear B	0	0	0
Motor rotation direction	Positive side=Counterclockwise	Positive side=Counterclockwise	Positive side=Counterclockwise
Mechanism type	Step	Step	No setting
Mechanism lead [mm]	0 [mm]		
Mechanism lead	0	0	0
Mechanism lead decimal digit setting	×1 [mm]	×1 [mm]	×1 [mm]
Mechanism stroke	0 [mm]		0 [mm]
Magnetic brake	None		None
Setting of gear ratio	Driver parameter		
Gear ratio	0.00	Prioritize ABZO setting	0.00
Initial coordinate generation & wrap coordinate	Driver parameter	Prioritize ABZO setting	No setting
Initial coordinate generation & wrap setting range	0.0 [rev]	0.0 [rev]	0.0 [rev]
Initial coordinate generation & wrap range offset ratio	0.00 [%]	0.00 [%]	0.00 [%]
Initial coordinate generation & wrap range offset value	0 [step]	0 [step]	0 [step]
Wrap setting	Disable	Disable	Disable
The number of the RND-ZERO output in wrap range	0	0	0
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]		0 [r/min]
Maximum Operating speed	0 [r/min]		0 [r/min]
Maximum pushing speed	0 [r/min]		0 [r/min]
Maximum pushing return-to-home speed	0 [r/min]		0 [r/min]
Maximum push current	Pushing not possible		Pushing not possible
JOG/HOME/ZHOME operation setting	Driver parameter	Prioritize ABZO setting	No setting
(JOG/HOME/ZHOME)Command filter time	0 [ms]	0 [ms]	0 [ms]
(JOG/HOME/ZHOME)Operating RUN current	0.0 [%]	0.0 [%]	0.0 [%]
(JOG) Travel amount	0 [step]	0 [step]	0 [step]
(JOG) Operating speed	0 [Hz]	0 [Hz]	0 [r/min]
(JOG) Acceleration/deceleration	0.000 [kHz/s]	0.000 [kHz/s]	0.000 [s]
(JOG) Starting speed	0 [Hz]	0 [Hz]	0 [r/min]
(JOG) Operating speed (high)	0 [Hz]	0 [Hz]	0 [r/min]
(ZHOME) Operation speed	0 [Hz]	0 [Hz]	0 [r/min]
(ZHOME) Acceleration/deceleration	0.000 [kHz/s]	0.000 [kHz/s]	0.000 [s]
(ZHOME) Starting speed	0 [Hz]	0 [Hz]	0 [r/min]
(HOME) Home-seeking mode	2-sensor	2-sensor	2-sensor
(HOME) Starting direction	Negative side	Negative side	Negative side
(HOME) Acceleration/deceleration	0.000 [kHz/s]	0.000 [kHz/s]	0.000 [s]
(HOME) Starting speed	0 [Hz]	0 [Hz]	0 [r/min]
(HOME) Operating speed	0 [Hz]	0 [Hz]	0 [r/min]
(HOME) Last speed	0 [Hz]	0 [Hz]	0 [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	0 [step]	0 [step]	0.000 [rev]
(HOME) Operating amount in uni-directional home-seeking	0 [step]	0 [step]	0.000 [rev]
(HOME) Operating current for push motion home-seeking	0.0 [%]	0.0 [%]	0.0 [%]
(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	0 [ms]	0 [ms]	0 [ms]
(HOME) Backward steps in push motion home-seeking	0 [step]	0 [step]	0.000 [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

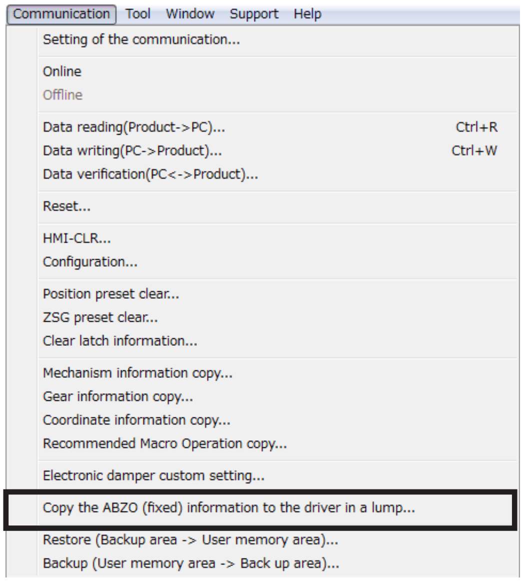
4-1 Creating the recovery data file

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.

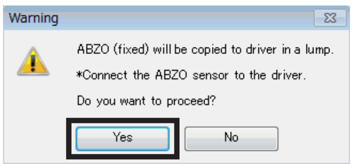
Note
- If you are the customer to use a motorized actuator, create the recovery data file without fail.
- Be sure to create the recovery data file before installing the motorized actuator to equipment.

■ Creating procedure for recovery data file

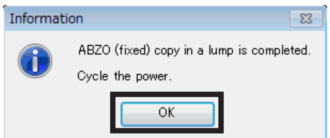
1. Start the **MEXE02** in the steps of "2 Starting the **MEXE02**" on p.21.
   Check the connected product is selected.
2. Copy the ABZO information (fixed value).
   1) Click [Copy the ABZO (fixed) information to the driver in a lump] from the [Communication] menu.



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



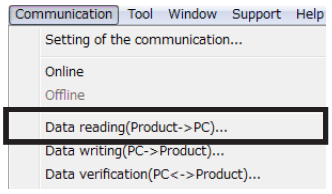
   3) After it is completed, click [OK].



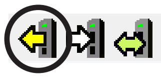
   4) Cycle the driver power.

3. Read the ABZO information stored in the driver.

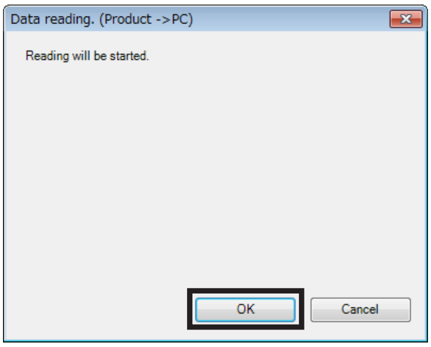
1) Click the [Data reading (Product → PC)] from the [Communication] menu or click the [Data reading (Product → PC)] icon in the toolbar.



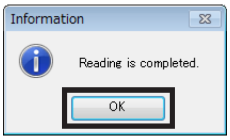
or



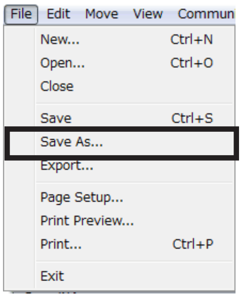
2) Click [OK].
Data reading is started.



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.

Note 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

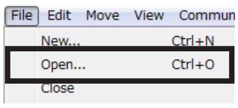
The recovery can be performed under the precondition of having created the recovery data file according to the "4-1 Creating the recovery data file" on p.24.

⚠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.

memo
- 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.

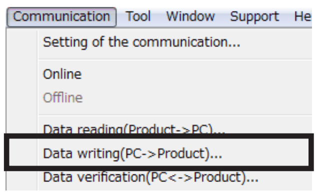
■ When the motor and driver were malfunctioned

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].

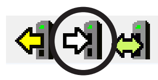


or

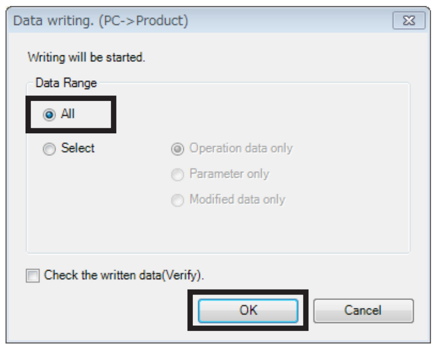
3. Check the data is correct, and write to the driver in the following steps.
   1) Click the [Data writing (PC → product)] from the [Communication] menu or click the [Data writing (PC → product)] icon in the toolbar.



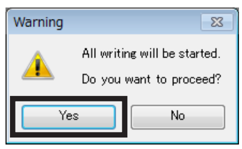
or



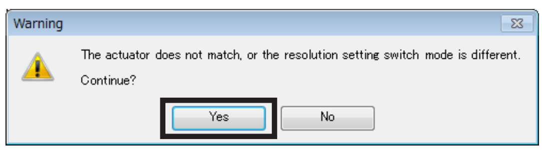
   2) Select the [All], and click [OK].



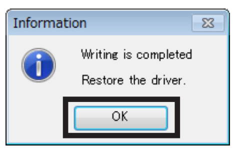
   3) Click [Yes].
   Writing data is started.



   If the following message appears, click [Yes].

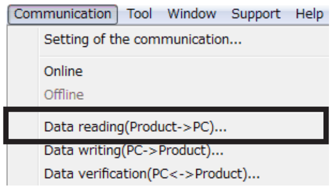


   4) After it is completed, click [OK].

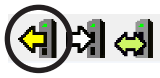


   5) Cycle the driver power.

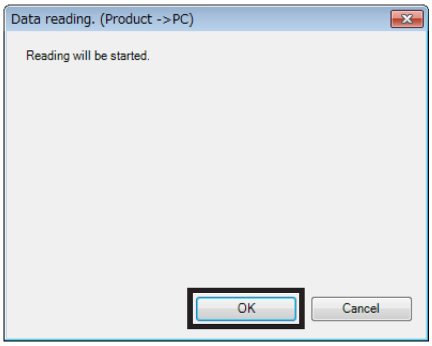
4. Read the information of the factory setting written to the driver.
   When the motor is replaced, set the home position again after reading the driver information.
   The communication function of the **MEXE02** cannot be used without reading the driver information.
   1) Click the [Data reading (product → PC)] from the [Communication] menu or click the [Data reading (product → PC)] icon in the toolbar.



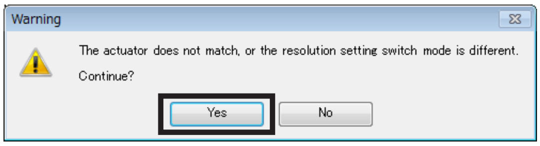
or



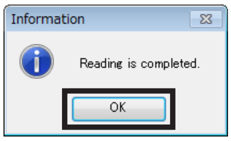
   2) Click [OK].
   Data reading is started.



   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**.

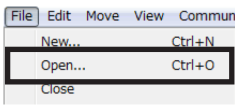
5. Refer to p.36 and set the home position again.
6. Refer to p.24 and create the recovery data file for the product after replacement.

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

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

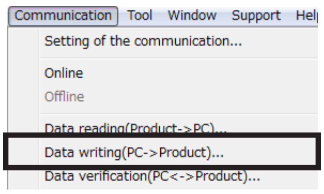
■ When the driver was malfunctioned

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].

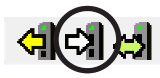


or

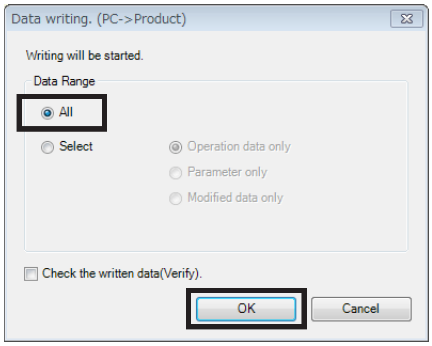
3. Check the data is correct, and write to the driver in the following steps.
   1) Click the [Data writing (PC → product)] from the [Communication] menu or click the [Data writing (PC → product)] icon in the toolbar.



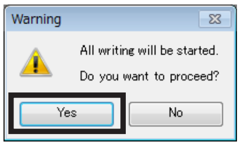
or



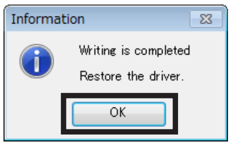
2) Select the [All], and click [OK].



3) Click [Yes].
Writing data is started.



4) Click [OK].



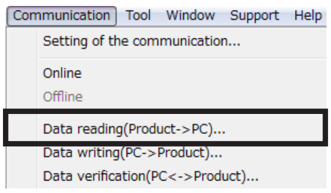
5) Cycle the driver power.

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

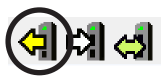
■ When the motor was malfunctioned

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.

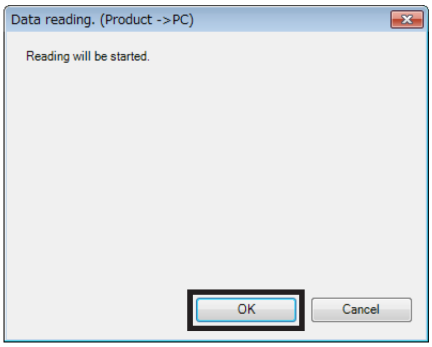
   1) Click the [Data reading (product → PC)] from the [Communication] menu or click the [Data reading (product → PC)] icon in the toolbar.



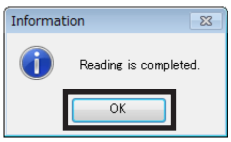
or



   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.

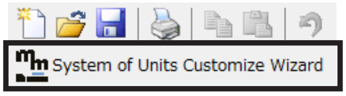
Note Save the read driver information as the new recovery data file.

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.

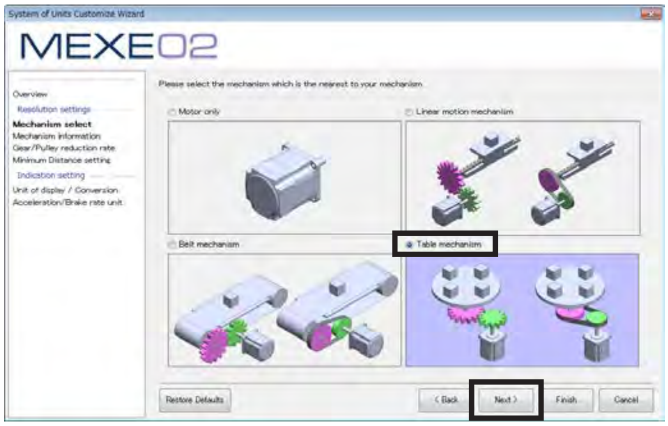
5-1 Setting example for when an index table is used

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.

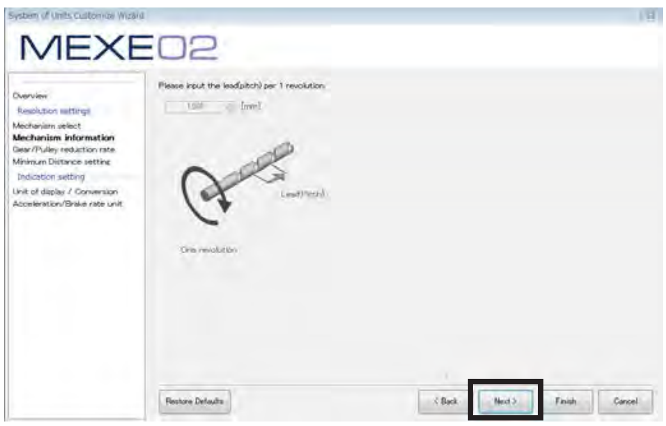


   2) Click [Next].

   3) Select the mechanism used. Select the [Table mechanism], and click [Next].



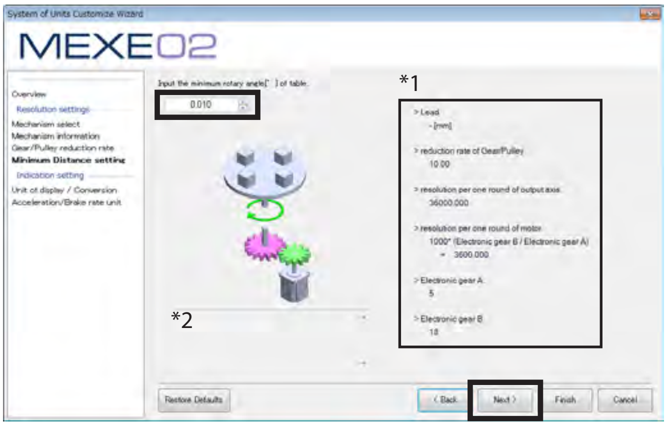
   4) Set the mechanism information. When the "table" is selected, the setting of the mechanism information is not required. Click [Next].



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].

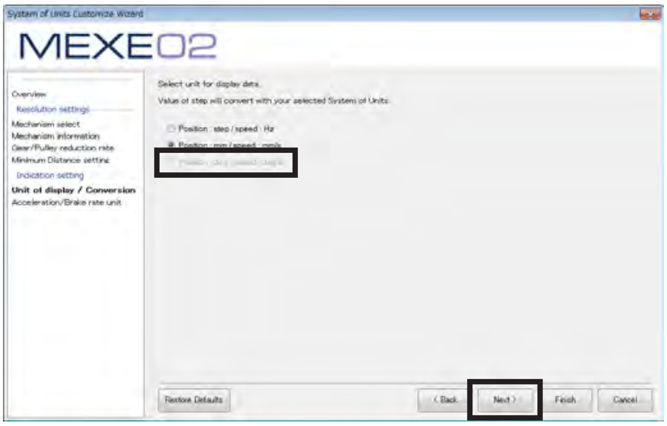
memo When gears or pulleys are not used externally, select "Use the factory default settings of selected product," and click [Next].

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.



memo 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].



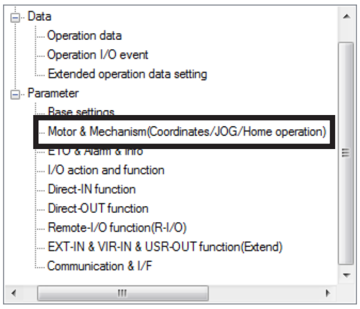
memo The unit for when operating via network is "step."

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

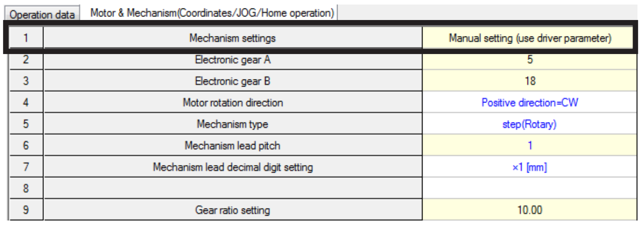
memo If "s" is selected in the acceleration/deceleration unit, the initial value of the "Starting/changing rate" and "Stopping deceleration" is "1000 s." After the setting was complete, change the value according to the operating condition.

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.



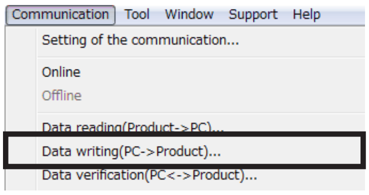
2) Change the "Mechanism settings" parameter to "Manual setting."



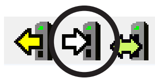
1	Mechanism settings	Manual setting (use driver parameter)
2	Electronic gear A	5
3	Electronic gear B	18
4	Motor rotation direction	Positive direction=CW
5	Mechanism type	step(Rotary)
6	Mechanism lead pitch	1
7	Mechanism lead decimal digit setting	×1 [mm]
8		
9	Gear ratio setting	10.00

3. Write the parameters to the driver.

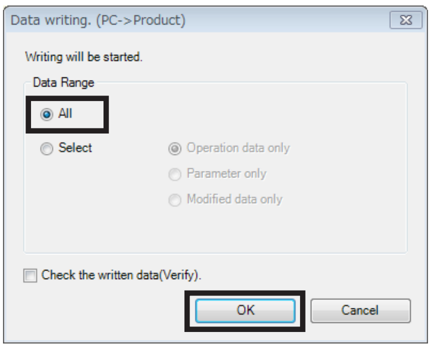
1) Click the [Data writing (PC → product)] from the [Communication] menu or click the [Data writing (PC → product)] icon in the toolbar.



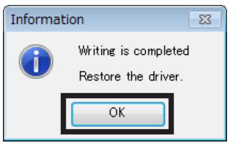
or



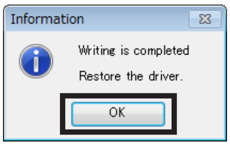
2) Select "All" in the data range, and click [OK].



3) Click [OK].
Writing parameters is started.



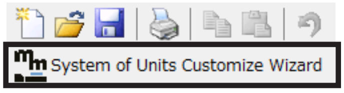
4) Click [OK].



4. Cycle the driver power.
   Parameters are applied.

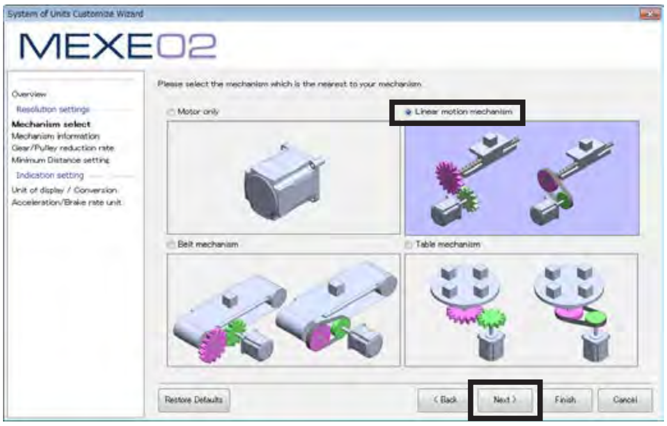
5-2 Setting example for when a linear mechanism is assembled

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].



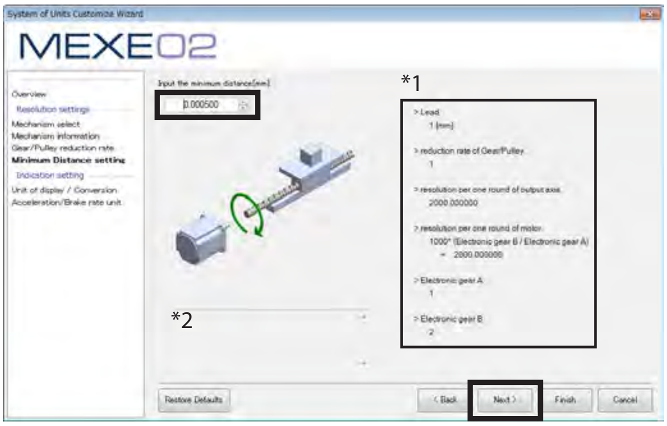
   4) Set the travel amount per a revolution.
      This example is set as "1 mm." Input "1," and click [Next].

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 mm." Input "0.0005", and click [Next].

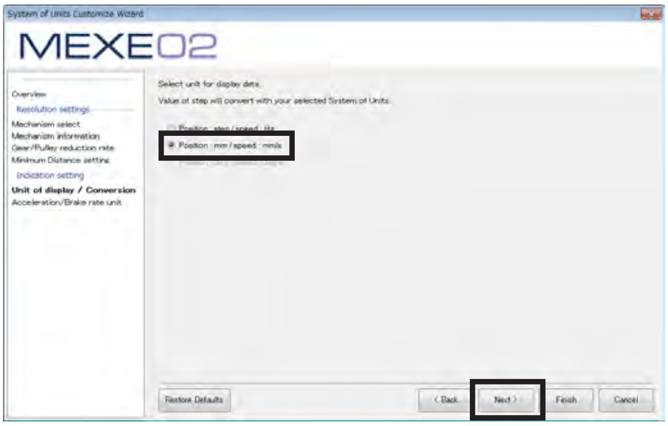
*1 The set contents are shown.
Since the wrong setting is indicated in red color, set it again.

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



memo 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].



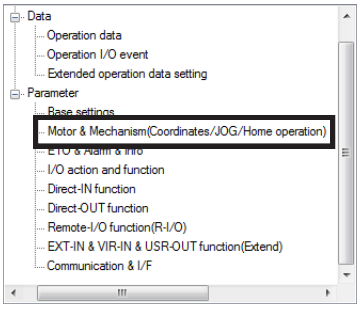
memo The unit for when operating via network is "step."

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

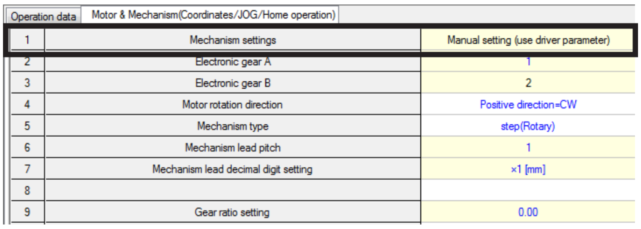
memo If "s" is selected in the acceleration/deceleration unit, the initial value of the "Starting/changing rate" and "Stopping deceleration" is "1000 s." After the setting was complete, change the value according to the operating condition.

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.



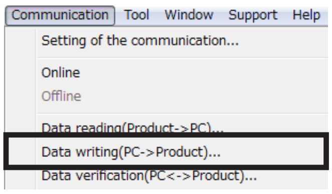
2) Change the "Mechanism settings" parameter to "Manual setting."



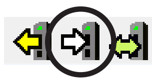
1	Mechanism settings	Manual setting (use driver parameter)
2	Electronic gear A	1
3	Electronic gear B	2
4	Motor rotation direction	Positive direction=CW
5	Mechanism type	step(Rotary)
6	Mechanism lead pitch	1
7	Mechanism lead decimal digit setting	×1 [mm]
8		
9	Gear ratio setting	0.00

3. Write the parameters to the driver.

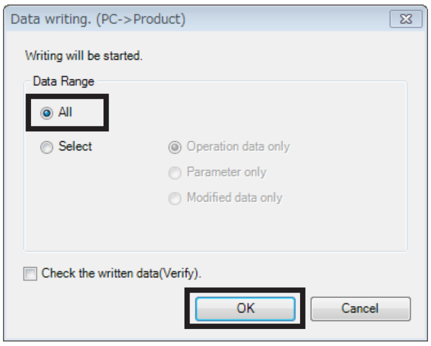
1) Click the [Data writing (PC → product)] from the [Communication] menu or click the [Data writing (PC → product)] icon in the toolbar.



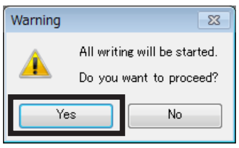
or



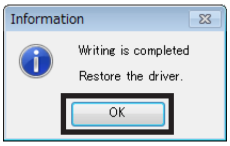
2) Select "All" in the data range, and click [OK].



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



4) Click [OK].



4. Cycle the driver power.
Parameters are applied.

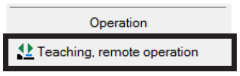
6 Home position setting

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.

memo
- 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.

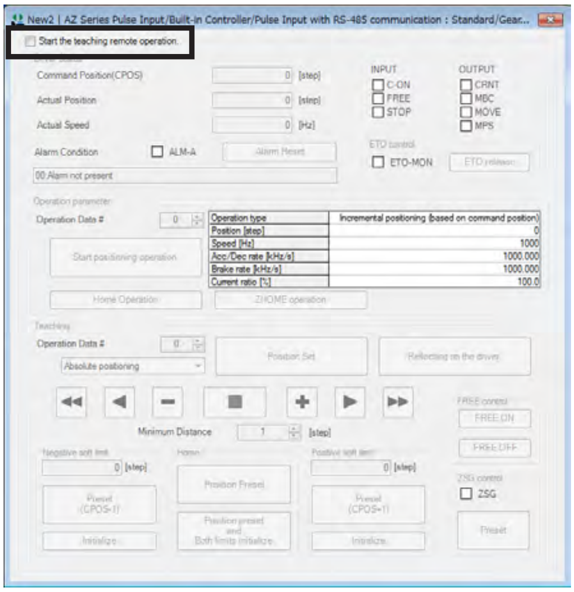
■ When a sensor is not used in return-to-home operation

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



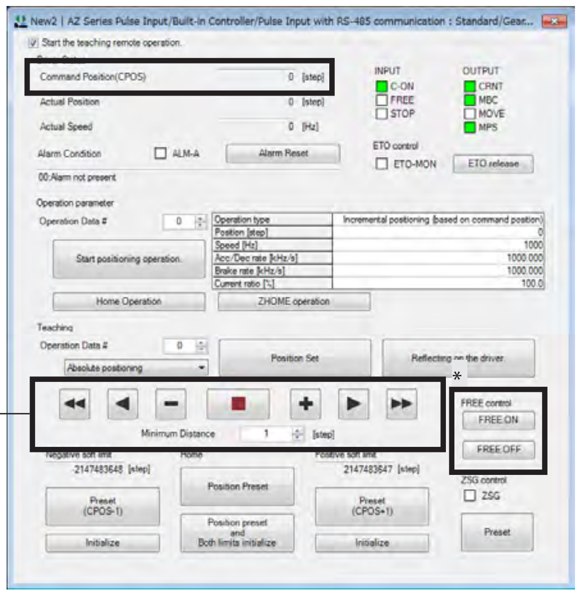
or

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



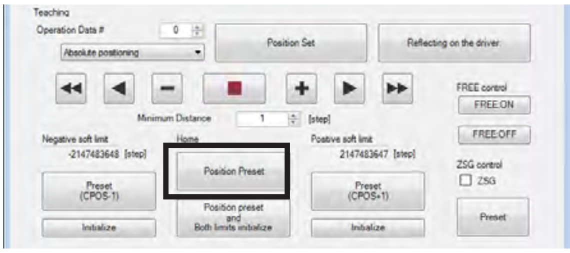
Descriptions of JOG operation buttons

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

Note 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.

memo 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.

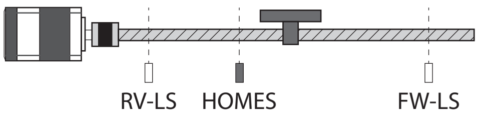


■ When a sensor input is used in return-to-home operation

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.

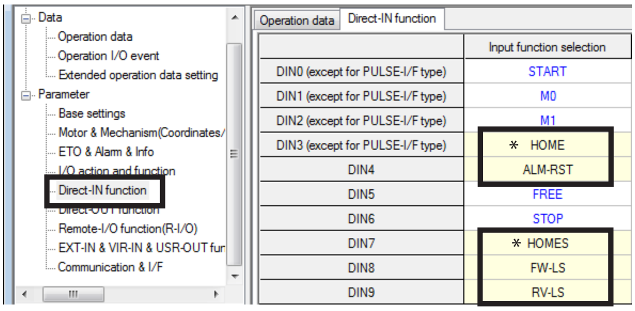


1 Before starting operation

● Built-in controller type

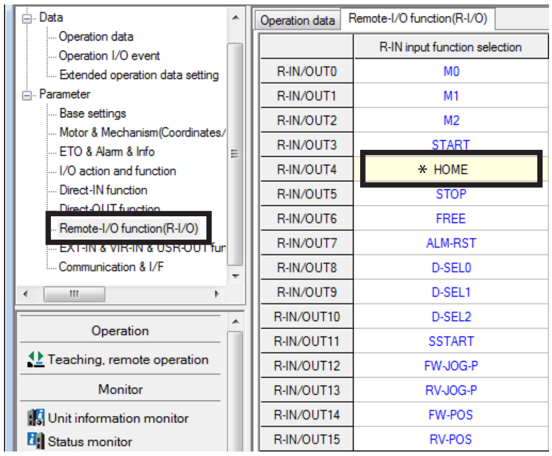
Input signals (HOMES, FW-LS, RV-LS) from sensors and signals (M0, M1, START, STOP) related in positioning operation are assigned to direct I/O. And the alarm reset signal (ALM-RST) is remained.
The HOME is assigned to both direct I/O and remote I/O so that return-to-home operation can be performed even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

Assignment example of direct I/O



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

Assignment example of remote I/O

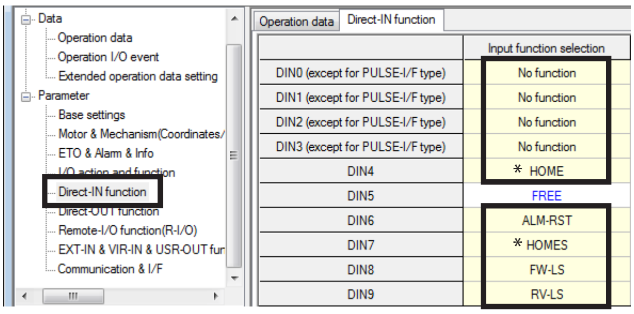


* In the case of 2-sensor mode, assign the "ZHOME."

memo
- 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.



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

memo
- Assign the input signals according to external sensors used.
- In the case of the pulse input type witn 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

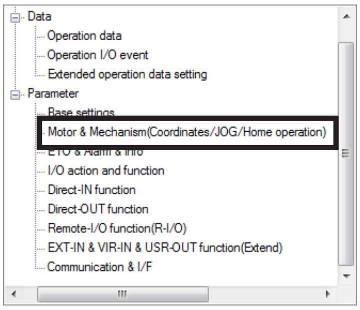
The wrap function is a function to automatically preset the position information of the present position when the number of revolutions of the motor output shaft exceeds the set range. Setting of wrap offset allows you to limit the operation area of the equipment and control the index table with coordinates 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: Effective)

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."

11	Initial coordinate generation/wrap coordinate setting	Manual setting (use driver parameter)
12	Initial coordinate generation & wrap setting range [rev]	1.0
13	Initial coordinate generation & wrap range offset ratio [%]	50.00
14	Initial coordinate generation & round coordinate offset value [mm]	0.0000
15	Wrap setting	Effective
16	The number of the RND-ZERO output in wrap range	1

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

11	Initial coordinate generation/wrap coordinate setting	Manual setting (use driver parameter)
12	Initial coordinate generation & wrap setting range [rev]	1.0
13	Initial coordinate generation & wrap range offset ratio [%]	50.00
14	Initial coordinate generation & round coordinate offset value [mm]	0.0000
15	Wrap setting	Disable
16	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.

Setting the wrap function

↓

Setting the wrap range

↓

Setting the offset ratio of the wrap range

↓

Setting the offset amount of the wrap range

↓

Writing the set parameters to the driver

1 Before starting operation

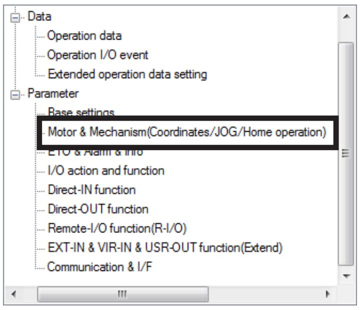
Related parameters

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

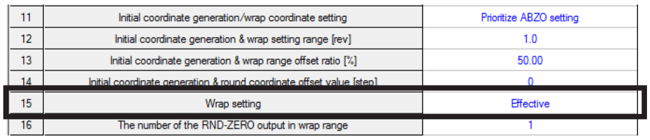
STEP 1 Set the wrap function

Set the "Wrap setting" parameter.

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 "Wrap setting" parameter to "Effective."

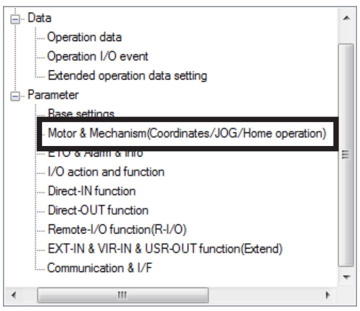


11	Initial coordinate generation/wrap coordinate setting	Prioritize ABZO setting
12	Initial coordinate generation & wrap setting range [rev]	1.0
13	Initial coordinate generation & wrap range offset ratio [%]	50.00
14	Initial coordinate generation & round coordinate offset value [step]	0
15	Wrap setting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

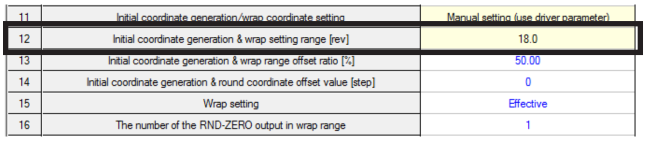
STEP 2 Set the wrap range

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.

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 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.



11	Initial coordinate generation/wrap coordinate setting	Manual setting (use driver parameter)
12	Initial coordinate generation & wrap setting range [rev]	18.0
13	Initial coordinate generation & wrap range offset ratio [%]	50.00
14	Initial coordinate generation & round coordinate offset value [step]	0
15	Wrap setting	Effective
16	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%)

memo 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.

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

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

● 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)

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

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

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)

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

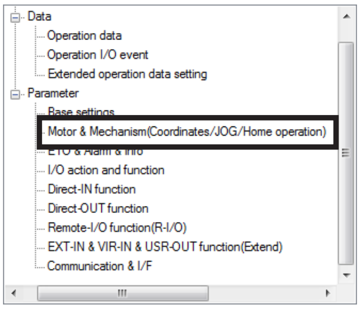
Condition (2) $\text{Wrap setting range} \times \dfrac{\text{Electronic gear B}}{\text{Electronic gear A}} \times 1{,}000 = 14.4 \times \dfrac{1}{3} \times 1{,}000 = 4{,}800$

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

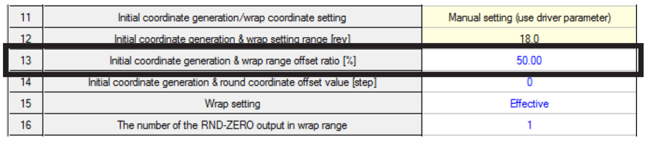
STEP 3 Set the offset ratio of the wrap range

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

1. Click "Motor and mechanism (coordinates/JOG/home operation)" under "Parameter" in the tree view.
   The motor and mechanism parameter is shown.

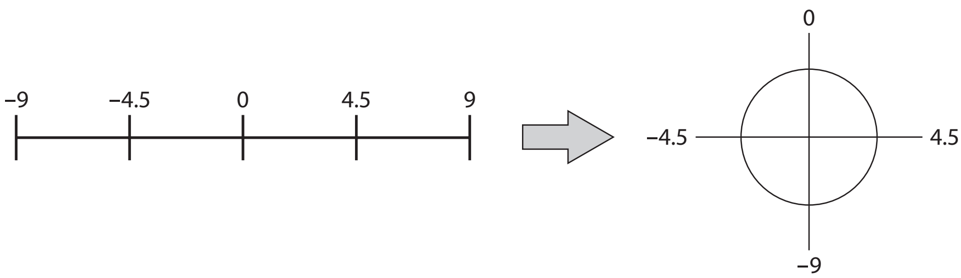


2. Set the "Initial coordinate generation & wrap range offset ratio" parameter.
   Here, 18 revolutions is divided into 50% each in positive side and negative side so that the index table can be rotated in both directions.



11	Initial coordinate generation/wrap coordinate setting	Manual setting (use driver parameter)
12	Initial coordinate generation & wrap setting range [rev]	18.0
13	Initial coordinate generation & wrap range offset ratio [%]	50.00
14	Initial coordinate generation & round coordinate offset value [step]	0
15	Wrap setting	Effective
16	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%

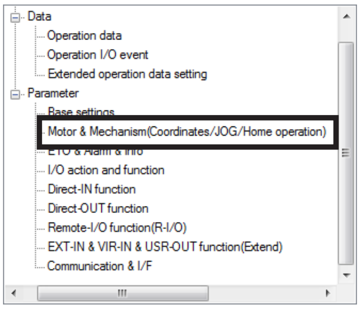


Note If the "Wrap setting" parameter or "Initial coordinate generation & wrap setting range" parameter is changed, the absolute position may be moved. When the parameter is changed, perform high-speed return-to-home operation or return-to-home operation.

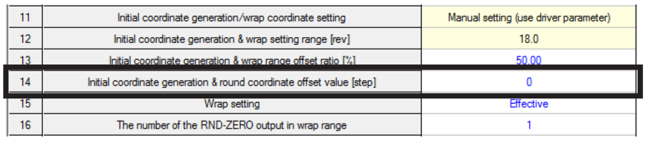
STEP 4 Set the amount of offset of the wrap range

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

1. Click "Motor and mechanism (coordinates/JOG/home operation)" under "Parameter" in the tree view.
   The motor and mechanism parameter is shown.



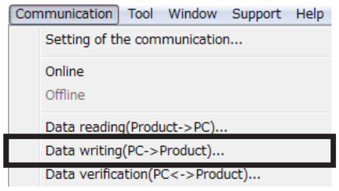
2. Set the "Initial coordinate generation & wrap range offset value" parameter.
   Set "0" if the setting is not required.



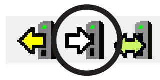
11	Initial coordinate generation/wrap coordinate setting	Manual setting (use driver parameter)
12	Initial coordinate generation & wrap setting range [rev]	18.0
13	Initial coordinate generation & wrap range offset ratio [%]	50.00
14	Initial coordinate generation & round coordinate offset value [step]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

STEP 5 Write the set parameters to the driver

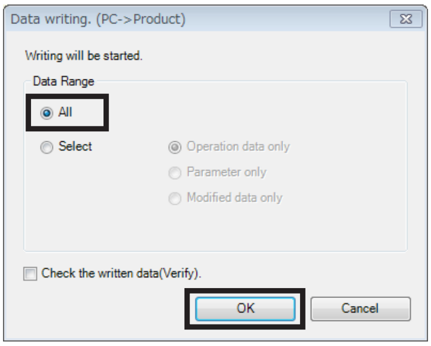
1. Click the [Data writing (PC → product)] from the [Communication] menu or click the [Data writing (PC → product)] icon in the toolbar.



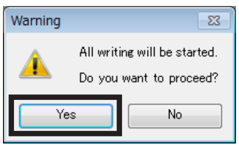
or



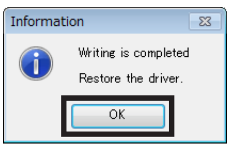
2. Select "All" in the data range, and click [OK].



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



4. Click [OK].



5. Cycle the driver power.
   Parameters are applied.

memo 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.

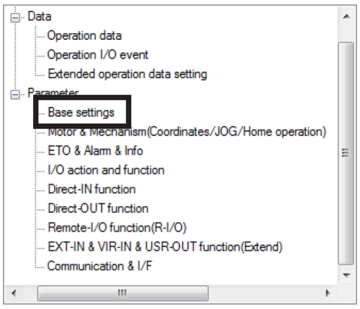
8 Setting of software limit

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.

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



2. 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

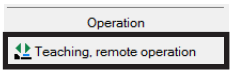
memo When the "Deceleration stop" is selected, take account the distance till the motor stops after starting deceleration. If the load may contact with the mechanism during deceleration, change the setting to "Immediate stop" or shorten the brake deceleration in the operation data.

■ Setting of software limit

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

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

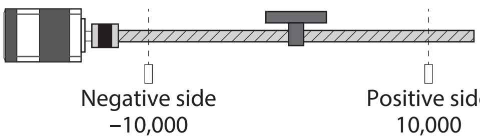
1. Click the [Teaching, remote operation] shortcut button or click the [Teaching, remote operation] icon in the toolbar.



or

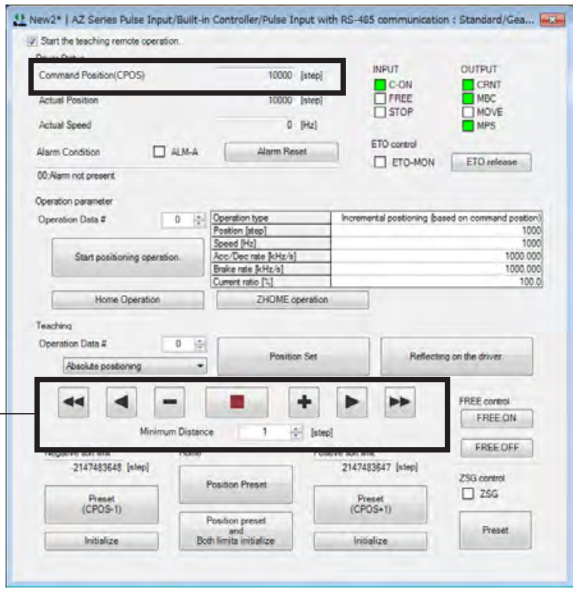
2. Click "Start the teaching remote operation."

3. 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.

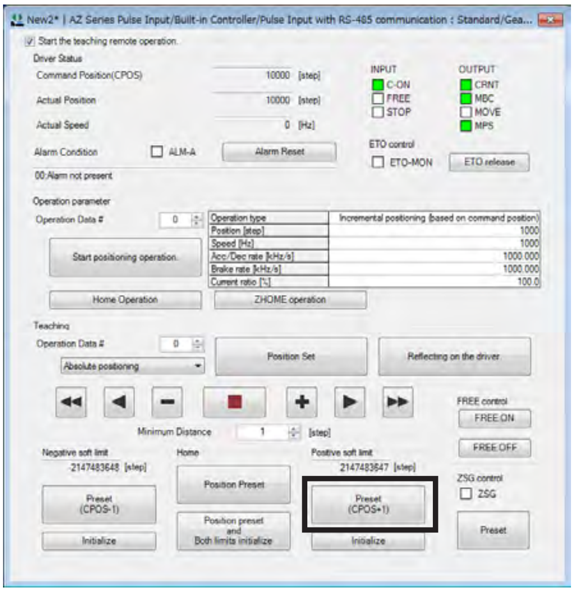


1) Using the JOG operation buttons, operate the motor to the moving range 10,000 of the positive side.
Adjust the position while checking the "Command position (CPOS)" in the "Driver status" field.

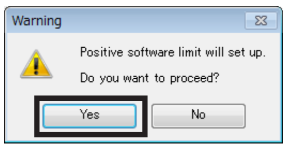
JOG operation buttons

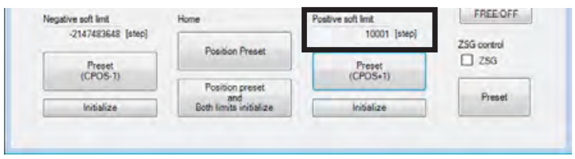


2) Click the [Preset (CPOS+1)] button in the "Positive software limit" field.



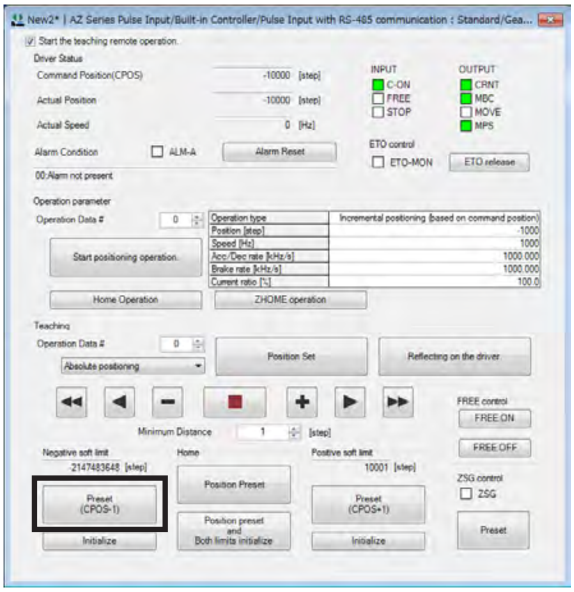
3) Click [Yes].
The value that was added 1 to the present command position is set in the software limit.



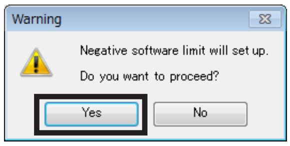


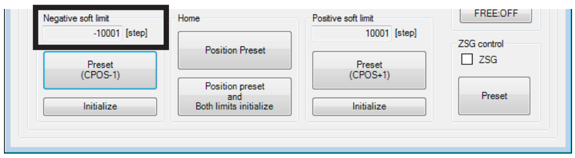
4) Operate the motor to the moving range –10,000 of the negative side using the same method as 1).

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.

Note 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

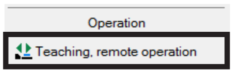
↓

Operation check for software limit ⇨ p.48

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

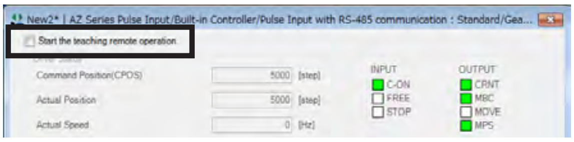
■ When no sensor is used

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

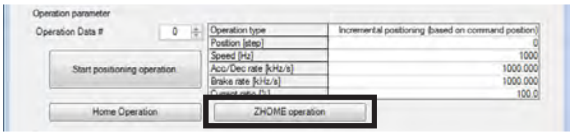


or

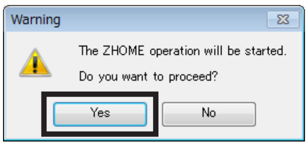
2. Click "Start the teaching remote operation."



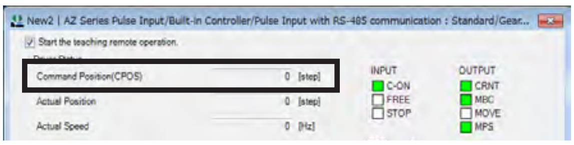
3. Execute the following high-speed return-to-home operation, and check the command position (CPOS) is being "0."
   1) Click "ZHOME operation."



   2) Click [Yes].
   High-speed return-to-home operation is started.



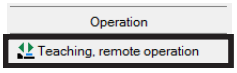
   3) After the motor stopped, check the command position (CPOS) is being "0."



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

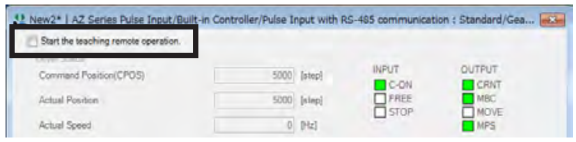
When sensors are used

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

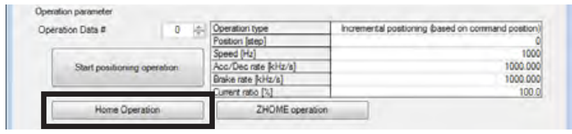


or

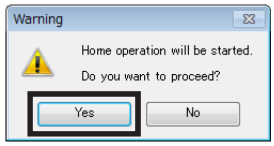
2. Click "Start the teaching remote operation."



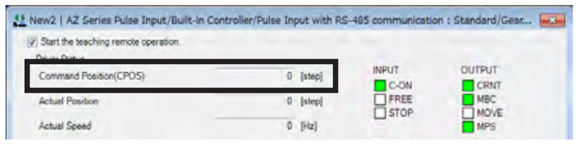
3. Execute the following return-to-home operation, and check the command position (CPOS) is being "0."
   1) Click "Home operation."



   2) Click [Yes].
   Return-to-home operation is started.



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



memo 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.

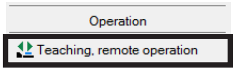
Setting of related parameters

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.

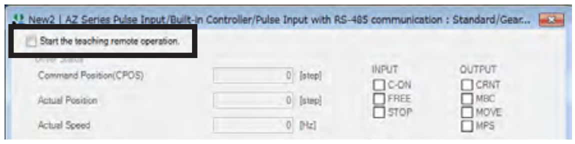
■ Operation check

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



or

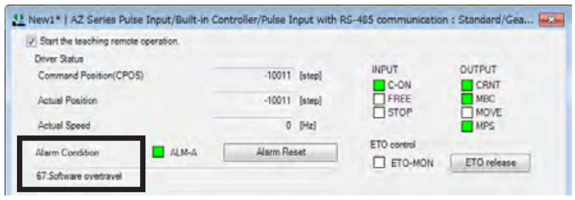
2. Click "Start the teaching remote operation."



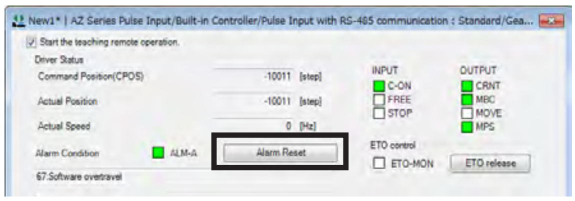
3. Operate the motor using the JOG operation buttons.

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.441 for details.

2 Operation

This part explains the operation functions and parameters.

Table of contents

1 Flow of setting required for positioning operation

The contents of are explained in this manual.

OPERATING MANUAL Driver

- 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. ⇨p.140
In addition, if an electronic gear is used, the resolution can be set. ⇨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.
- Macro operation: In JOG operation, continuous operation, etc., the motor is operated by inputting a specific signal.
- High-speed return-to-home / Return-to-home operation: The motor is returned to the home position.

Part Four

Set parameters.

Part Nine

Make settings concerning information and alarms.

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	1
	Electronic gear B	Sets the numerator of electronic gear. **Setting range** 1 to 65,535	

Note
- 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.

memo
- The initial value of resolution may vary depending on the product connected.
- If you use the pulse-input type, refer to p.487. (⇨ p.487)

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)

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

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

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

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

Calculation example 2: Rotary table

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

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

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

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

Therefore, electronic gear A is 10 and electronic gear B is 36, and the resolution is 3600 P/R.

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

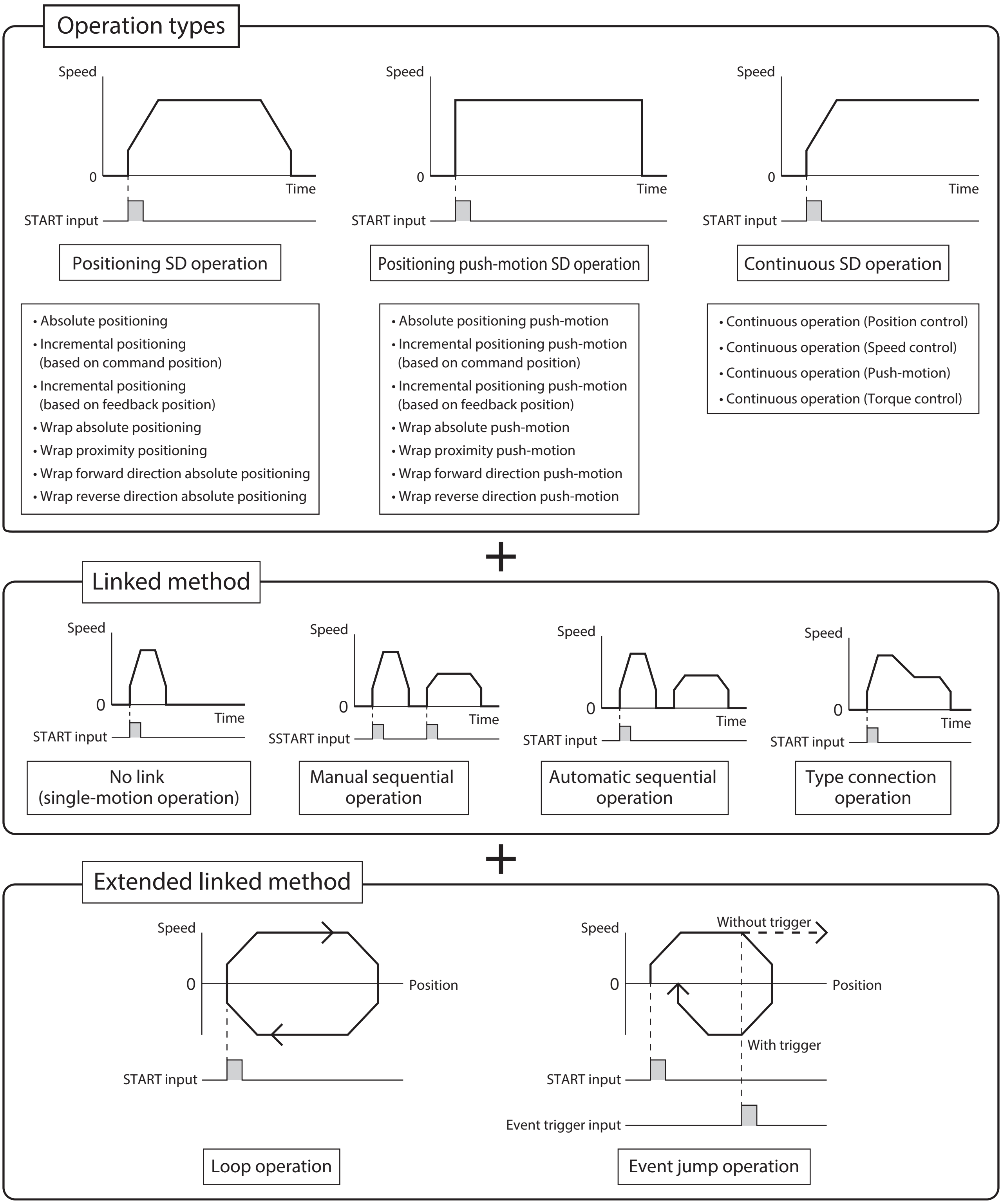
The A-phase output and B-phase output are pulse signals output from the ABZO sensor. Since pulses are output from the A-phase and B-phase outputs in response to the motor operation, the motor position can be monitored by counting the number of pulses.
The resolution for the A-phase output and B-phase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

Operation types	Description
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.

<table>
<tr><th>Operation types</th><th colspan="2">Description</th></tr>
<tr><td rowspan="6">Continuous stored data (SD) operation</td><td colspan="2">Operation is continued with the set operating speed.</td></tr>
<tr><th>Operation mode</th><th>Description</th></tr>
<tr><td>Continuous operation (Position control)</td><td>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.</td></tr>
<tr><td>Continuous operation (Speed control)</td><td>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.</td></tr>
<tr><td>Continuous operation (Push-motion)</td><td>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.</td></tr>
<tr><td>Continuous operation (Torque control)</td><td>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.</td></tr>
</table>

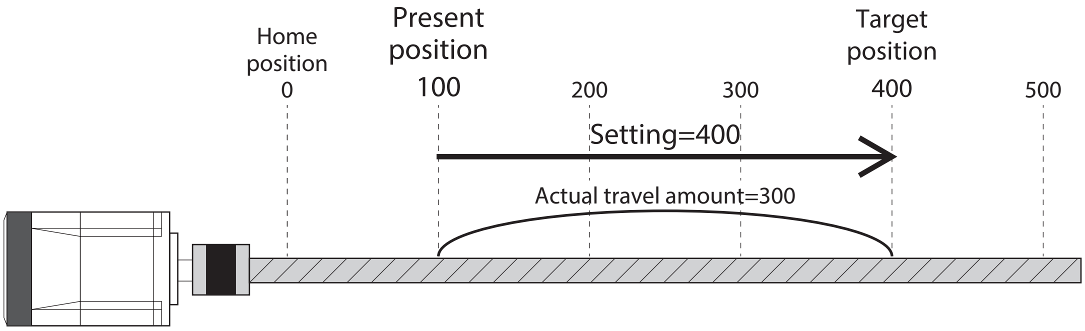
■ How to set target position

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.

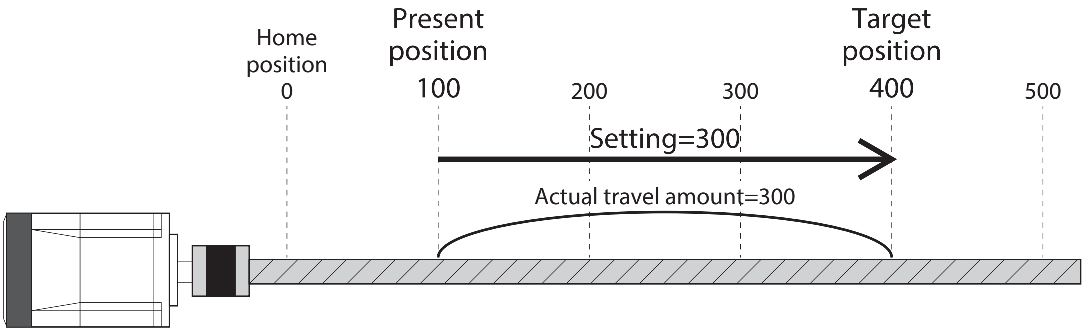
Example: Setting to move from the present position "100" to the target position "400"



● 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.

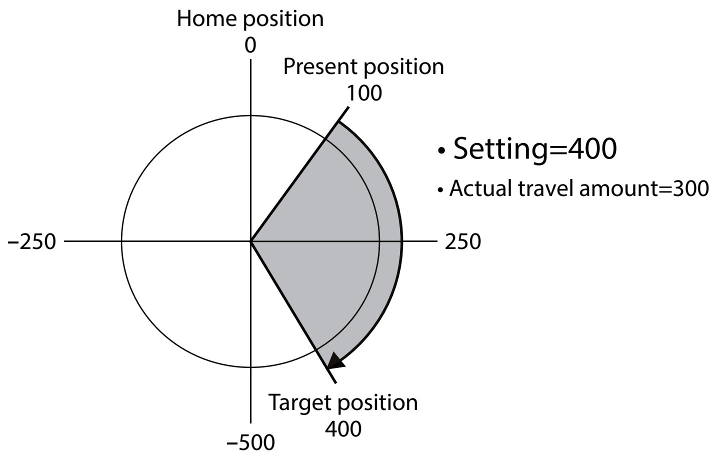
Example: Setting to move from the present position "100" to the target position "400"



● 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	Selects the operation type. **Setting range** 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 direcion absolute positioning 11: Wrap reverse direction absolute positioning 12: Wrap absolute push-motion 13: Wrap proximity push-motion 14: Wrap forward direcion 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)	2
	Position	Sets the target position (travel amount). It is not used for continuous SD operation. **Setting range** −2,147,483,648 to 2,147,483,647 steps	0
	Operating speed	Sets the operating speed. 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. **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

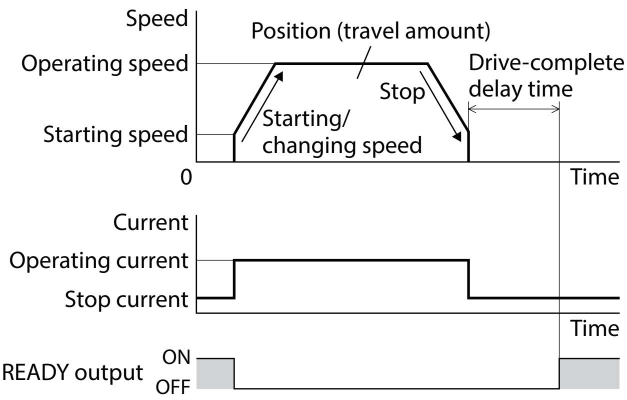
MEXE02 tree view	Item	Description	Initial value
Operation data	Stopping deceleration	Sets the deceleration rate (deceleration time) for stop. **Setting range** 1 to 1,000,000,000 (1=0.001 kHz/s, 1=0.001 s, or 1=0.001 ms/kHz)	1,000,000
	Operating current	Sets the motor operating current based on the base 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

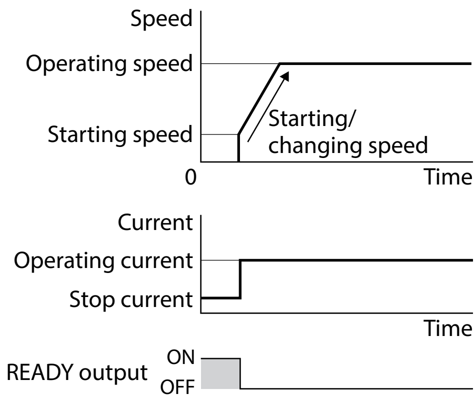
- **Position, Speed, Starting/changing rate, Stopping deceleration, Operating current, Drive-complete delay time**

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

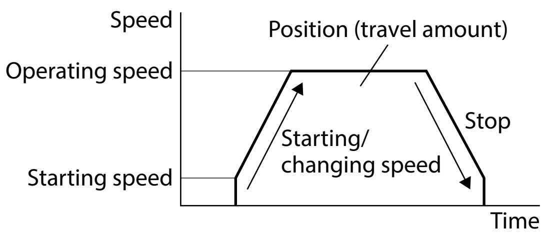
• Positioning operation



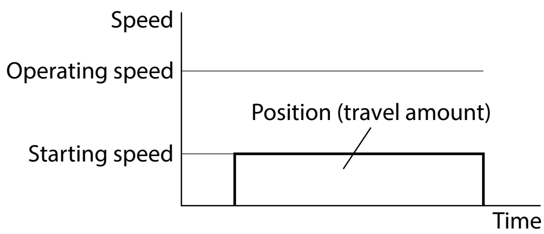
• Continuous operation



• When starting speed < operating speed

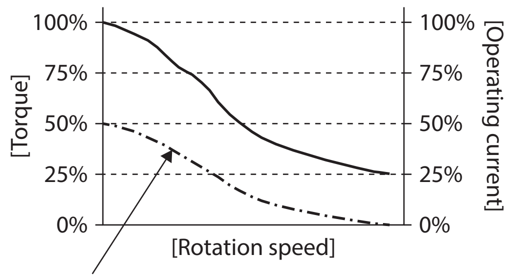


• When operating speed ≤ starting speed



memo 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%

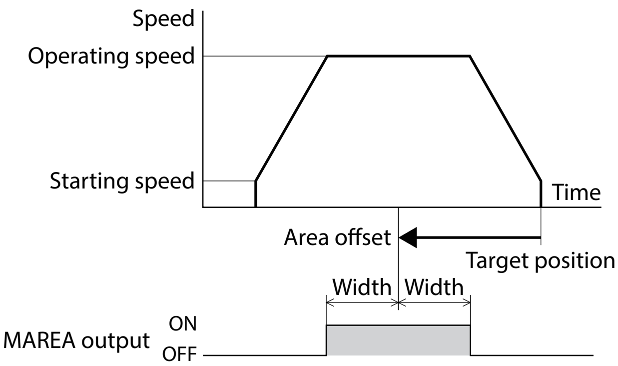
- **Link, Next data No.**
  - No Link
    Executes operation once with one operation data number. (Single-motion operation)
  - Manual sequential
    Executes operation of the operation data number set in "Next data No." every time the SSTART input is input. The SSTART input is enabled when the READY 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**

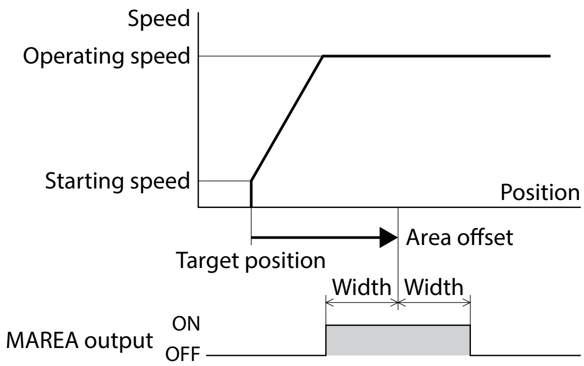
You can set the range of the MAREA output for each operation data by setting Area offset and Area width.

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**

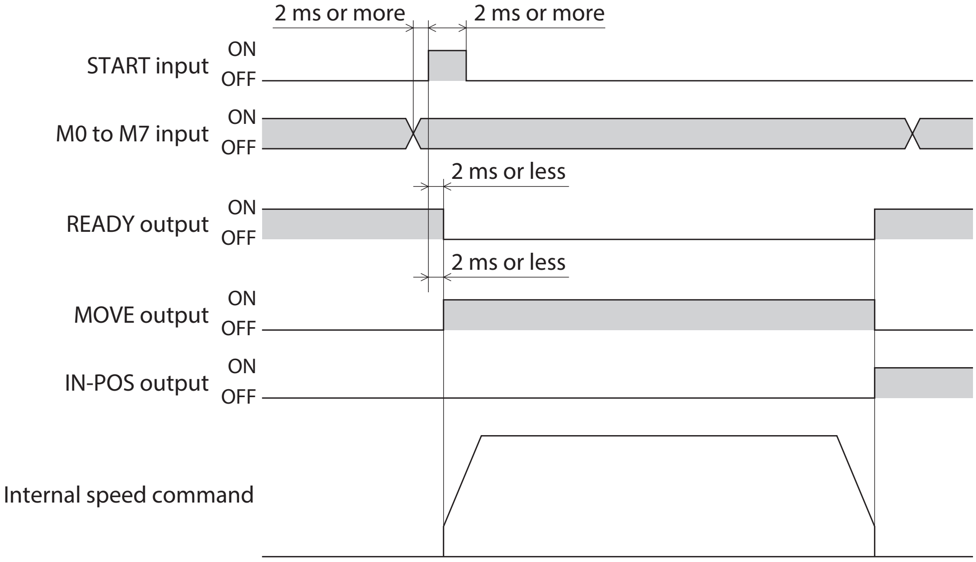
● Selection using the M0 to M7 inputs

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

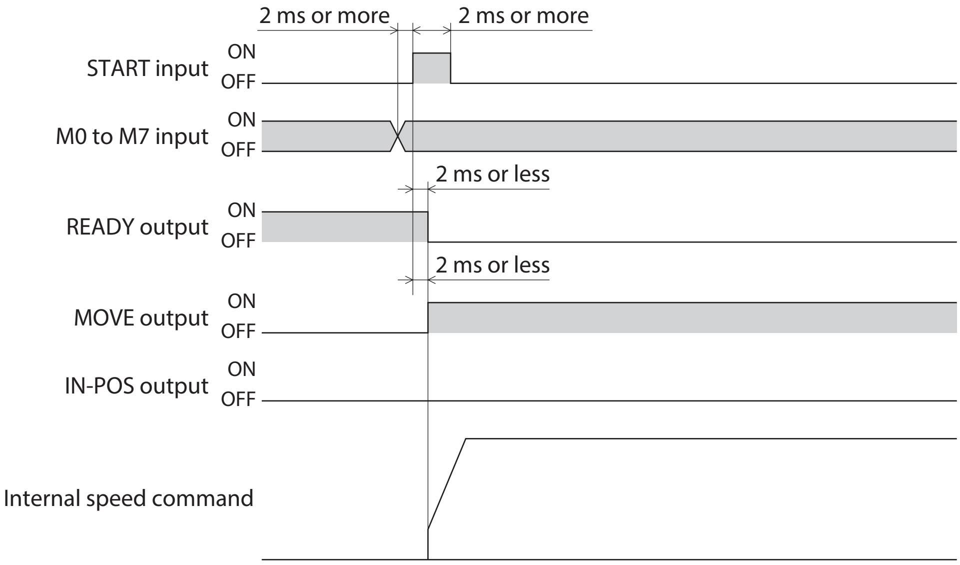
Operation data number	M7	M6	M5	M4	M3	M2	M1	M0
0	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
1	OFF	OFF	OFF	OFF	OFF	OFF	OFF	**ON**
2	OFF	OFF	OFF	OFF	OFF	OFF	**ON**	OFF
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
253	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	OFF	**ON**
254	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	OFF
255	**ON**	**ON**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

■ Timing charts

● Positioning operation



● Continuous operation

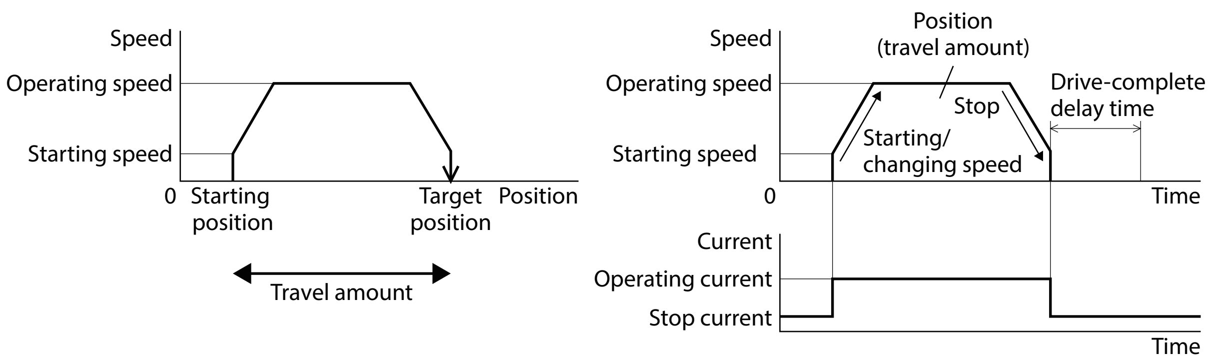


3-3 Positioning SD operation

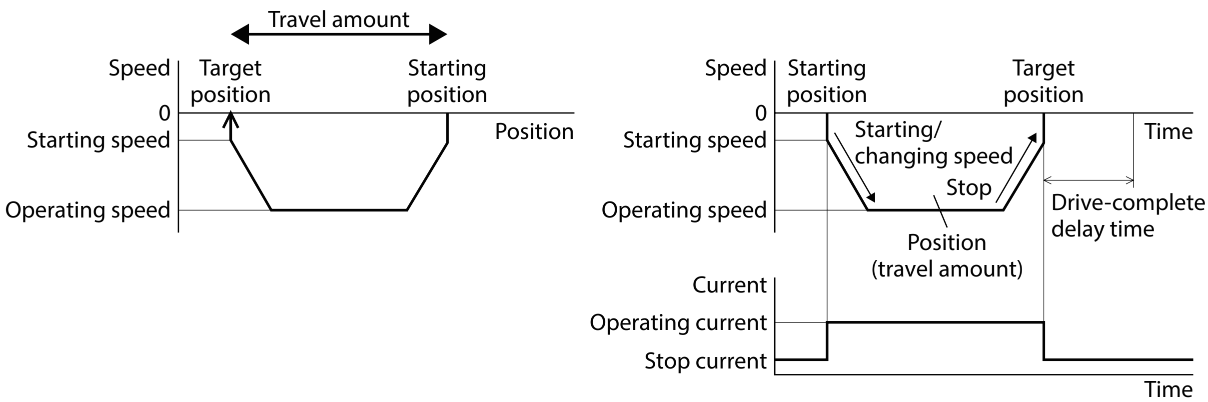
Positioning SD operation is an operation executed by setting the motor operating speed, position (travel amount) and other items as operation data. When positioning SD operation is executed, the motor is started running at the starting speed and accelerates until the operating speed is reached. Once 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

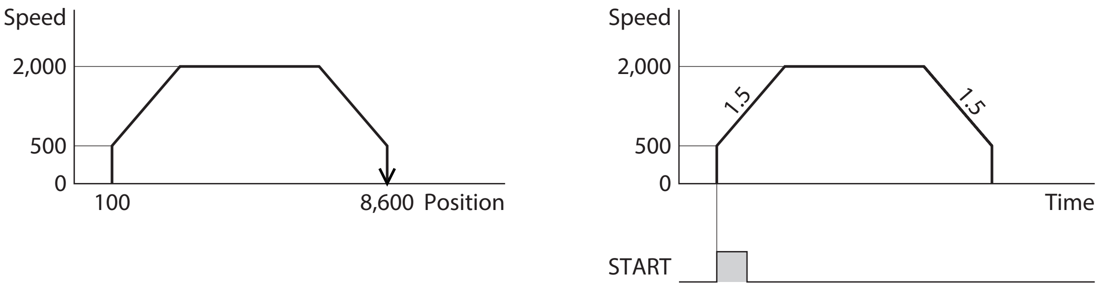
Sets the target position on coordinates with the home position as a reference.

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

Setting of operation data

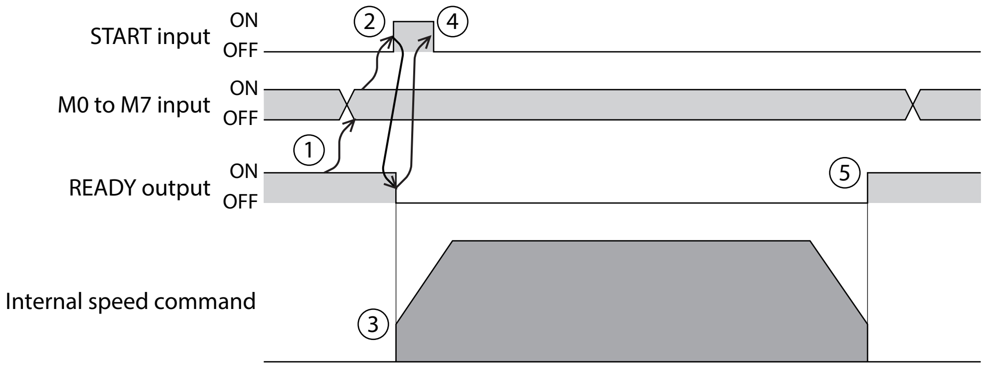
	Name	Operation type	Position [step]	Operating speed [Hz]	Acceleration [kHz/s]	Stopping deceleration [kHz/s]
#0		Absolute positioning	8600	2000	1.500	1.500

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.

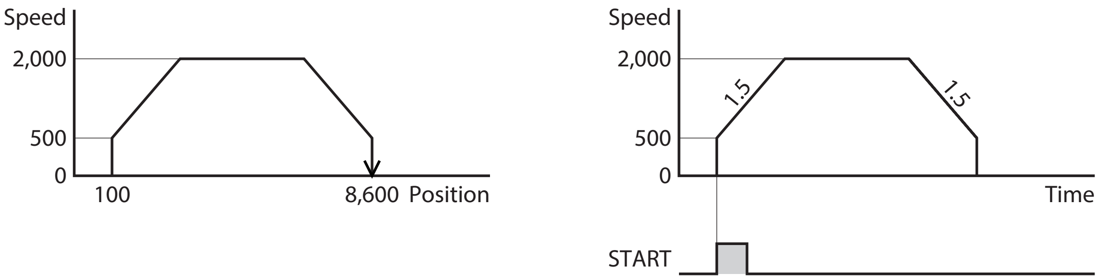
● Usage example

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

Setting of operation data

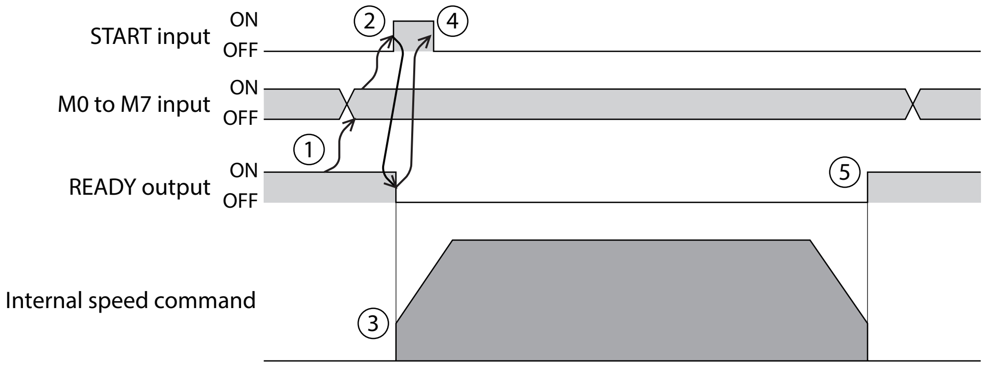
	Name	Operation type	Position [step]	Operating speed [Hz]	Acceleration [kHz/s]	Stopping deceleration [kHz/s]
#0		Incremental positioning (based on command position)	8500	2000	1.500	1.500

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.

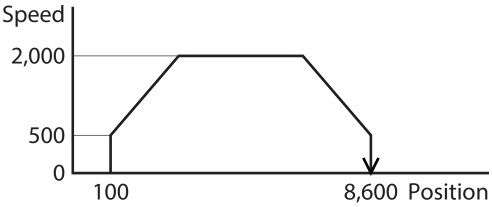
● Usage example

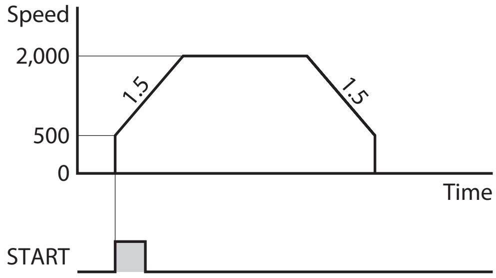
When the motor is operated from the feedback position 100 to the target position 8,600

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

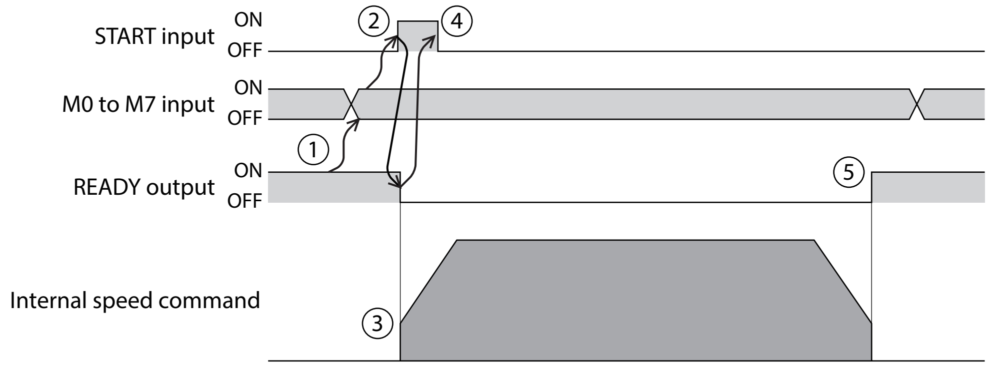
Operation image





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.



memo 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

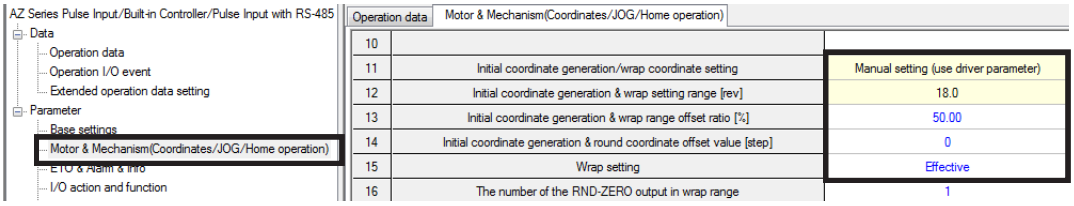
Sets the target position within the wrap range to the operation data.

● 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.

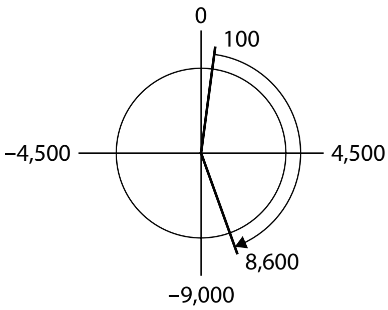


10		
11	Initial coordinate generation/wrap coordinate setting	Manual setting (use driver parameter)
12	Initial coordinate generation & wrap setting range [rev]	18.0
13	Initial coordinate generation & wrap range offset ratio [%]	50.00
14	Initial coordinate generation & round coordinate offset value [step]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

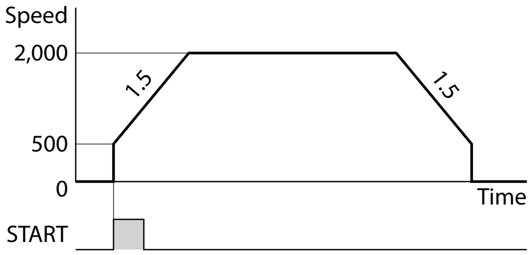
Setting of operation data

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

Position coordinate image

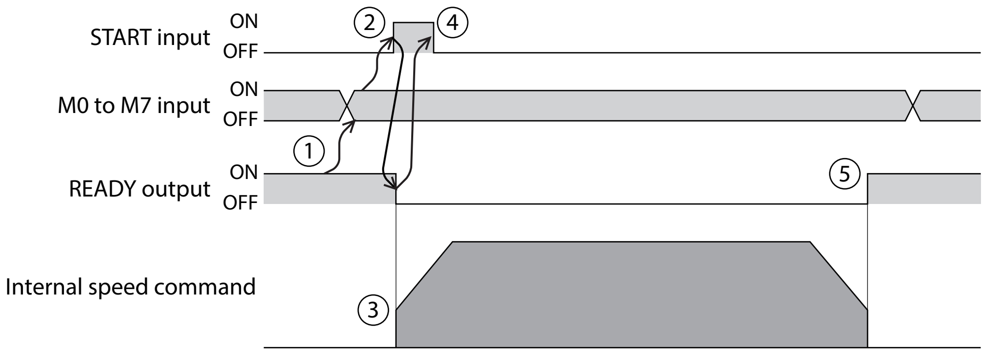


Operation image



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.



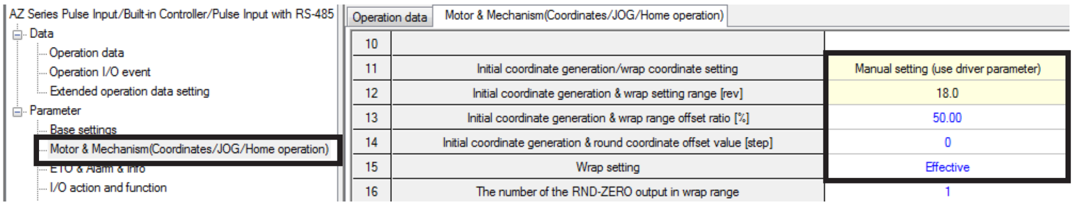
■ Wrap proximity positioning

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



AZ Series Pulse Input/Built-in Controller/Pulse Input with RS-485
- Data
  - Operation data
  - Operation I/O event
  - Extended operation data setting
- Parameter
  - Base settings
  - Motor & Mechanism(Coordinates/JOG/Home operation)
  - ETO & Alarm & Info
  - I/O action and function

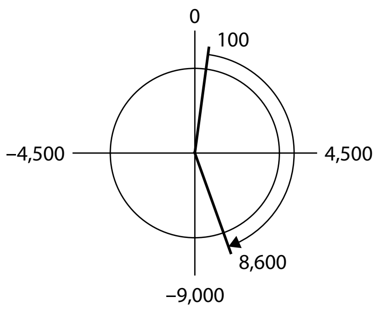
Operation data | Motor & Mechanism(Coordinates/JOG/Home operation)

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

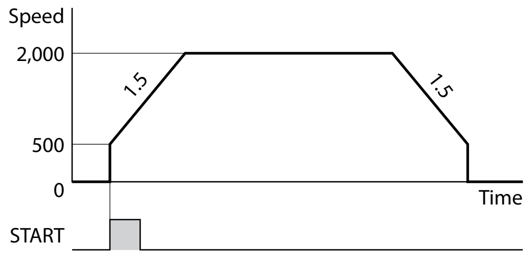
Setting of operation data

	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

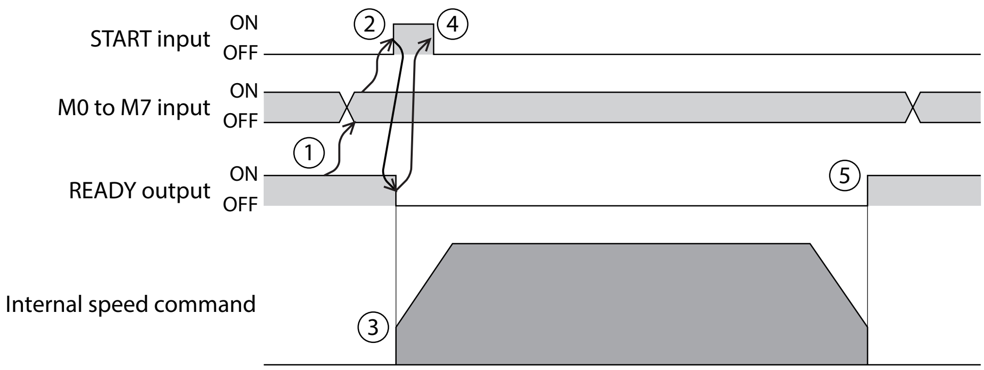


Operation image



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.



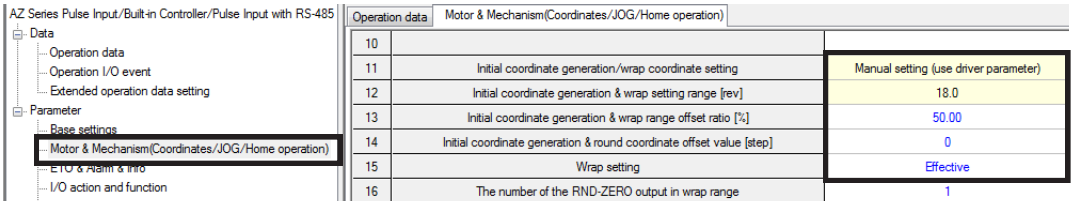
■ Wrap forward direction absolute positioning

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**

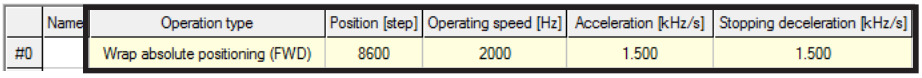
When the motor is operated from the command position 100 to the target position 8,600 (Wrap setting range 18 rev, wrap offset ratio 50%)

Setting of wrap function



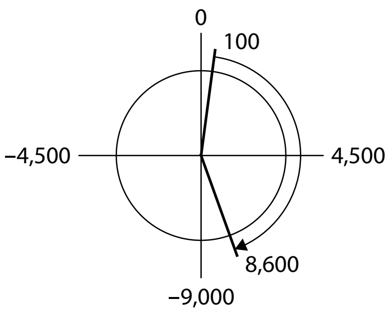
10		
11	Initial coordinate generation/wrap coordinate setting	Manual setting (use driver parameter)
12	Initial coordinate generation & wrap setting range [rev]	18.0
13	Initial coordinate generation & wrap range offset ratio [%]	50.00
14	Initial coordinate generation & round coordinate offset value [step]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

Setting of operation data

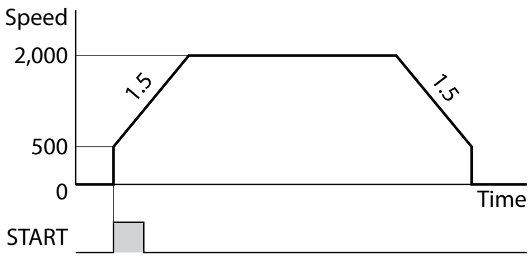


	Name	Operation type	Position [step]	Operating speed [Hz]	Acceleration [kHz/s]	Stopping deceleration [kHz/s]
#0		Wrap absolute positioning (FWD)	8600	2000	1.500	1.500

Position coordinate image

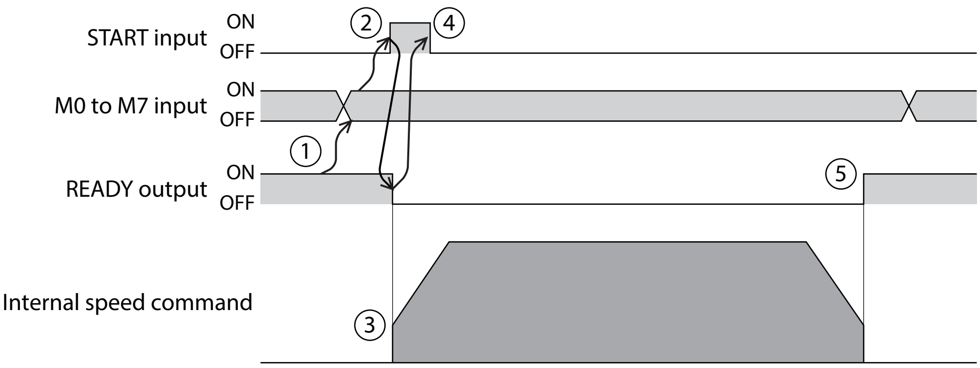


Operation image



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.



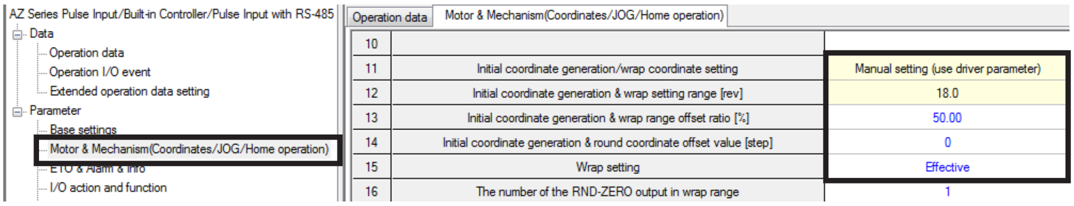
■ Wrap reverse direction absolute positioning

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

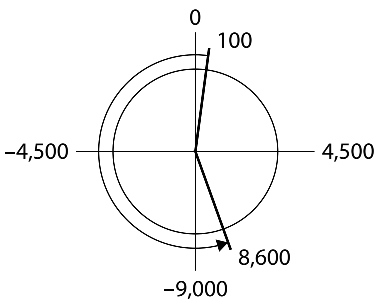


10		
11	Initial coordinate generation/wrap coordinate setting	Manual setting (use driver parameter)
12	Initial coordinate generation & wrap setting range [rev]	18.0
13	Initial coordinate generation & wrap range offset ratio [%]	50.00
14	Initial coordinate generation & round coordinate offset value [step]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

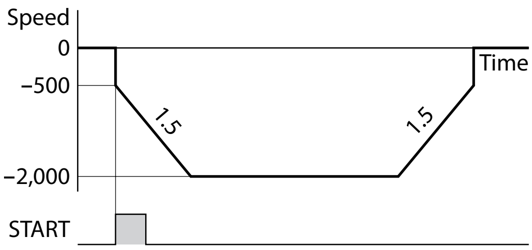
Setting of operation data

	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

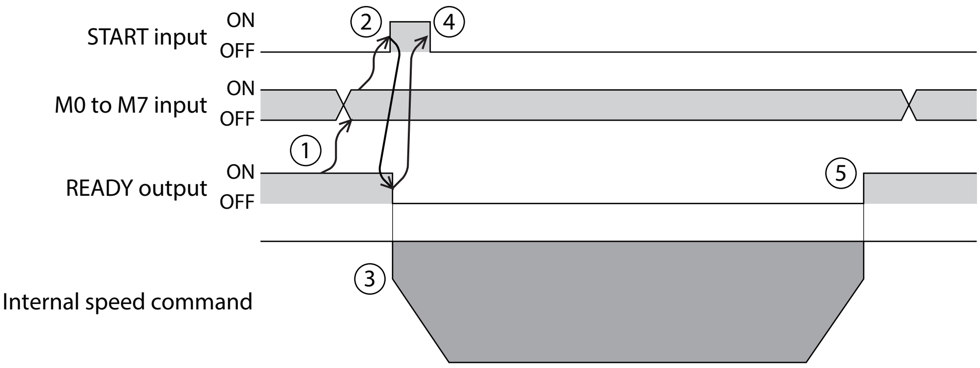


Operation image



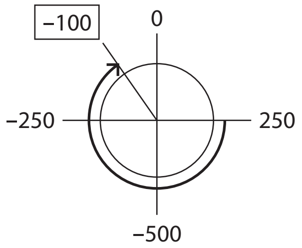
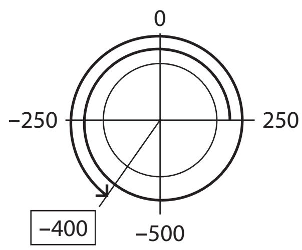
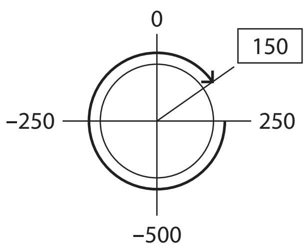
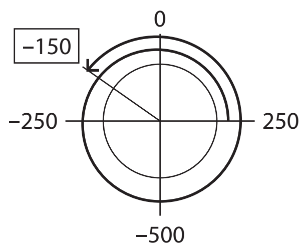
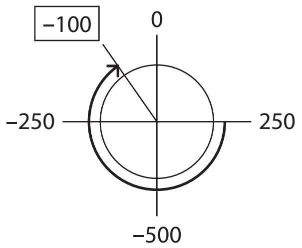
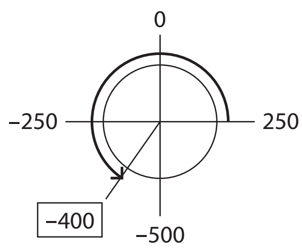
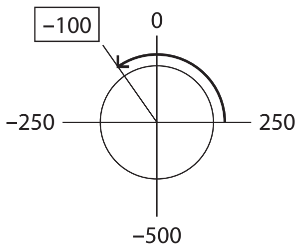
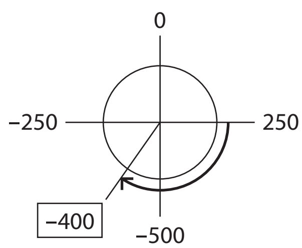
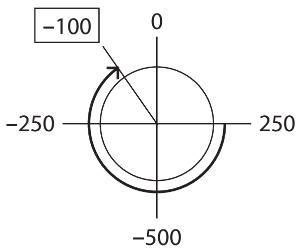
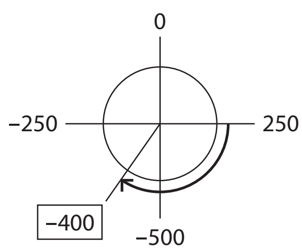
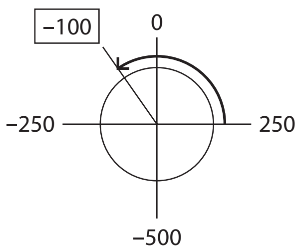
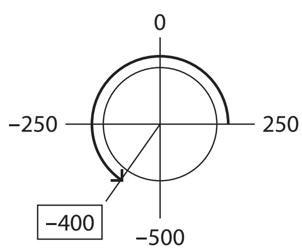
Operation method

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.

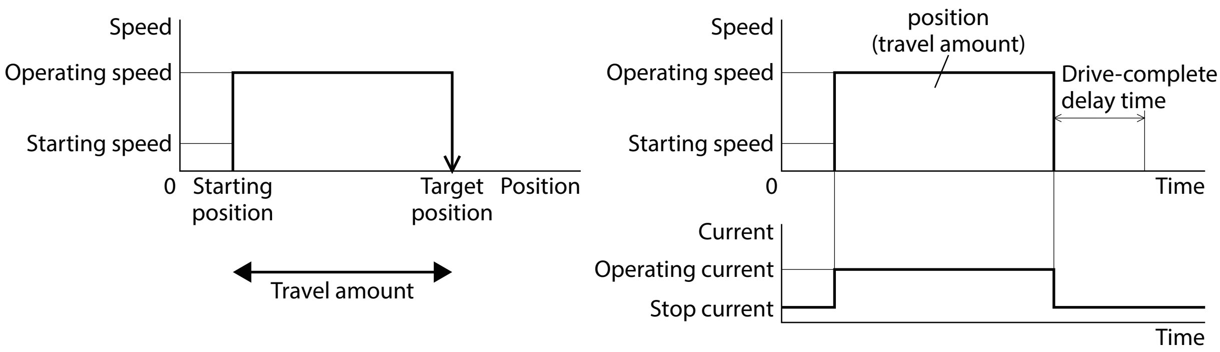
3-4 Positioning push-motion SD operation

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.

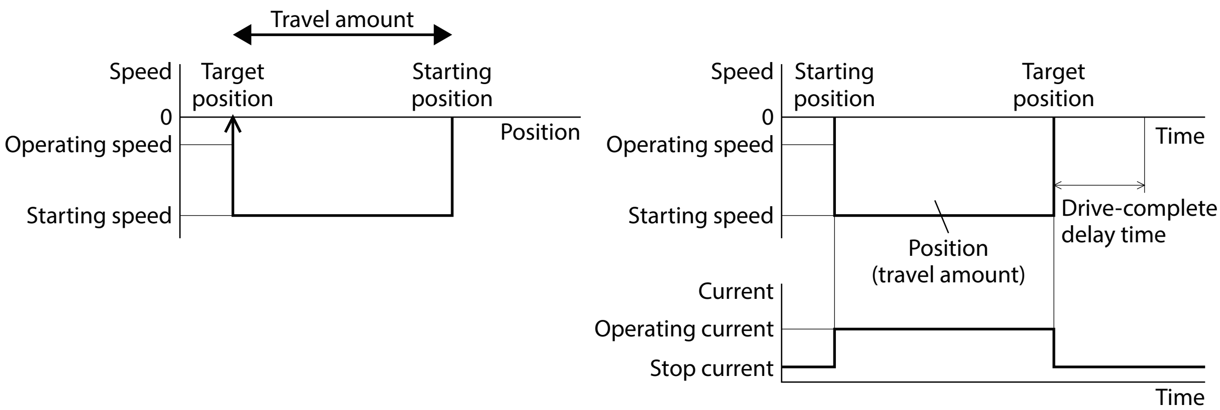
Set the operating current of the next data to the value of the operating current before linking or less. If a value larger than that of the operating current before linking, the push-motion current may become larger when operation transits, and unexpected push-motion force may be applied.

- **Operation**

When start position < target position (forward direction)

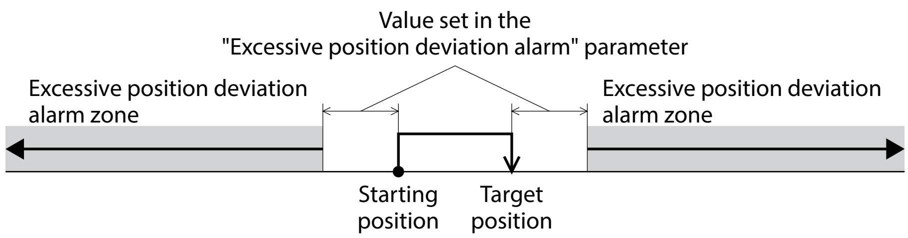


When start position > target position (reverse direction)



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.



memo
- 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

memo
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

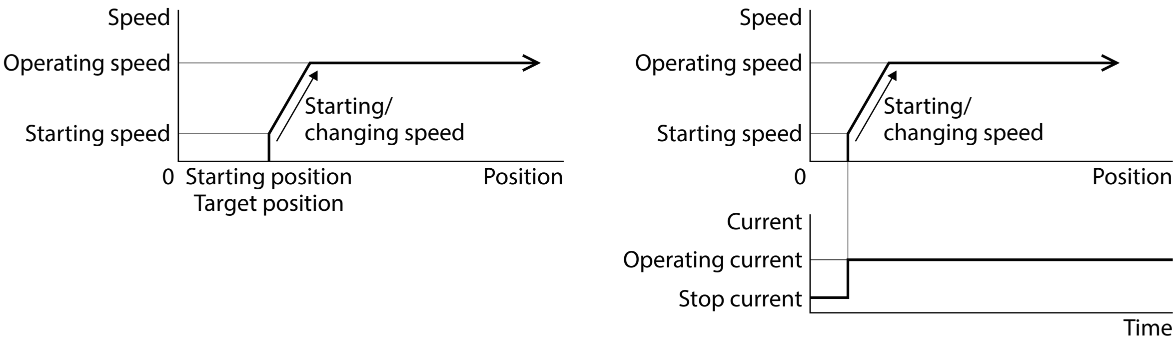
	Name	Operation type	Position [step]	Operating speed [Hz]
#0		Wrap push-motion (RVS)	8600	2000

3-5 Continuous SD operation

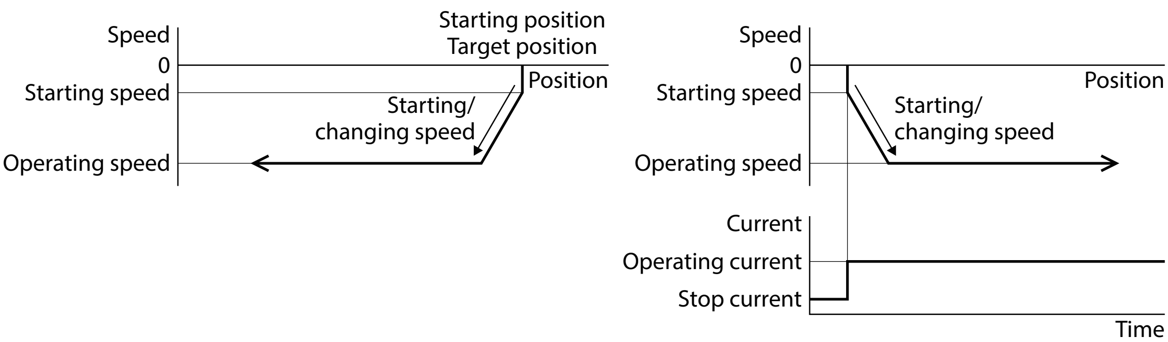
Continuous SD operation is an operation executed by setting the operating speed to the operation data. The motor is continuously operated in the forward direction when a positive operating speed is set, and in the reverse direction when a negative operating speed is set.

- **Operation**

0 < operating speed (forward direction)



0 > operating speed (reverse direction)



memo
- 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)

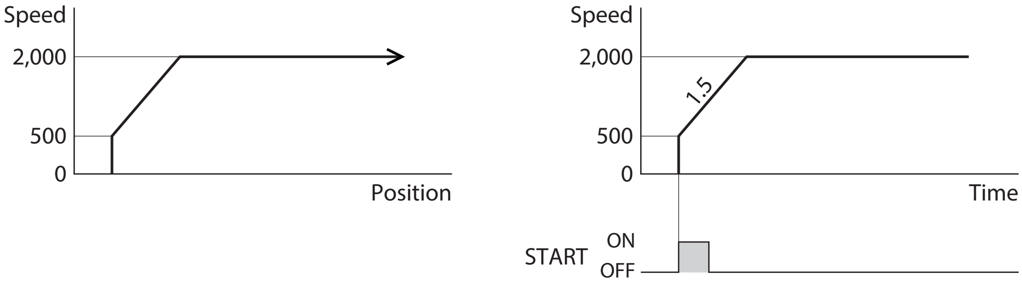
Set the operating speed to the operation data to execute operation. When the operation is executed, the motor is started running at the starting speed and accelerates until the operating speed is reached. When the operating speed is reached, operation is continued with the speed maintained. Operation 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

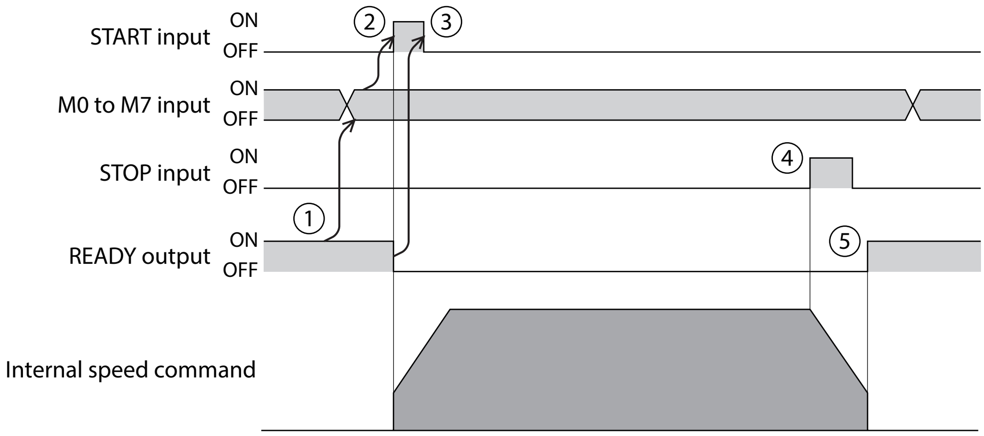
	Name	Operation type	Position [step]	Operating speed [Hz]	Acceleration [kHz/s]	Stopping deceleration [kHz/s]
#0		Continuous (Position control)	0	2000	1.500	1.500

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)

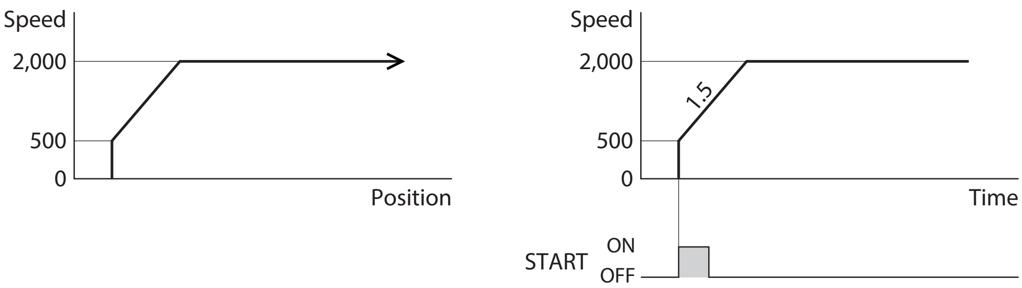
Sets the operating speed to the operation data to execute operation. When the operation is executed, the motor is started running at the starting speed and accelerates until the operating speed is reached. When the operating speed is reached, operation is continued with the speed maintained. When the 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

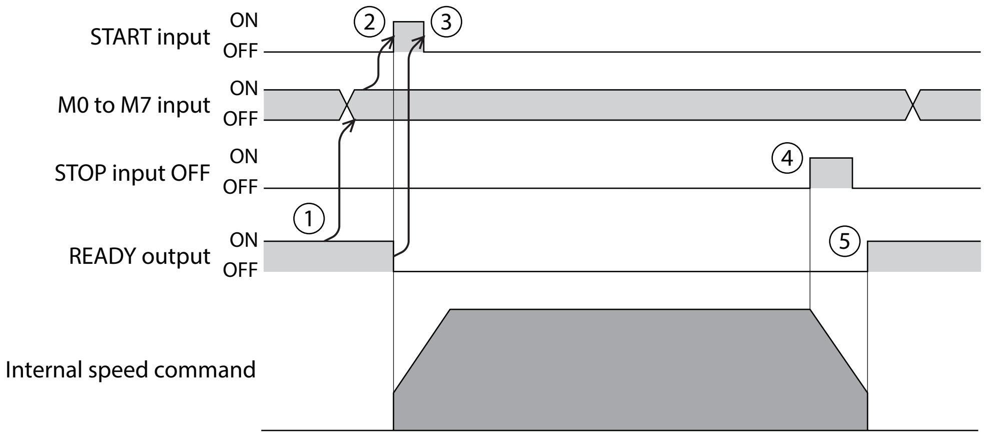
	Name	Operation type	Position [step]	Operating speed [Hz]	Acceleration [kHz/s]	Stopping deceleration [kHz/s]
#0		Continuous (Speed control)	0	2000	1.500	1.500

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)

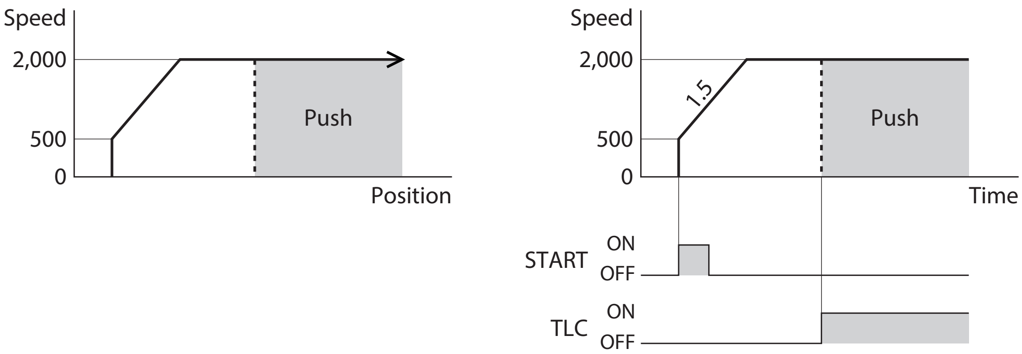
Set the operating speed to the operation data to execute operation. When the operation is executed, the motor is started running at the starting speed and accelerates until the operating speed is reached. When the operating speed is reached, operation is continued with the speed maintained. When a mechanism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

● Usage example

Setting of operation data

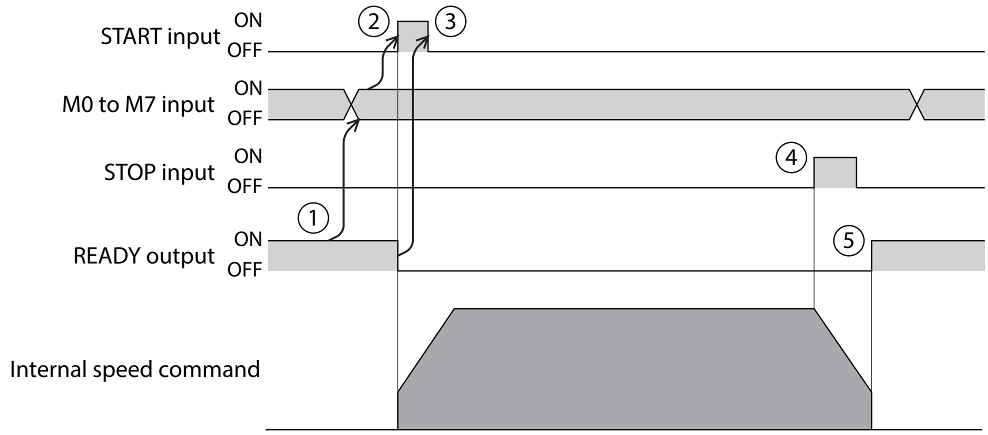
	Name	Operation type	Position [step]	Operating speed [Hz]	Acceleration [kHz/s]	Stopping deceleration [kHz/s]
#0		Continuous (Push motion)	0	2000	1.500	1.500

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)

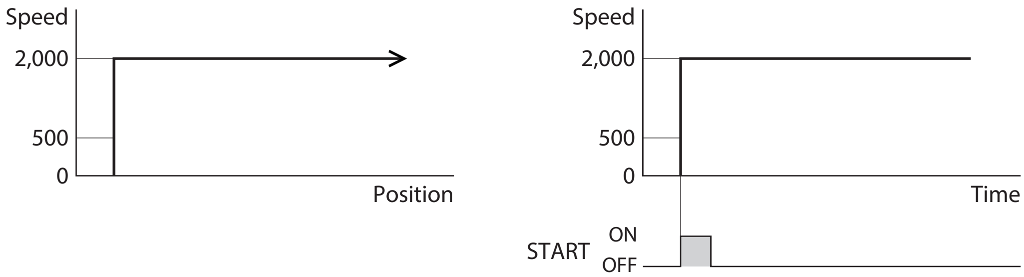
Rectangular operation (drive without acceleration/deceleration time) of the motor is executed at the speed set in the operation data, and operation is continued with the speed maintained. When a mechanism installed to the motor presses against a load, pressure is continuously applied to the load.

● Usage example

Setting of operation data

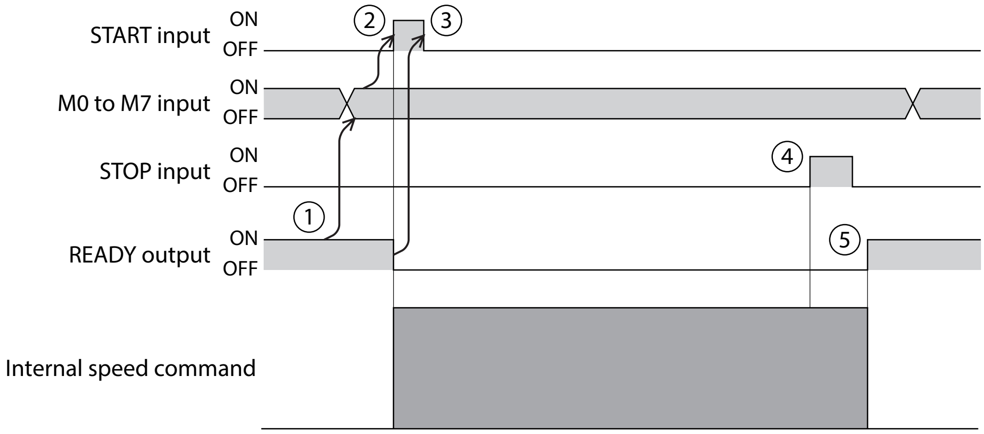
	Name	Operation type	Position [step]	Operating speed [Hz]	Acceleration [kHz/s]	Stopping deceleration [kHz/s]	Operating current [%]
#0		Continuous (Torque control)	0	2000	1000.000	1000.000	20.0

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)

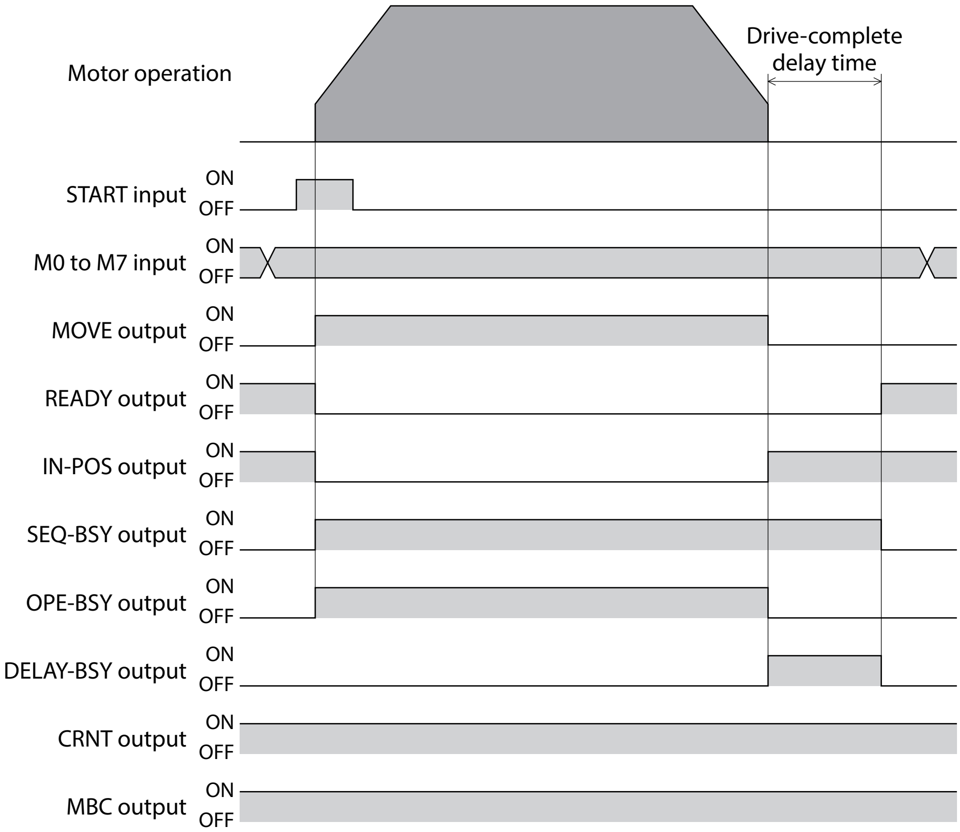
Related operation data

MEXE02 tree view	Item	Description	Initial value
Operation data	Link	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

■ 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.

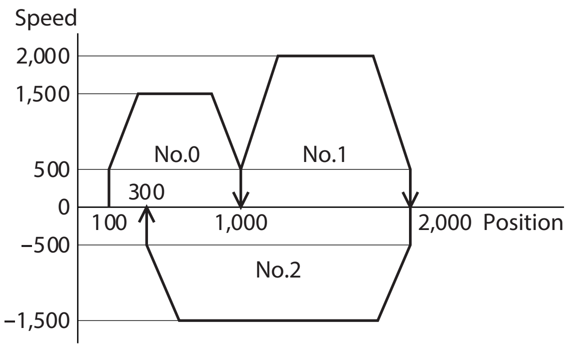
memo
- When the operation of the operation data number for which manual sequential operation is set is complete, the SEQ-BSY output is turned ON (manual sequential waiting status). Operation of the operation data number set in "Next data No." is executed when the SSTART input is turned ON in this status.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

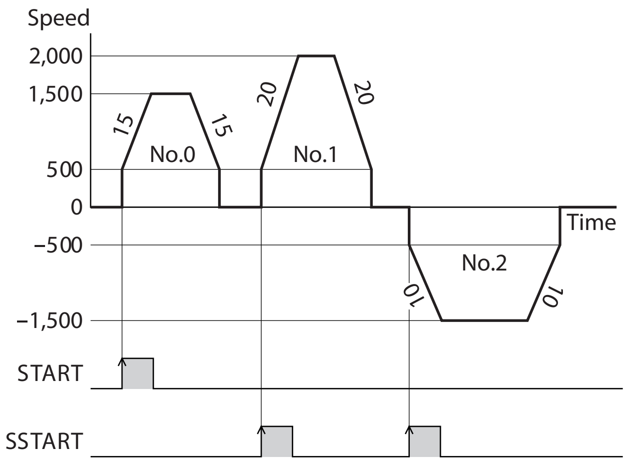
● Usage example
When positioning operation is performed for multiple coordinates at an arbitrary timing

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

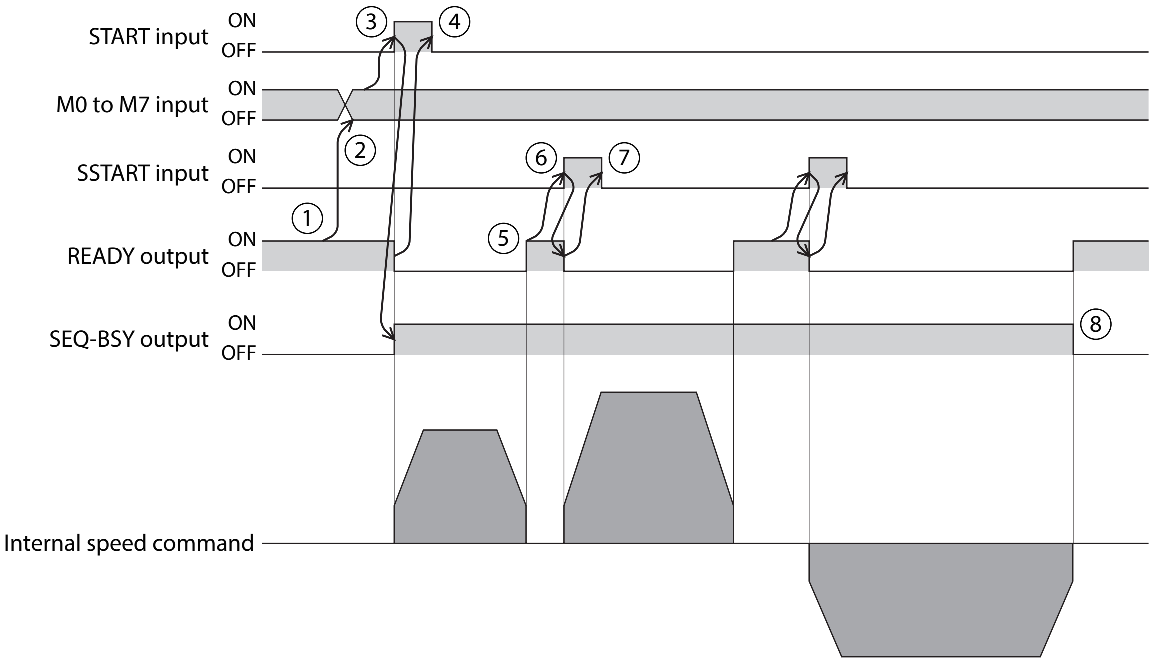
Operation image



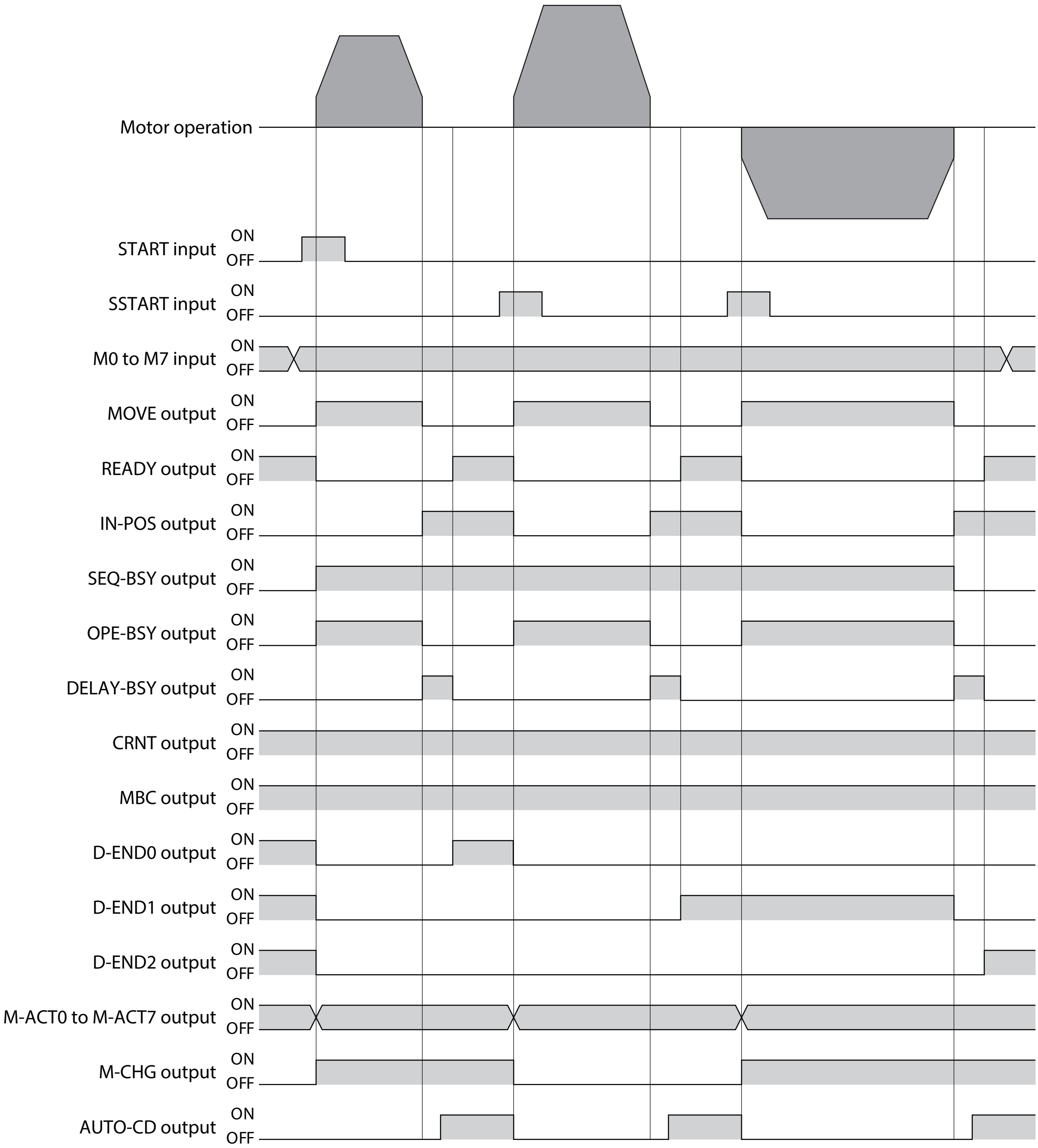


Timing chart

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



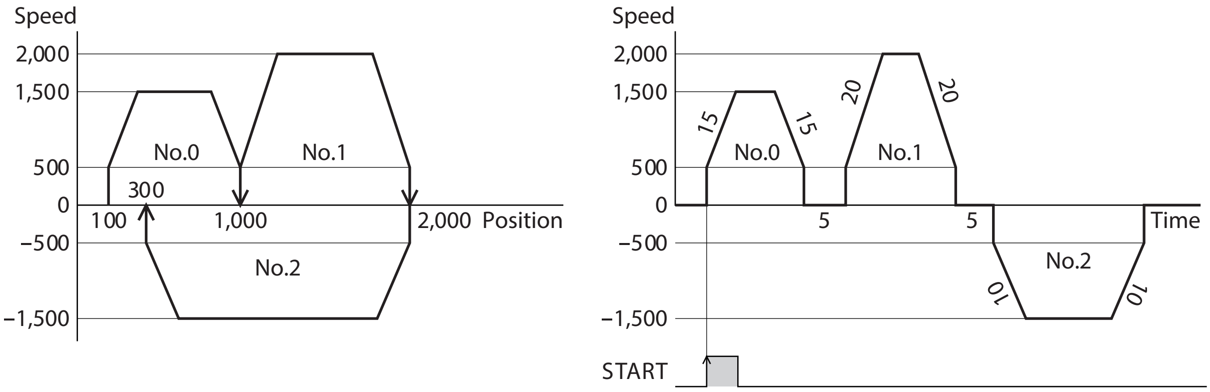
■ Automatic sequential operation

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

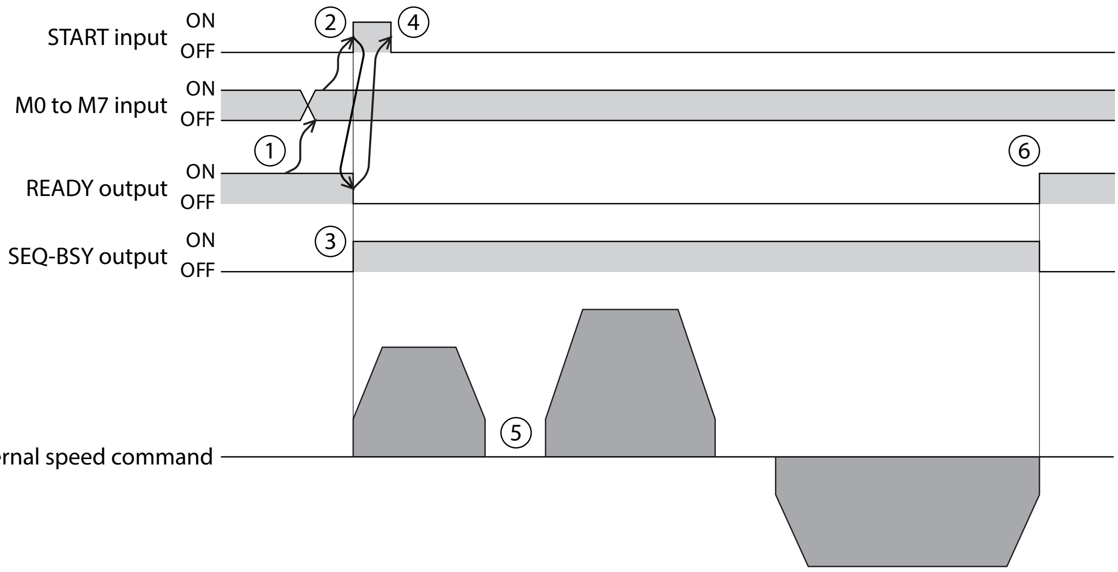
	Name	Operation type	Position [step]	Operating speed [Hz]	Acceleration [kHz/s]	Stopping deceleration [kHz/s]	Operating current [%]	Drive-complete delay time [s]	Link	Next data No.
#0		Absolute positioning	1000	1500	15.000	15.000	100.0	5.000	Automatic Sequential	+1
#1		Absolute positioning	2000	2000	20.000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

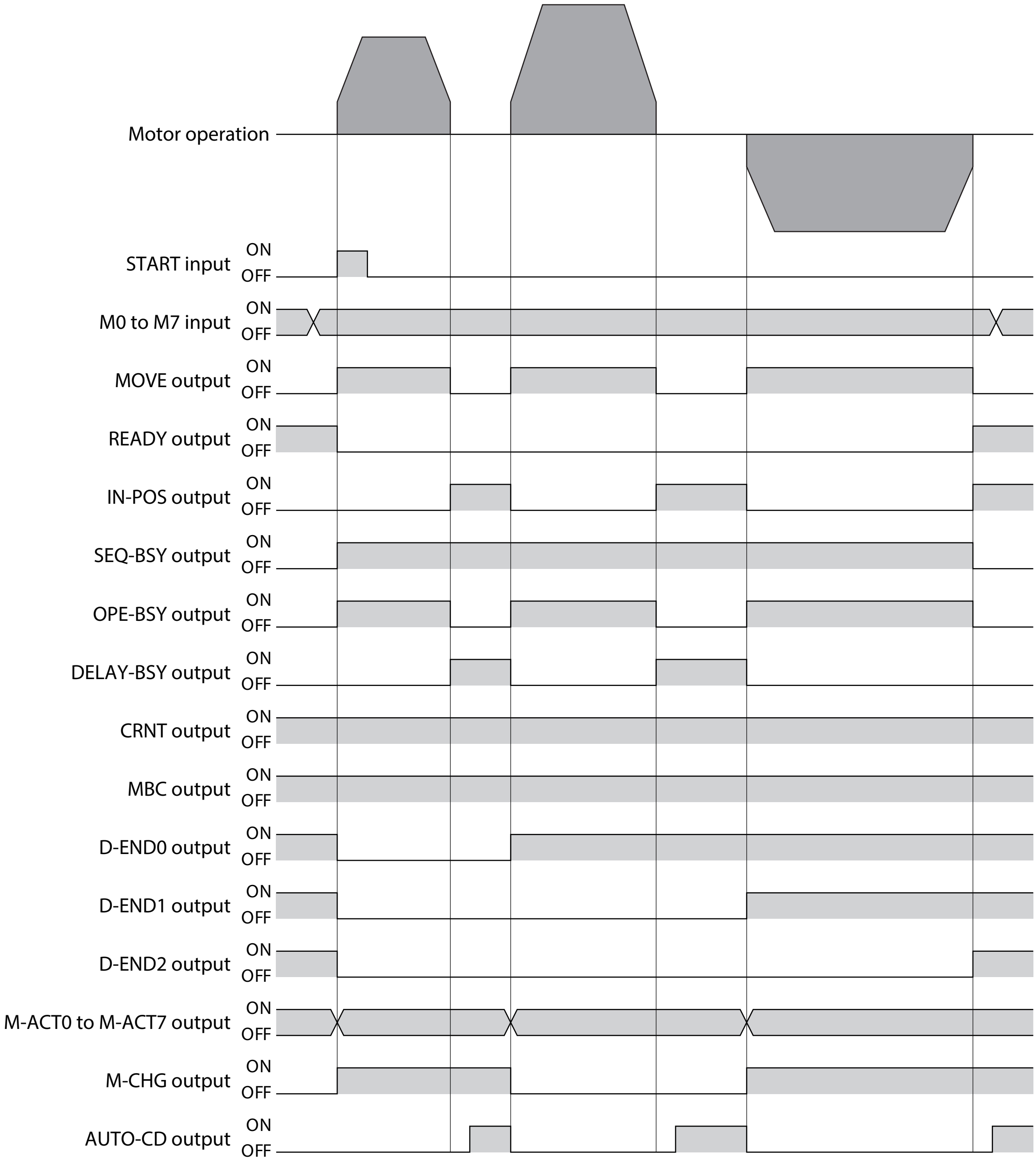


Timing chart

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

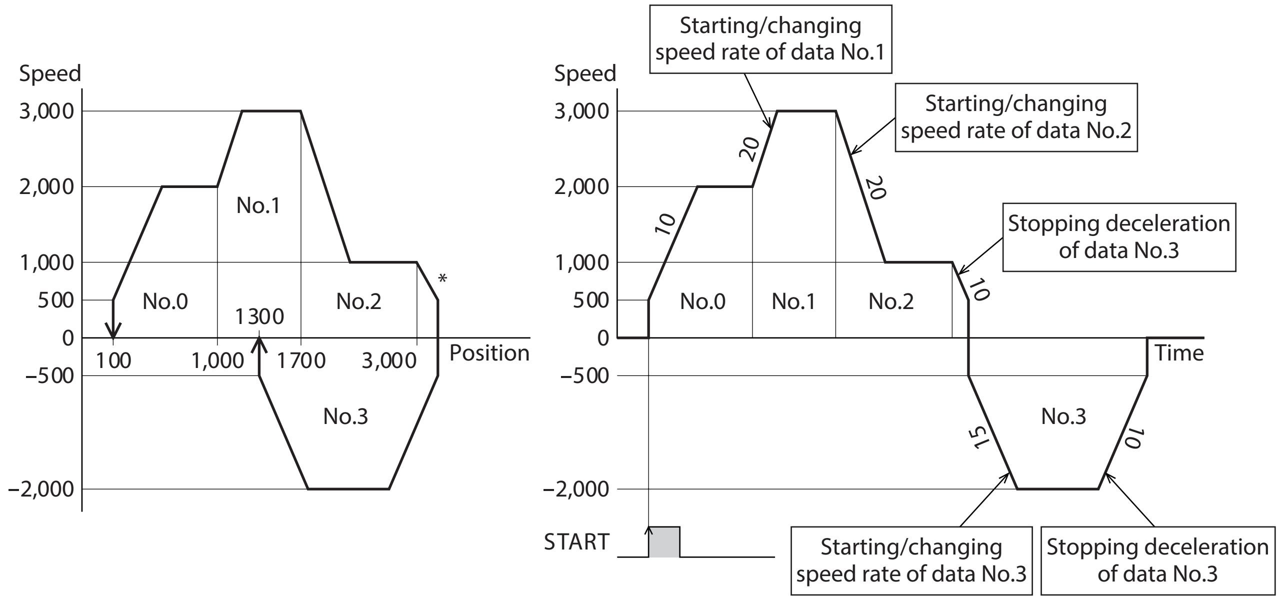
Operation of the operation data number set in "Next data No." is executed continuously without stopping the motor. If operation data includes data for which "No link" is set, the motor is stopped after the stored data operation with respect to the "No link" operation data is completed.

● 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

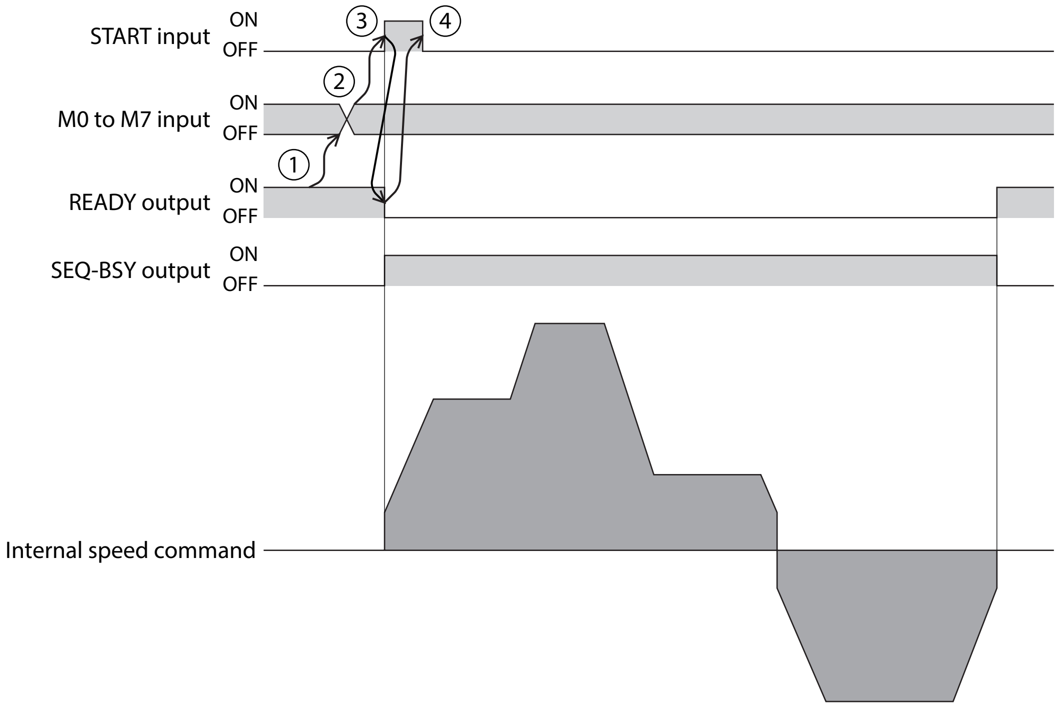


* If the direction of the operation is switched to the opposite direction while the operation is executed, the motor passes by the target position.

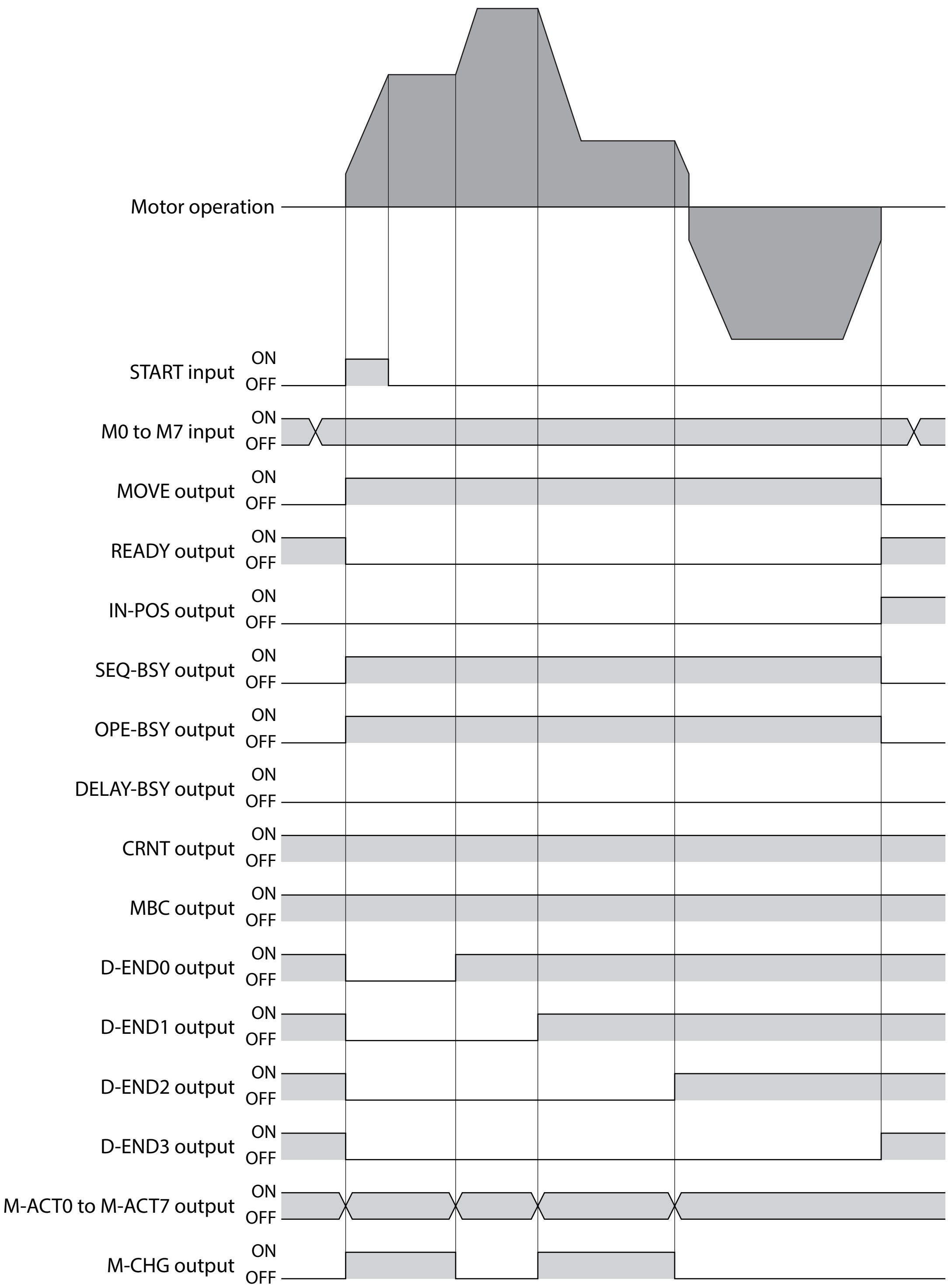
memo
- To link to the next operation data number, the motor accelerates with the starting/changing speed rate of the next data.
- When the motor rotates in the opposite direction in the operation of the next data, it decelerates at the stopping deceleration of the next data.
- To stop, the motor decelerates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



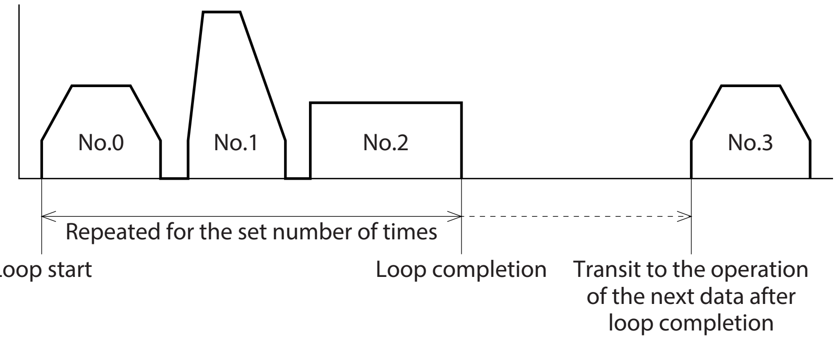
Related I/O signals



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)	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

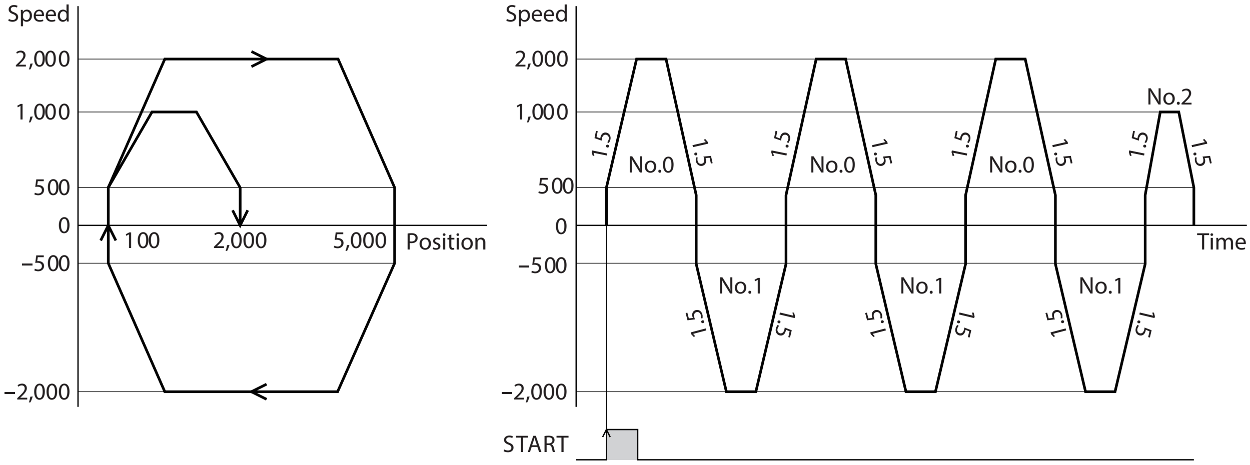
- **Usage example**
  When operation from the operation data No.0 to No.1 is repeated three times

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

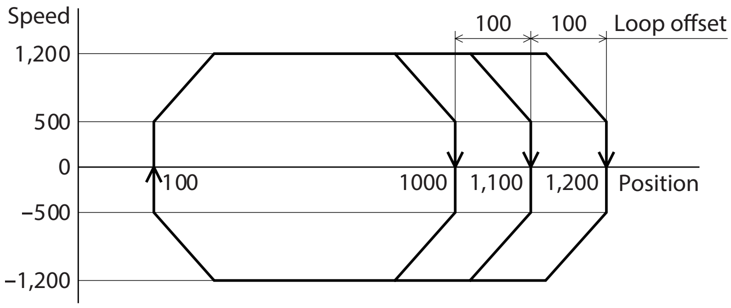
Link	Next data No.	Area offset	Area width	Loop count	Loop offset	Loop end No.
Automatic Sequential	+1	0	-1	loop 3{	100	-
Automatic Sequential	Stop	0	-1	-	0	}L-End

- 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

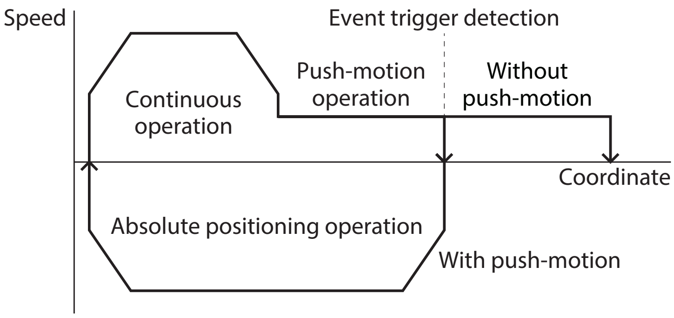
Link	Next data No.	Area offset	Area width	Loop count	Loop offset	Loop end No.
Automatic Sequential	+1	0	-1	loop 3{	100	-
Automatic Sequential	Stop	0	-1	-	-100	}L-End

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.		

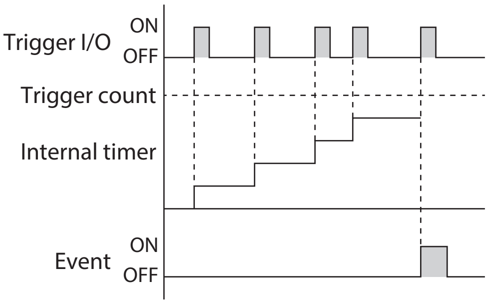
Related I/O event

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

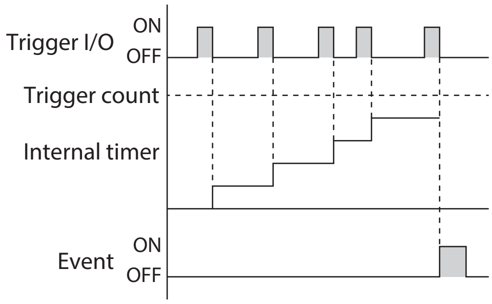
MEXE02 tree view	Item	Description	Initial value
Operation I/O event	Event trigger I/O	Sets I/O to be used as an event trigger. **Setting range** Refer to "2 Signal list" on p.165.	0: Not used
	Event trigger type	Sets the timing to detect the event trigger. **Setting range** 0: Non (Disable) 1: ON (calculated 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**

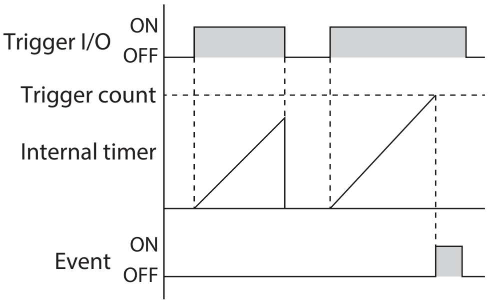
■ ON edge



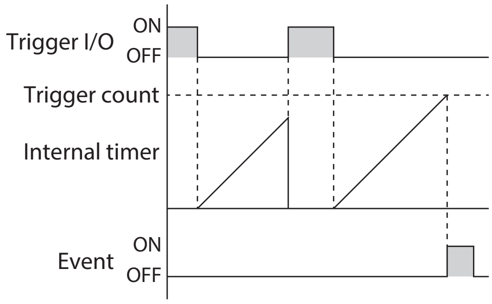
■ OFF edge



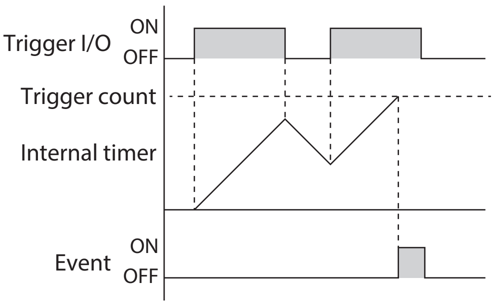
■ ON (msec)



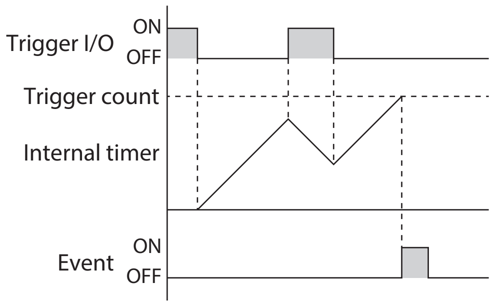
■ OFF (msec)



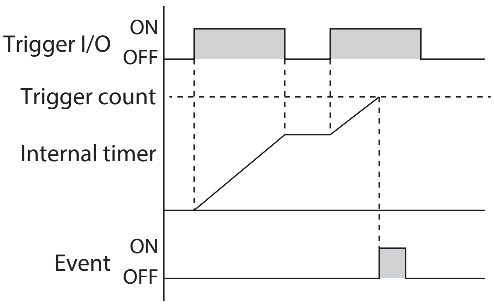
■ ON (calculated cumulative msec)



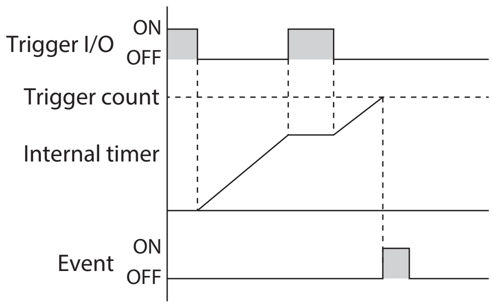
■ OFF (calculated cumulative msec)



■ ON (cumulative msec)



■ ON (cumulative msec)



memo 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

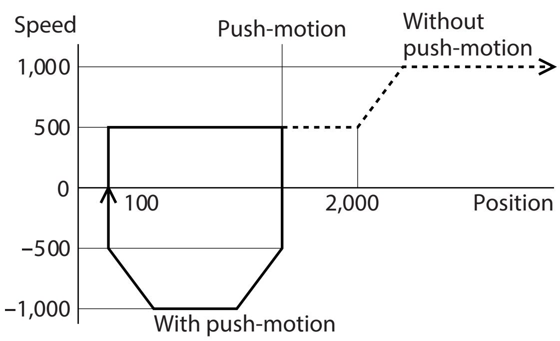
	Name	Operation type	Position [step]	Operating speed [Hz]	Acceleration [kHz/s]	Stopping deceleration [kHz/s]	Operating current [%]	Drive-complete delay time [s]
#0		Absolute push-motion	2000	500	1000.000	1000.000	25.0	0.000
#1		Continuous (Position control)	0	1000	0.500	0.500	25.0	0.000
#2		Absolute positioning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

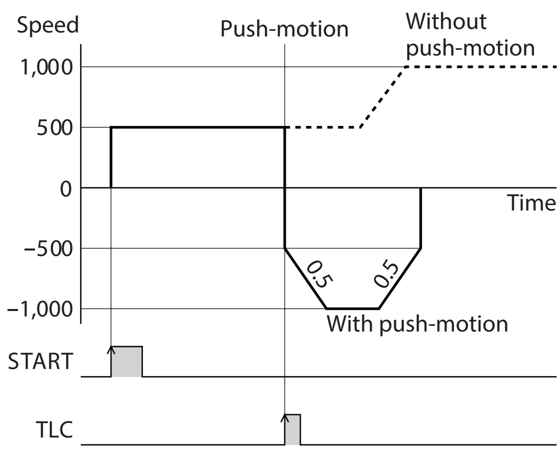
Link	Next data No.	Area offset	Area width	Loop count	Loop offset	Loop end No.	(Low)I/O event No.
Automatic Sequential	+1	0	-1	-	0	-	0
No link	+1	0	-1	-	0	-	-
No link	+1	0	-1	-	0	-	-

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





2 Operation

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.	–

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

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.

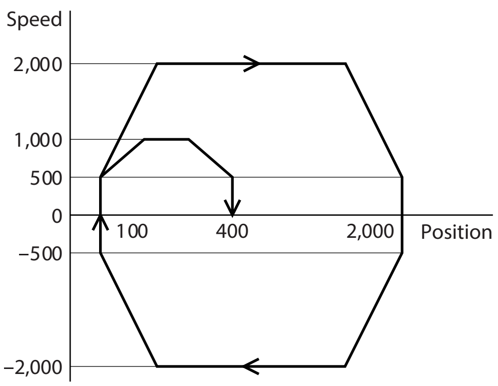
Operation data setting

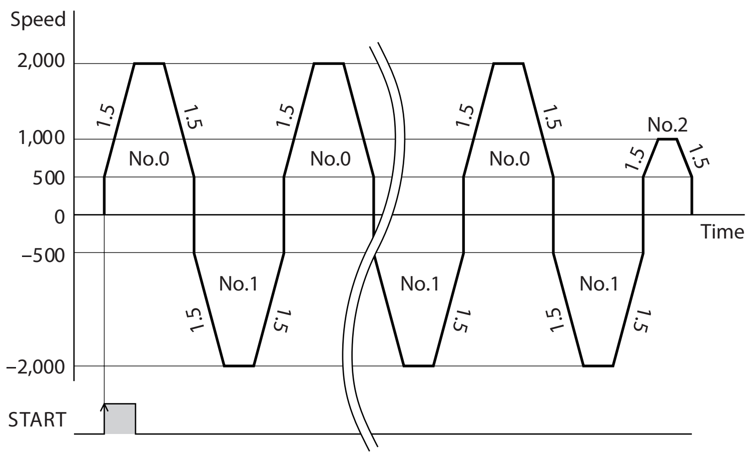
	Operation type	Position [step]	Speed [Hz]	Acceleration [kHz/s]	Stopping deceleration [kHz/s]	Operating current [%]	Drive-complete delay time [s]	Link	Next data No.
#0	Absolute positioning	2000	2000	1.500	1.500	100.0	0.000	Automatic Sequential	+1
#1	Absolute positioning	100	2000	1.500	1.500	100.0	0.000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

memo 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

memo 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

memo 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

memo 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

Note 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 Automatic current cutback function" on p.437) **Setting range** 0: Disable 1: Enable	1

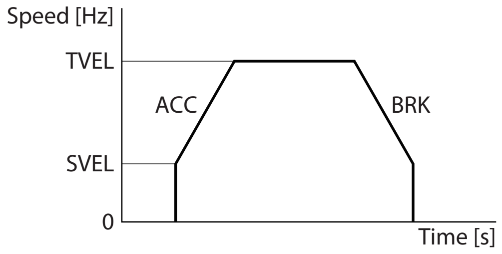
3-11 Acceleration/deceleration unit

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).

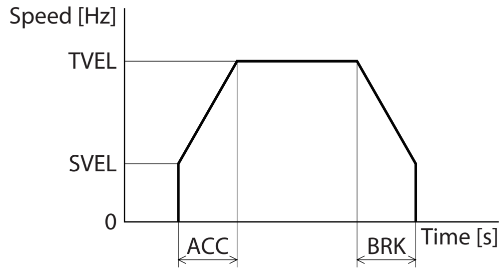
Explanation of labels

- 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.

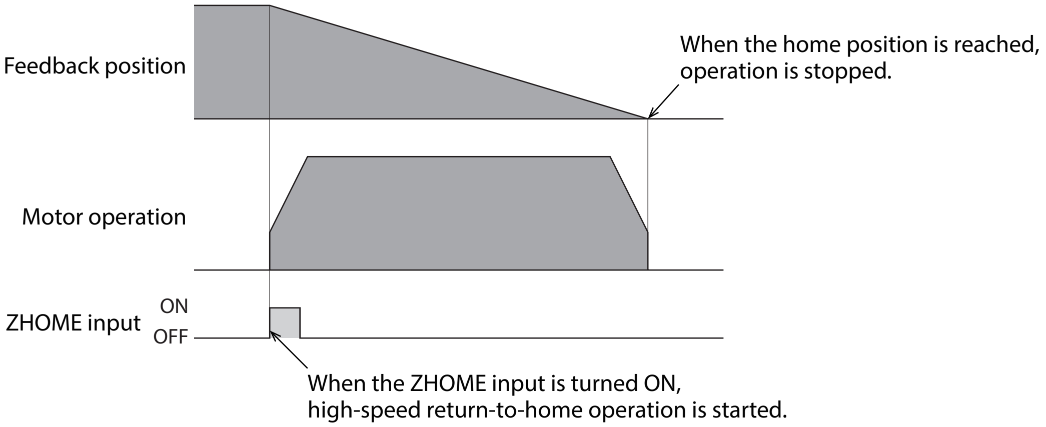
Related parameters

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.



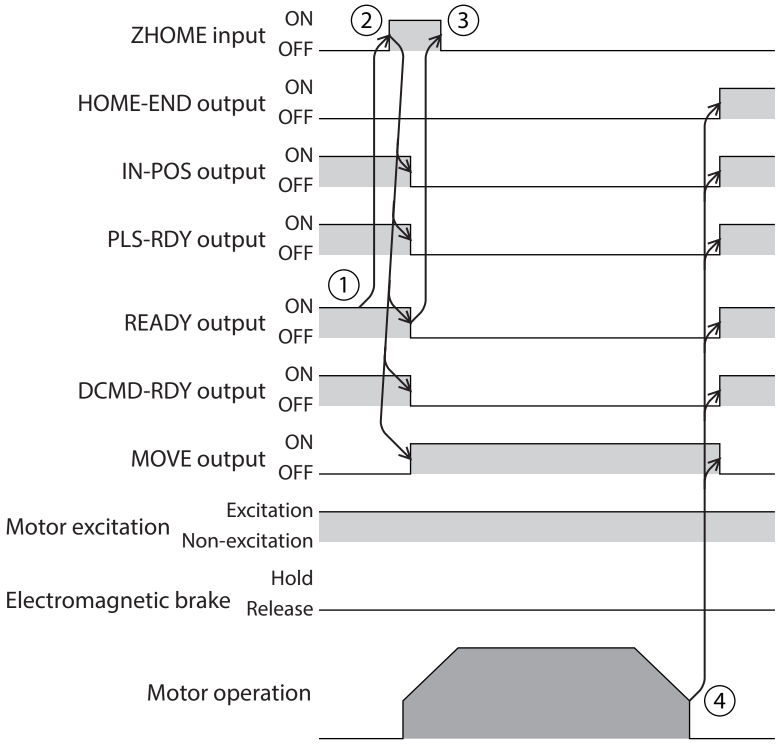
Note
- The home position is not set at the time of factory shipment and immediately after the resolution is changed. If high-speed return-to-home operation is started under the status, information of ZHOME start error is generated, and operation is not performed. Be sure to set the home position before 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.

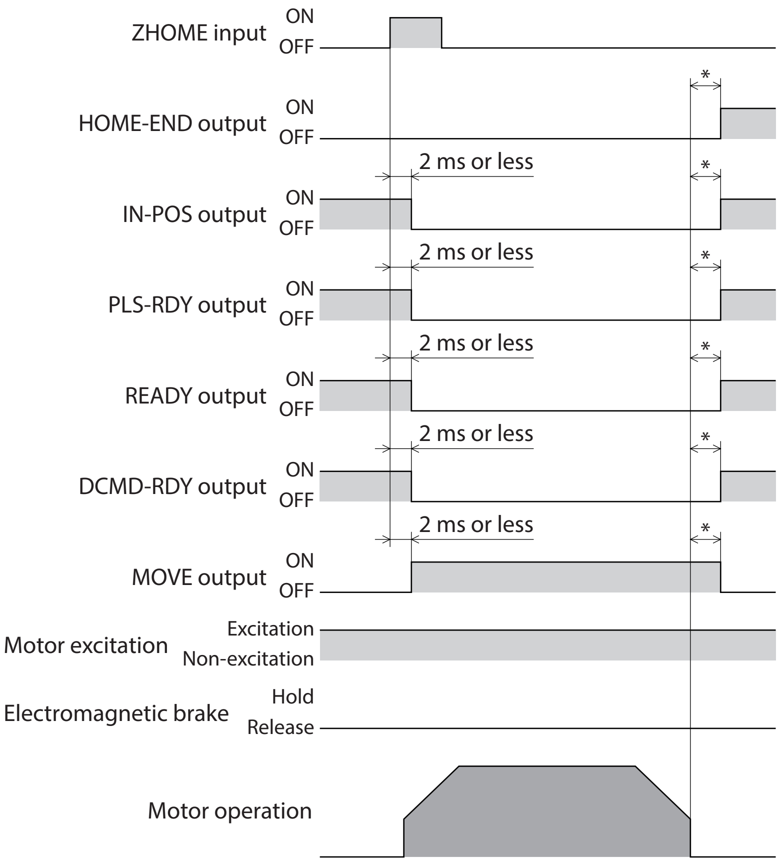
Related parameters

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.	• 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.	• 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 uni-directional home-seeking" parameter. The position at which the motor stopped becomes the home position.	• 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.	• An external sensor is not required • The operating speed is high (return-to-home operation speed)

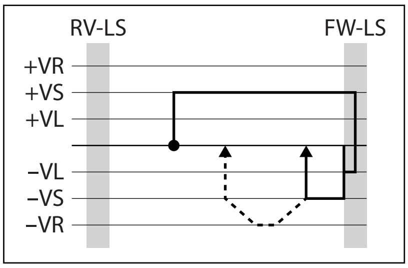
*1 Do not perform push-motion return-to-home operation with geared motors and the hollow rotary actuator **DGII** Series.
*2 With a rotating mechanism, the home position can be detected even with one external sensor.

memo 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.

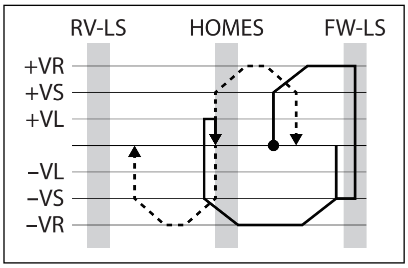
Explanation of labels

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

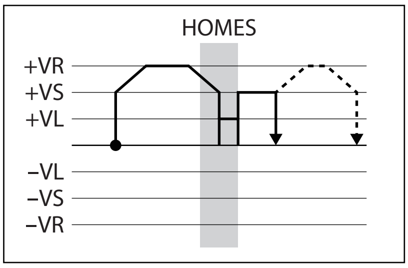
• 2-sensor mode



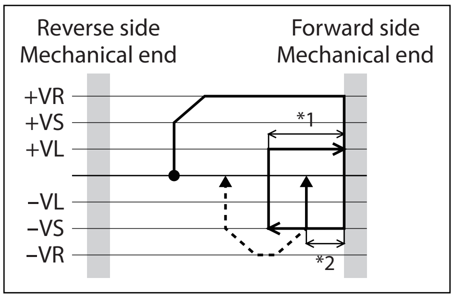
• 3-sensor mode



• 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

memo
- 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.

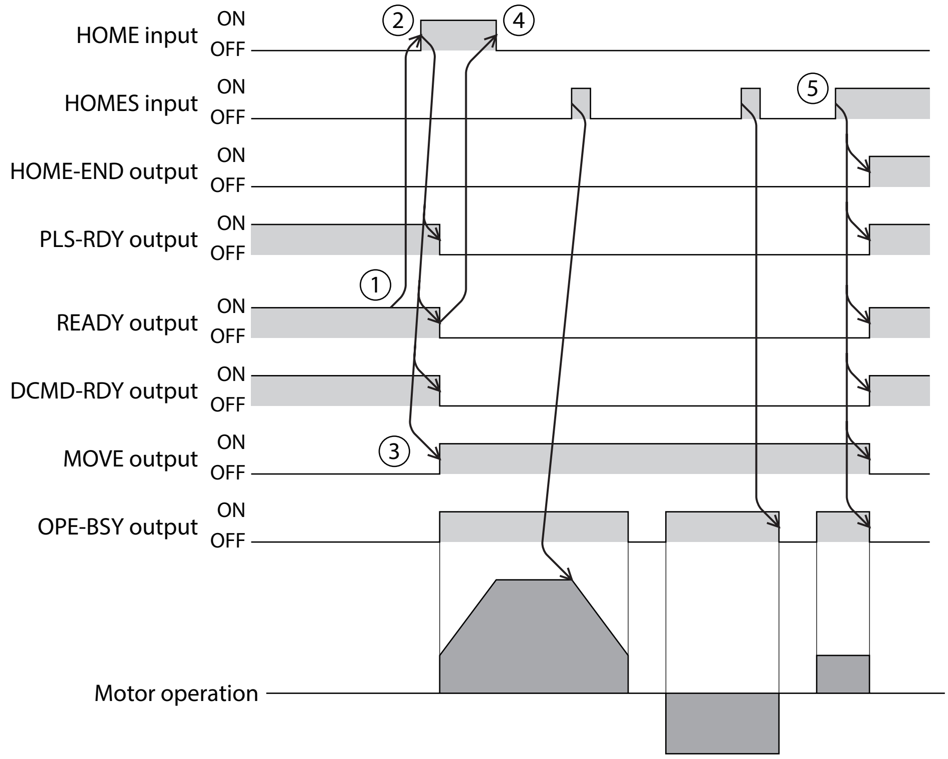
memo
- When the TIM signal is used, set the resolution to be an integral multiple of 50.
- When the "JOG/HOME/ZHOME operation setting" parameter is set to "ABZO setting is prioritized," the parameter suitable for the mechanism is automatically applied. If you want to set the operation information arbitrarily,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



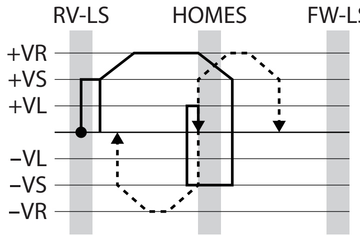
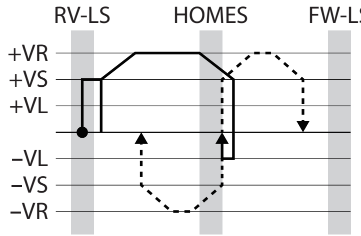
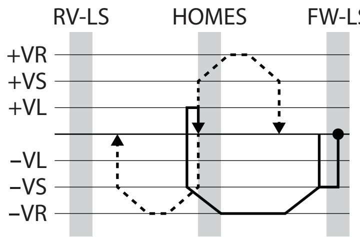
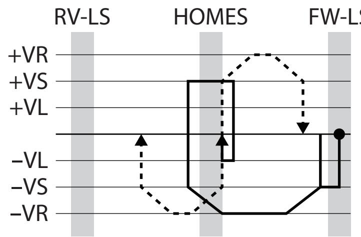
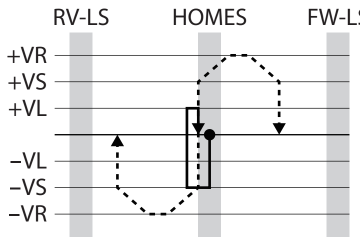
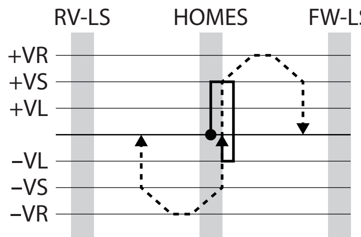
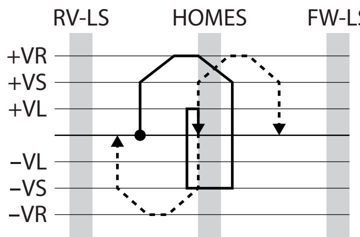
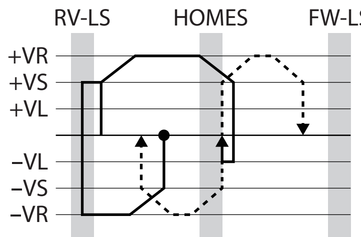
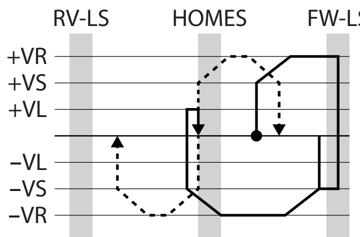
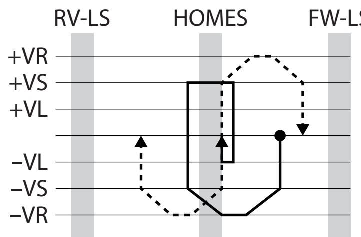
■ Operation sequence

● 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.

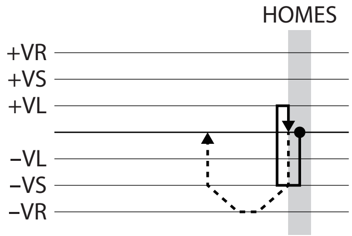
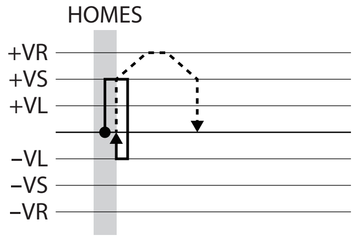
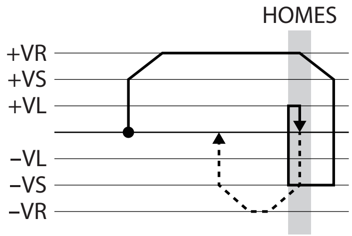
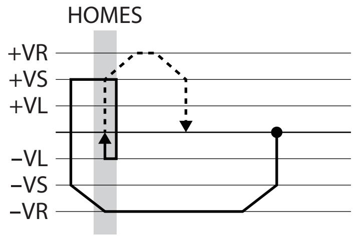
Explanation of labels

- 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.)

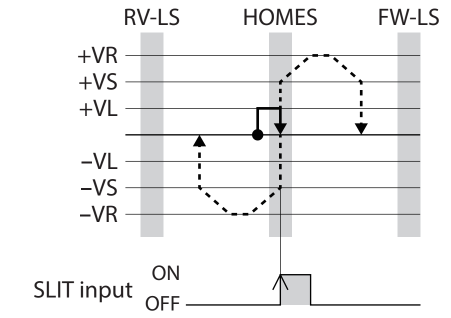
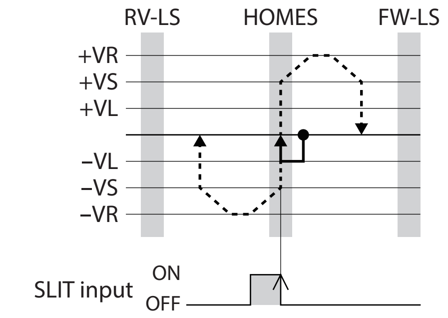
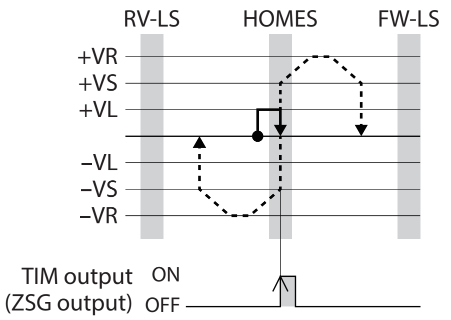
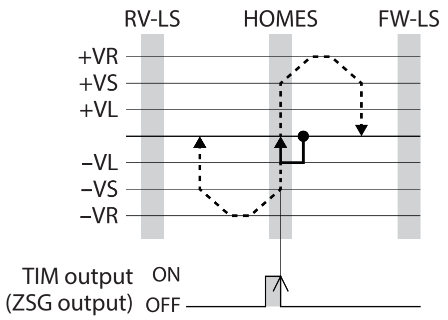
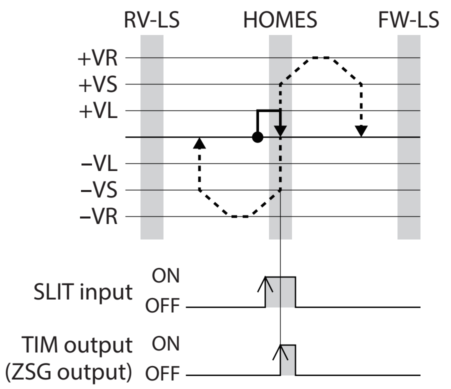
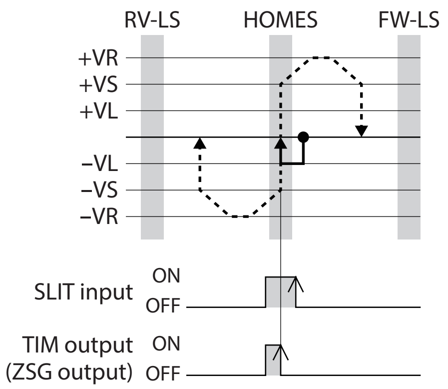
If the limit sensor is not used, in case of a rotating mechanism for example, the sequence is as follows.

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		
Other than HOMES		

Note 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.

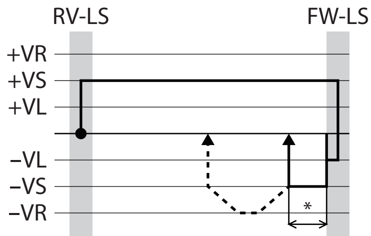
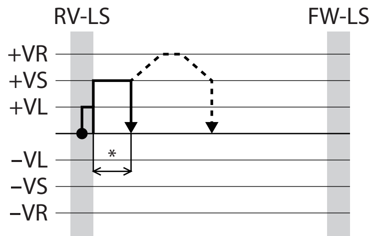
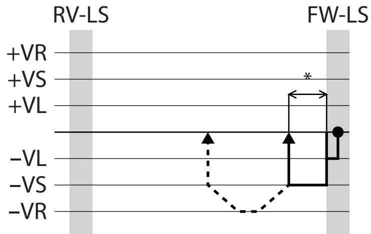
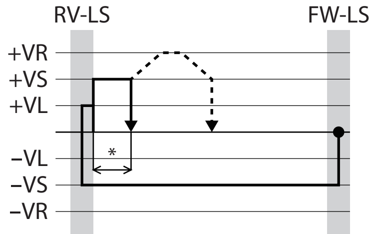
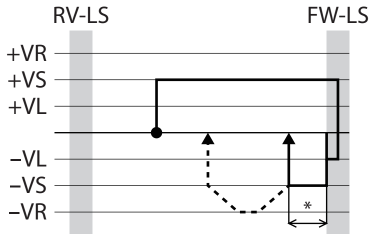
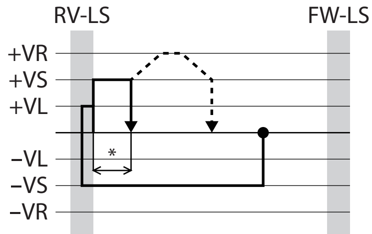
Home position detection signal	Starting direction of return-to-home operation: Positive side	Starting direction of return-to-home operation: Negative side
SLIT input		
TIM signal or ZSG signal		
SLIT input and TIM signal or SLIT input and ZSG signal		

- **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

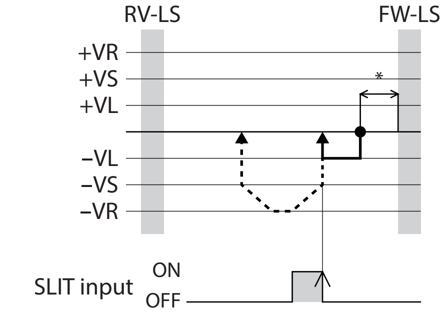
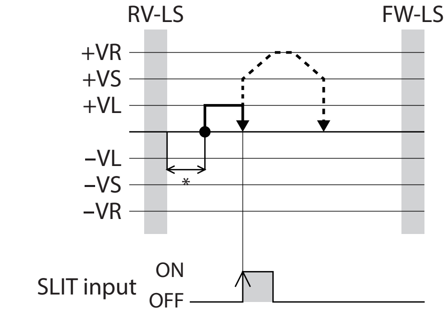
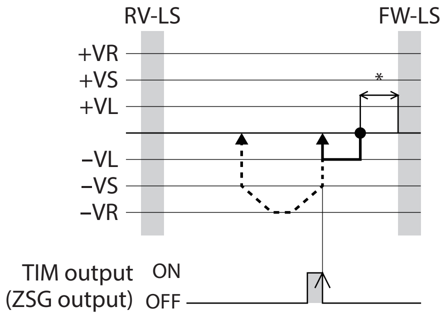
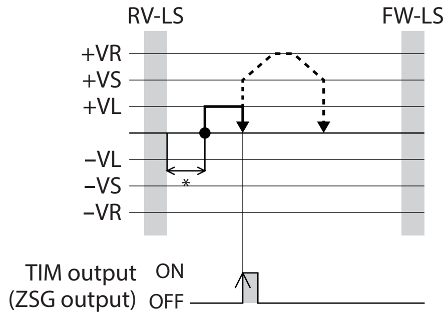
- VR: Return-to-home operation speed
- VS: Return-to-home starting speed
- VL: Last speed
- - - - : Orbit when a home offset is set

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.

<table>
<tr><th>Home position detection signal</th><th>Starting direction of return-to-home operation: Positive side</th><th>Starting direction of return-to-home operation: Negative side</th></tr>
<tr><td>SLIT input</td><td>
</td><td>
</td></tr>
<tr><td>TIM signal
or
ZSG signal</td><td>
</td><td>
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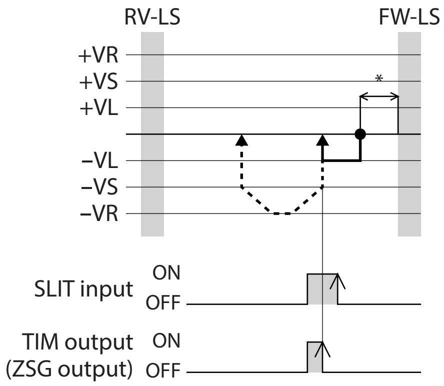
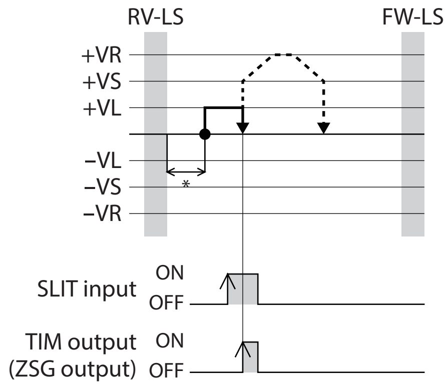
<tr><td>SLIT input and TIM signal
or
SLIT input and ZSG signal</td><td>
</td><td>
</td></tr>
</table>

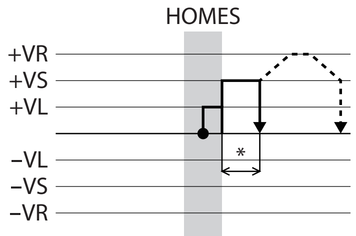
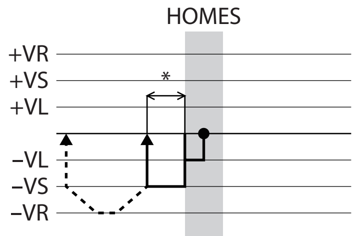
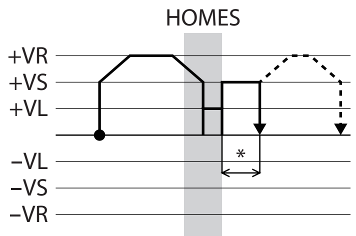
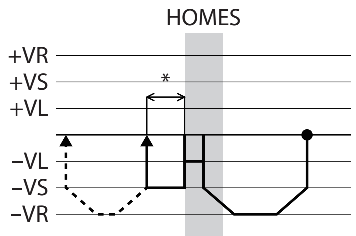
* The motor pulls out of the limit sensor and moves according to the value of "(HOME) Backward steps in 2 sensor home-seeking."

- **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		

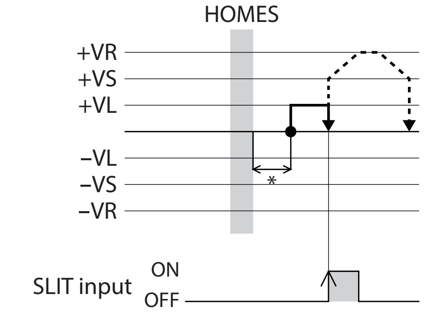
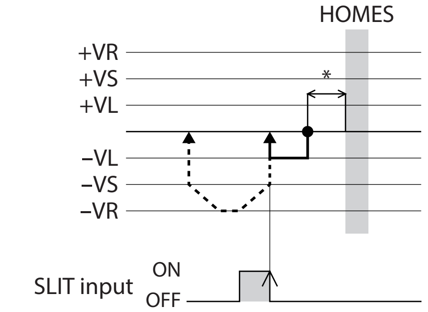
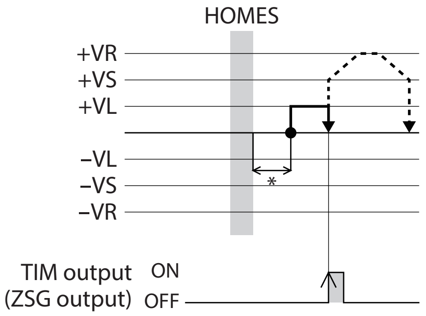
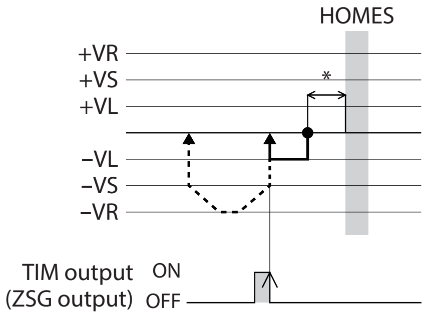
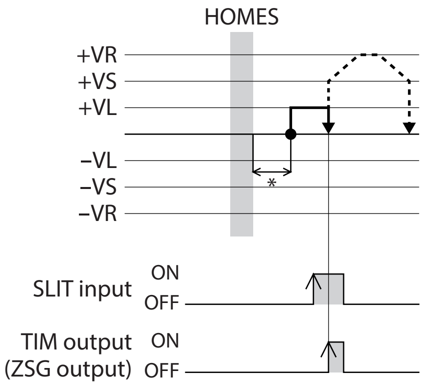
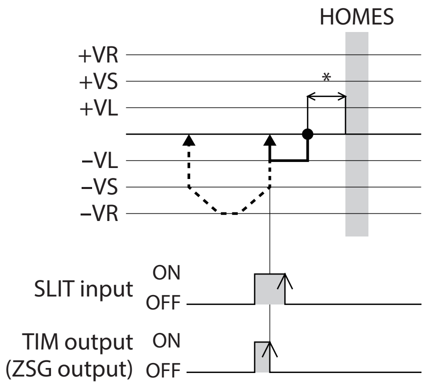
* The motor pulls out of the HOME sensor and moves according to the value of "(HOME) Operating amount in uni-directional home-seeking."

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

2 Operation

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		

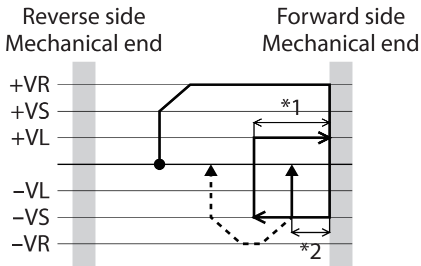
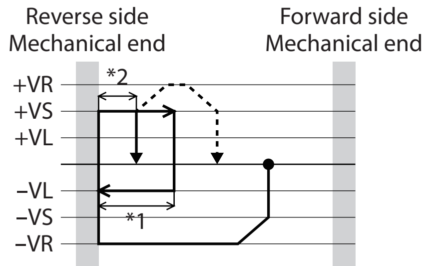
* The motor pulls out of the HOME sensor and moves according to the value of "(HOME) Operating amount in uni-directional home-seeking."

● 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

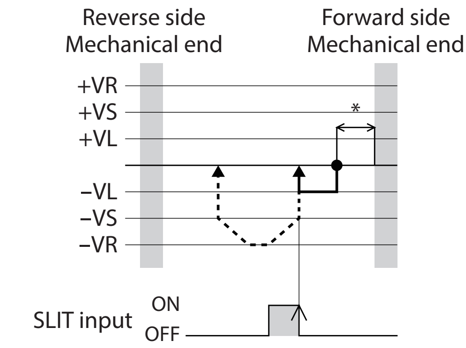
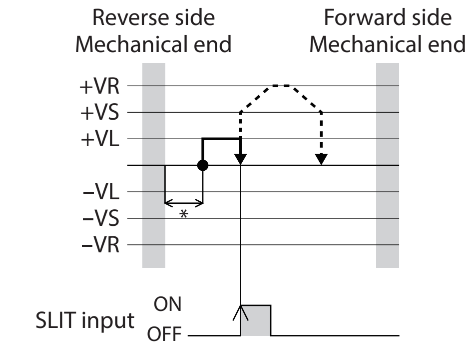
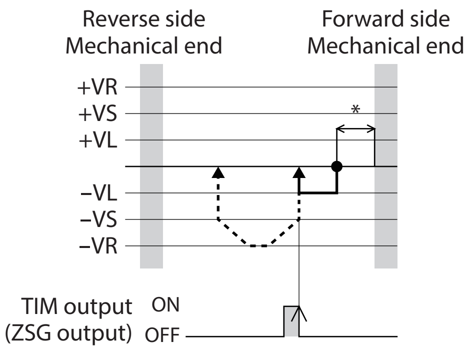
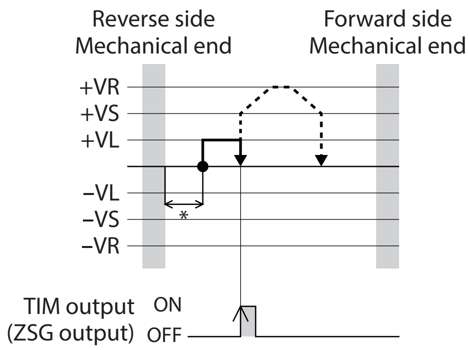
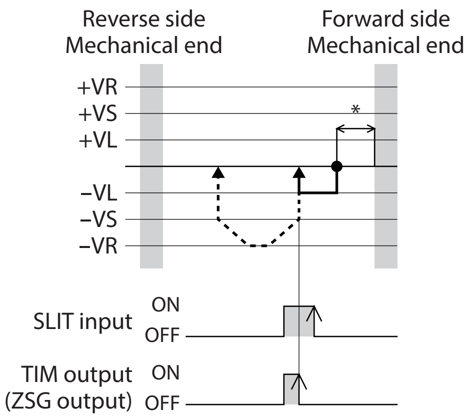
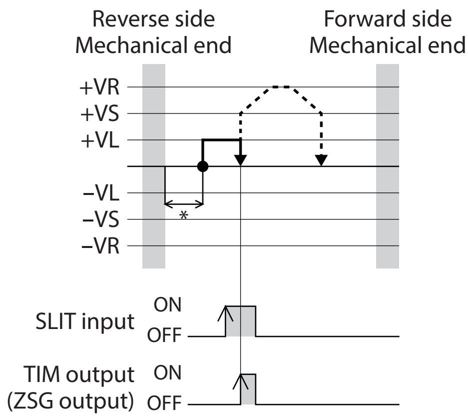
Starting position of return-to-home operation	Starting direction of return-to-home operation: Positive side	Starting direction of return-to-home operation: Negative side
Between mechanical ends		

*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		
TIM signal or ZSG signal		
SLIT input and TIM signal or SLIT input and ZSG signal		

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

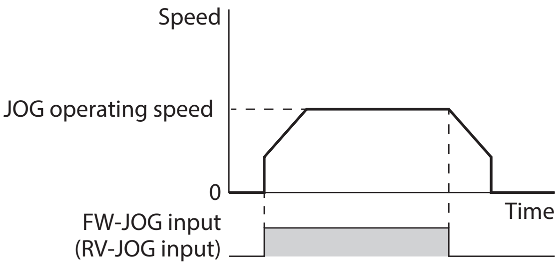
5 Macro operation

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

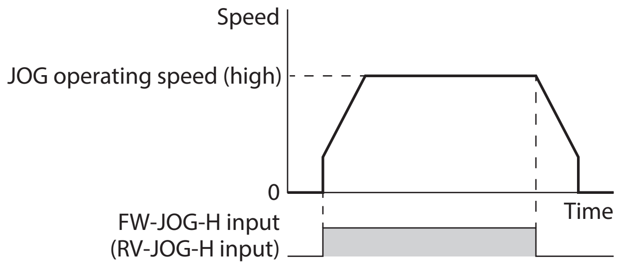
■ JOG macro operation

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



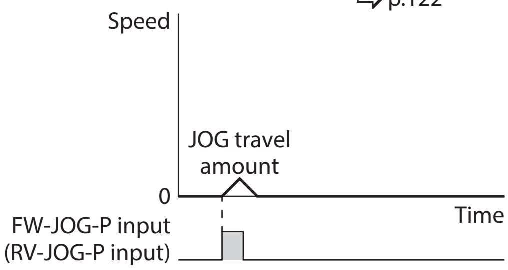
JOG operation

➩p.122



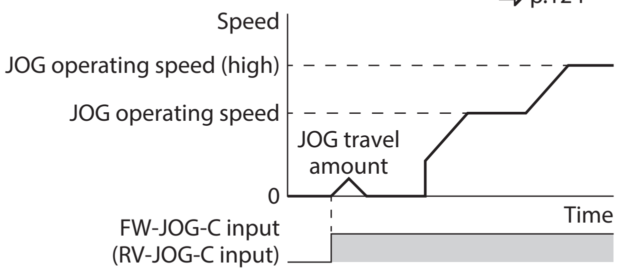
High-speed JOG operation

➩p.124



Inching operation

➩p.126

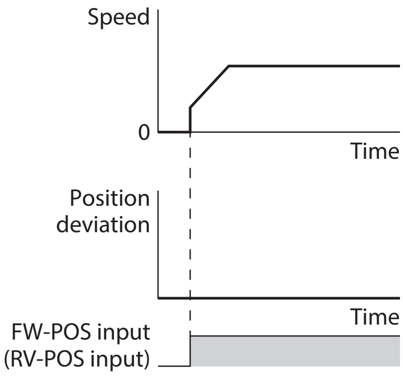


Combined JOG operation

➩p.128

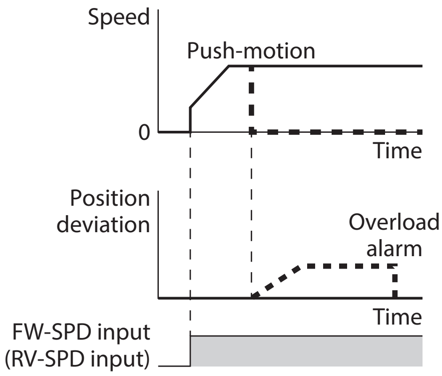
■ Continuous macro operation

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



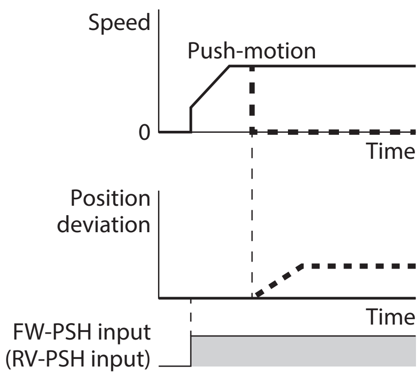
Continuous operation

➩p.130



Speed control operation

➩p.132



Speed control push-motion operation

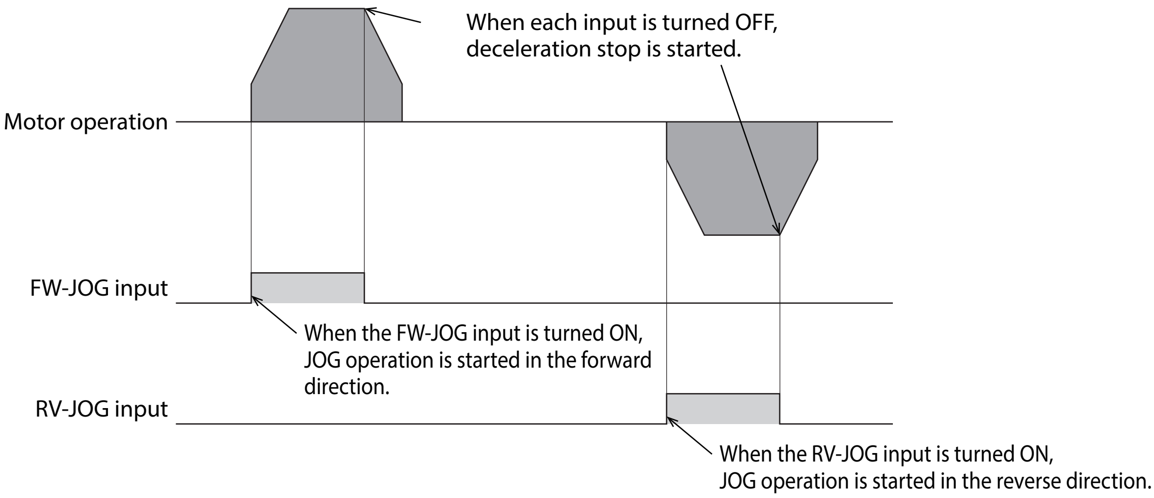
➩p.134

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

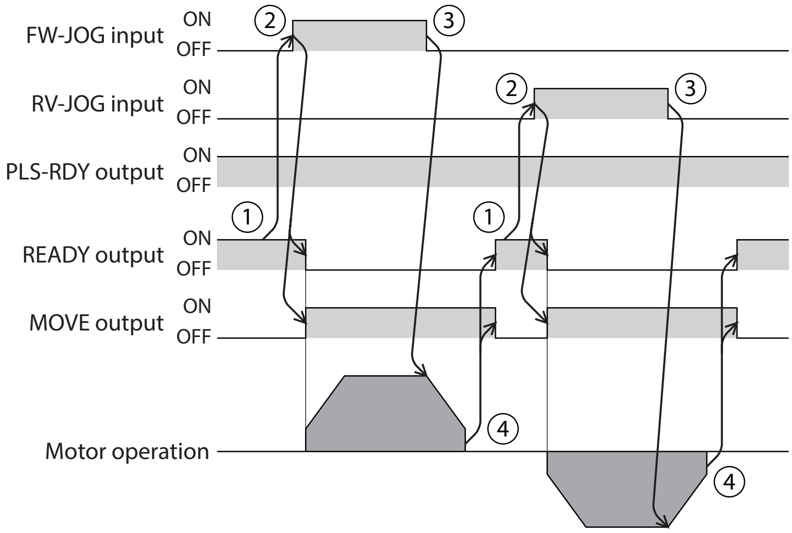


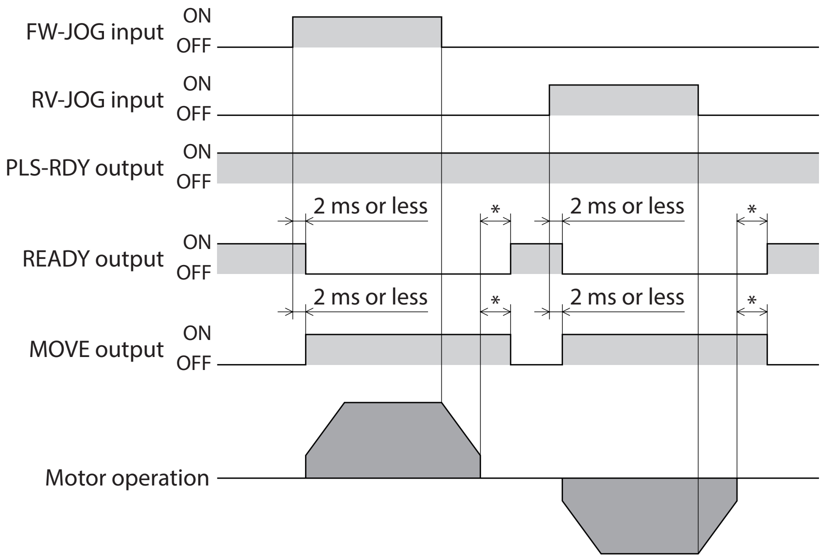
Related parameters

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.



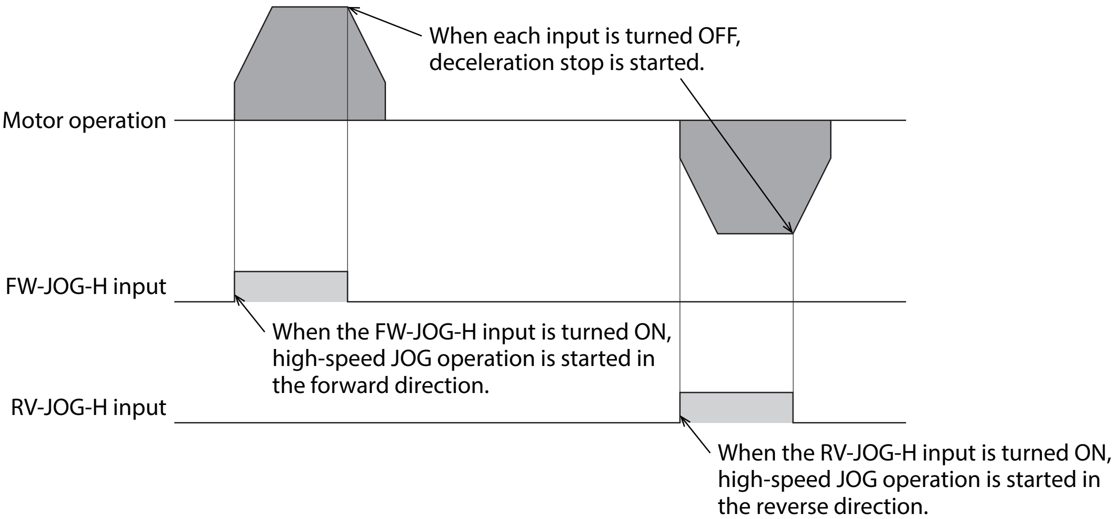


* The specific time varies depending on the load, operating speed, speed filter and other.

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

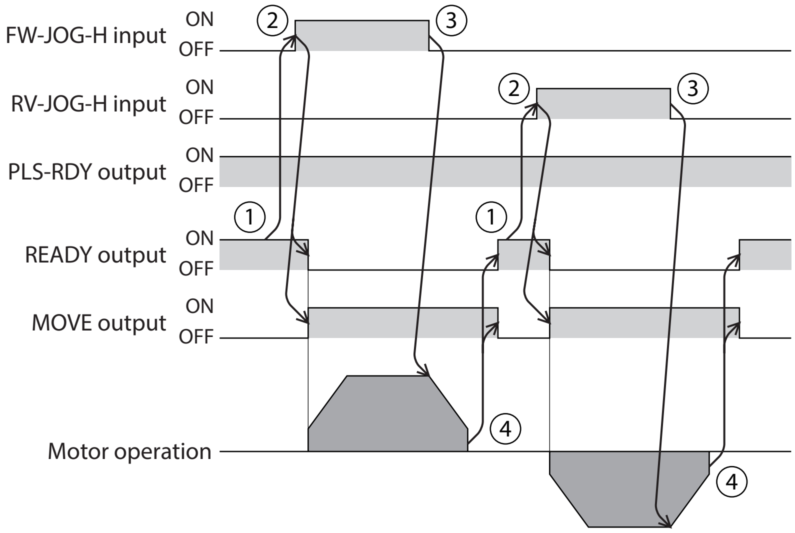


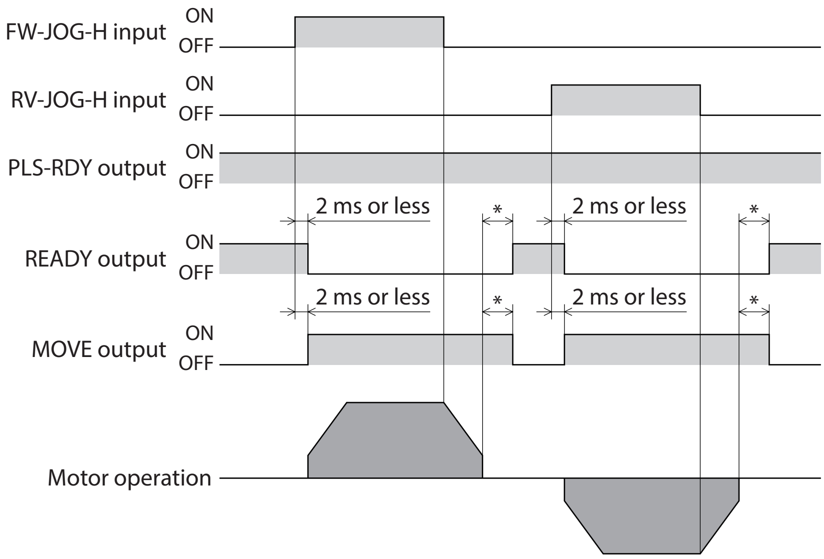
Related parameters

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.



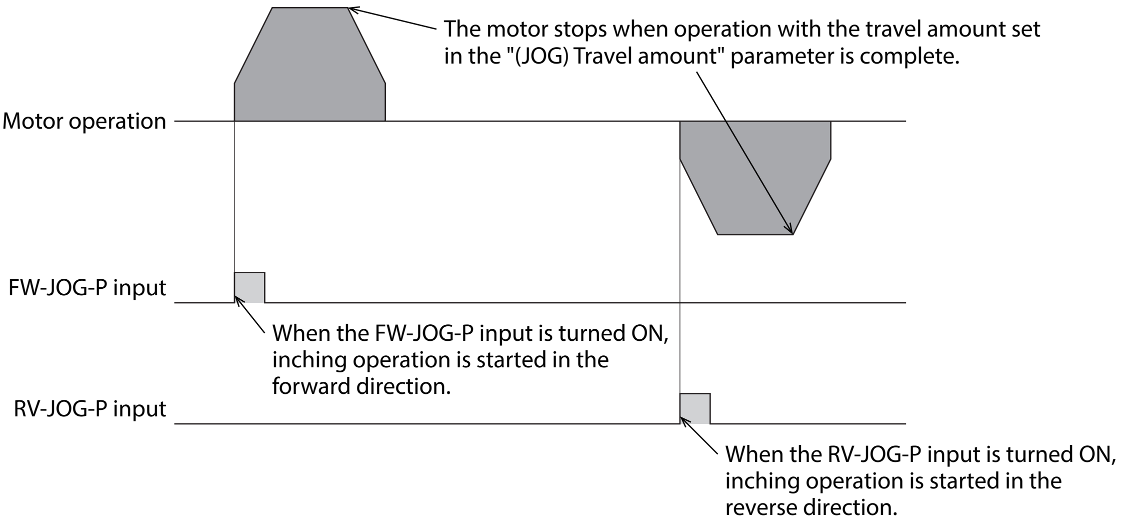


* The specific time varies depending on the load, operating speed, speed filter and other.

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

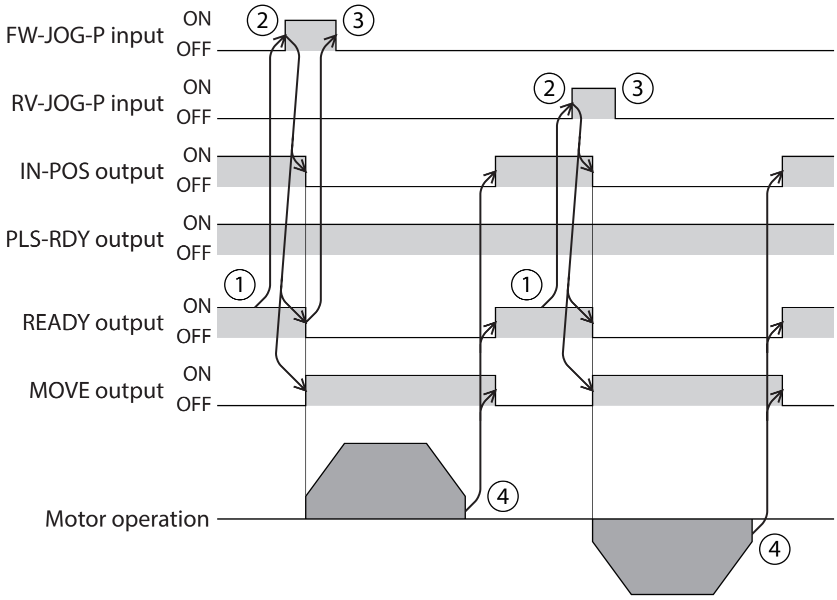


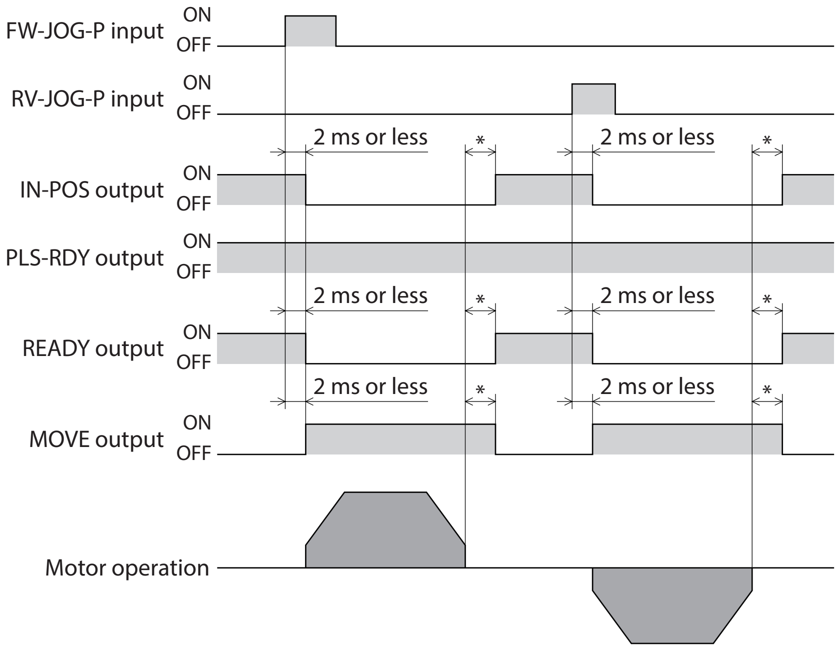
Related parameters

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.



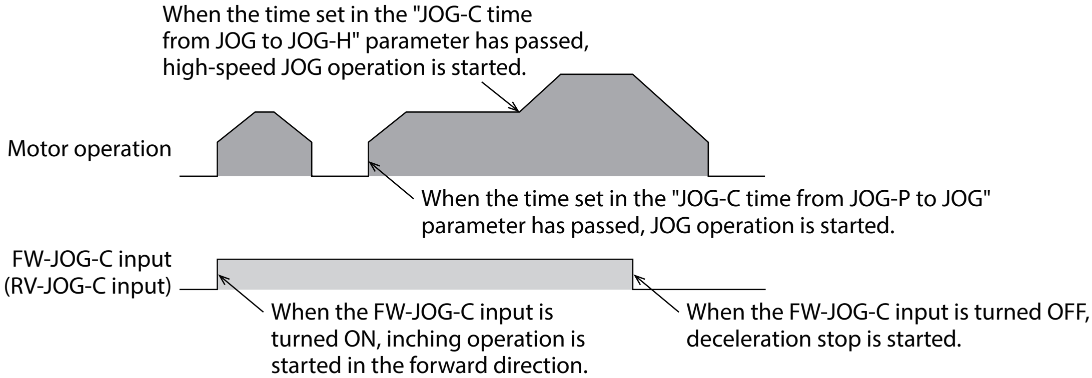


* The specific time varies depending on the load, operating speed, speed filter and other.

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



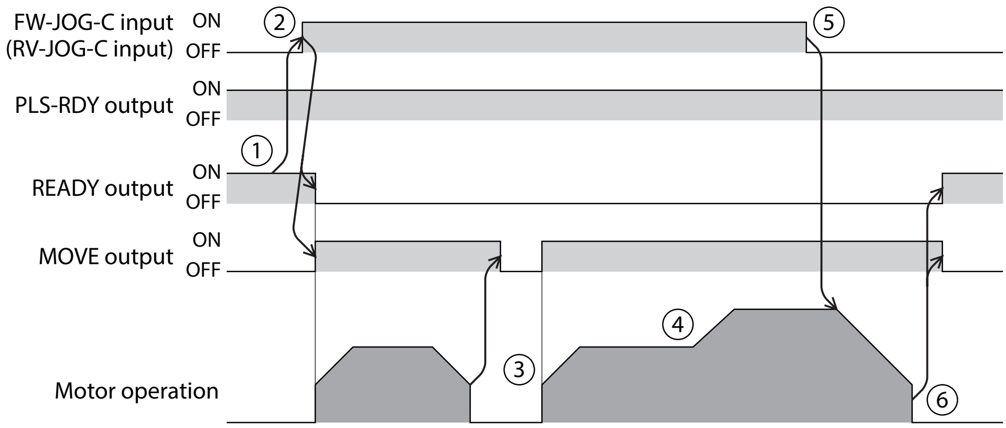
Related parameters

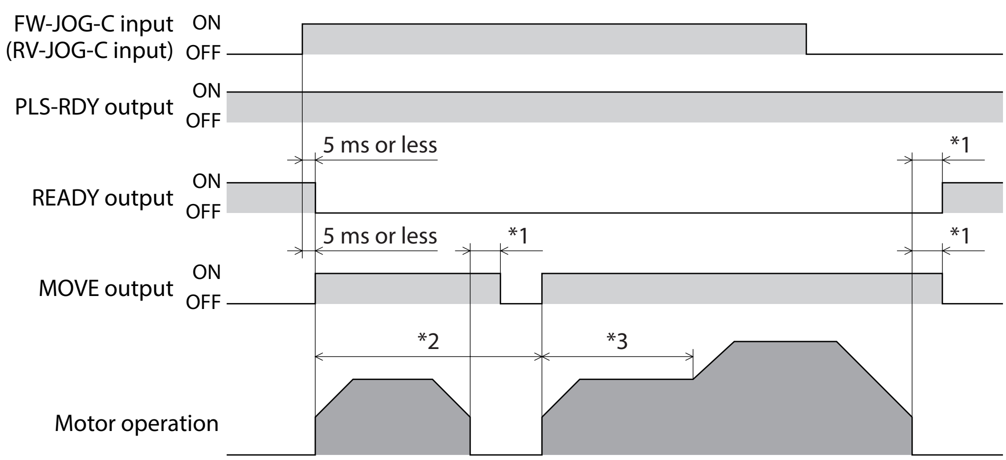
MEXE02 tree view	Parameter name	Description	Initial value
Motor and mechanism	JOG/HOME/ZHOME command filter time constant	Sets the time constant for the command filter. **Setting range** 1 to 200 ms	1
	JOG/HOME/ZHOME operating current	Set the operating current. **Setting range** 0 to 1,000 (1=0.1%)	1,000
	(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.



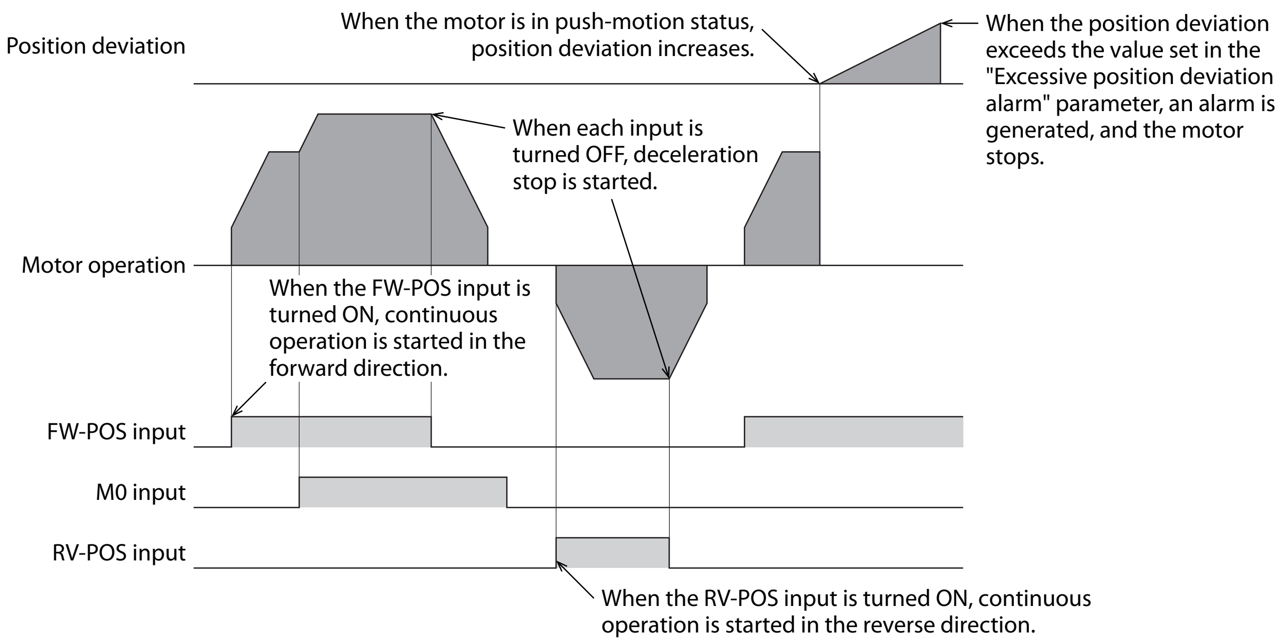


*1 The specific time varies depending on the load, operating speed, speed filter and other.
*2 Set in "JOG-C time from JOG-P to JOG."
*3 Set in "JOG-C time from JOG to JOG-H."

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

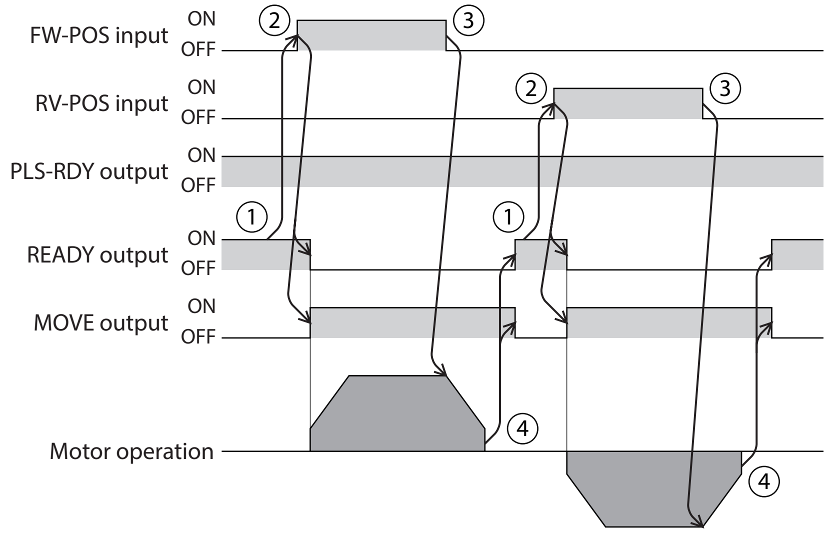
MEXE02 tree view	Item	Description	Initial value
Operation data	Operating speed	Sets the operating speed. **Setting range** –4,000,000 to 4,000,000 Hz	1,000
	Starting/changing rate	Sets the acceleration/deceleration rate (acceleration/deceleration time) for start and change of the speed. **Setting range** 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

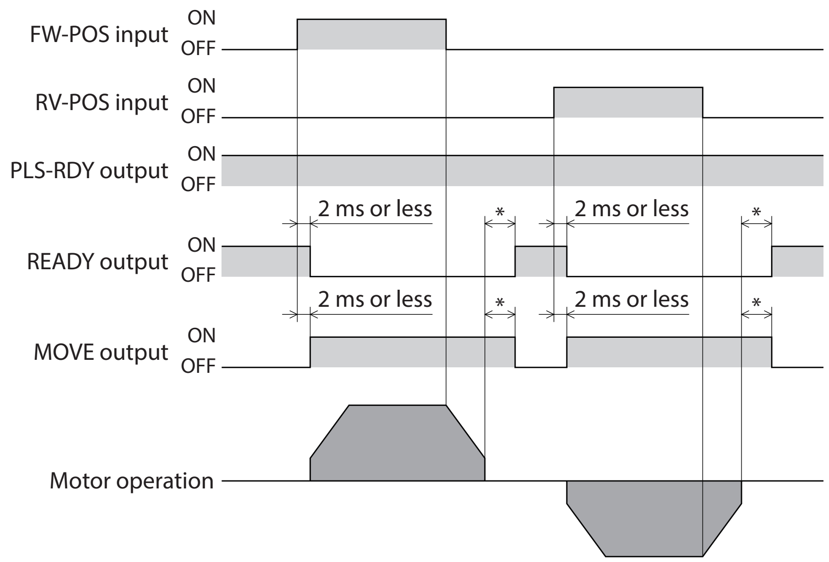
Related parameters

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.



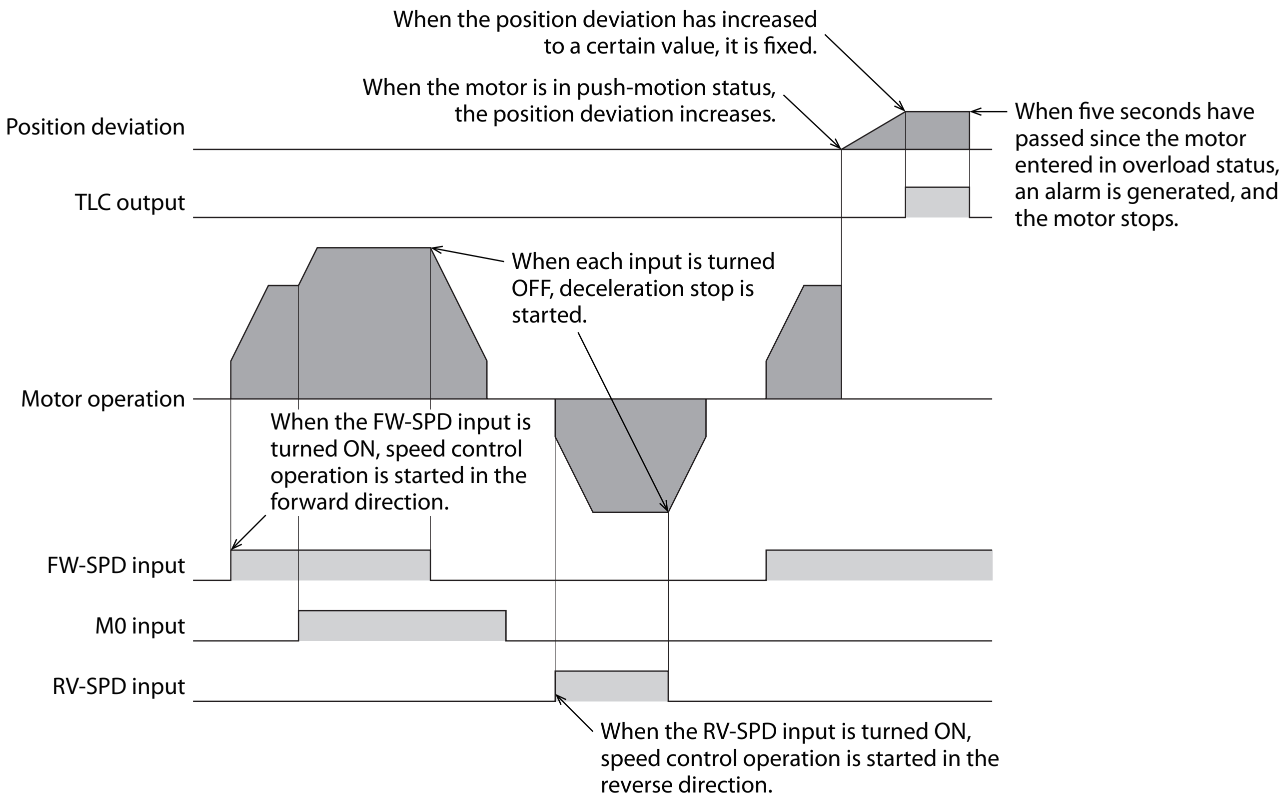


* The specific time varies depending on the load, operating speed, speed filter and other.

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

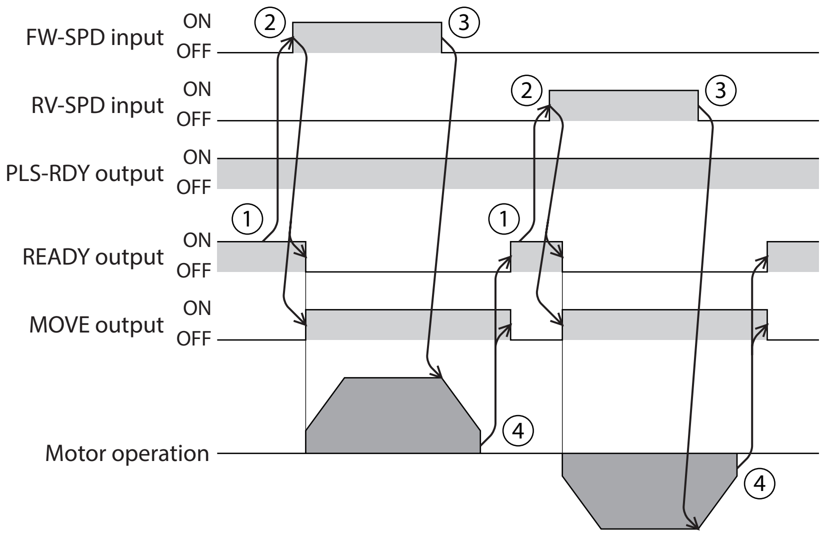
MEXE02 tree view	Item	Description	Initial value
Operation data	Operating speed	Sets the operating speed. **Setting range** −4,000,000 to 4,000,000 Hz	1,000
	Starting/changing rate	Sets the acceleration/deceleration rate (acceleration/deceleration time) for start and change of the speed. **Setting range** 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

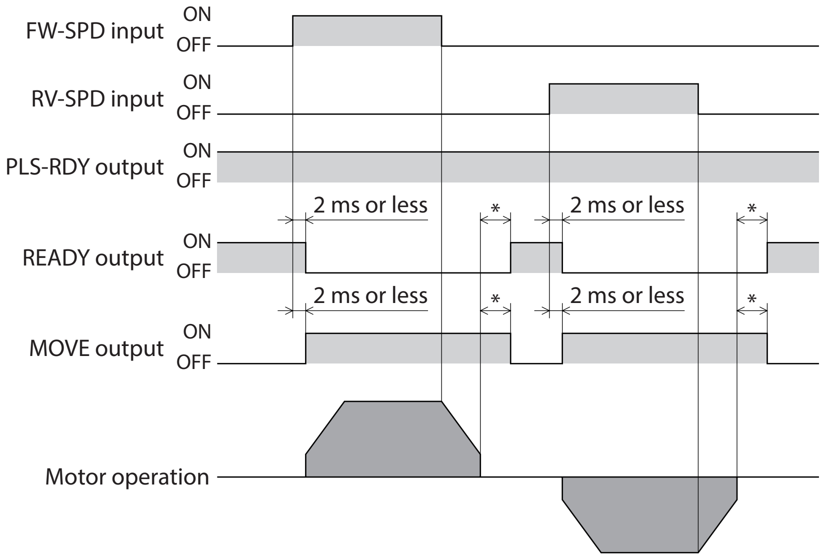
Related parameters

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.



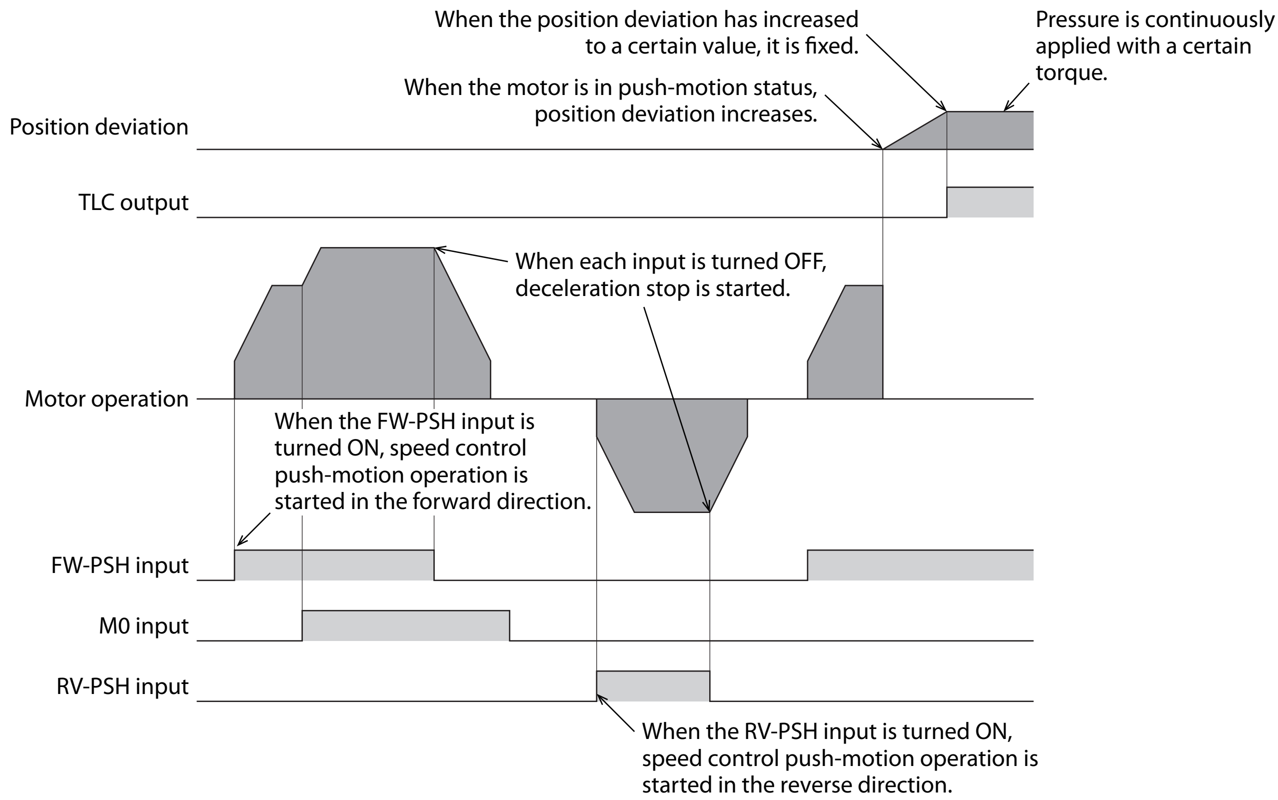


* The specific time varies depending on the load, operating speed, speed filter and other.

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

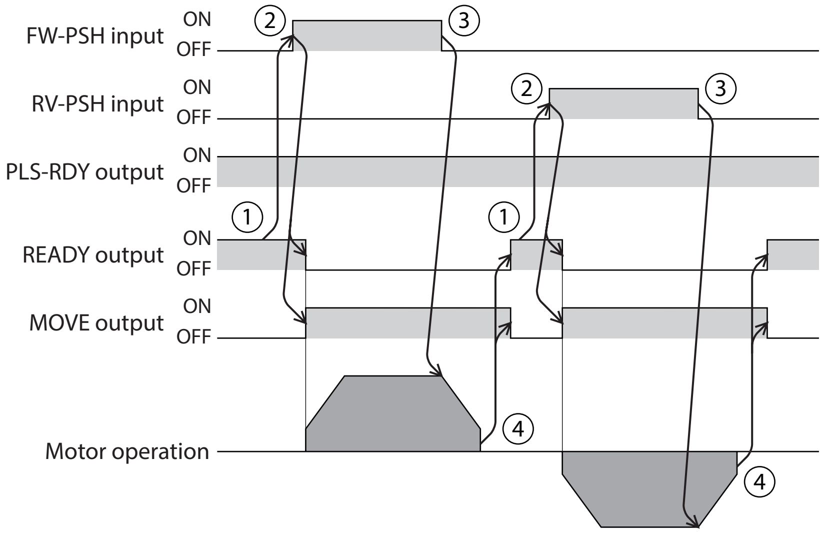
MEXE02 tree view	Item	Description	Initial value
Operation data	Operating speed	Sets the operating speed. **Setting range** –4,000,000 to 4,000,000 Hz	1,000
	Starting/changing rate	Sets the acceleration/deceleration rate (acceleration/deceleration time) for start and change of the speed. **Setting range** 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

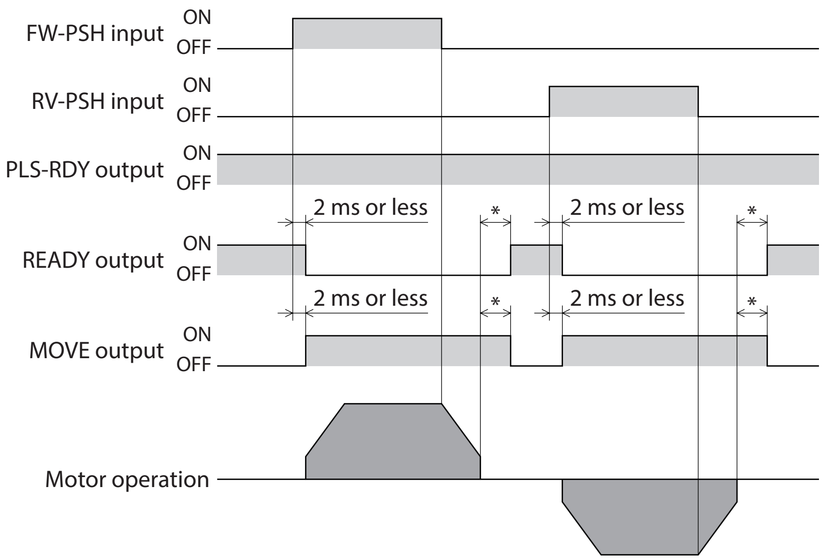
Related parameters

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	Stored data operation	High-speed return-to-home operation
Operation data	Operation data	○	–
Operation I/O event	Operation I/O event	○	–
Extended operation data setting	Extended operation data setting	○	–
Base setting	Base current	○	○
	Stop current	○	○
	Command filter setting	○	○
	Command filter time constant	○	–
	Common acceleration rate or time	○	–
	Common stopping deceleration	○	–
	Starting speed	○	–
	Acceleration/deceleration rate	○	–
	Acceleration/deceleration unit	○	○
	Permission of absolute positioning without setting absolute coordinates	○	–
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	–	○
	(ZHOME) Acceleration/deceleration rate	–	○
	(ZHOME) Starting speed	–	○
	JOG/HOME/ZHOME command filter time constant	–	○
	JOG/HOME/ZHOME operating current	–	○
	(HOME) Home-seeking mode	–	–
	(HOME) Starting direction	–	–

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

MEXE02 tree view	Parameter name	Stored data operation	High-speed return-to-home operation
Motor and Mechanism (Coordinates/JOG/Home 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	–	–

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

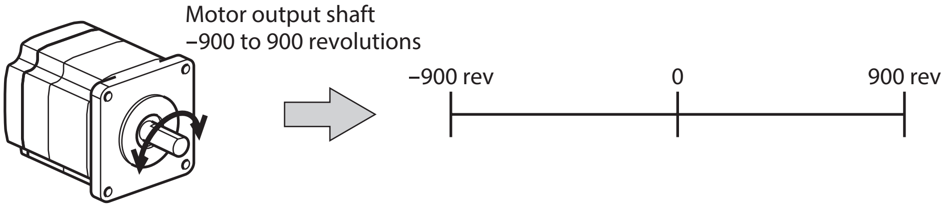
Decision of how to use the revolution range to 1,800 that can be managed by the ABZO sensor is called "initial coordinate generation."
There are three parameters required for initial coordinate generation as shown below. These parameters are read when the power is turned on.

- 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

memo 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.

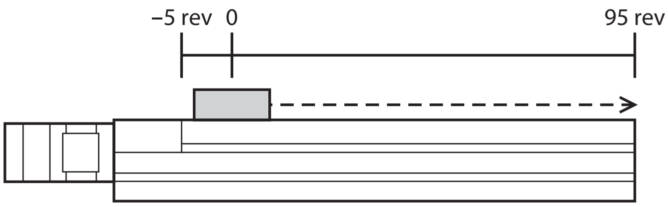
- Stroke of motorized actuator: 600 mm
- Pitch of motorized actuator: 6 mm/rev

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

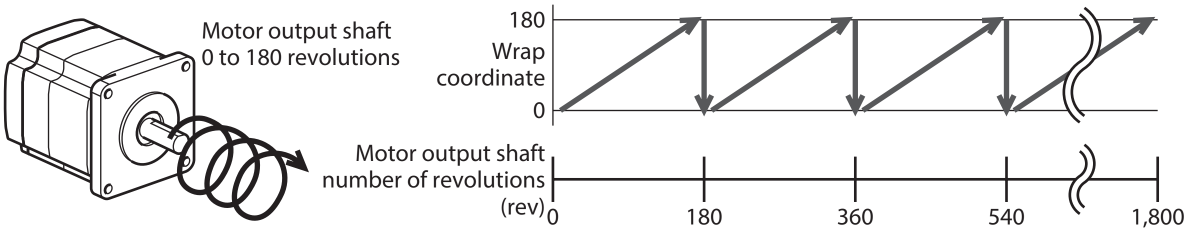
The wrap function is a function to automatically preset the position information of the current position when the number of revolutions of the motor output shaft exceeds the set range. Setting of wrap offset allows you to limit the operation area of the equipment and control the index table with coordinates 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

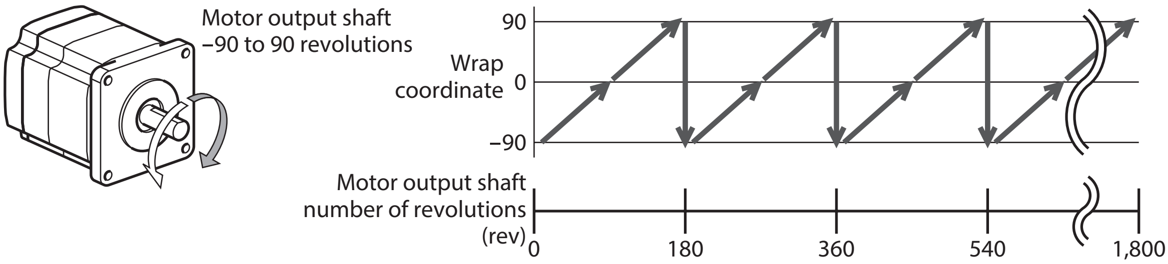
This explains as an example for the motor of the frame size 60 mm (2.36 in.).
With wrap setting, 1,800 revolutions managed by the ABZO sensor are divided evenly to generate coordinates within the number of revolutions divided evenly.
Therefore, set a value by which 1,800 can exactly be divided.

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

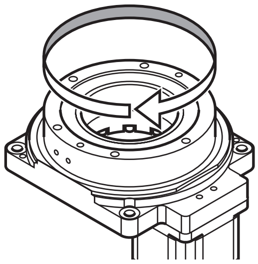


When the wrap setting range is exceeded, the symbol is reversed.

● Setting example of index table

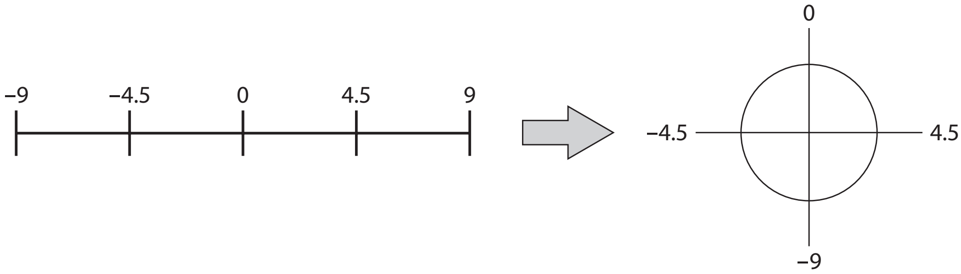
The following is an example in which the index table is made rotate once when the motor output shaft rotates 18 times.

- 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.



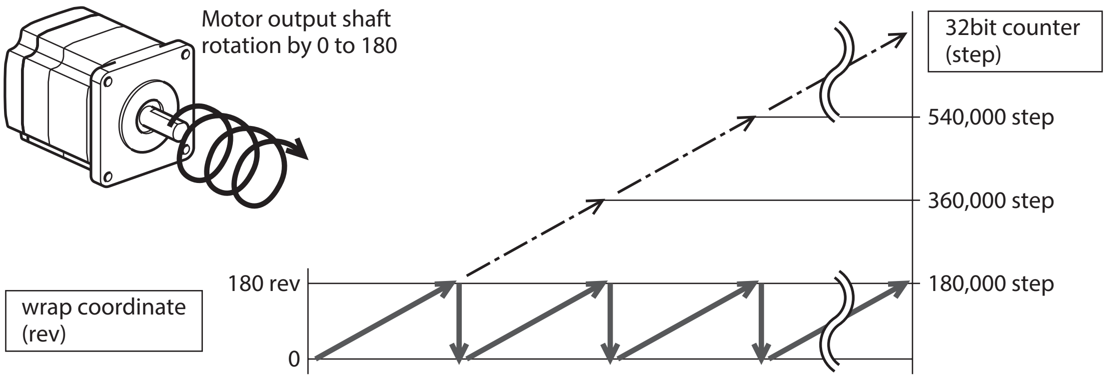
Setting examples of parameters

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

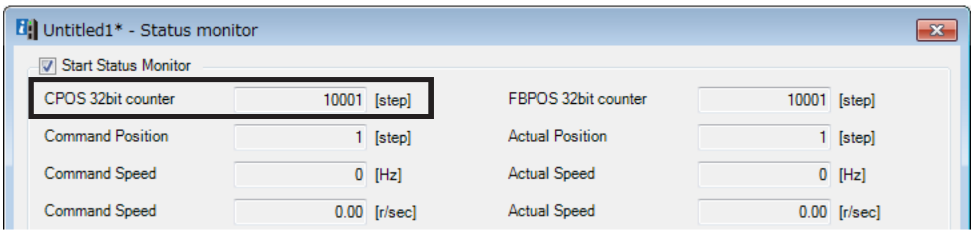
● Relationship between the wrap function and the 32 bit counter inside the driver

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.

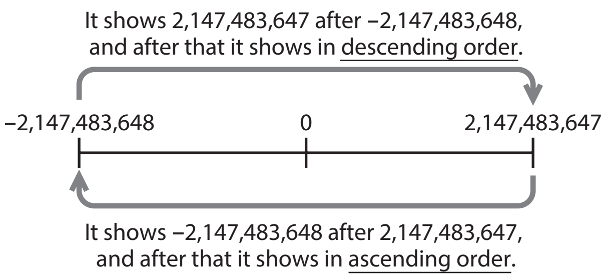
Example: If the wrap function is performed when the motor rotates 180 revolutions in the same direction



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.



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 cleared by "Position preset clear" from the [Communication] menu 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.

Note 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.

Note 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	Electronic gear A	Sets the denominator of electronic gear. **Setting range** 1 to 65,535	1
	Electronic gear B	Sets the numerator of electronic gear. **Setting range** 1 to 65,535	1
	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

MEXE02 tree view	Parameter name	Description	Initial value
Motor and mechanism	Mechanism lead pitch	Sets the lead of the ball screw. This parameter is applied to the **MEXE02** only. **Setting range** 1 to 32,767	1
	Mechanism lead decimal digit setting	Sets the number of decimal places when the lead of the ball screw contains a decimal point. This parameter is applied to the **MEXE02** only. **Setting range** 0: ×1 mm 1: ×0.1 mm 2: ×0.01 mm 3: ×0.001 mm	0

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

MEXE02 tree view	Parameter name	Description	Initial value
Motor and mechanism	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	$\boxed{4.8}$	12.0	25.0	$\boxed{72.0}$	$\boxed{200.0}$
0.6	2.0	5.0	12.5	30.0	75.0	225.0
0.8	2.4	6.0	$\boxed{14.4}$	36.0	90.0	300.0
0.9	2.5	7.2	15.0	37.5	100.0	$\boxed{360.0}$
1.0	3.0	7.5	18.0	$\boxed{40.0}$	112.5	450.0
1.2	3.6	$\boxed{8.0}$	20.0	45.0	$\boxed{120.0}$	$\boxed{600.0}$
1.5	4.0	9.0	22.5	50.0	150.0	900.0
$\boxed{1.6}$	4.5	10.0	$\boxed{24.0}$	60.0	180.0	$\boxed{1,800.0}$

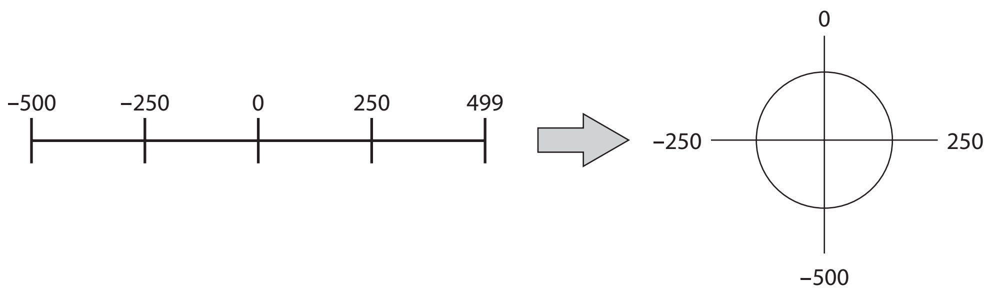
- **Setting example**
  When "Initial coordinate generation & wrap range offset ratio" is set to "50%" and "Initial coordinate generation & wrap range offset value" to "0"

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.

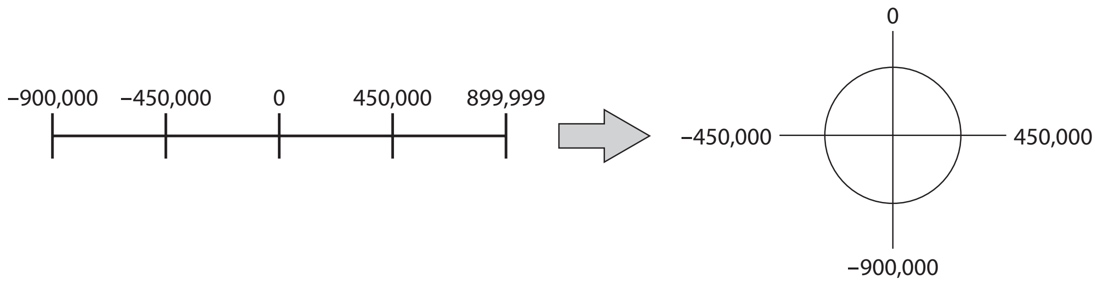


Example 2: Coordinate when the "Wrap setting range" is 1,800 rev and the resolution is 1,000 P/R

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.



Note 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.

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

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

Note 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)

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

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

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: **TS** geared motor (gear ratio 3.6)

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

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

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)
- Motorized actuator: **DGII** Series (gear ratio 18)

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

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

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: **TS** geared motor (gear ratio 20)

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

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

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.

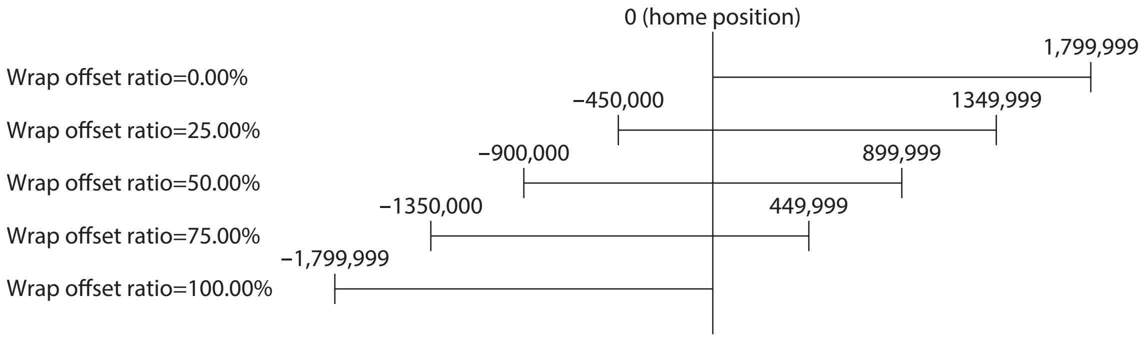
■ Wrap offset function

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

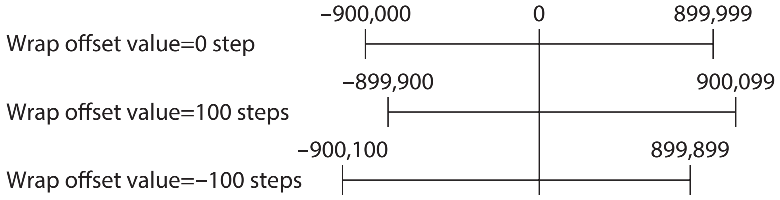


- **Wrap range offset value setting**

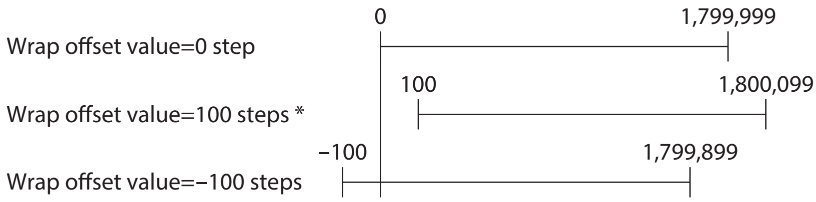
For the coordinate system offset in the "Initial coordinate generation & wrap range offset ratio" parameter, the coordinate can be shifted by step.

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

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

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

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.441)
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.442)
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

Note If the "Mechanism protection parameter setting" parameter is set to "Disable," the alarm function utilized 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

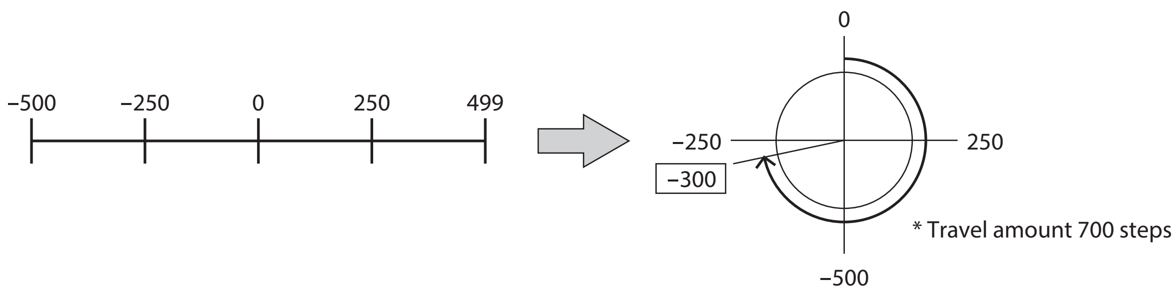
Since the wrap range is –500 to 499 steps, the present position coordinate is output as follows.

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.453)

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.

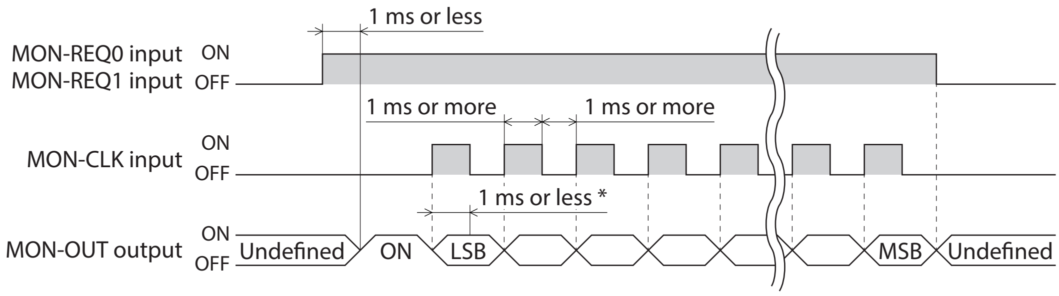
Output example
The feedback position and the alarm code are output while an alarm of hardware overtravel (alarm code: 66h) is generated with the feedback position 300 steps.

- Checksum
  Feedback position: 300 steps = 0000 0000 0000 0000 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

$\underbrace{\text{0011 0100 1000 0000 0000 0000 0000 0000}}_{\text{Feedback position}}\ \underbrace{\text{0110 0110}}_{\text{Alarm code}}\ \underbrace{\text{1100 1001}}_{\text{Checksum}}$

- **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.

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

■ Pulse request function

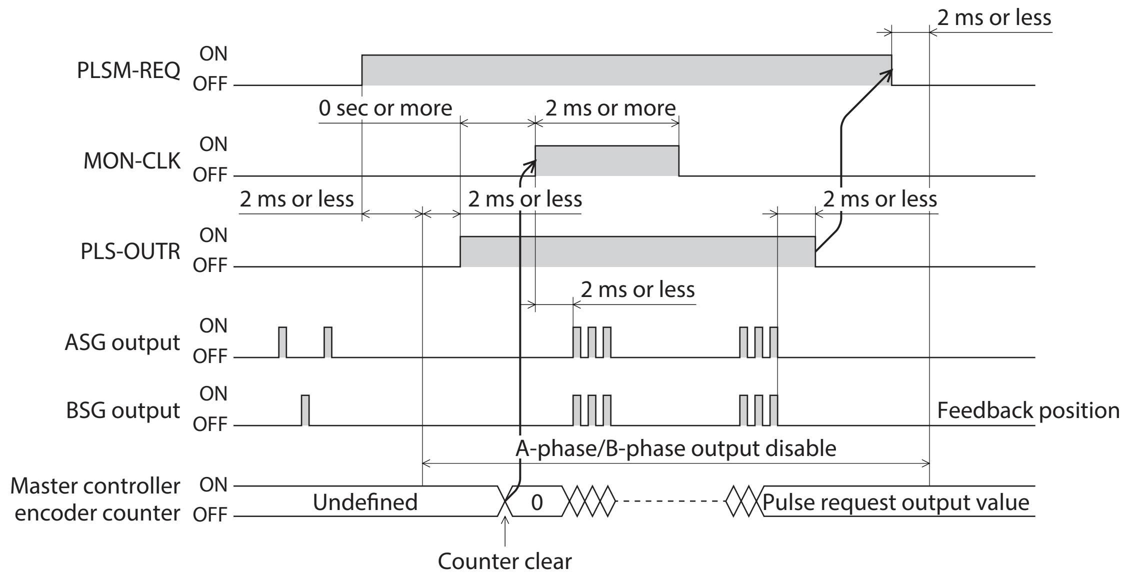
The pulse request function is a function to transmit the present position (absolute position) to the master controller by using the A-phase and B-phase outputs. When the A-phase and B-phase outputs of the encoder counter of the master controller and driver are connected and the pulse request function 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.



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.

3 I/O signals

This chapter explains input signals and output signals.

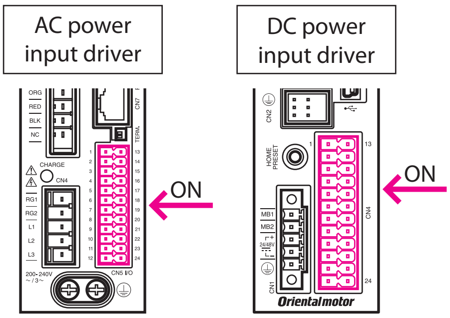
Table of contents

1 Overview of I/O signals

1-1 Overview of input signals

■ Direct input

Direct input (DIN) is a method in which a signal is input directly by connecting the I/O cable to the connector.
If 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.

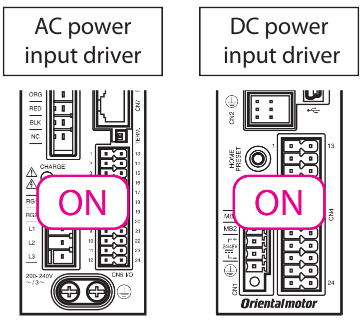
Setting example of the MEXE02:
When continuous operation is executed with the operation data No.1 if the FW-POS input is turned "ON"

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.

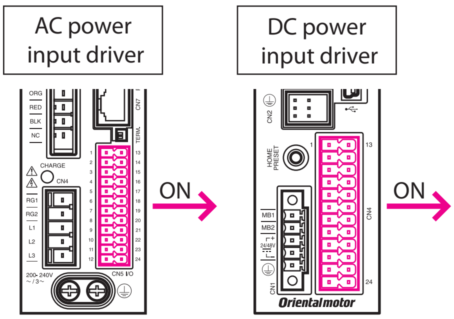
Setting example of the MEXE02:
When the TLC output is turned ON, stop the motor operation by turning the STOP input ON

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

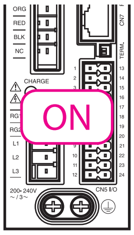
When "HOME-END" is set to the (Normal) Output function, "AND" to composite logical combination, and "AREA0" to the composite output function, you can confirm that return-to-home operation is complete (HOME-END) and the motor has reached the specified position (AREA0) with one output signal (DOUT0).

	(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

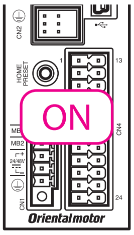
■ User output

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.

AC power input driver



DC power input driver



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.

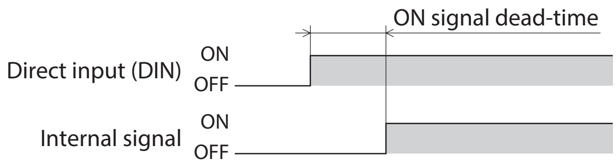
Input function	Initial value
DIN0	CW+ [PLS+]
DIN1	CW– [PLS–]
DIN2	CCW+ [DIR+]
DIN3	CCW– [DIR–]

- **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

Note 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**

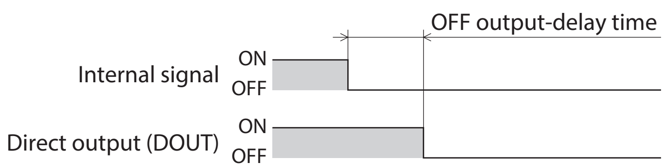
MEXE02 tree view	Parameter name	Description	Initial value
Direct-OUT function	DOUT0 output function	Selects the output signal to be assigned to DOUT0 to DOUT5. **Setting range** ⇨"2-2 Output signal list" on p.167	144: HOME-END
	DOUT1 output function		138: IN-POS
	DOUT2 output function		133: PLS-RDY
	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	Execute direct positioning operation.
43	D-SEL3	
44	D-SEL4	
45	D-SEL5	
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	Select the operation data number using eight bits.
65	M1	
66	M2	
67	M3	
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	Output in response to the input signal.
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	Output in response to the input signal.
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	
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.469.
225	INFO-POSERR	
226	INFO-DRVTMP	
227	INFO-MTRTMP	
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.469.
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

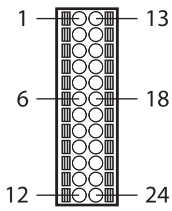
3-1 Direct I/O

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.

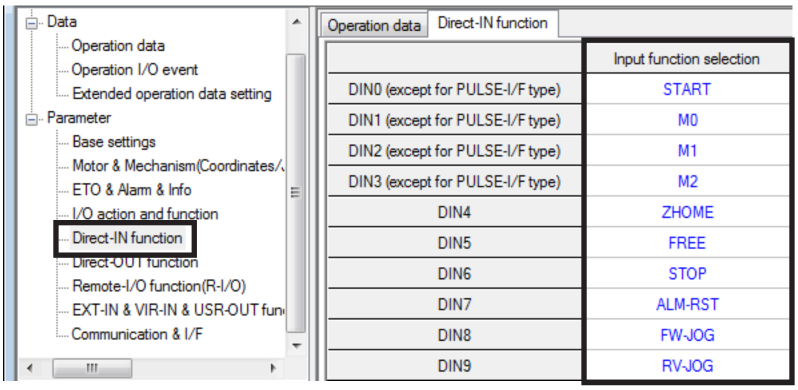
Connector terminal number	Terminal name	Initial value
1	DIN0	START
2	DIN2	M1
3	DIN4	ZHOME
4	DIN6	STOP
6	DIN8	FW-JOG



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.



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.

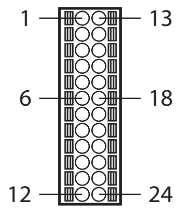
memo

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

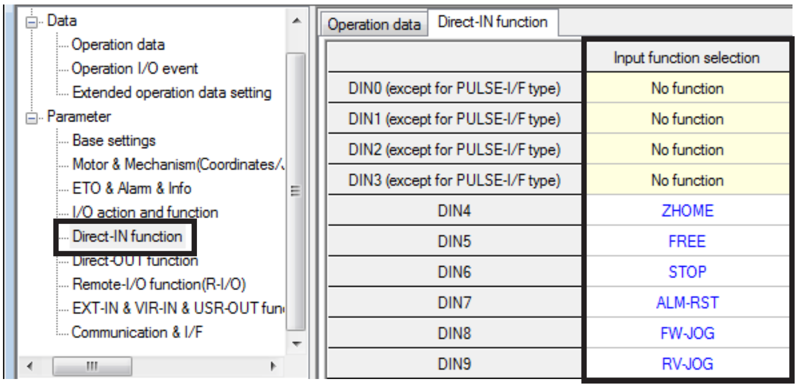


Connector terminal number	Terminal name	Initial value
13	DIN1	CW– [PLS–] *
14	DIN3	CCW– [DIR–] *
15	DIN5	FREE
16	DIN7	ALM-RST
18	DIN9	RV-JOG

* [ ]: 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.

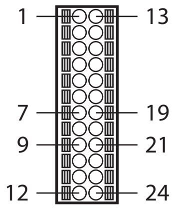
memo

- 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.

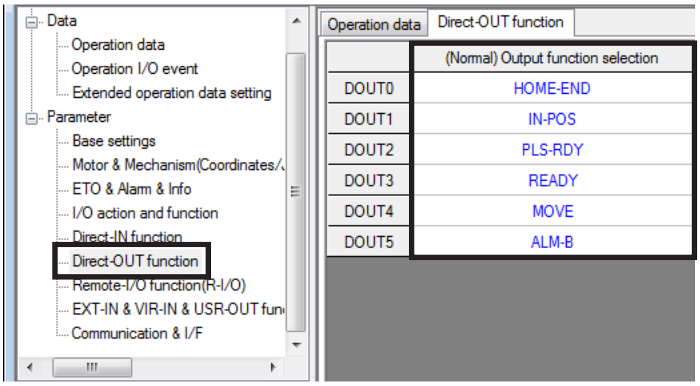
Connector terminal number	Terminal name	Initial value
7	DOUT0	HOME-END
8	DOUT2	PLS-RDY
9	DOUT4	MOVE



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.



3 I/O signals

■ Pin assignments list

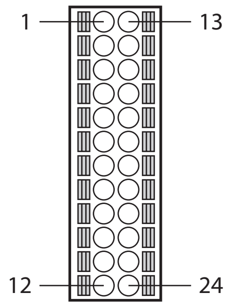
- AC power input driver: CN5 connector
- DC power input driver: CN4 connector

memo
- 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



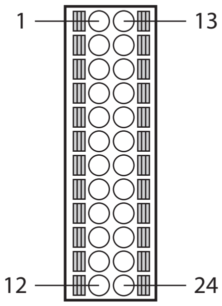
Pin No.	Signal name	Description *
13	IN1	Control input 1 (M0)
14	IN3	Control input 3 (M2)
15	IN5	Control input 5 (FREE)
16	IN7	Control input 7 (ALM-RST)
17	IN-COM [8-9]	IN8 and IN9 input common
18	IN9	Control input 9 (RV-JOG)
19	OUT1	Control output 1 (IN-POS)
20	OUT3	Control output 3 (READY)
21	OUT5	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

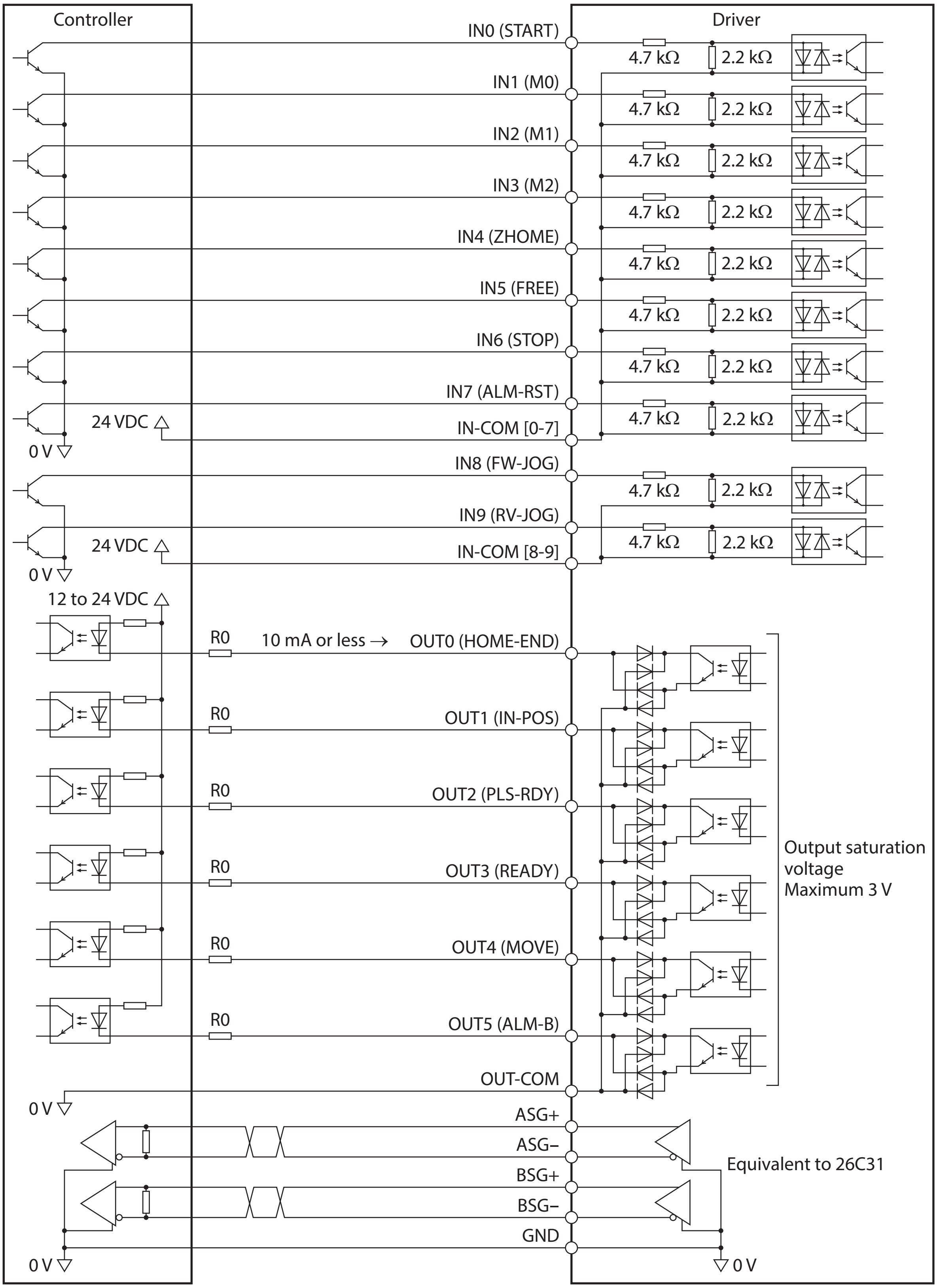


Pin No.	Signal name	Description *
13	CW– [PLS–]	CW pulse input– [Pulse input–]
14	CCW– [DIR–]	CCW pulse input– [Rotation direction input–]
15	IN5	Control input 5 (FREE)
16	IN7	Control input 7 (ALM-RST)
17	IN-COM [8-9]	IN8 and IN9 input common
18	IN9	Control input 9 (RV-JOG)
19	OUT1	Control output 1 (IN-POS)
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.

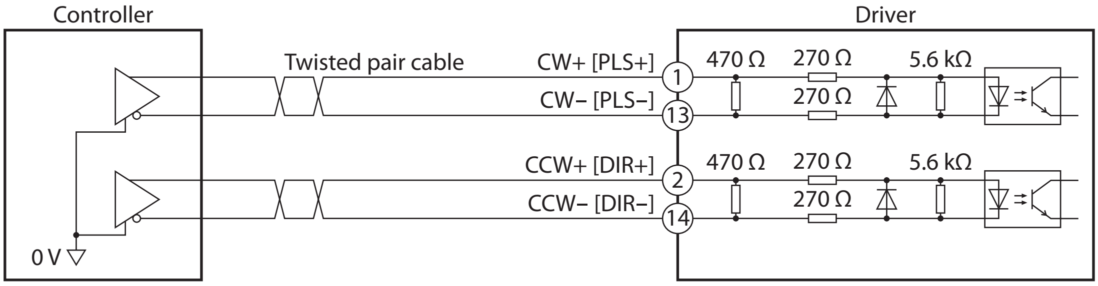


* ( ): Initial value

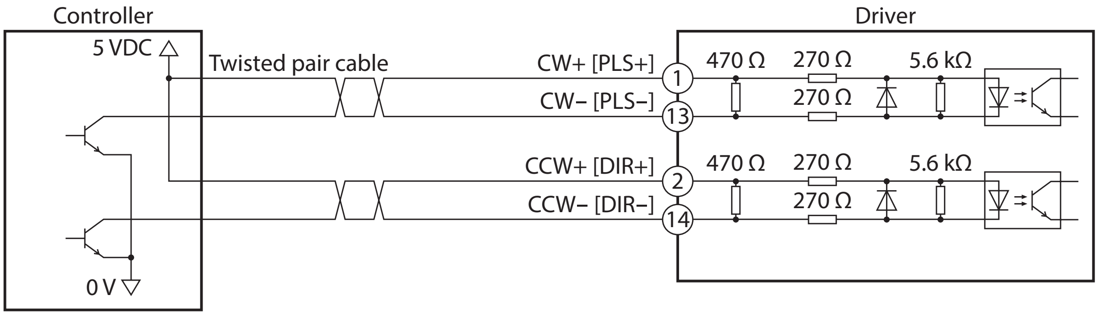
- **Pulse input type with RS-485 communication interface, pulse input type**

The pin No.1, No.2, No.13, and No.14 are only available to the pulse input. Other functions cannot be assigned.

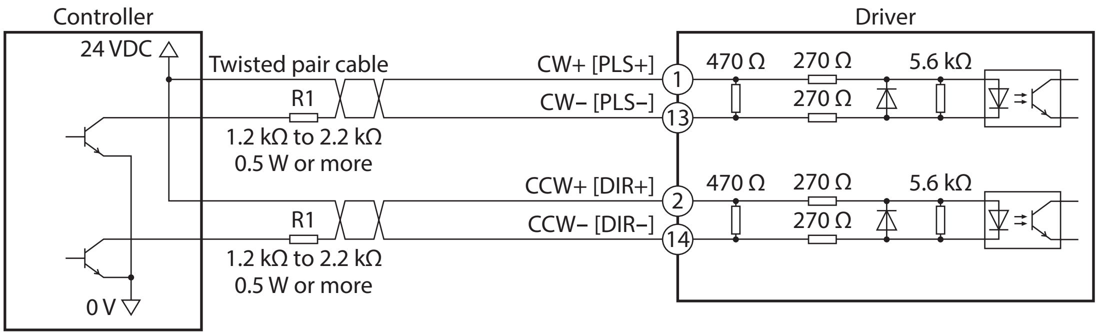
When pulse input is of line driver type



When pulse input is of open-collector type (When using the voltage of pulse input signals at 5 VDC)



When pulse input is of open-collector type (When using the voltage of pulse input signals at 24 VDC)

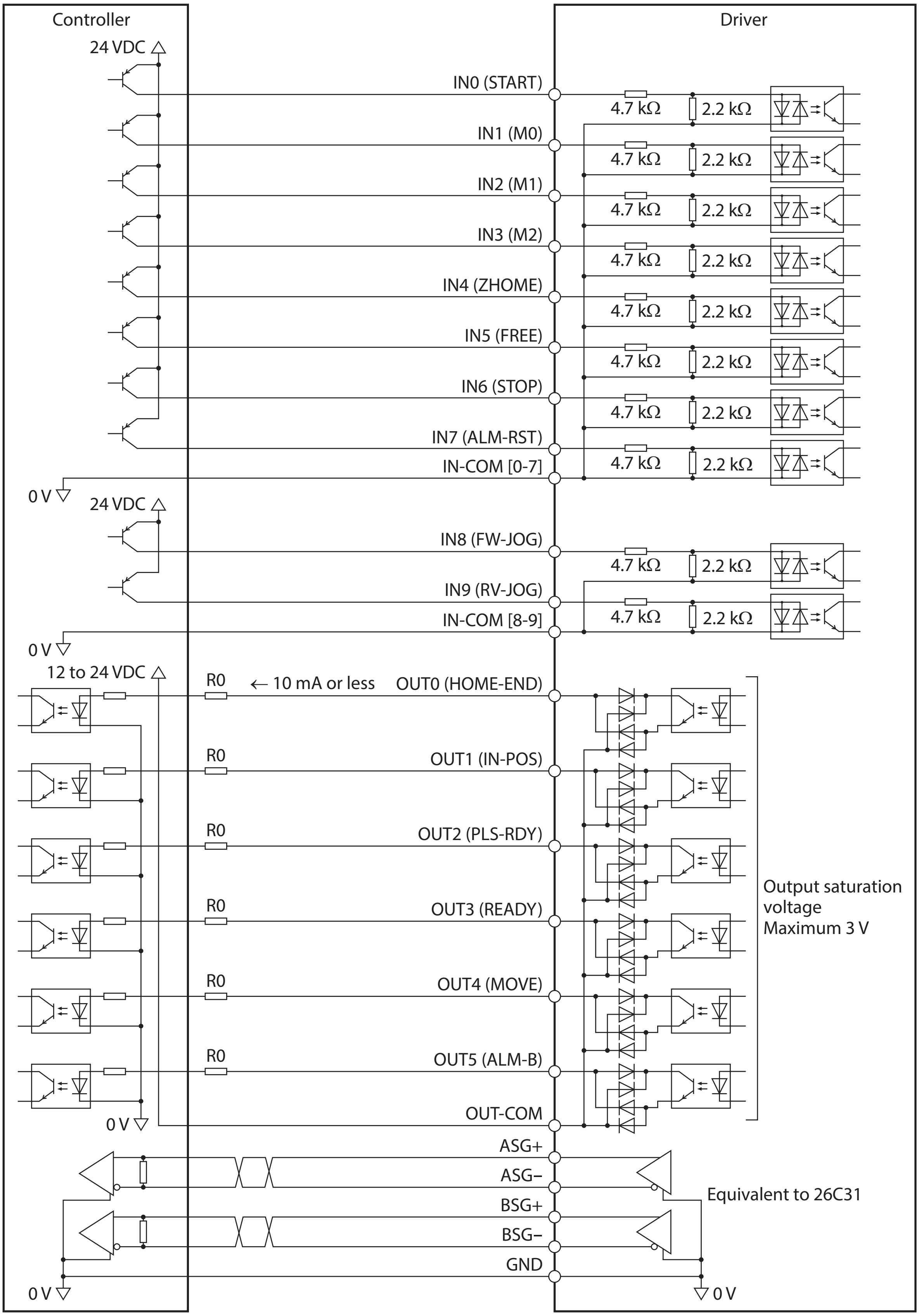


memo Use the CW [PLS] input and CCW [DIR] input at 5 VDC to 24 VDC. When using signals at 24 VDC, connect an external resistor R1 (1.2 kΩ to 2.2 kΩ, 0.5 W or more). When using signals at 5 VDC, apply the voltage directly.

3 I/O signals

■ 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.

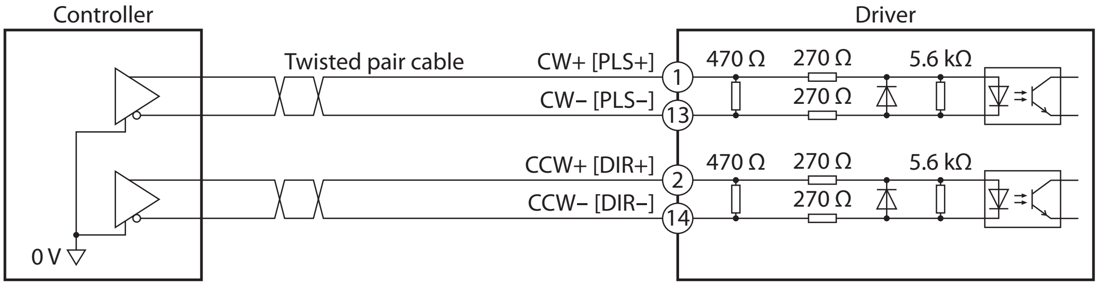


* ( ): Initial value

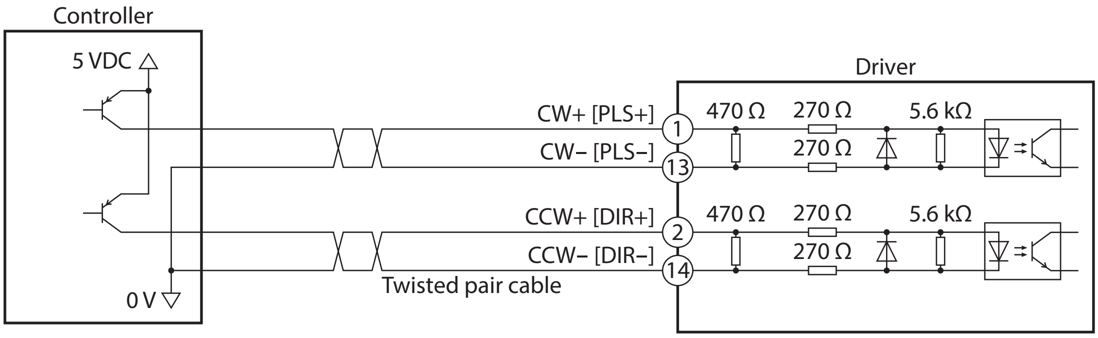
- **Pulse input type with RS-485 communication interface, pulse input type**

The pin No.1, No.2, No.13, and No.14 are only available to the pulse input. Other functions cannot be assigned.

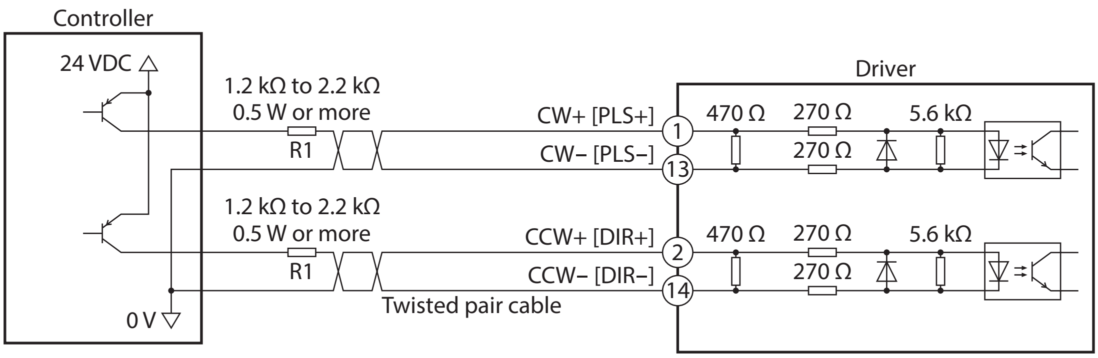
When pulse input is of line driver type



When pulse input is of open-collector type (When using the voltage of pulse input signals at 5 VDC)



When pulse input is of open-collector type (When using the voltage of pulse input signals at 24 VDC)



memo

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.

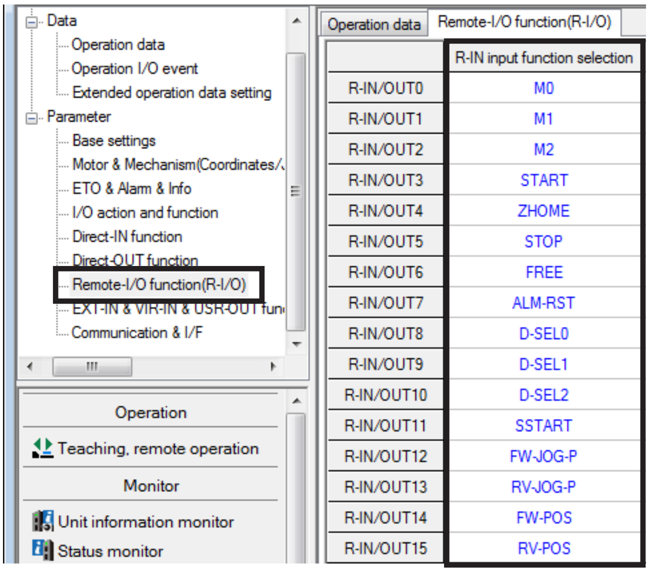
■ Assignment to input signals

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.



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.

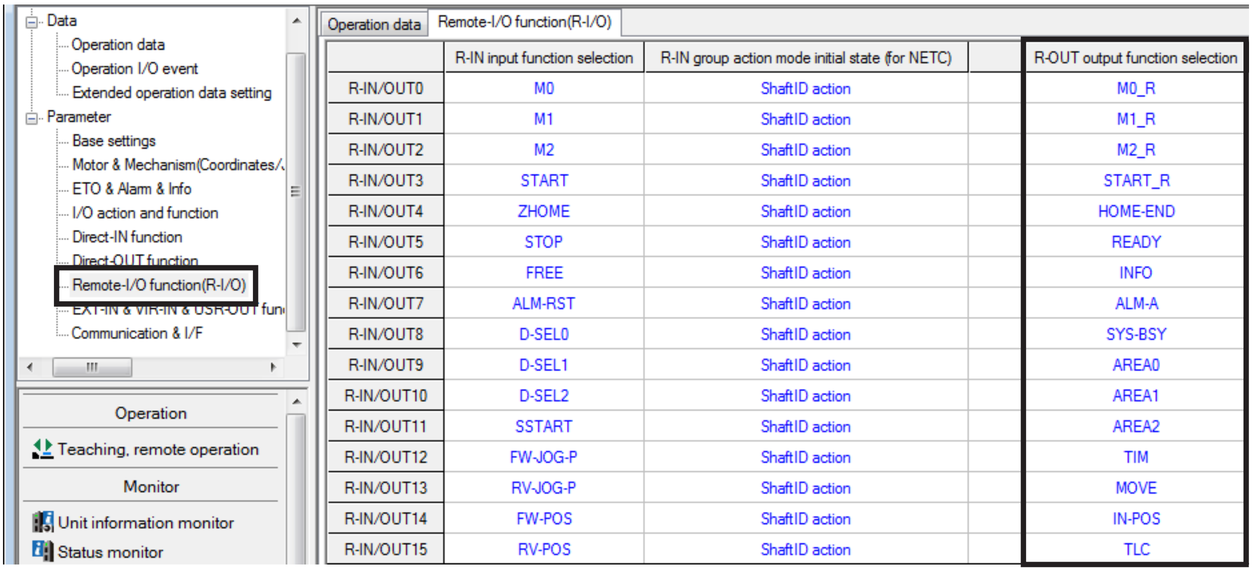
Assignment to output signals

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.



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.

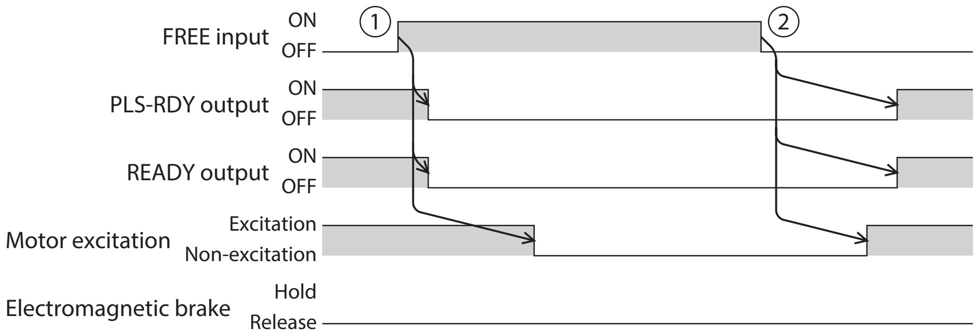
● FREE input

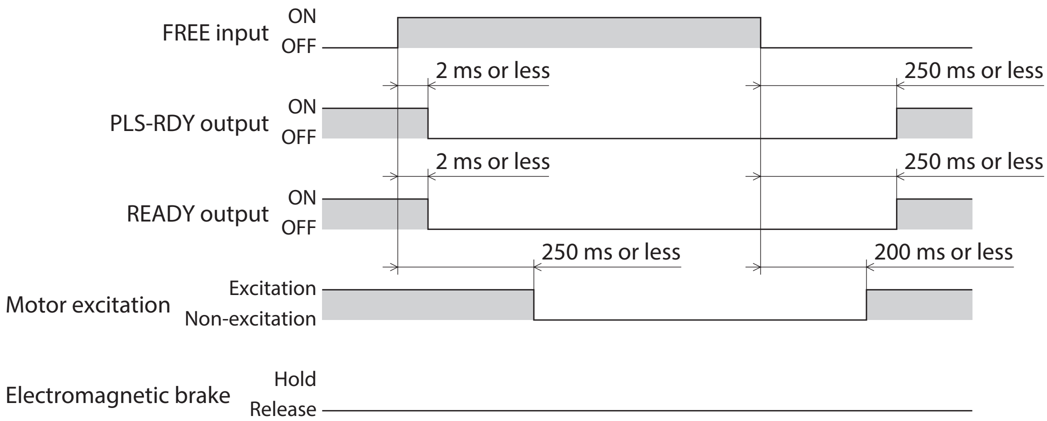
When the FREE input is turned ON, the motor current is cut off and the motor excitation is stopped.
The motor output shaft can be rotated manually since the motor holding torque is lost. When an electromagnetic brake motor is used, the electromagnetic brake is also released.

Note 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.

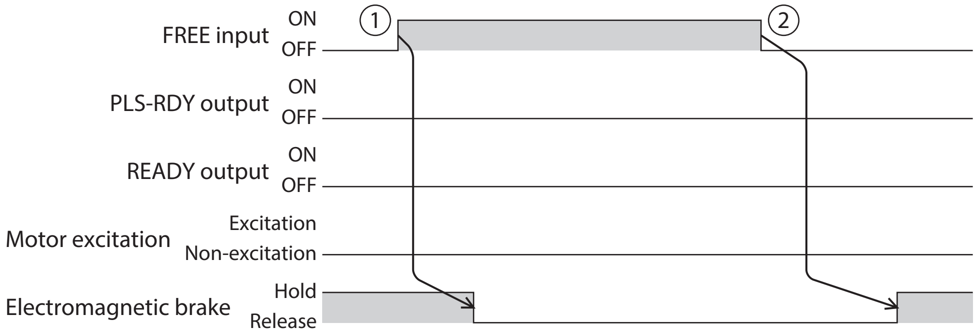


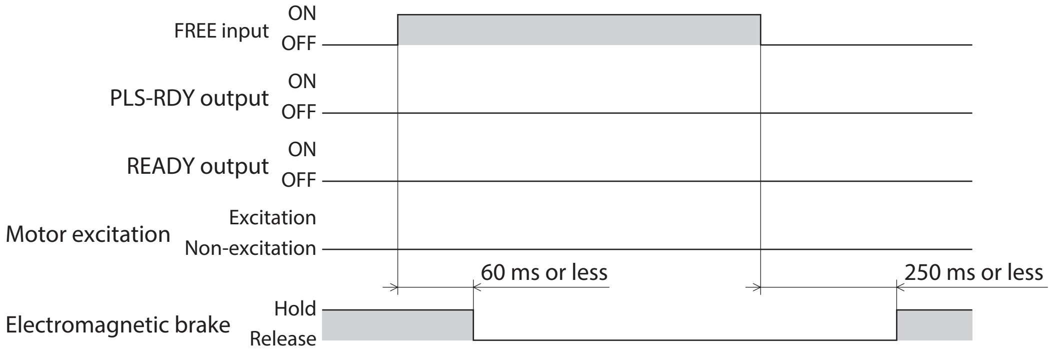


3 I/O signals

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.





C-ON input

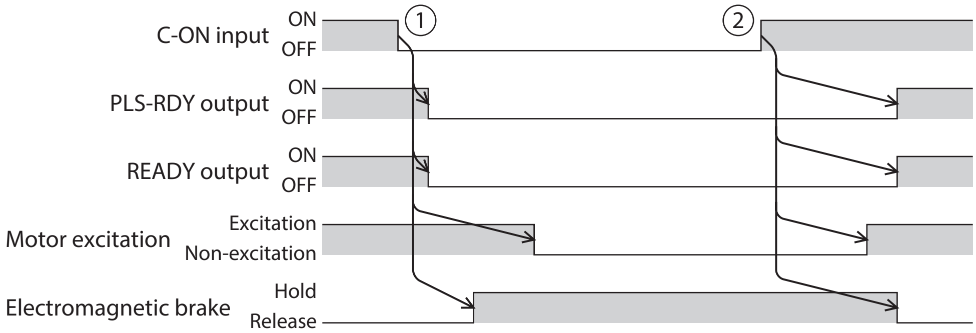
When the C-ON input is turned ON, the motor is excited. When it is turned OFF, the motor excitation is stopped. When an electromagnetic brake motor is used, the electromagnetic brake is released after the motor is excited.

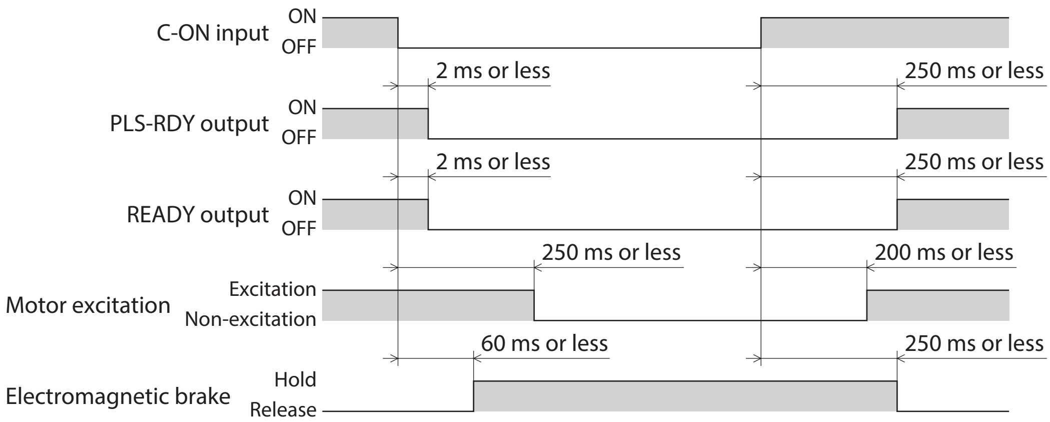
Note When the C-ON input is not assigned to the direct I/O or remote I/O, this input is always turned ON. Also, when this input is assigned to both direct I/O and remote I/O, the function is executed only when both of them are turned ON.

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.

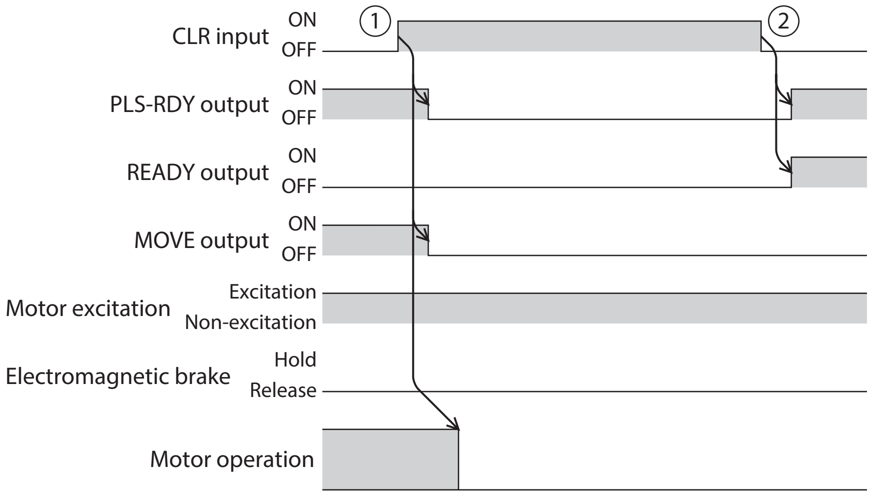
● CLR input

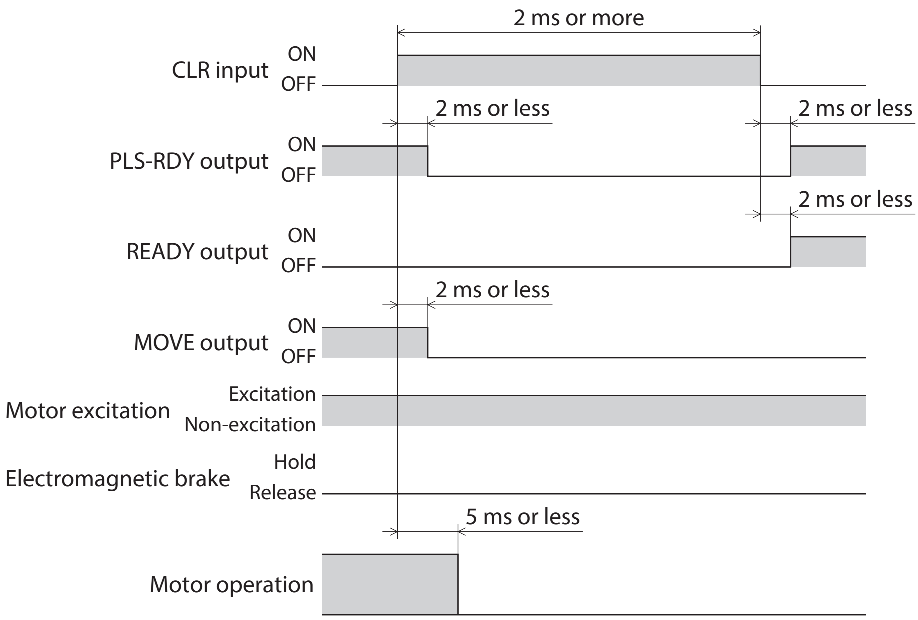
When the CLR input is turned ON, the position deviation counter is cleared, and the deviation between the command position and feedback position becomes 0. During operation, the motor stops at the current feedback position.

Function for each operation

Operation types	Function
Pulse-input operation	The pulse input is disabled. During operation, the motor stops immediately.
Stored data operation	The remaining travel amount is cleared. During operation, the motor stops immediately.
Macro operation	
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

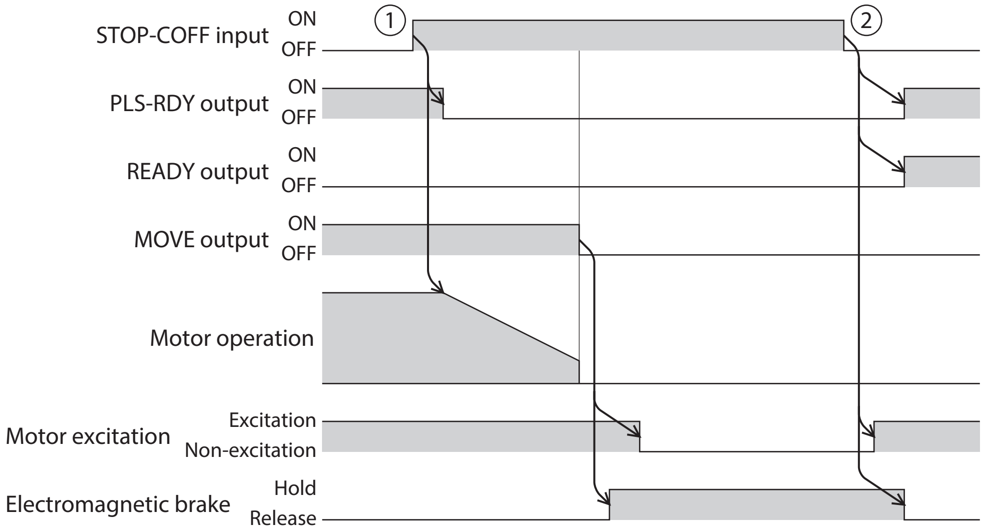
Operation types	Function
Pulse-input operation	The motor stops immediately. The pulse input is disabled. The motor excitation is stopped.
Stored data operation	Operation is stopped according to the "STOP/STOP-COFF input action" parameter. When operation is stopped, the motor excitation is stopped, and the remaining travel amount is cleared.
Macro operation	
Direct data operation	

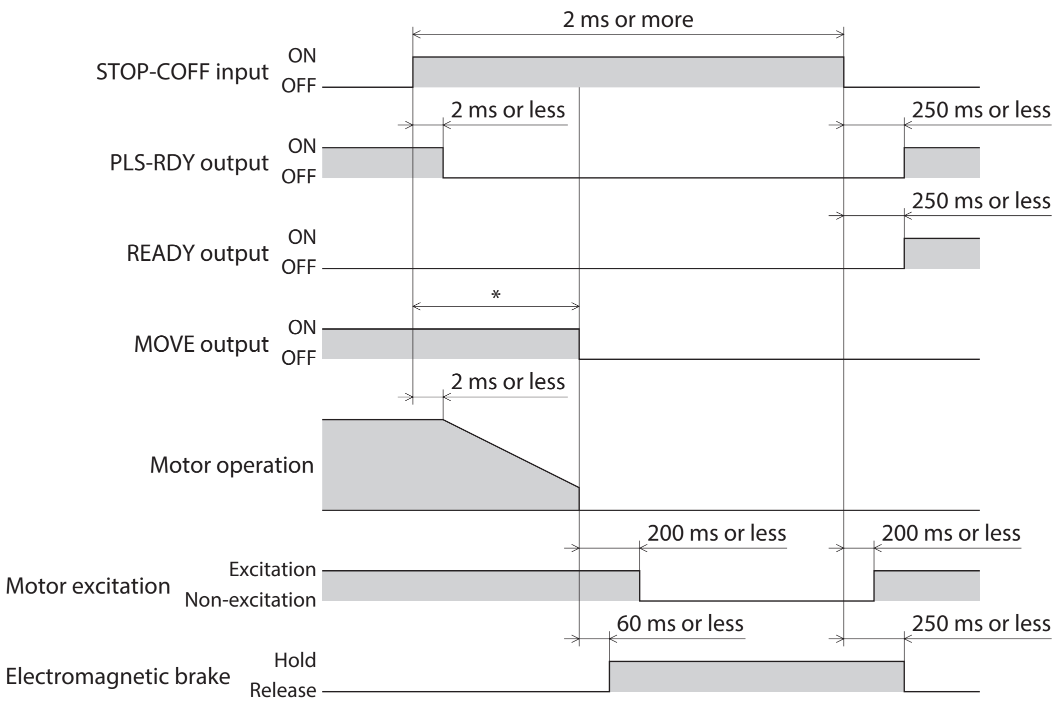
Related parameters

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.

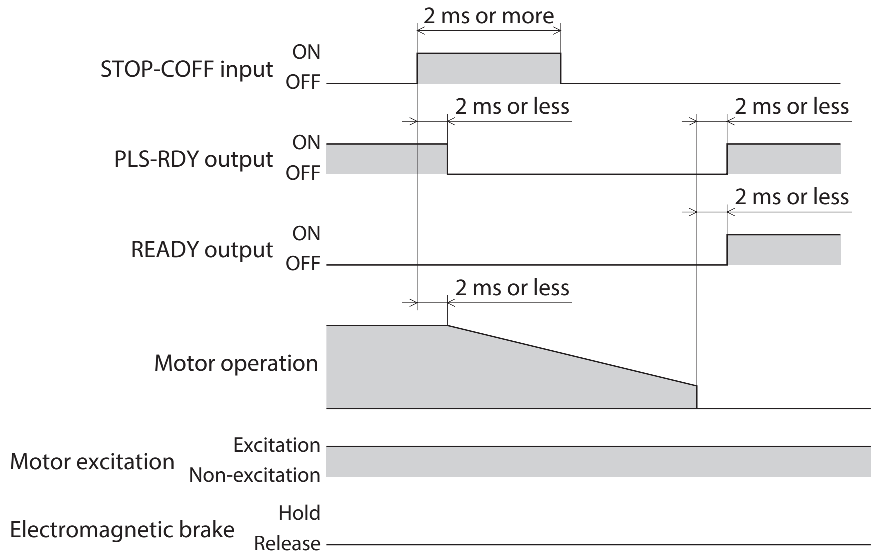




* It varies depending on the driving condition.

When the STOP/STOP-COFF input action is "Deceleration stop" (The motor does not stop while the STOP-COFF input is ON)

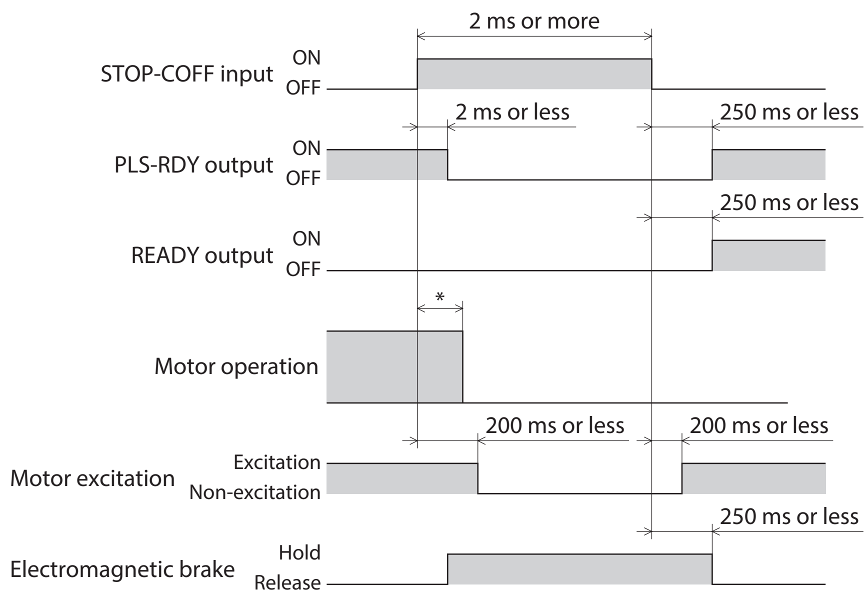
1. When the STOP-COFF input is turned ON during operation, the PLS-RDY output is turned OFF, and the motor starts stop operation.
   Even after the STOP-COFF input is turned OFF, the motor continues deceleration operation until it stops.
2. When the motor stops, the PLS-RDY output and the READY output are turned ON.



memo 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.

3 I/O signals

● STOP input

When the STOP input is turned ON, the motor stops.

Function for each operation

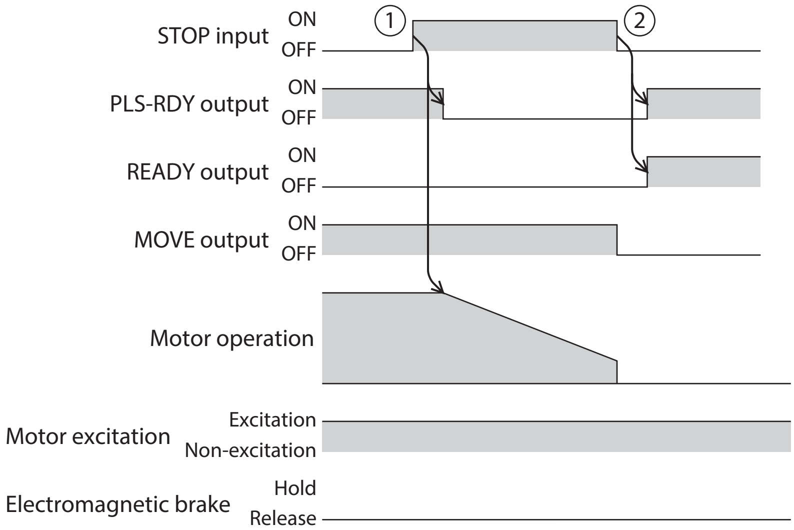
Operation types	Function
Pulse-input operation	The motor stops immediately. The pulse input is disabled.
Stored data operation	Operation is stopped according to the "STOP/STOP-COFF input action" parameter. The remaining travel amount is cleared.
Macro operation	
Direct data operation	

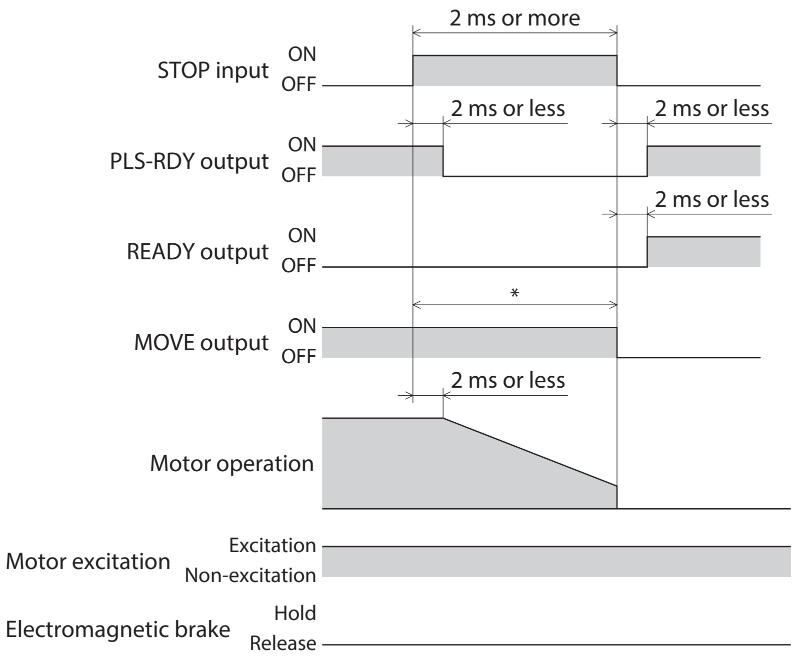
Related parameters

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.

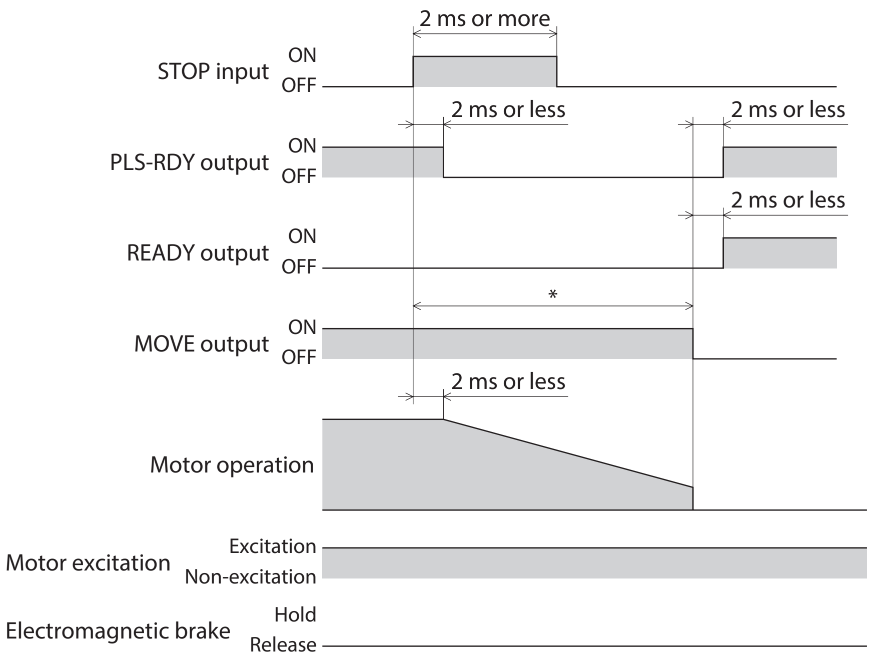




* It varies depending on the driving condition.

When the STOP/STOP-COFF input action is "Deceleration stop" (The motor does not stop while the STOP input is ON)

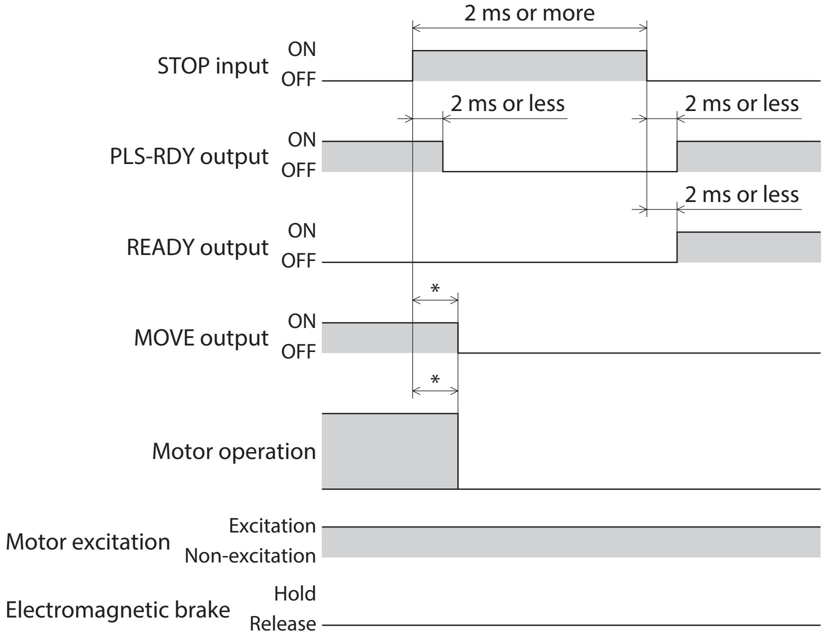
1. When the STOP input is turned ON during operation, the PLS-RDY output is turned OFF, and the motor starts stop operation.
   Even after the STOP input is turned OFF, the motor continues deceleration operation until it stops.
2. When the motor stops, the PLS-RDY output and the READY output are turned 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.

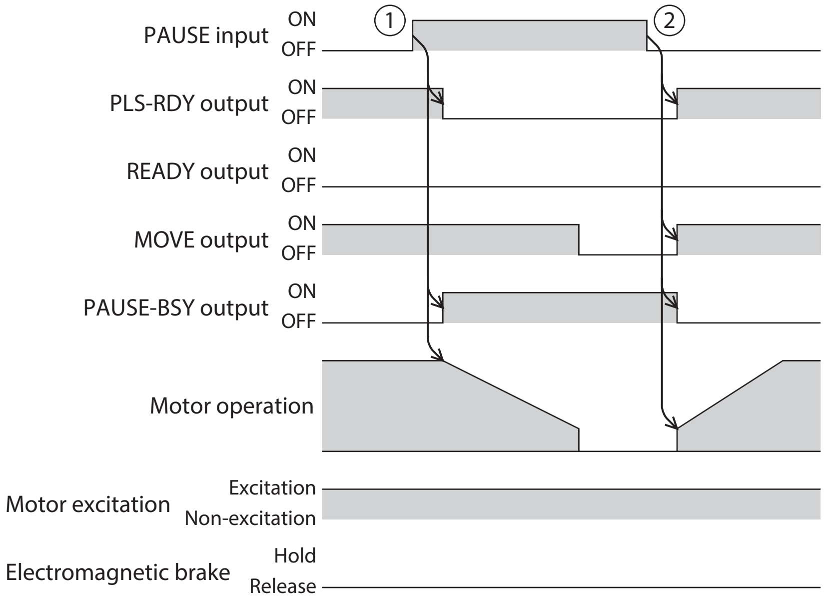
Related parameters

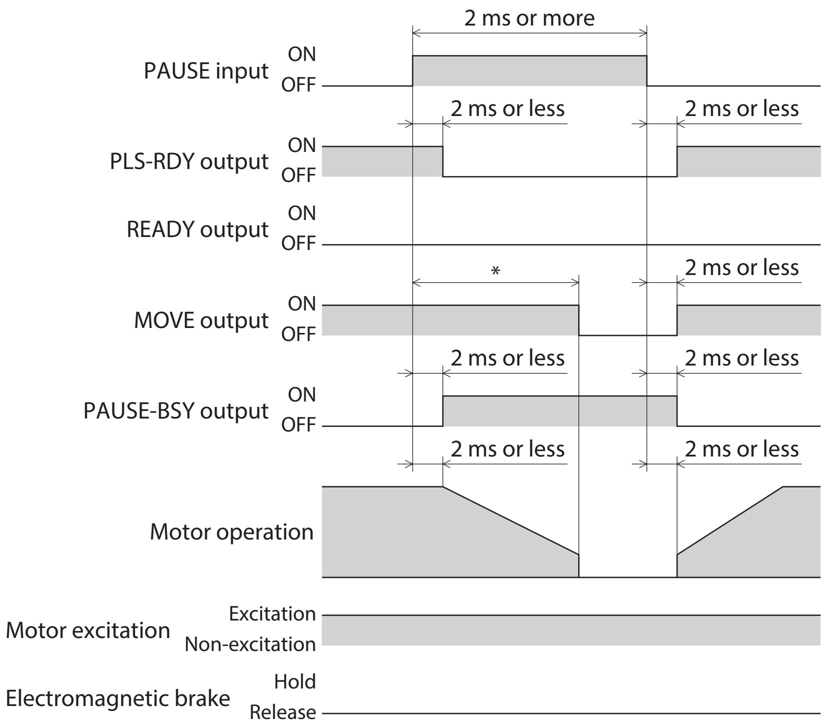
MEXE02 tree view	Parameter name	Description	Initial value
I/O action and function	PAUSE standby condition selection	Selects the waiting status when the PAUSE input is turned ON. **Setting range** 0: Standstill mode 1: Operating status waiting	0

memo 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

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 MOVE output are turned ON, and the PAUSE-BSY output is turned OFF. The motor restarts operation.

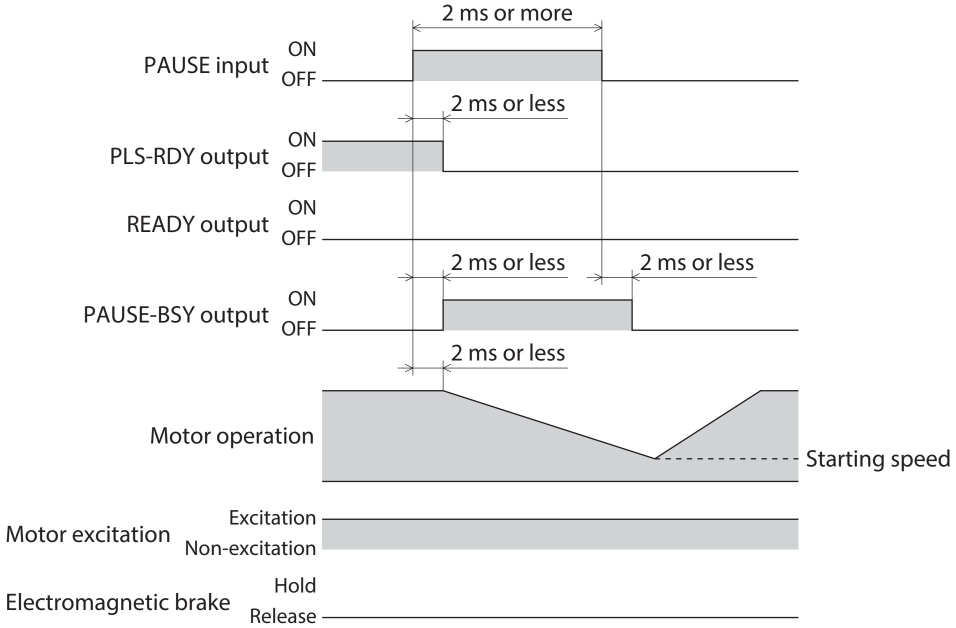




* It varies depending on the driving condition.

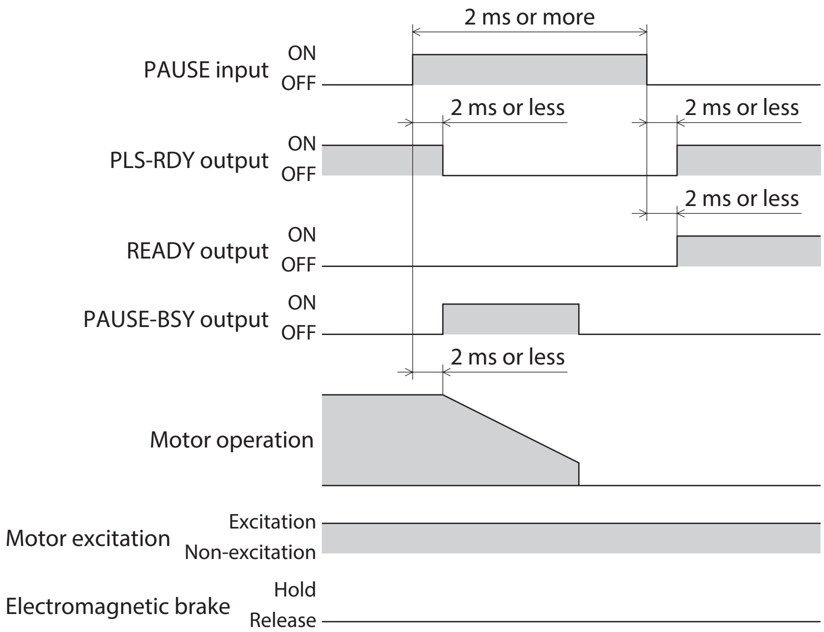
In case of stored data operation and direct data operation (The PAUSE input is turned OFF during deceleration stop)

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	Operation is stopped according to the "FW-BLK, RV-BLK input action" parameter. The remaining travel amount is cleared.
Macro operation	
Direct data operation	

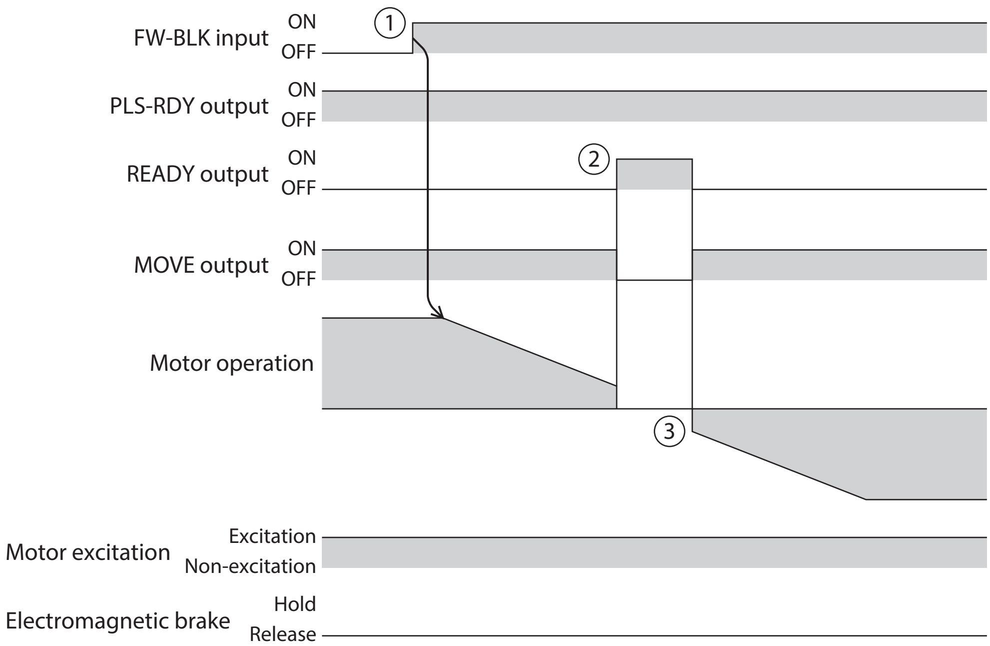
Related parameters

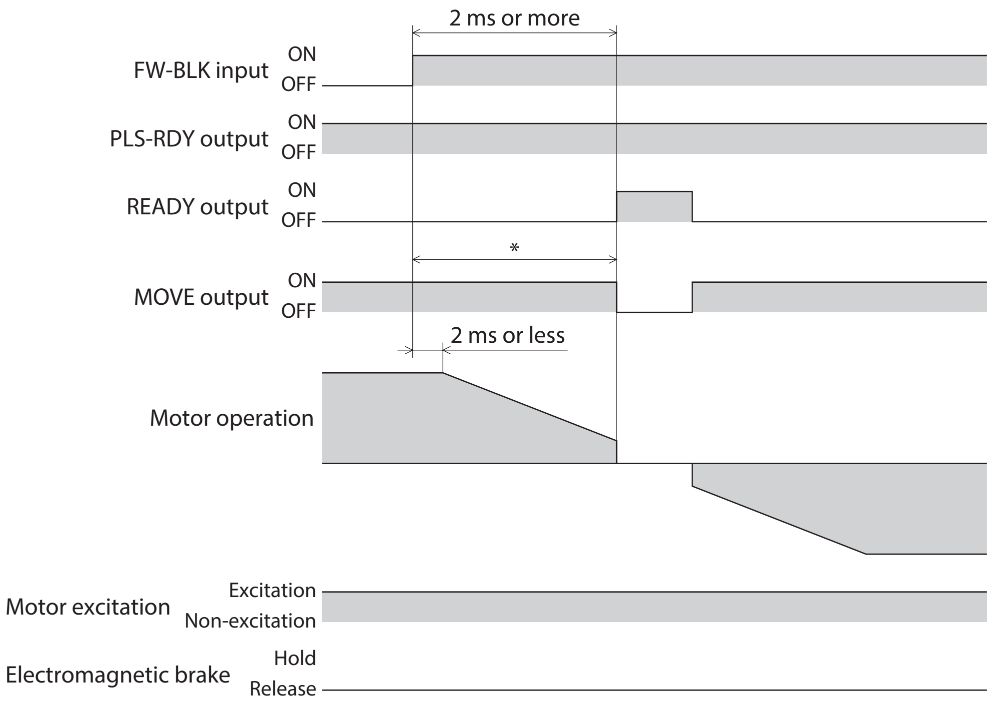
MEXE02 tree view	Parameter name	Description	Initial value
I/O action and function	FW-BLK, RV-BLK input action	Sets how to stop the motor when the FW-BLK input or RV-BLK input has been turned ON. **Setting range** 0: Immediate stop 1: Deceleration stop	1

memo 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.

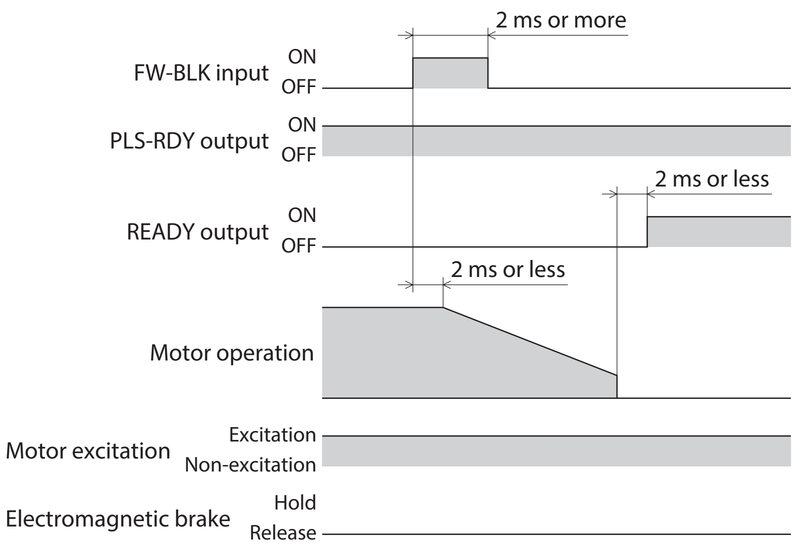




* It varies depending on the driving condition.

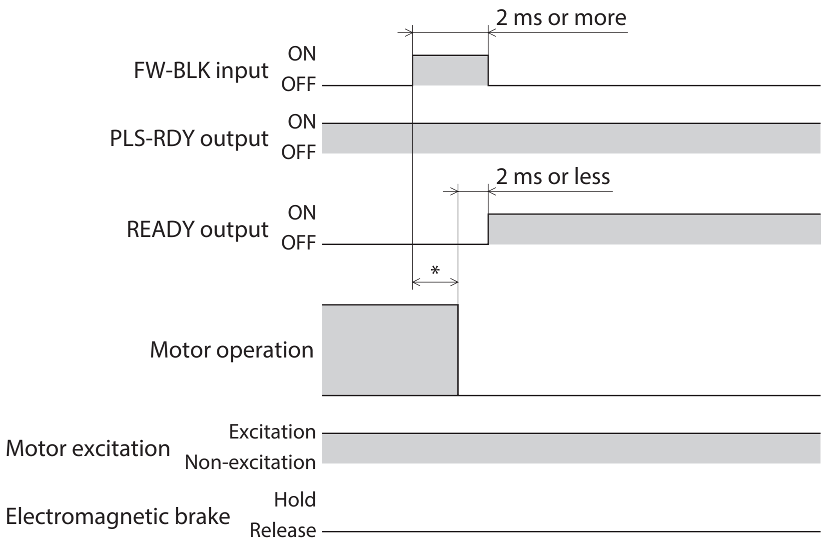
When the FW-BLK, RV-BLK input action is "Deceleration stop" (The motor does not stop while the FW-BLK input is ON)

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.



* It varies depending on the driving condition.

■ 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	OFF	OFF	OFF	OFF	OFF	OFF	OFF
1	OFF	OFF	OFF	OFF	OFF	OFF	OFF	**ON**
2	OFF	OFF	OFF	OFF	OFF	OFF	**ON**	OFF
3	OFF	OFF	OFF	OFF	OFF	OFF	**ON**	**ON**
• • •	• • •	• • •	• • •	• • •	• • •	• • •	• • •	• • •
252	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	OFF	OFF
253	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	OFF	**ON**
254	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	OFF
255	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**

Setting example 1
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.

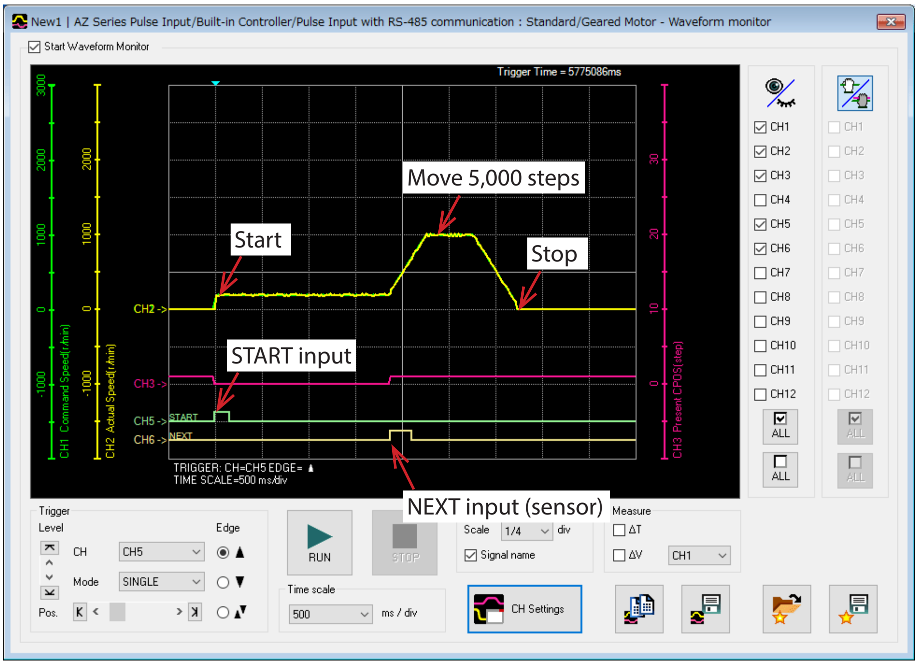
Setting example 1

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



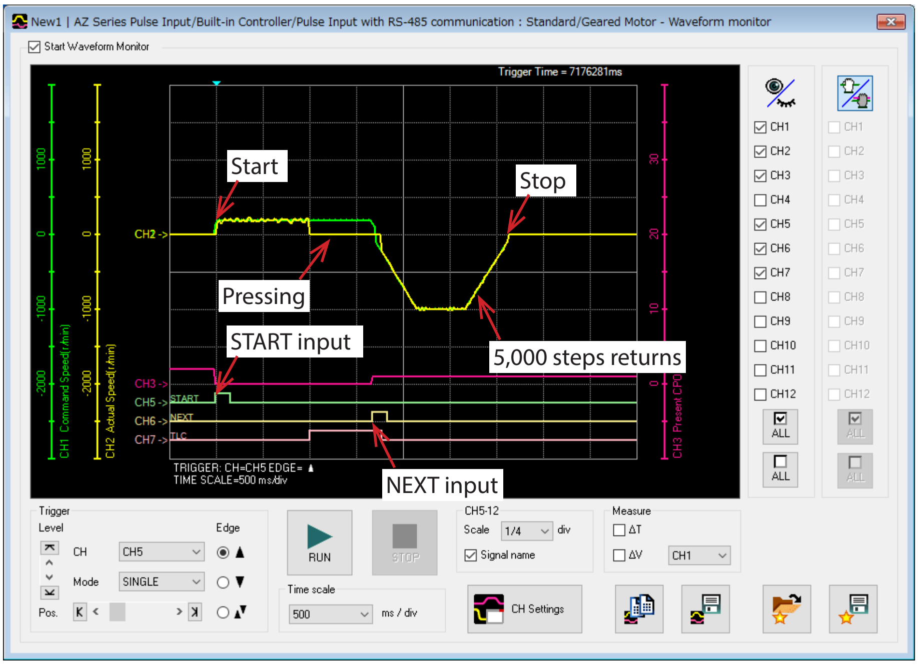
* The figure shows the waveform monitor screen of the **MEXE02**. (⇨ p.448)

3 I/O signals

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

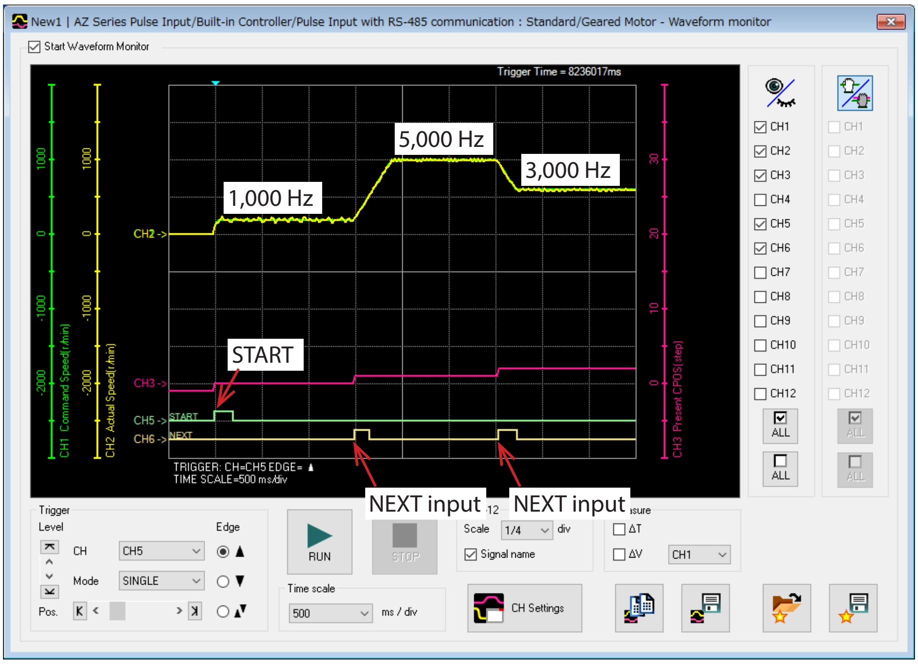
Stopping deceleration [kHz/s]	Operating current [%]	Drive-complete delay time [s]	Link	Next data No.
1000.000	30.0	0.000	Continuous form connection	+1
10.000	30.0	0.000	No link	Stop



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.

Note 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 continue 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	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. **Setting range** −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	Sets the mode for return-to-home operation. **Setting range** 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 excecuting 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.

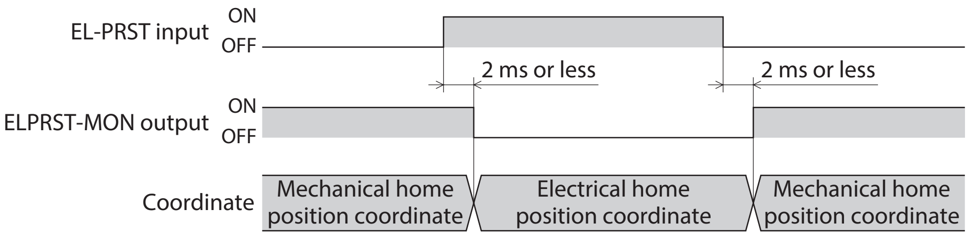
● P-PRESET input

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.

Note
- 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.



memo
- 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.453.

- **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.476)

- 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 operation data and parameters, downloading, initializing

Note
- 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

memo 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.437.

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 (or POWER/ALARM 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/ALM LED (or POWER/ALARM 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.469.

■ 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

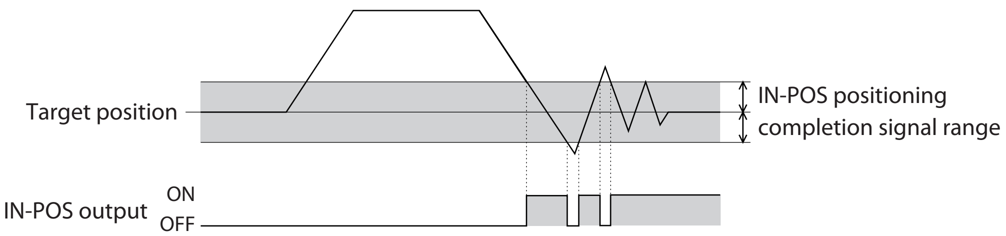
● OPE-BSY output

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

memo 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 "α 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 current reaches the upper limit

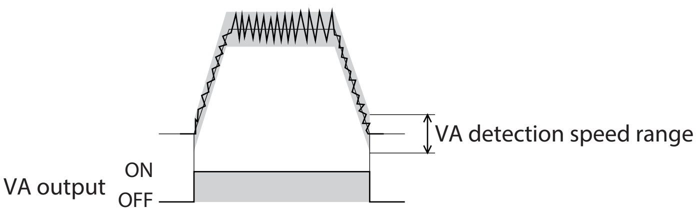
memo For details of the current control mode, refer to p.437.

- **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.

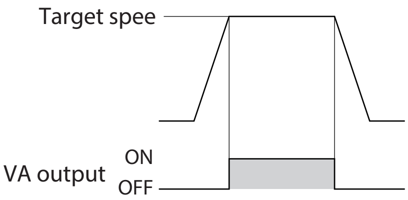
When the "VA mode selection" parameter is "Feedback speed attainment (speed at feedback position)"

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.



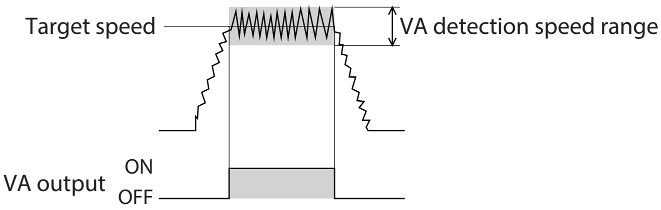
When the "VA mode selection" parameter is "Speed at command position (only internal profile)"

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	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. **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)	0
	VA detection speed range	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)." **Setting range** 1 to 200 r/min	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	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-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

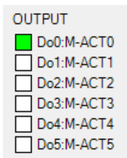
These signals are enabled in operations using operation data (pulse-input operation, stored data operation, continuous macro operation).
The operation data number during operation is output in binary numbers.
In operations, which does not use the operation data (high-speed return-to-home operation, JOG operation, etc.), the status of the signal output in the previous operation are kept.

Output example

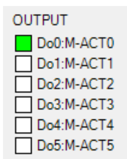
If high-speed return-to-home operation was performed after completion of positioning operation in the operation data No.1, and the operation data No.3 was finally operated

This is an example for when signals are monitored on the D-I/O, R-I/O monitor screen.

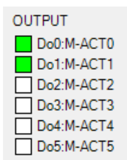
1. When positioning operation of the operation data No.1 is performed, the signal (M-ACT0) corresponding to the operation data No.1 is turned ON.



2. When high-speed return-to-home operation is performed, the signal status of the operation data No.1 is kept.



3. 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.



- **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	Non-excitation
OFF	**ON**	OFF	
OFF	OFF	**ON**	

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

memo Set the "ZSG signal width" parameter according to the operating speed so that the ZSG output is output for 1 ms or more.

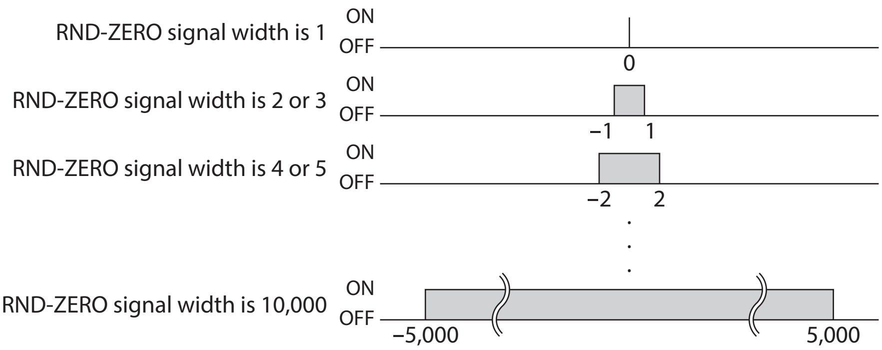
RND-ZERO output

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.

Note If the command speed is 1,000 Hz or more, the TIM output is not turned ON correctly.

- **MAREA output**

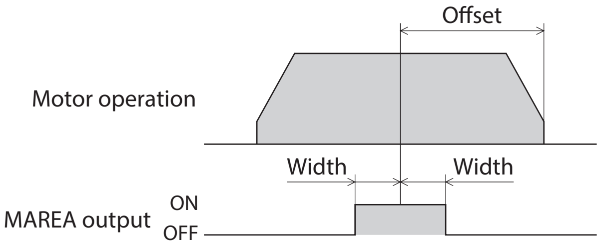
The MAREA output is turned ON when the motor is inside the set area.

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

memo 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

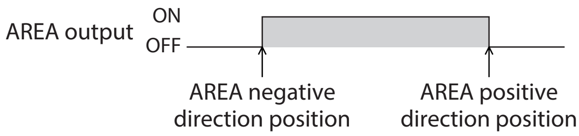
The AREA outputs are turned ON when the motor is inside the set area.
They are turned ON when the motor is inside the area even if the motor is stopped.

Related parameters

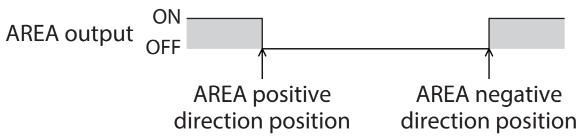
MEXE02 tree view	Parameter name	Description	Initial value
I/O action and function	AREA0 positive direction position/offset to AREA7 positive direction position/ offset	Sets the positive direction position or offset from the target position for the AREA0 to AREA7 outputs. **Setting range** –2,147,483,648 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"

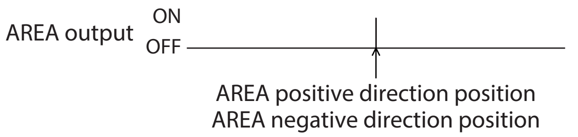
- "AREA positive direction position/offset" parameter > "AREA negative direction position/detection range" parameter
  When the position of the motor is "AREA negative direction position/detection range" or more or "AREA positive direction position/offset" or less, the AREA output is turned ON.



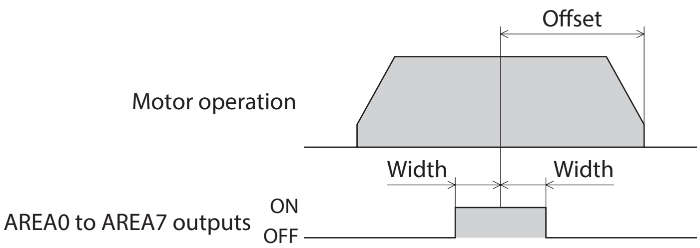
- "AREA positive direction position/offset" parameter < "AREA negative direction position/detection range" parameter
  When the position of the motor is "AREA positive direction position/offset" or less or "AREA negative direction position/detection range" or more, the AREA output is turned ON.



- "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.497. (⇨ p.497)

● 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.

memo 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.476. (⇨ p.476)

- **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.

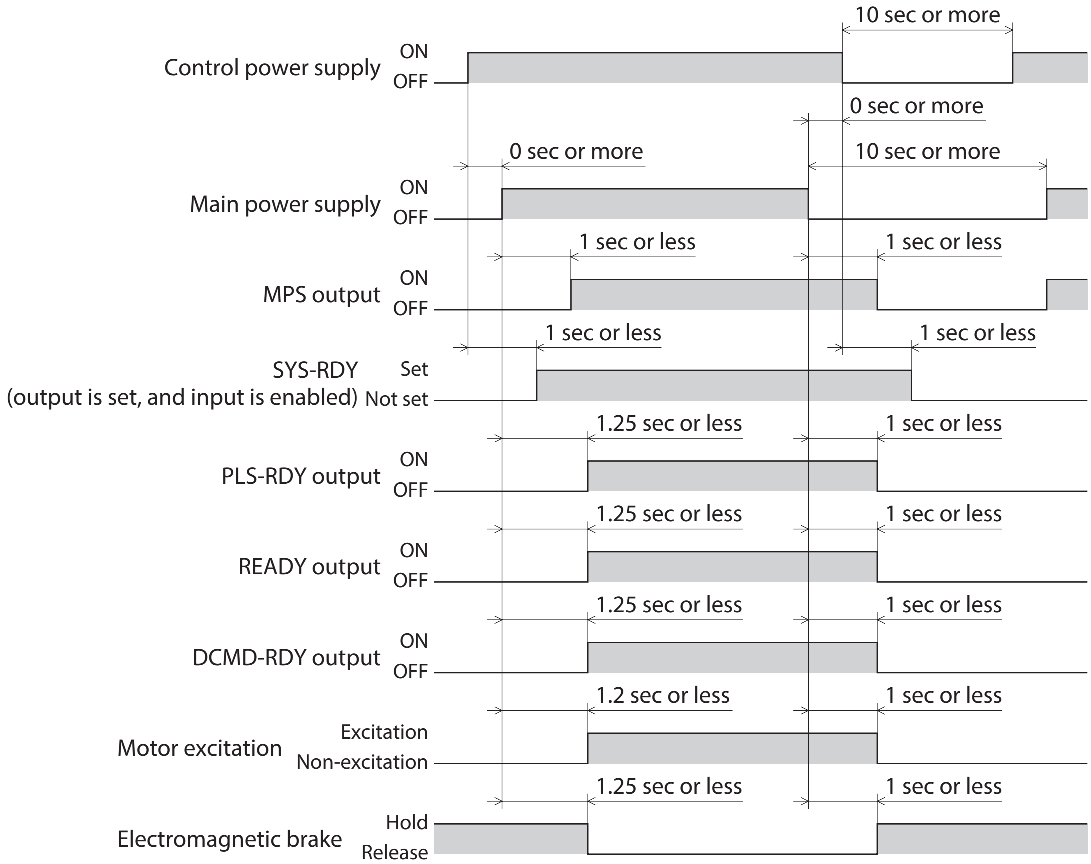
Input signals	Output signals
FREE	FREE_R
C-ON	C-ON_R
CLR	CLR_R
STOP-COFF	STOP-COFF_R
STOP	STOP_R
PAUSE	PAUSE_R
BREAK-ATSQ	BREAK-ATSQ_R
ALM-RST	ALM-RST_R
P-PRESET	P-PRESET_R
EL-PRST	EL-PRST_R
ETO-CLR	ETO-CLR_R
LAT-CLR	LAT-CLR_R
INFO-CLR	INFO-CLR_R
HMI	HMI_R
CCM	CCM_R
PLS-XMODE	PLS-XMODE_R
PLS-DIS	PLS-DIS_R
T-MODE	T-MODE_R
CRNT-LMT	CRNT-LMT_R
SPD-LMT	SPD-LMT_R
FW-BLK	FW-BLK_R
RV-BLK	RV-BLK_R
FW-LS	FW-LS_R
RV-LS	RV-LS_R
HOMES	HOMES_R
SLIT	SLIT_R
START	START_R
SSTART	SSTART_R

Input signals	Output signals
NEXT	NEXT_R
HOME	HOME_R
ZHOME	ZHOME_R
D-SEL0	D-SEL0_R
D-SEL1	D-SEL1_R
D-SEL2	D-SEL2_R
D-SEL3	D-SEL3_R
D-SEL4	D-SEL4_R
D-SEL5	D-SEL5_R
D-SEL6	D-SEL6_R
D-SEL7	D-SEL7_R
FW-JOG	FW-JOG_R
RV-JOG	RV-JOG_R
FW-JOG-H	FW-JOG-H_R
RV-JOG-H	RV-JOG-H_R
FW-JOG-P	FW-JOG-P_R
RV-JOG-P	RV-JOG-P_R
FW-JOG-C	FW-JOG-C_R
RV-JOG-C	RV-JOG-C_R
FW-POS	FW-POS_R
RV-POS	RV-POS_R
FW-SPD	FW-SPD_R
RV-SPD	RV-SPD_R
FW-PSH	FW-PSH_R
RV-PSH	RV-PSH_R
M0	M0_R
M1	M1_R
M2	M2_R

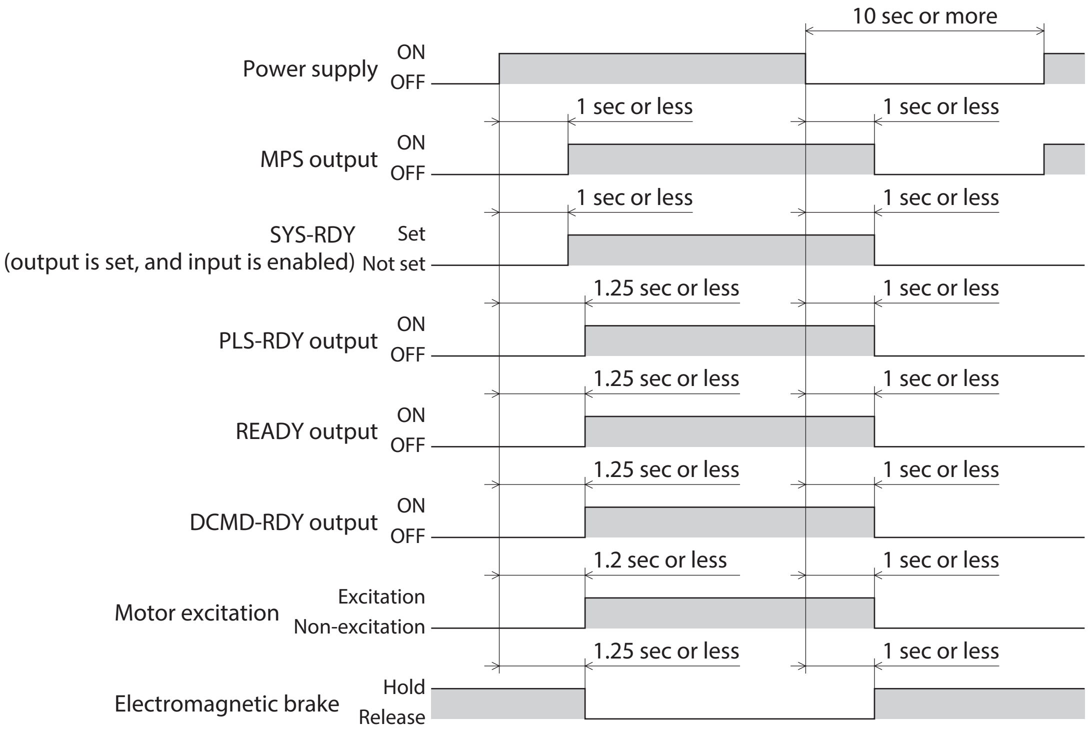
Input signals	Output signals
M3	M3_R
M4	M4_R
M5	M5_R
M6	M6_R
M7	M7_R
TEACH	TEACH_R
MON-REQ0	MON-REQ0_R
MON-REQ1	MON-REQ1_R
MON-CLK	MON-CLK_R
PLSM-REQ	PLSM-REQ_R
R0	R0_R
R1	R1_R
R2	R2_R
R3	R3_R
R4	R4_R
R5	R5_R
R6	R6_R
R7	R7_R
R8	R8_R
R9	R9_R
R10	R10_R
R11	R11_R
R12	R12_R
R13	R13_R
R14	R14_R
R15	R15_R

6 Timing chart

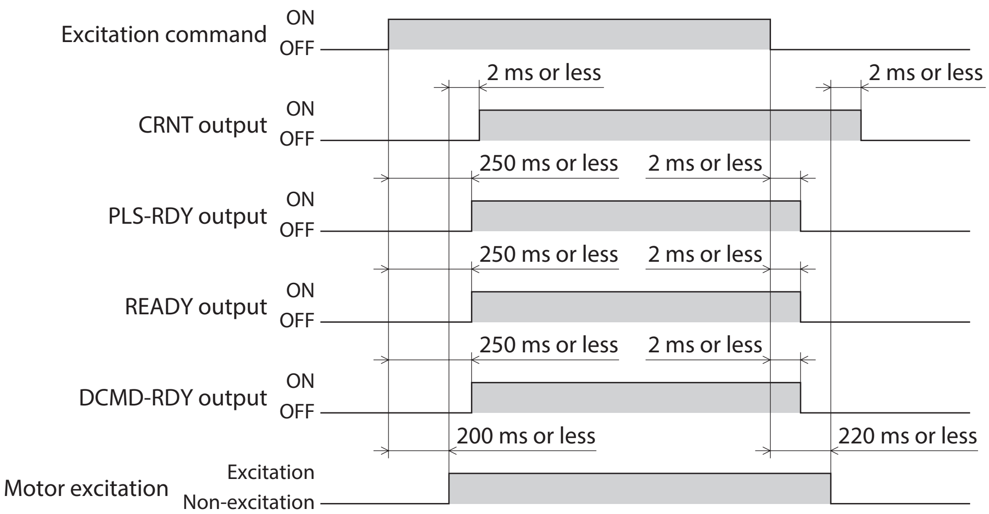
■ Power supply (AC power input driver)



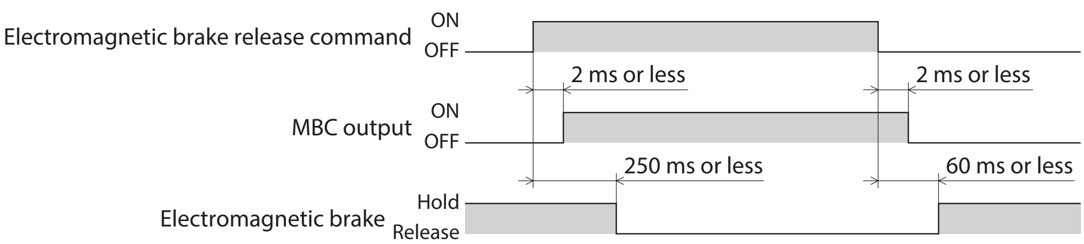
■ Power supply (DC power input driver)



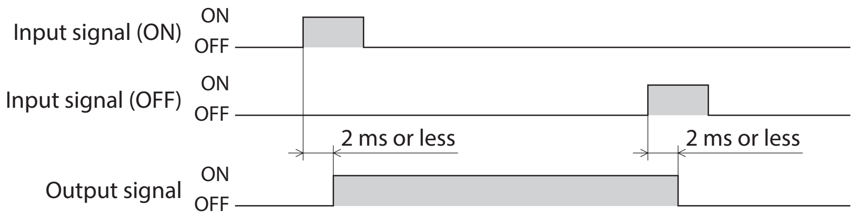
■ Excitation



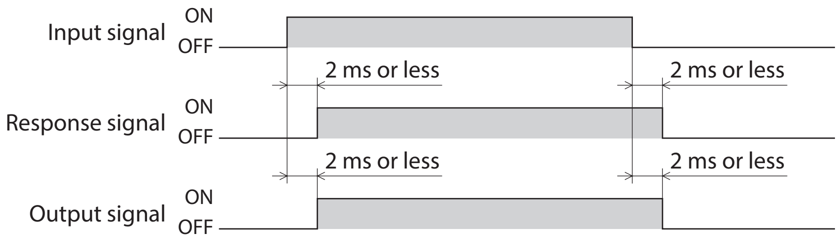
■ Electromagnetic brake



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

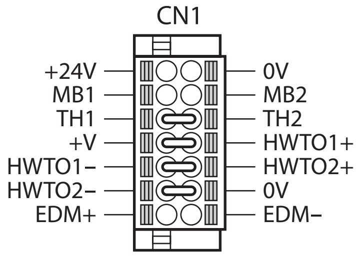


■ I/O signal (when output is switched with the ON/OFF edge of the input signal)



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.



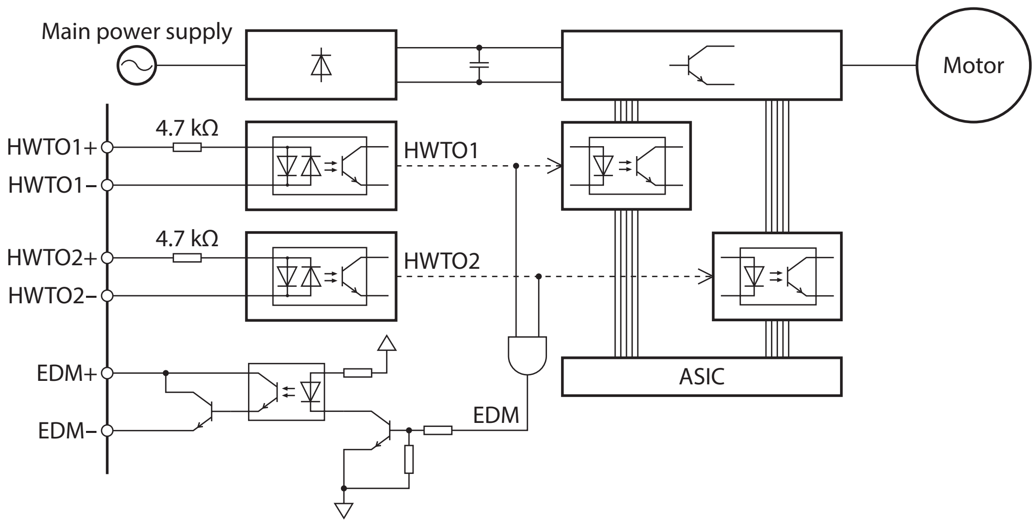
Overview of the ETO function

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.

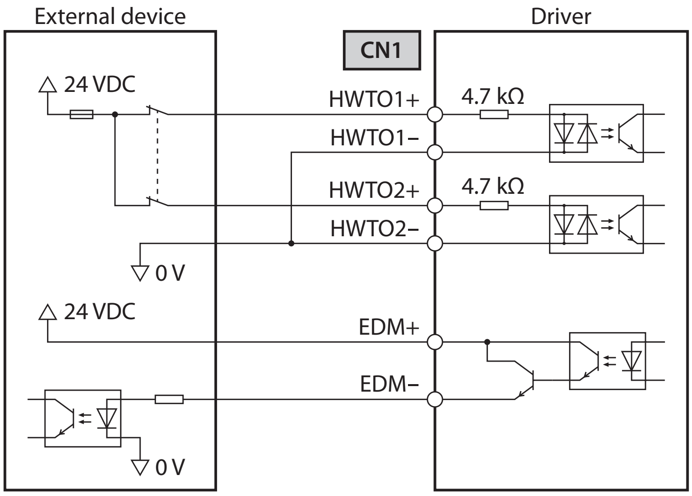
7-1 Block diagram

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	
EDM+ output EDM– output	30 VDC or less, 50 mA or less 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		
OFF	OFF	**ON**	The setting of the "HWTO mode selection" parameter is followed. (ETO-mode or alarm generation)	Non-excitation

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.

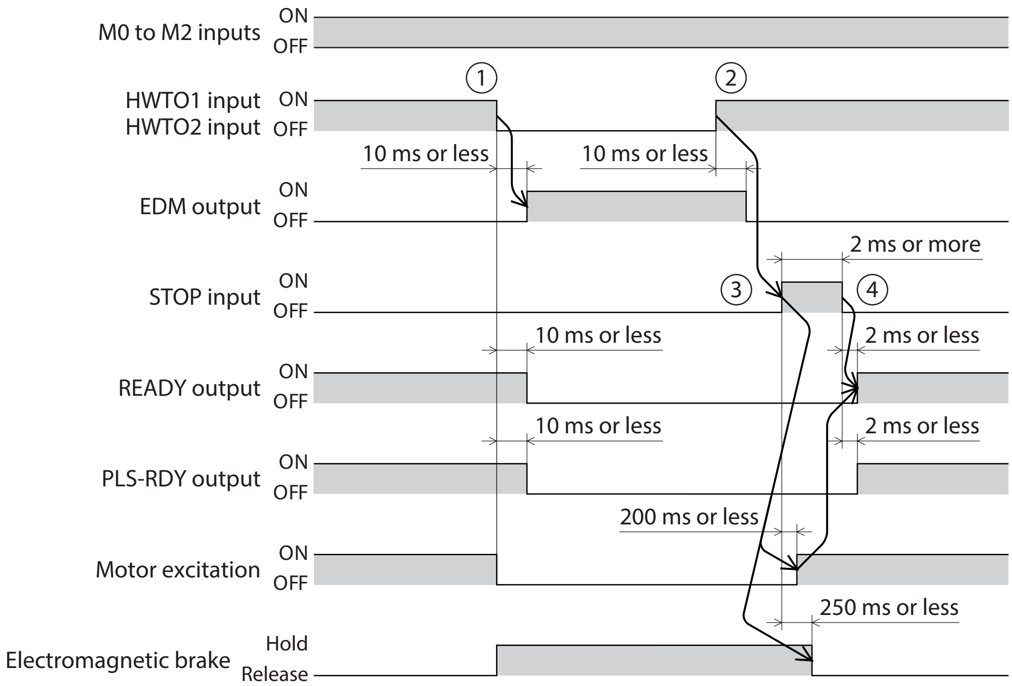
MEXE02 tree view	Parameter name	Description	Initial value
ETO and Alarm and Info	HWTO mode selection	Sets the status of the driver when both HWTO1 input and HWTO2 input are turned OFF. **Setting range** 0: ETO-mode (power removal status) 1: Alarm generation	0
	HWTO delay time of checking dual system [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.

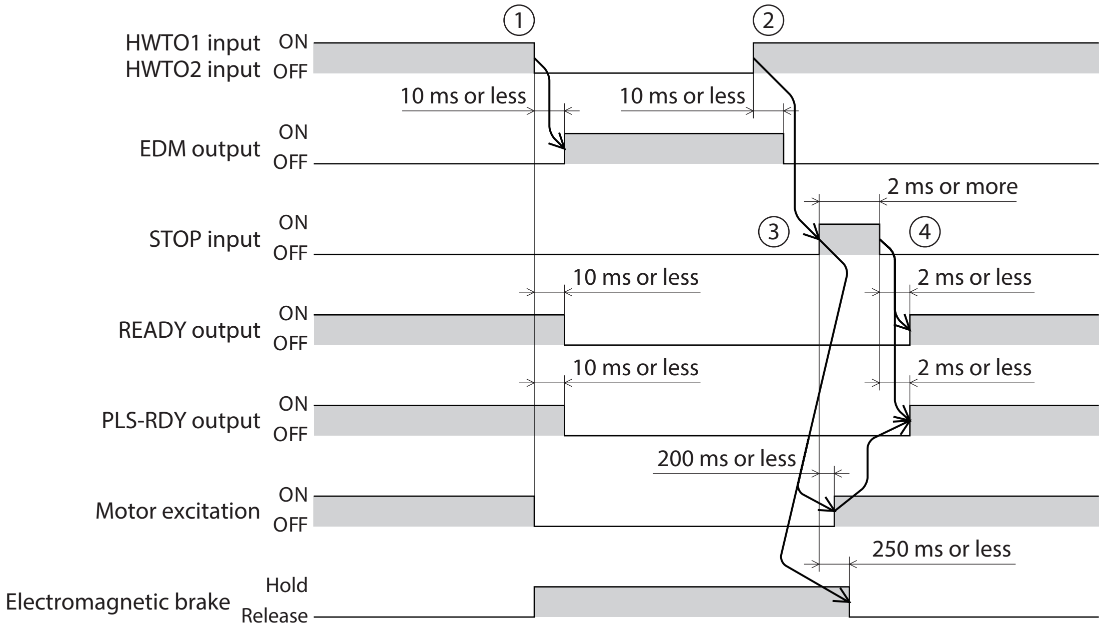
1. When both HWTO1 input and HWTO2 input are turned OFF, the EDM output is turned ON. The power supplying to the motor is cut off.
2. Turn the HWTO1 input and the HWTO2 input ON.
3. Turn the STOP input ON.
   The power is supplied to the motor, and the motor is excited.
4. Turn the STOP input OFF.
   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

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 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.**

4 Parameters

This part explains the parameters. The parameters are classified based on the window display of the **MEXE02**.

Table of contents

1 Parameter: Base setting

memo 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: α 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 α 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 decreased.	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
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)

memo

- 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.442)
- 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	1
Mechanism lead decimal digit setting	Sets the number of decimal places when the lead of the ball screw contains a decimal point.	0: ×1 mm 1: ×0.1 mm 2: ×0.01 mm 3: ×0.001 mm	0
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

Parameter name	Description	Setting range	Initial value
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
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

Parameter name	Description	Setting range	Initial value
(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
(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-DRVTMP) [°C]	Sets the generation condition of the driver temperature information (INFO-DRVTMP).	40 to 85 °C	85
Motor temperature information (INFO-MTRTMP) [°C]	Sets the generation condition of the motor temperature information (INFO-MTRTMP).	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-DRVTMP))			1
INFO action (Motor temperature information (INFO-MTPTMP))			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.		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

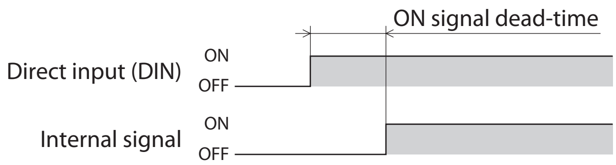
Parameter name	Description	Setting range	Initial value
MAREA output source	Sets the standard to turn the MAREA output ON and the status of the MAREA output after operation.	0: Feedback position (ON after operation) 1: Command position (ON after operation) 2: Feedback position (MAREA output OFF at completion) 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

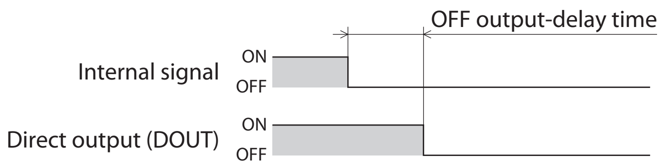
5 Parameter: Direct-IN function

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

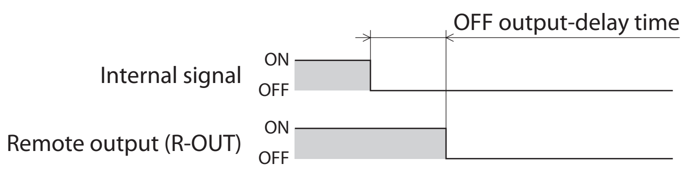
Parameter name	Description	Setting range	Initial value
DOUT0 output function selection	Selects the output signal to be assigned to DOUT0.	Output signal list ⇨ p.257	144: HOME-END
DOUT1 output function selection	Selects the output signal to be assigned to DOUT1.		138: IN-POS
DOUT2 output function selection	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)	• When setting in **MEXE02** 0: Operation with the slave ID 1: Operation with the group ID • When setting via communication 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 (×1) 4: Phase difference input mode (×2) 5: Phase difference input mode (×4) * 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.	–	–

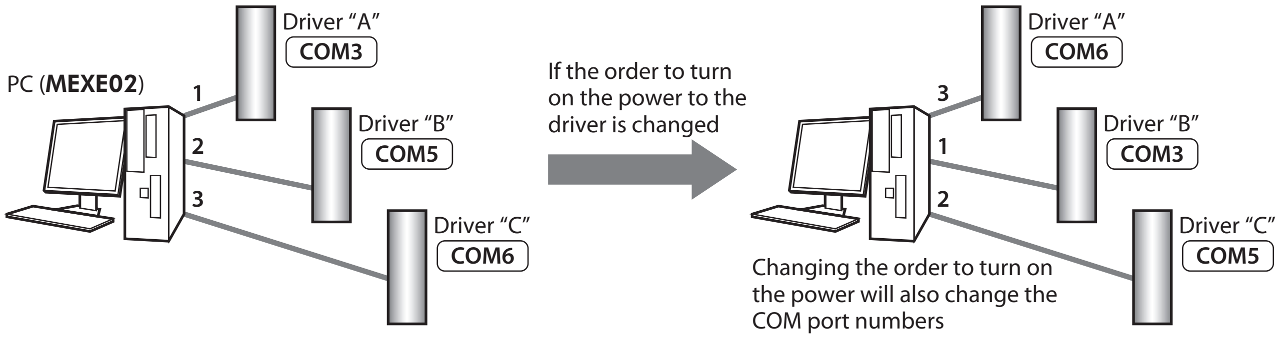
■ USB-ID

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.

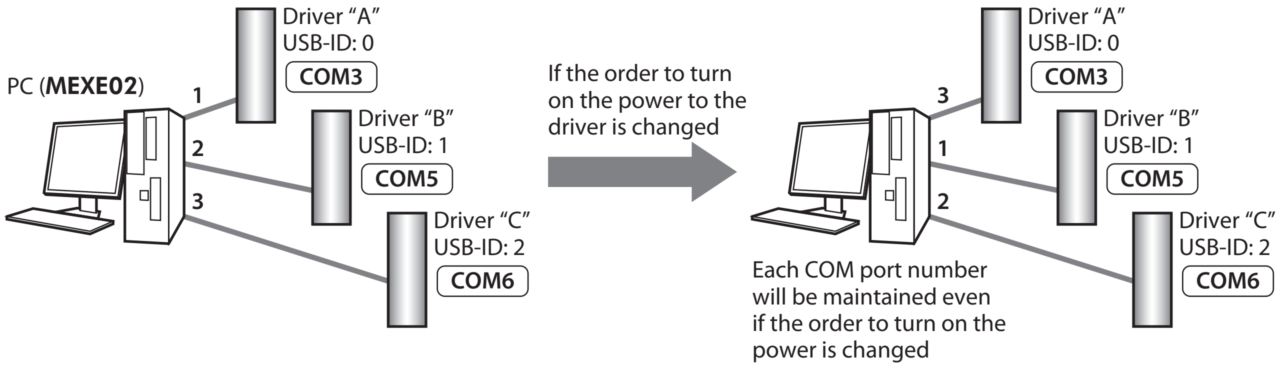
● When the USB-ID is not set

COM port number	Connection status	
1	Connected	
2	Connected	
3	Empty	← COM port on the driver that was turned on the power first
4	Connected	
5	Empty	← COM port on the driver that was turned on the power second
6	Empty	← COM port on the driver that was turned on the power third



● When the USB-ID is set

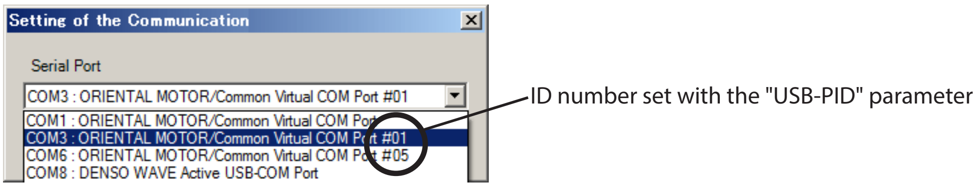
If the "USB-ID" parameter is set, the same COM port numbers are always displayed regardless of the order of connection because the COM port number is fixed to each driver. (The USB-ID and the COM port number may not match because a PC associates with empty COM port numbers in descending order.)



Note 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.



memo 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
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
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	Assignment No.	Signal name	Assignment No.	Signal name
0	Not used	52	FW-JOG-P_R	133	PLS-RDY
1	FREE_R	53	RV-JOG-P_R	134	MOVE
2	C-ON_R	54	FW-JOG-C_R	135	INFO
3	CLR_R	55	RV-JOG-C_R	136	SYS-BSY
4	STOP-COFF_R	56	FW-POS_R	137	ETO-MON
5	STOP_R	57	RV-POS_R	138	IN-POS
6	PAUSE_R	58	FW-SPD_R	140	TLC
7	BREAK-ATSQ_R	59	RV-SPD_R	141	VA
8	ALM-RST_R	60	FW-PSH_R	142	CRNT
9	P-PRESET_R	61	RV-PSH_R	143	AUTO-CD
10	EL-PRST_R	64	M0_R	144	HOME-END
12	ETO-CLR_R	65	M1_R	145	ABSPEN
13	LAT-CLR_R	66	M2_R	146	ELPRST-MON
14	INFO-CLR_R	67	M3_R	149	PRST-DIS
16	HMI_R	68	M4_R	150	PRST-STLD
18	CCM_R	69	M5_R	151	ORGN-STLD
19	PLS-XMODE_R	70	M6_R	152	RND-OVF
20	PLS-DIS_R	71	M7_R	153	FW-SLS
21	T-MODE_R	75	TEACH_R	154	RV-SLS
22	CRNT-LMT_R	76	MON-REQ0_R	155	ZSG
23	SPD-LMT_R	77	MON-REQ1_R	156	RND-ZERO
26	FW-BLK_R	78	MON-CLK_R	157	TIM
27	RV-BLK_R	79	PLSM-REQ_R	159	MAREA
28	FW-LS_R	80	R0_R	160	AREA0
29	RV-LS_R	81	R1_R	161	AREA1
30	HOMES_R	82	R2_R	162	AREA2
31	SLIT_R	83	R3_R	163	AREA3
32	START_R	84	R4_R	164	AREA4
33	SSTART_R	85	R5_R	165	AREA5
35	NEXT_R	86	R6_R	166	AREA6
36	HOME_R	87	R7_R	167	AREA7
37	ZHOME_R	88	R8_R	168	MPS
40	DSEL0_R	89	R9_R	169	MBC
41	DSEL1_R	90	R10_R	170	RG
42	DSEL2_R	91	R11_R	172	EDM
43	DSEL3_R	92	R12_R	173	HWTOIN-MON
44	DSEL4_R	93	R13_R	176	MON-OUT
45	DSEL5_R	94	R14_R	177	PLS-OUTR
46	DSEL6_R	95	R15_R	180	USR-OUT0
47	DSEL7_R	128	CONST-OFF	181	USR-OUT1
48	FW-JOG_R	129	ALM-A	192	CRNT-LMTD
49	RV-JOG_R	130	ALM-B	193	SPD-LMTD
50	FW-JOG-H_R	131	SYS-RDY	196	OPE-BSY
51	RV-JOG-H_R	132	READY	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-DRVTMP
227	INFO-MTRTMP
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.

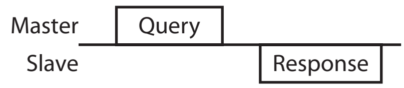
Table of contents

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.

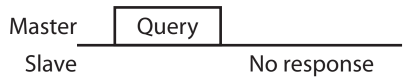
- **Unicast mode**

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.



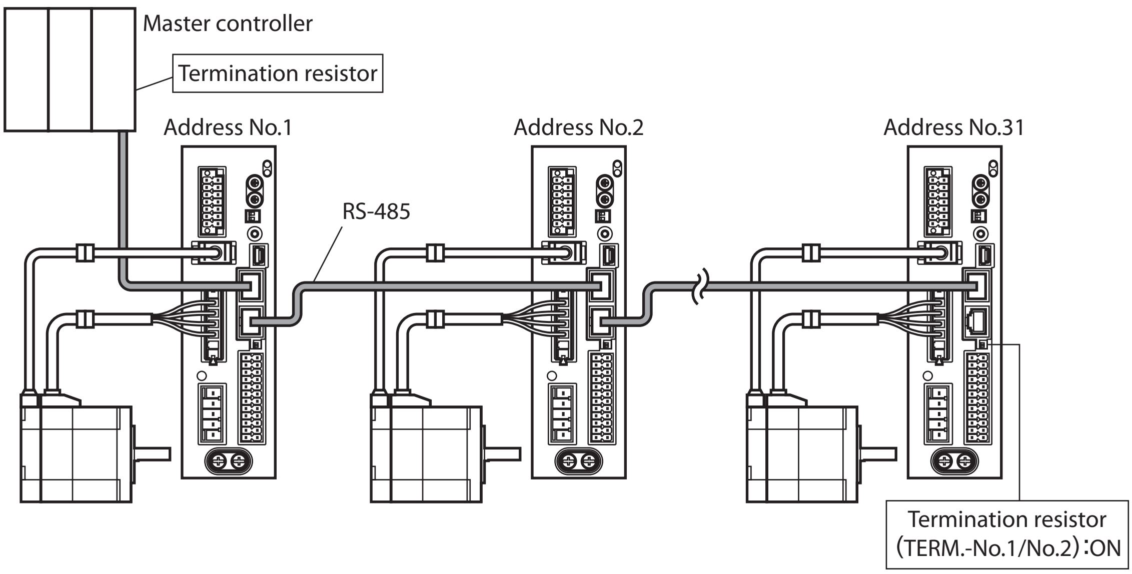
1-1 Communication specifications

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.

* If the motor cable or power supply cable generates an undesirable amount of noise depending on the wiring or configuration, shield the cable or install a ferrite core.

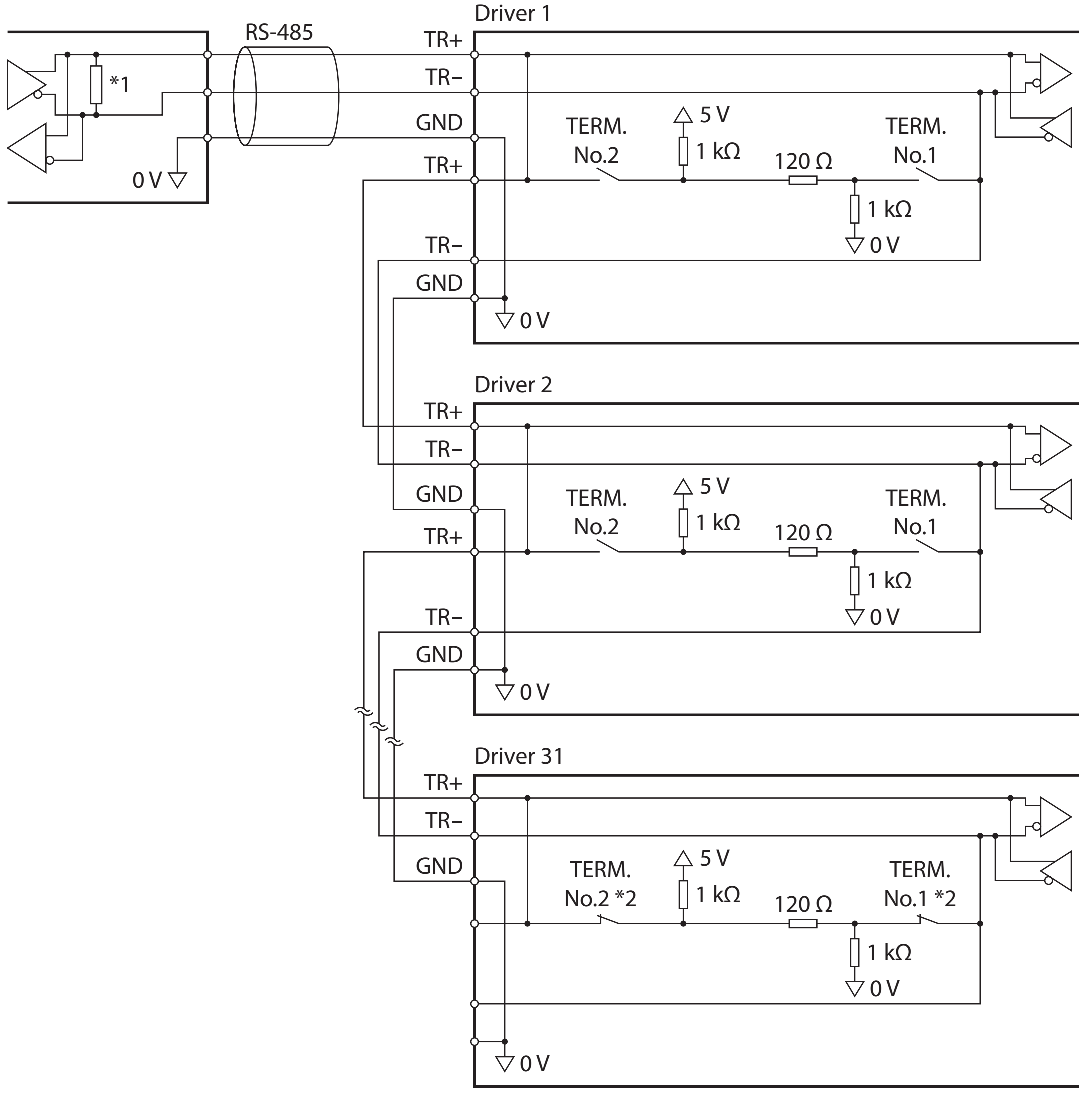
■ Connection example

The figure shows the case of the AC power input driver.



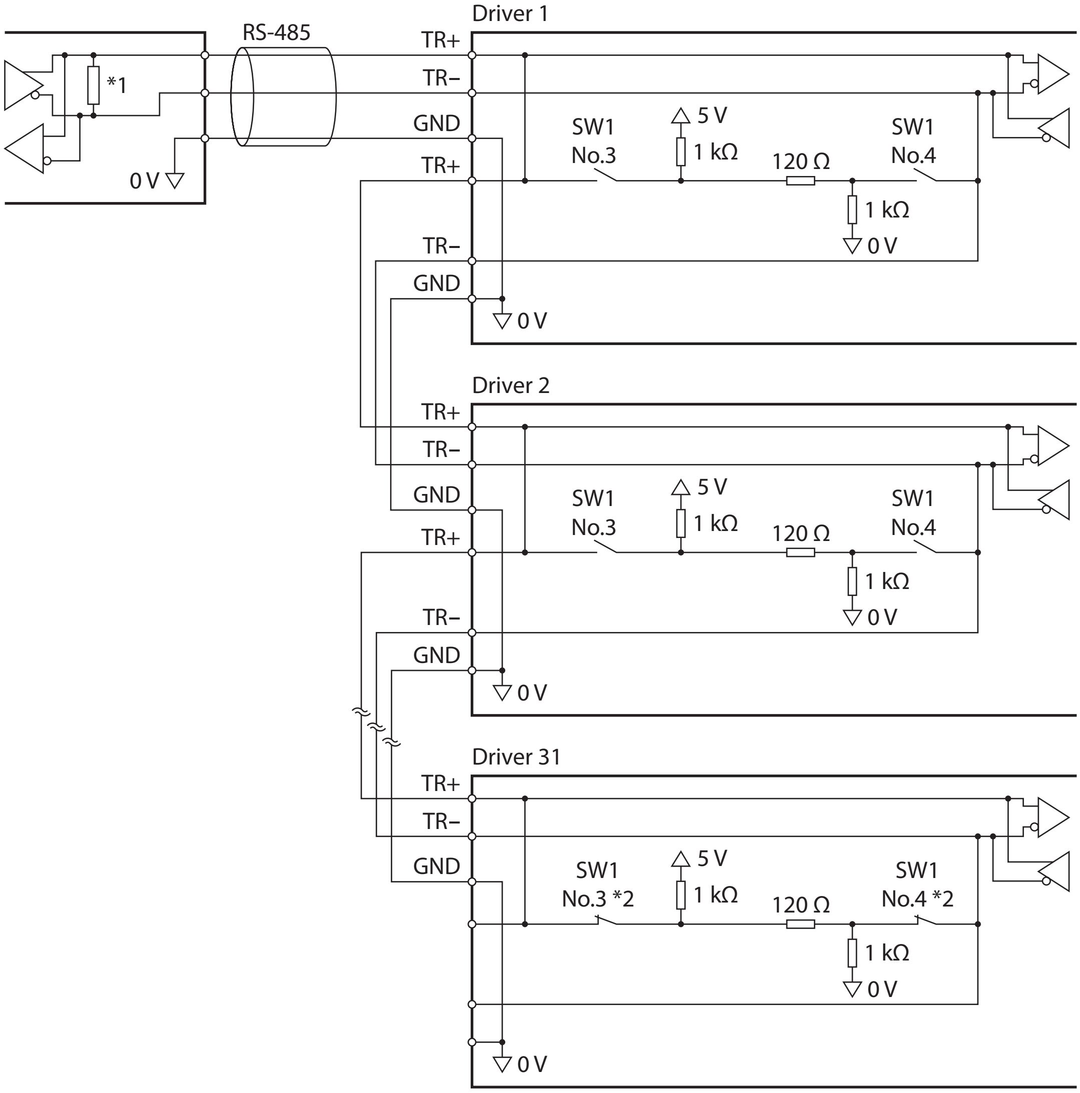
■ Internal circuit diagram

- **In case of AC power input driver**



*1 Termination resistor 120 Ω
*2 Turn the termination resistor ON.

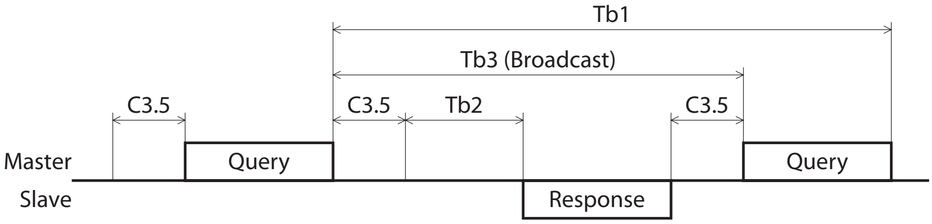
- **In case of DC power input driver**



*1 Termination resistor 120 Ω
*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 silient 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 57,600 115,200 230,400	2.5 ms or more	3.0 ms or more

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.

Master	Query → / ← Response	Slave
Slave address		Slave address
Function code		Function code
Data		Data
Error check		Error check

2-1 Query

The query message structure is shown.

Slave address	Function code	Data	Error check
8 bit	8 bit	N×8 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
17h	Read/write of multiple holding registers	Read: 1 to 125 Write: 1 to 121	Not 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	N×8 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
17h	97h

Example of exception response

Query

Slave address		01h
Function code		10h
Data	Register address (upper)	02h
	Register address (lower)	4Ch
	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)	03h
	Value write to register address + 1 (lower)	E9h
Error check (lower)		2Fh
Error check (upper)		D4h

Response

Slave address		01h
Function code		90h
Data	Exception code	04h
Error check (lower)		4Dh
Error check (upper)		C3h

Exception code

Indicates why the process cannot be executed.

Exception code	Communication error code	Cause	Description
01h	88h	Invalid function	The process could not be executed because the function code was invalid. • The function code is not supported. • The sub-function code for diagnosis (08h) is other than 00h.
02h	88h	Invalid data address	The process could not be executed because the data address was invalid. • 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	The process could not be executed because the data was invalid. • 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	The process could not be executed because an error occurred at the slave. • 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). - 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 to start reading from
	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)		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 to start writing from
	Register address (lower)	C6h	
	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
	Value write to register address (upper)	00h	Value written to register address 18C6h
	Value write to register address (lower)	00h	
	Value write to register address + 1 (upper)	27h	Value written to register address 18C7h
	Value write to register address + 1 (lower)	10h	
	Value write to register address + 2 (upper)	00h	Value written to register address 18C8h
	Value write to register address + 2 (lower)	00h	
	Value write to register address + 3 (upper)	4Eh	Value written to register address 18C9h
	Value write to register address + 3 (lower)	20h	
	Value write to register address + 4 (upper)	00h	Value written to register address 18CAh
	Value write to register address + 4 (lower)	00h	
	Value write to register address + 5 (upper)	01h	Value written to register address 18CBh
	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	

3-5 Read/write of multiple holding registers (17h)

With a single function code, reading data and writing data for multiple successive registers can be performed.
Data is written first, and then data is read from the specified registers.

■ Read

Data can be read from successive registers of up to 125.
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 registers are read, they are read in order of register addresses.

■ Write

Data can be written to successive registers of up to 121.
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 read/write

Prepare the read address and write address in a single query.
In this example, after writing the data to "Position" and "Operating speed" of the operation data No.1, read the present temperatures for the driver and motor.

Description	Register address	Value write	Corresponding decimal
Position of operation data No.1 (upper)	6210 (1842h)	0000h	10,000
Position of operation data No.1 (lower)	6211 (1843h)	2710h	
Operating speed of operation data No.1 (upper)	6212 (1844h)	0000h	5,000
Operating speed of operation data No.1 (lower)	6213 (1845h)	1388h	

Description	Register address	Value read	Corresponding decimal
Driver temperature (upper)	248 (00F8h)	0000h	383
Driver temperature (lower)	249 (00F9h)	017Fh	
Motor temperature (upper)	250 (00FAh)	0000h	426
Motor temperature (lower)	251 (00FBh)	01AAh	

- **Query**

Field name		Data	Description
Slave address		01h	Slave address 1
Function code		17h	Read/write of multiple holding registers
Data	(Read) Register address (upper)	00h	Register address to start reading from
	(Read) Register address (lower)	F8h	
	(Read) Number of registers (upper)	00h	Number of registers to be read from the starting register address (4 registers=0004h)
	(Read) Number of registers (lower)	04h	
	(Write) Register address (upper)	18h	Register address to start writing from
	(Write) Register address (lower)	42h	
	(Write) Number of registers (upper)	00h	Number of registers to be written from the starting register address (4 registers=0004h)
	(Write) Number of registers (lower)	04h	
	(Write) Number of bytes	08h	Value of twice the number of (Write) registers in the query
	(Write) Value write to register address (upper)	00h	Value written to register address 1842h
	(Write) Value write to register address (lower)	00h	
	(Write) Value write to register address + 1 (upper)	27h	Value written to register address 1843h
	(Write) Value write to register address + 1 (lower)	10h	
	(Write) Value write to register address + 2 (upper)	00h	Value written to register address 1844h
	(Write) Value write to register address + 2 (lower)	00h	
	(Write) Value write to register address + 3 (upper)	13h	Value written to register address 1845h
	(Write) Value write to register address + 3 (lower)	88h	
Error check (lower)		DFh	Calculation result of CRC-16
Error check (upper)		59h	

- **Response**

Field name		Data	Description
Slave address		01h	Same as query
Function code		17h	Same as query
Data	(Read) Number of bytes	08h	Value of twice the number of (Read) registers in the query
	(Read) Value read from register address (upper)	00h	Value read from register address 00F8h
	(Read) Value read from register address (lower)	00h	
	(Read) Value read from register address + 1 (upper)	01h	Value read from register address 00F9h
	(Read) Value read from register address + 1 (lower)	7Fh	
	(Read) Value read from register address + 2 (upper)	00h	Value read from register address 00FAh
	(Read) Value read from register address + 2 (lower)	00h	
	(Read) Value read from register address + 3 (upper)	01h	Value read from register address 00FBh
	(Read) Value read from register address + 3 (lower)	AAh	
Error check (lower)		40h	Calculation result of CRC-16
Error check (upper)		63h	

4 Flow of setting required for Modbus communication

The contents of [shaded box] are explained in this manual.

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

Set the protocol, address number, and transmission rate with switches.
The initial setting of the switches can be changed with parameters.

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.

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 are introduced.

Select the setting method of the query.
- Direct data operation: Rewriting of data and start of operation are executed at the same time.
- Indirect reference: Data is stored in the address exclusive for sending and sent.
- Direct reference: Data is sent by specifying the register address.

Part Two
Select the operation method and set data.
- Direct data operation: Rewriting of data and start of operation are executed simultaneously.
- 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.
- Macro operation: In JOG operation, continuous operation, etc., the motor is operated by inputting a specific signal.
- Return-to-home operation: The motor is returned to the home position.

Part Four
Set parameters.

Part Nine
Make settings concerning information and alarms.

Completion of setting

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.

STEP 1	Installation and connection
↓	
STEP 2	Setting of switches
↓	
STEP 3	Power-on and check of communication parameters
↓	
STEP 4	Power cycle
↓	
STEP 5	Operation of motor

Communication parameters are enabled after the power is cycled.

● Example of operating condition

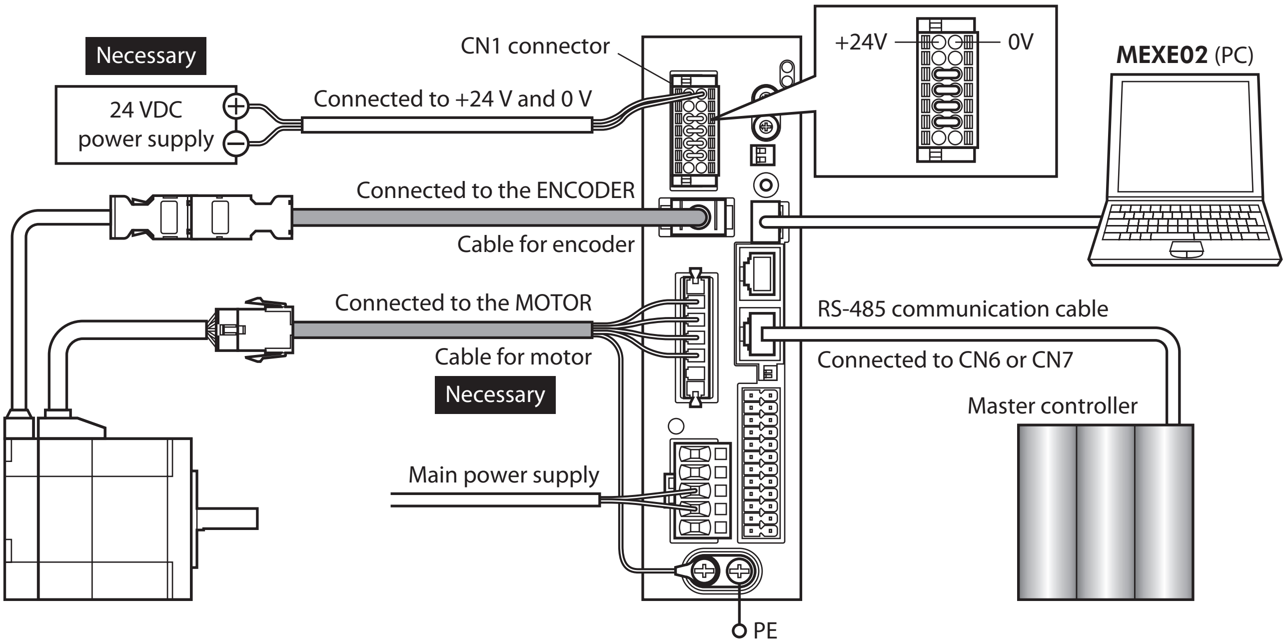
Here, the motor is assumed to be operated under the following conditions.

- Number of drivers connected: One
- Address number: 1
- Transmission rate: 115,200 bps
- Termination resistor: Set

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

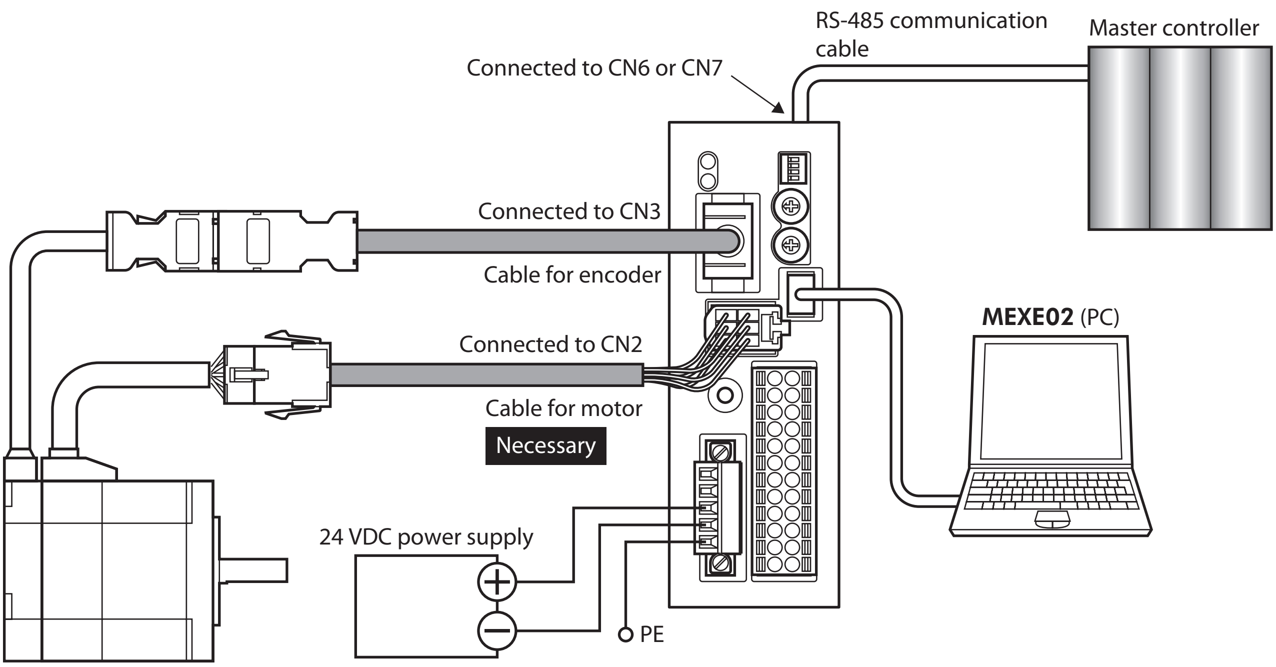
STEP 1 Check the installation and connection

■ 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



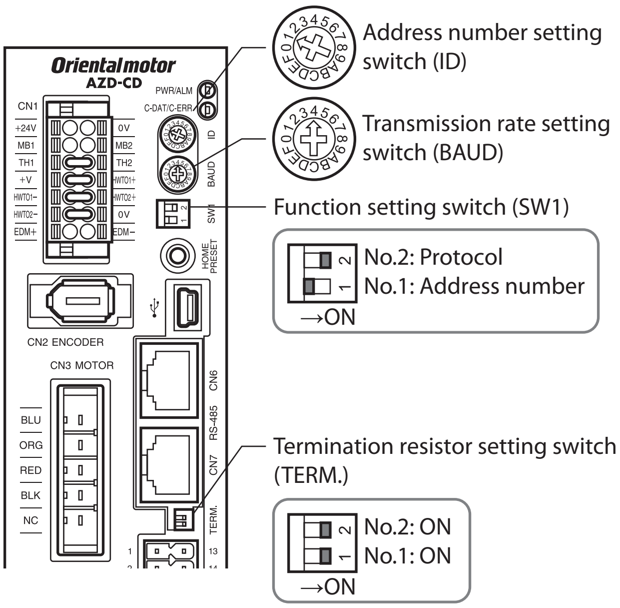
Cables represented in gray color are accessories. Use the cable for encoder when the length of the encoder cable of motor is not enough.

STEP 2 Set the switches

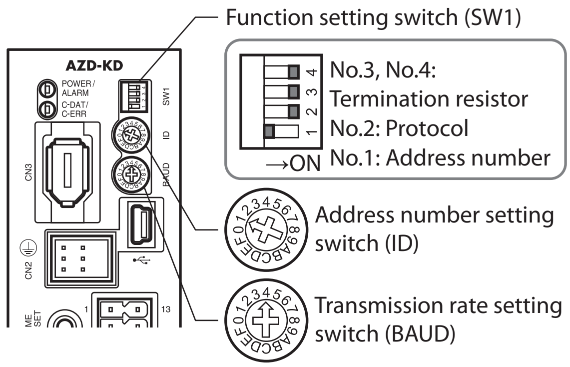
Set as shown in the following table with the switches. The status becomes as shown in the following figures after setting.

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)]

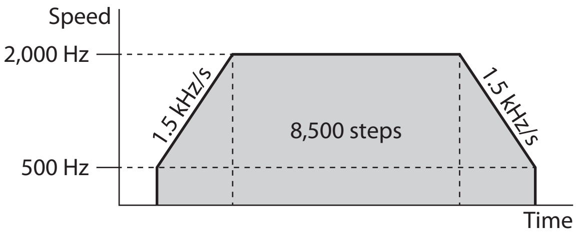
Note Set the transmission interval of frames sent from the master to be longer than the silent interval of the driver. When the transmission rate is 115,200 bps, the silent interval of the driver is 2.5 ms.

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.



1. 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

2. 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

3. 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)

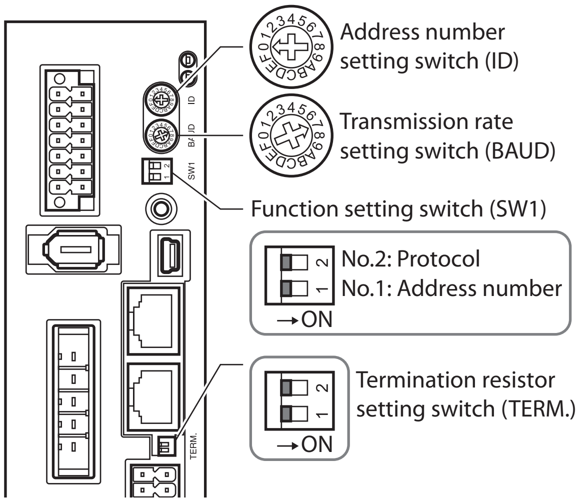
6 Setting of switches

The following figure shows the status of factory setting.

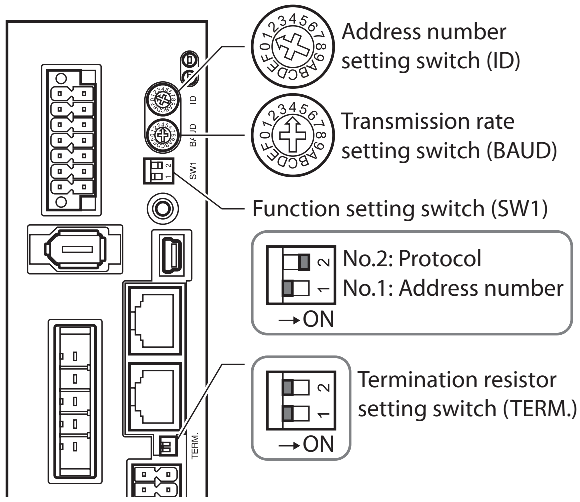
Note Be sure to turn off the driver power before setting the switches. If the switches are set while the power is still on, the new setting will not become effective.

■ AC power input driver

● Built-in controller type

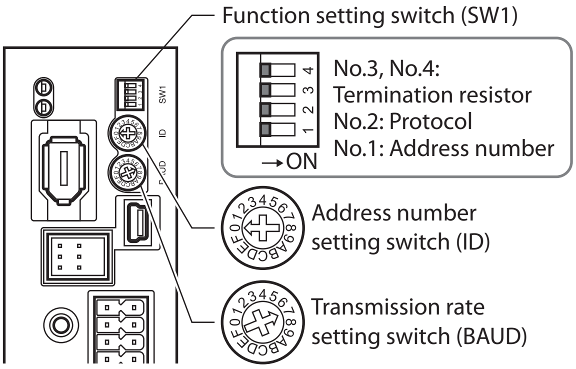


● Pulse input type with RS-485 communication interface

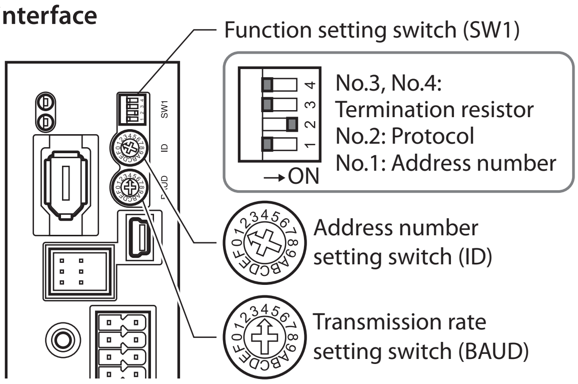


■ DC power input driver

● 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
0	OFF	Not used
1		1
2		2
3		3
4		4
5		5
6		6
7		7
8		8
9		9
A		10
B		11
C		12
D		13
E		14
F		15

ID switch	SW1-No.1	Address number
0	ON	16
1		17
2		18
3		19
4		20
5		21
6		22
7		23
8		24
9		25
A		26
B		27
C		28
D		29
E		30
F		31

Note 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

Note
- 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.283)

6-4 Termination resistor

For the driver that is most distant from the master controller (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

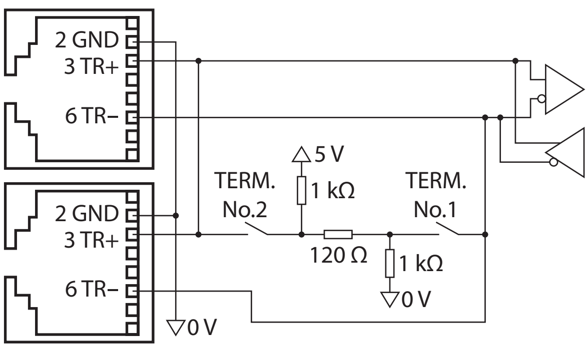
Note If only one of the two switches is turned ON, a communication error may occur.

■ CN6/CN7 pin assignment

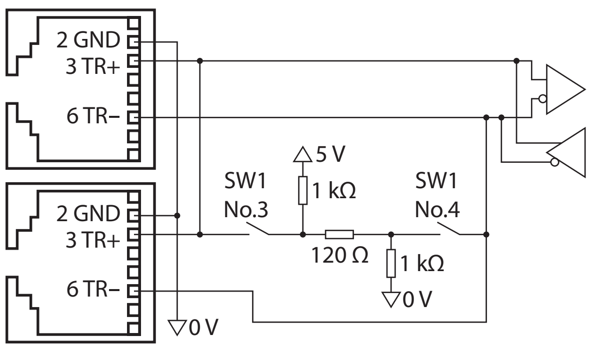
Pin No.	Signal name	Description
1	NC	Not used
2	GND	GND
3	TR+	RS-485 communication signal (+)
4	NC	Not used
5	NC	Not used
6	TR–	RS-485 communication signal (–)
7	NC	Not used
8	NC	Not used

■ Internal input circuit

• AC power input driver



• DC power input driver



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

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.283) **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

memo 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.

1. Turn No.2 of the SW1 switch ON.
   The Modbus protocol is selected.
2. 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.285)	–	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

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-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 to start writing from =Position No.0 (1802h)
	Register address (lower)	02h	
	Number of registers (upper)	00h	Number of registers to be written from the starting register address (4 registers=0004h)
	Number of registers (lower)	04h	
	Number of bytes	08h	Twice the number of registers in the query=8
	Value write to register address (upper)	00h	Value written to register address 1802h =Position (travel amount) 1,000 steps (0000 03E8h)
	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 written to register address 1804h =Operating speed 5,000 Hz (0000 1388h)
	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	Same as query
	Register address (lower)	02h	
	Number of registers (upper)	00h	Same as query
	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

<table>
<tr><th colspan="2">Field name</th><th>Data</th><th>Description</th></tr>
<tr><td colspan="2">Slave address</td><td>01h</td><td>Slave address 1</td></tr>
<tr><td colspan="2">Function code</td><td>10h</td><td>Writing to multiple holding registers</td></tr>
<tr><td rowspan="9">Data</td><td>Register address (upper)</td><td>04h</td><td rowspan="2">Register address to start writing from
=Operating speed No.0 (0480h)</td></tr>
<tr><td>Register address (lower)</td><td>80h</td></tr>
<tr><td>Number of registers (upper)</td><td>00h</td><td rowspan="2">Number of registers to be written from the starting register address (2 registers=0002h)</td></tr>
<tr><td>Number of registers (lower)</td><td>02h</td></tr>
<tr><td>Number of bytes</td><td>04h</td><td>Twice the number of registers in the query=4</td></tr>
<tr><td>Value write to register address (upper)</td><td>00h</td><td rowspan="4">Value written to register address 0480h
=Operating speed 5,000 Hz (0000 1388h)</td></tr>
<tr><td>Value write to register address (lower)</td><td>00h</td></tr>
<tr><td>Value write to register address + 1 (upper)</td><td>13h</td></tr>
<tr><td>Value write to register address + 1 (lower)</td><td>88h</td></tr>
</table>

Error check (lower)	C4h	Calculation result of CRC-16
Error check (upper)	59h	

Response

Field name		Data	Description
Slave address		01h	Same as query
Function code		10h	Same as query
Data	Register address (upper)	04h	Same as query
	Register address (lower)	80h	
	Number of registers (upper)	00h	Same as query
	Number of registers (lower)	02h	

Error check (lower)	41h	Calculation result of CRC-16
Error check (upper)	10h	

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. ⇨p.302)
Direct reference	• 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	• 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.

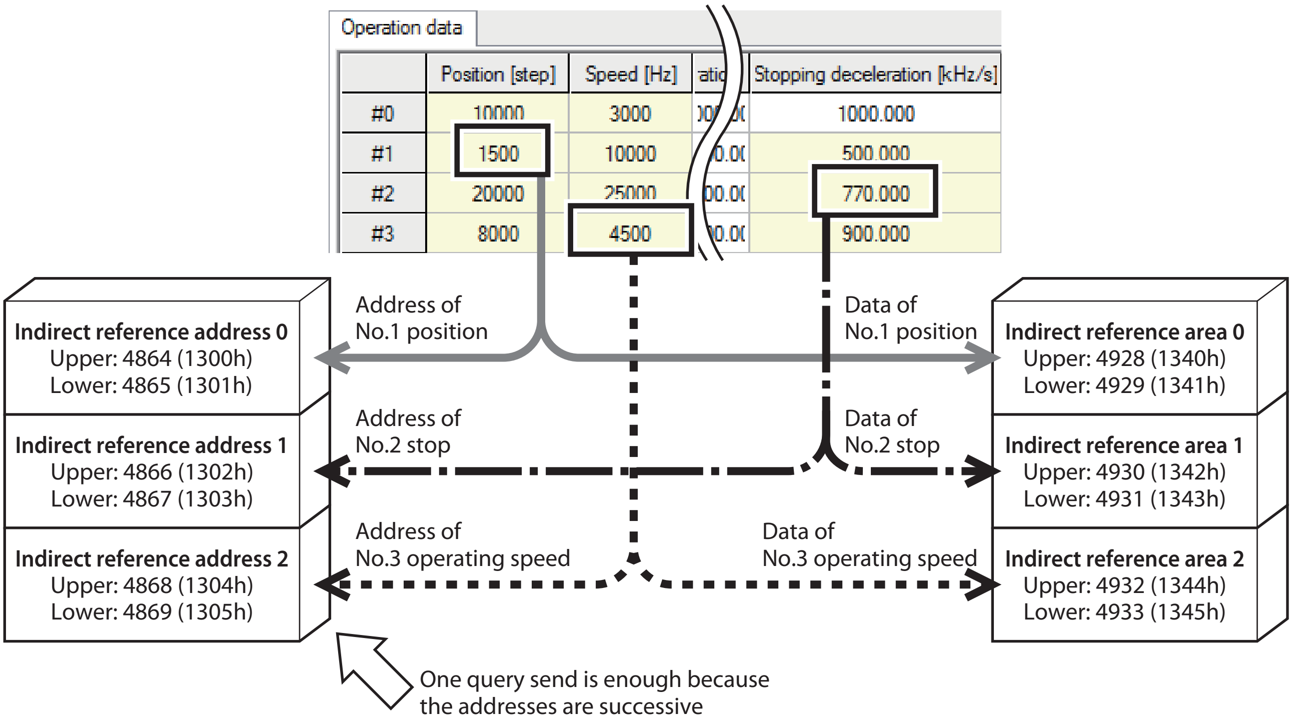
9-2 Direct reference

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.

memo 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. (⇨p.381)

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)	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 (1)	
· · ·	
Indirect reference address setting (30)	
Indirect reference address setting (31)	
Indirect reference area 0	Stores the set value of data to be sent in indirect reference.
Indirect reference area 1	
· · ·	
Indirect reference area 30	
Indirect reference area 31	

Related parameters

MEXE02 tree view	Name	Description	Initial value
Communication & I/F	Indirect reference address setting (0)	Sets the ID of the data to be stored in the indirect reference address. **Setting range** 0 to 65,535 (0 to FFFFh)	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)		
	Indirect reference address setting (15)		
	Indirect reference address setting (16)		
	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
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 written to register address 1300h =ID of operation data No.1 position (C21h)
	Value write to register address (lower)	00h	
	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	Calculation result of CRC-16
Error check (upper)		A6h	

- **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
Data	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 write to register address + 1 (lower)	DCh	
	Value write to register address + 2 (upper)	00h	Value written to register address 1342h =Operation data No.2 stopping deceleration 770,000 (BBFD0h)
	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 written to register address 1344h =Operation data No.3 operating speed 4,500 (1194h)
	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

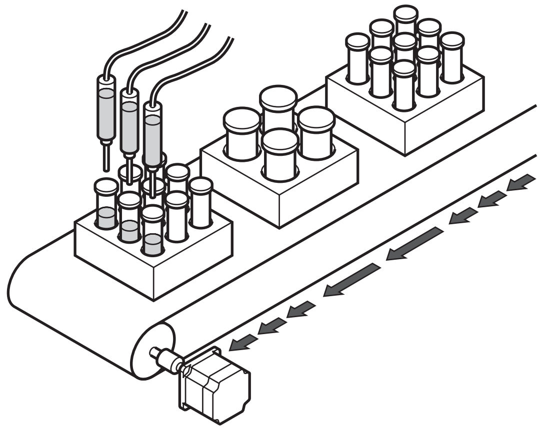
Direct data operation is a mode that allows rewriting of data and start of operation to be executed at the same time.
It is suitable to frequently change operation data such as the position (travel amount) and operating speed or to fine-tune the position.
There are eight types of triggers to start operation 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

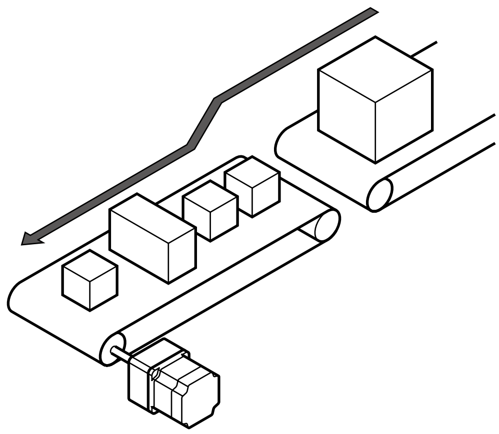
1. Write the data of the position and operating speed.
2. Write "1" to the trigger.

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

STEP 1	Installation and connection	
↓		
STEP 2	Setting of switches	
↓		
STEP 3	Power-on and check of communication parameters	
↓		
STEP 4	Power cycle	Communication parameters are enabled after the power is cycled.
↓		
STEP 5	Operation of motor	

- **Example of operating condition**

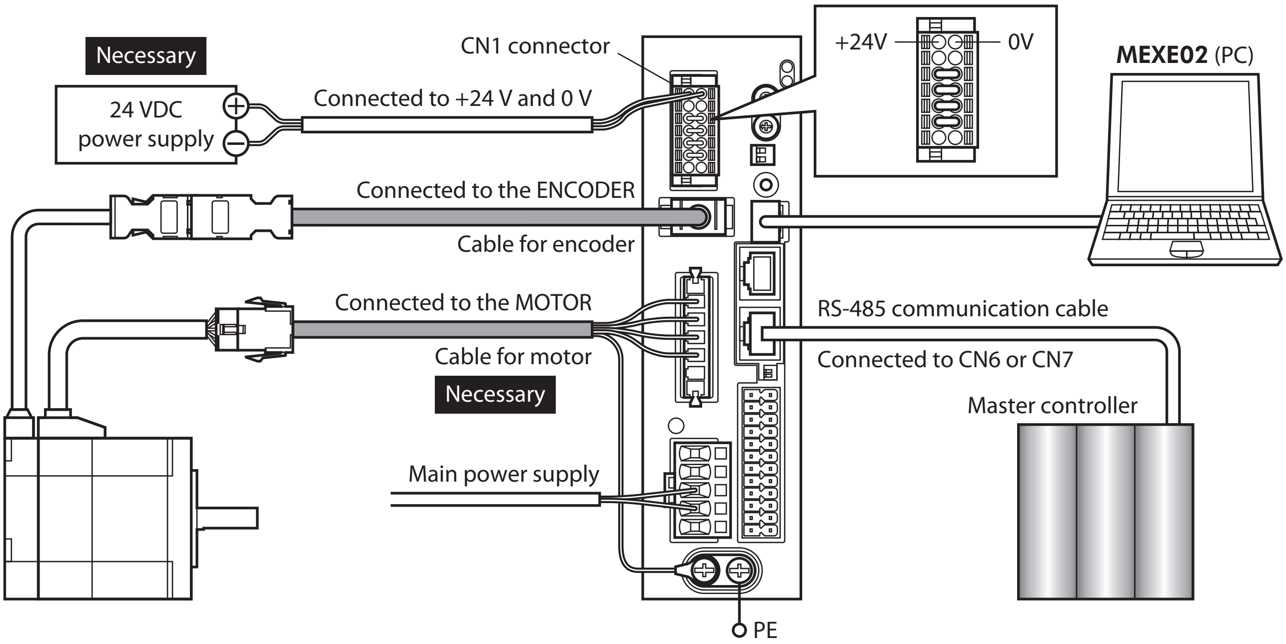
Here, the motor is assumed to be operated under the following conditions.

- Number of drivers connected: One
- Address number: 1
- Transmission rate: 115,200 bps
- Termination resistor: Set

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

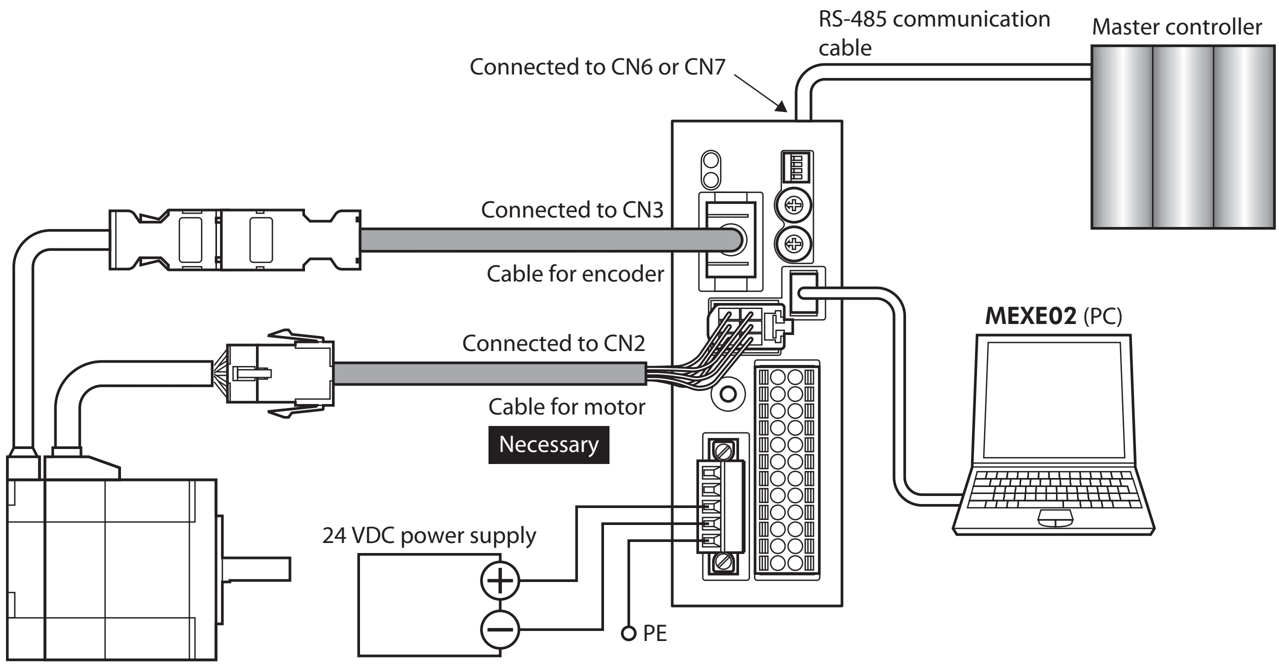
STEP 1 Check the installation and connection

■ 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



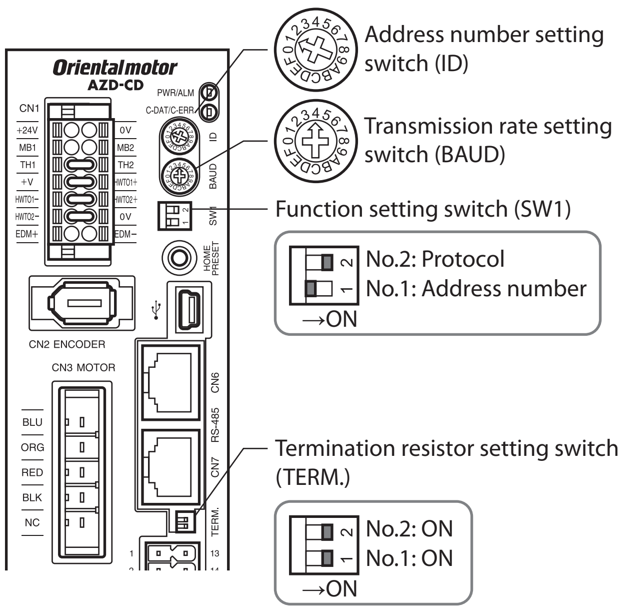
Cables represented in gray color are accessories. Use the cable for encoder when the length of the encoder cable of motor is not enough.

STEP 2 Set the switches

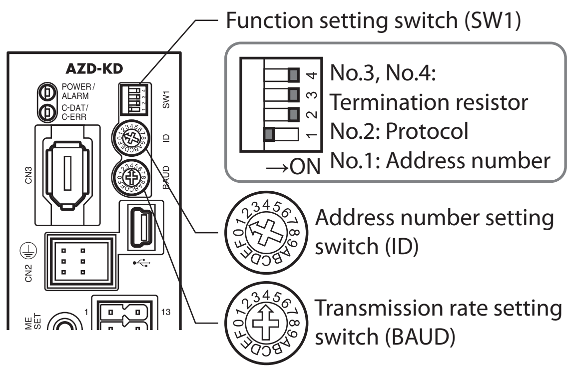
Set as shown in the following table with the switches. The status becomes as shown in the figures below after setting.

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)]

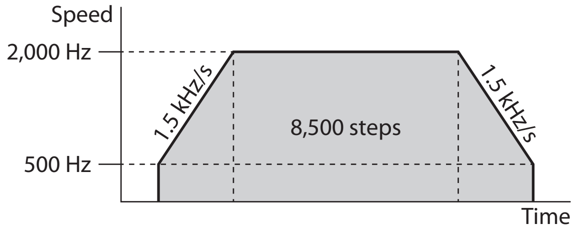
Note Set the silent interval of the driver to be shorter than the transmission interval of frames sent from the master. When the transmission rate is 115,200 bps, the silent interval of the driver is 2.5 ms.

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.



1. With the following query, send the operation data and the trigger. Operation is started at the same time as transmission.

01	10	00 58	00 10	20	00 00 00 00	00 00 00 02	00 00 21 34
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

00 00 07 D0	00 00 05 DC	00 00 05 DC	00 00 03 E8	00 00 00 01	1C 08
(9)	(10)	(11)	(12)	(13)	(14)

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

2. Confirm that the motor rotates without any problem.

memo Compared with the transmission example of p.278, 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 Upper	Register address Lower	Name	Description	Initial value
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.310) **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."

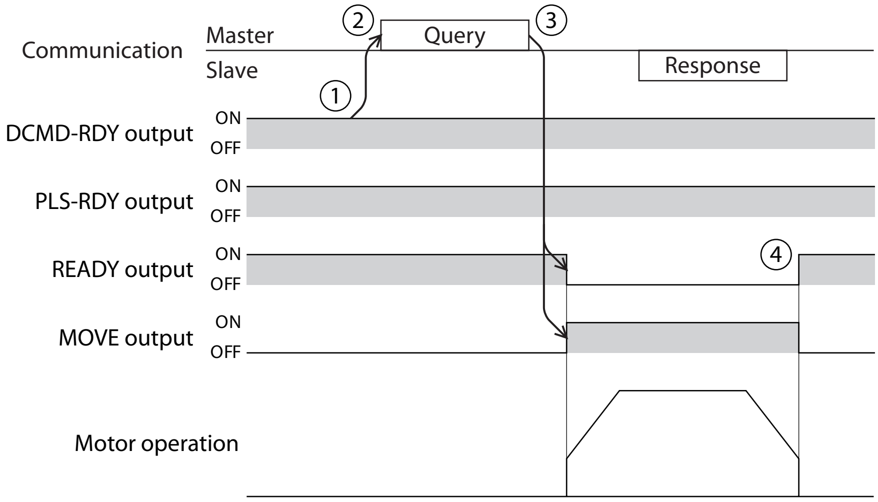
● When the trigger is "−1 to −7"

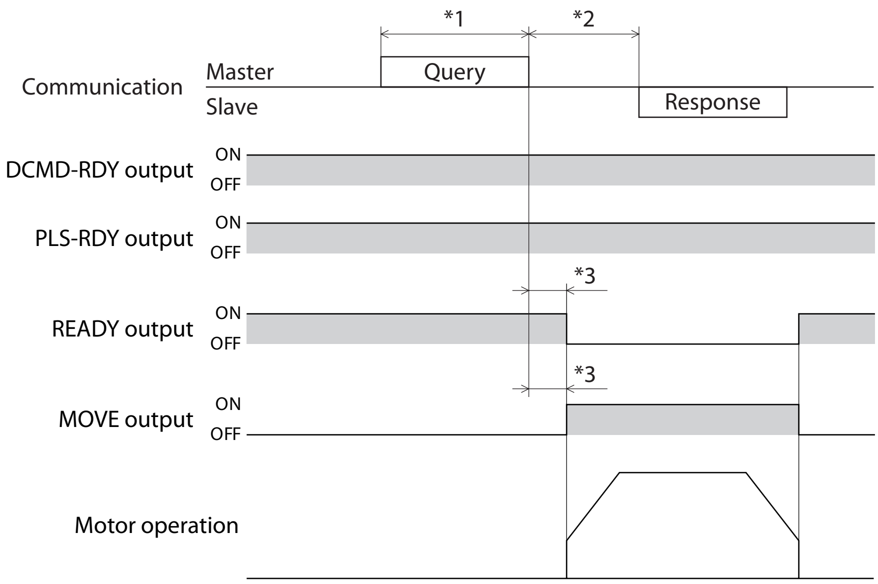
When the data corresponding to the trigger is written, direct data operation is started. Even if operation is started, the set value of the trigger is retained.

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

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

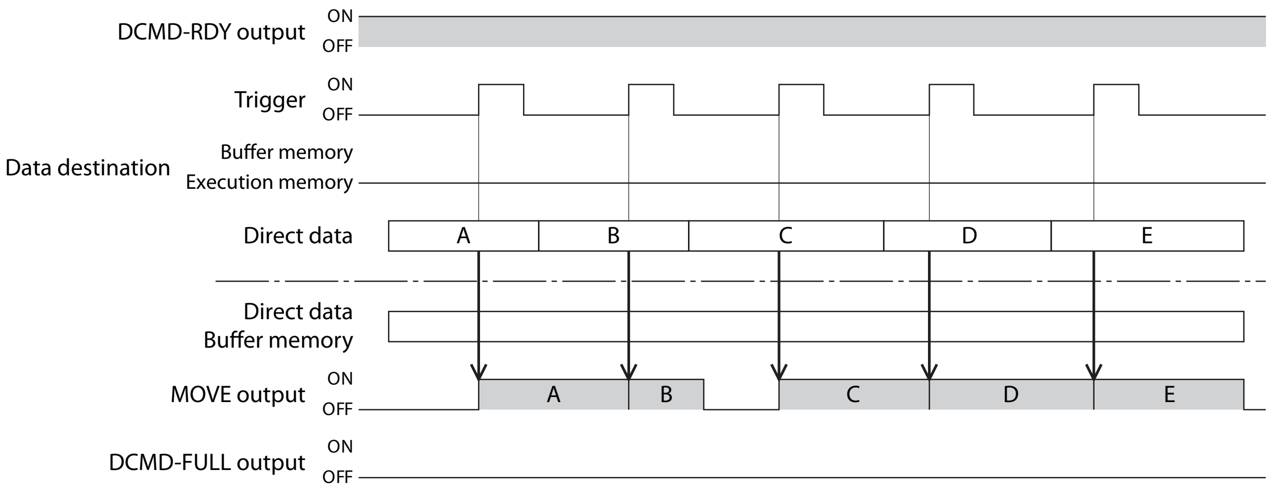
■ Data destination

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

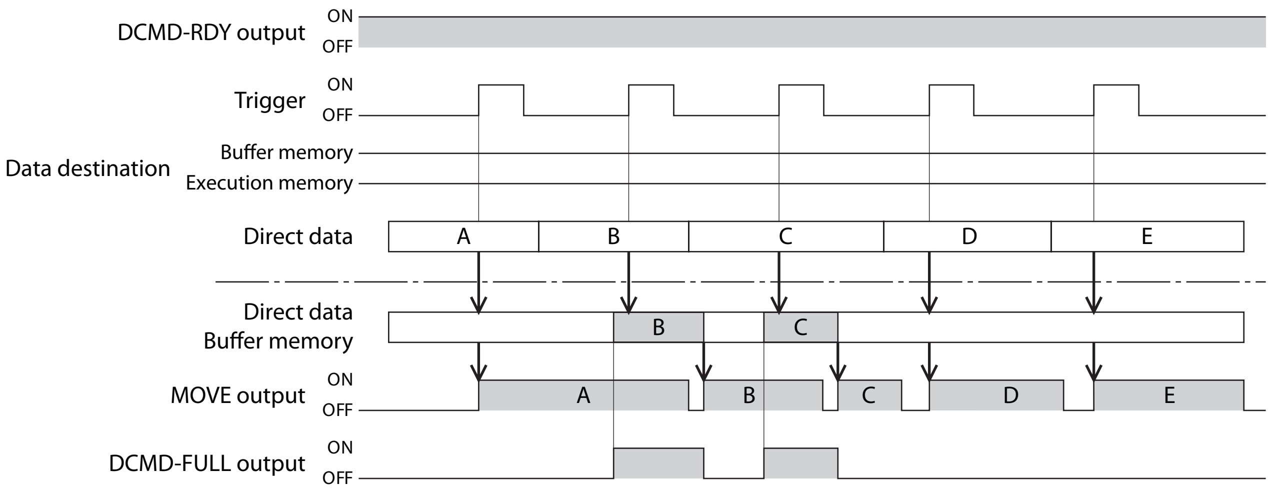
● When the data destination is set to "Execution memory"

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

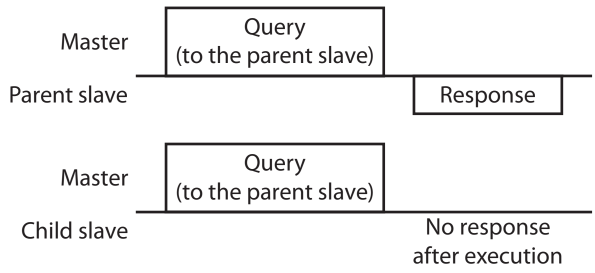
Multiple slaves are made into a group and a query is sent to these group at once.

■ 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

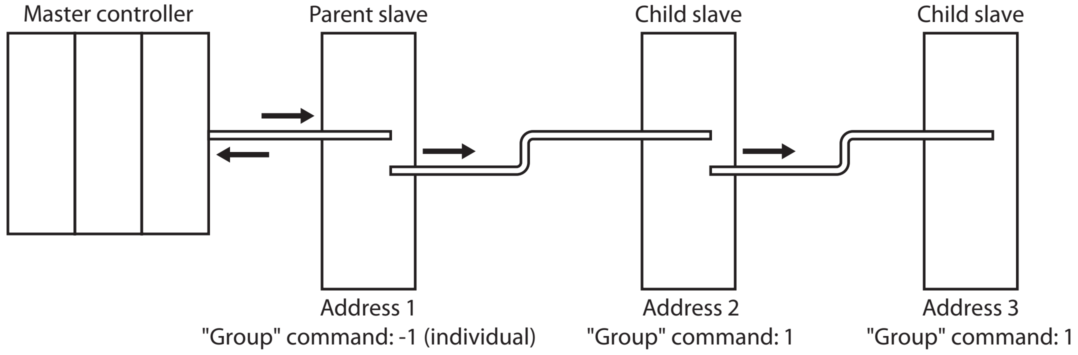
Register address		Name	Description	READ/ WRITE	Setting range
Dec	Hex				
48	0030h	Group ID (upper)	Sets a group address.	R/W	−1: No group specification (group send is not performed) 1 to 31: The address (address of the parent slave) of the group
49	0031h	Group ID (lower)			

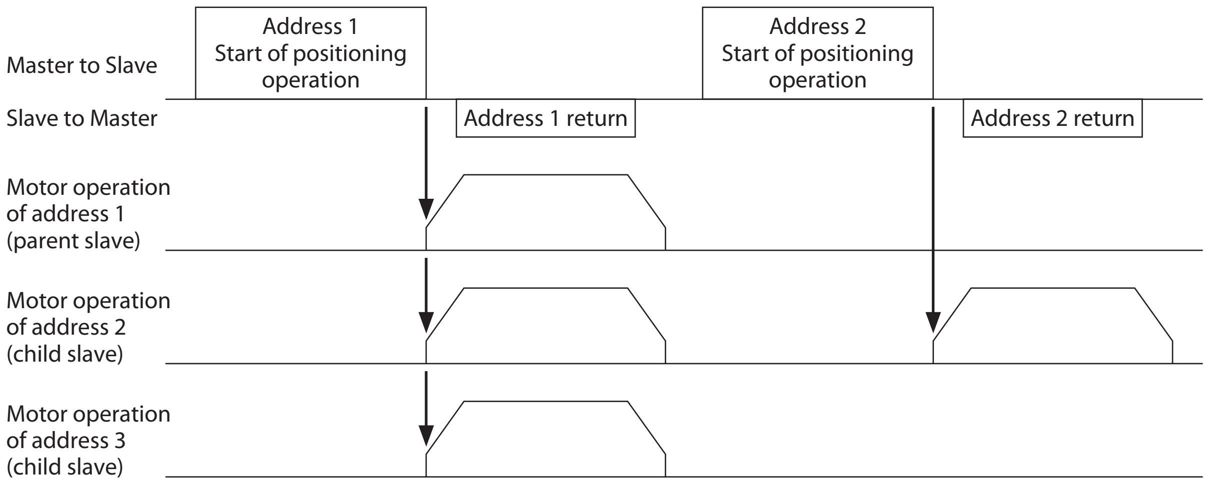
Note
- Do not set "0" to the group ID.
- Change the group address in the unicast mode.
- Since the group setting is stored in RAM, the initial value is returned when the driver is turned off.

- **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.

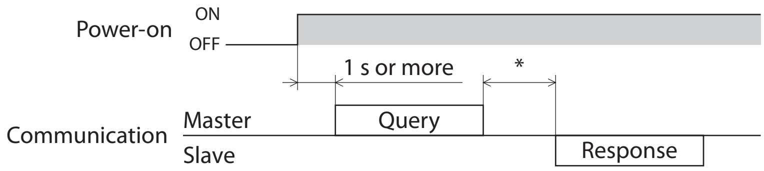
MEXE02 tree view	Parameter name	Description	Initial value
Communication & I/F	Initial group ID (Modbus)	Sets the address (address number of the parent slave) of the group. It is stored even if the power is turned off. **Setting range** Disable: Group send is not executed 0 to 31: Group ID	Disable





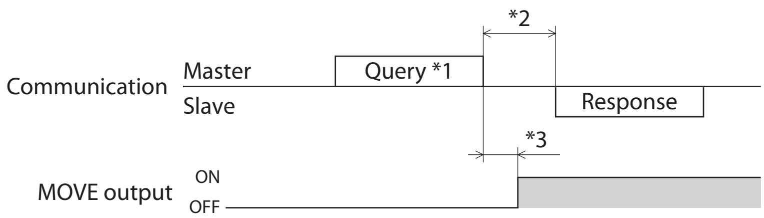
12 Timing chart

12-1 Communication start



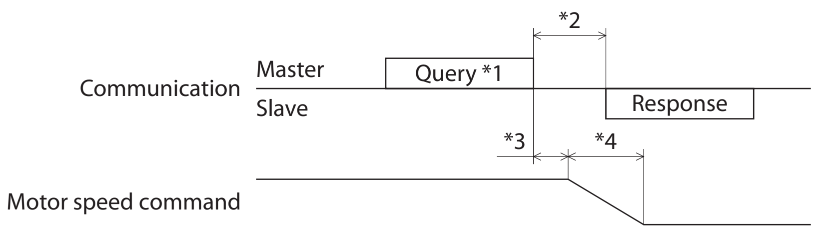
* Tb2 (transmission waiting time) + C3.5 (silent interval)

12-2 Start of operation



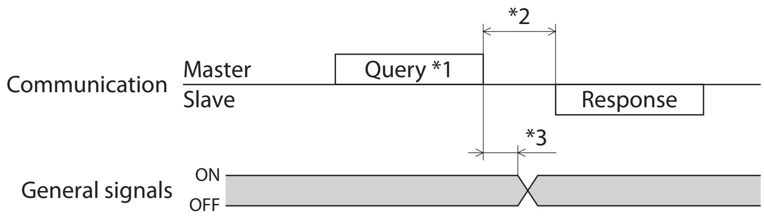
*1 A message including a query to start operation via RS-485 communication.
*2 Tb2 (transmission waiting time) + C3.5 (silent interval)
*3 C3.5 (silent interval) + 2 ms or less

12-3 Operation stop, speed change



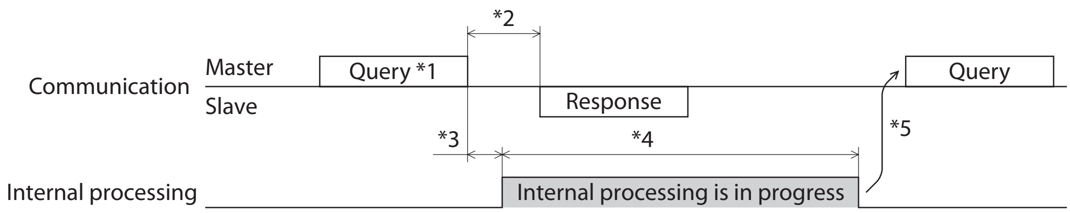
*1 A message including a query to stop operation and another to change the speed via RS-485 communication.
*2 Tb2 (transmission waiting time) + C3.5 (silent interval)
*3 It varies depending on the operating condition.
*4 It varies depending on the setting of the "STOP/STOP-COFF input action" parameter.

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 (or 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**.

Note 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

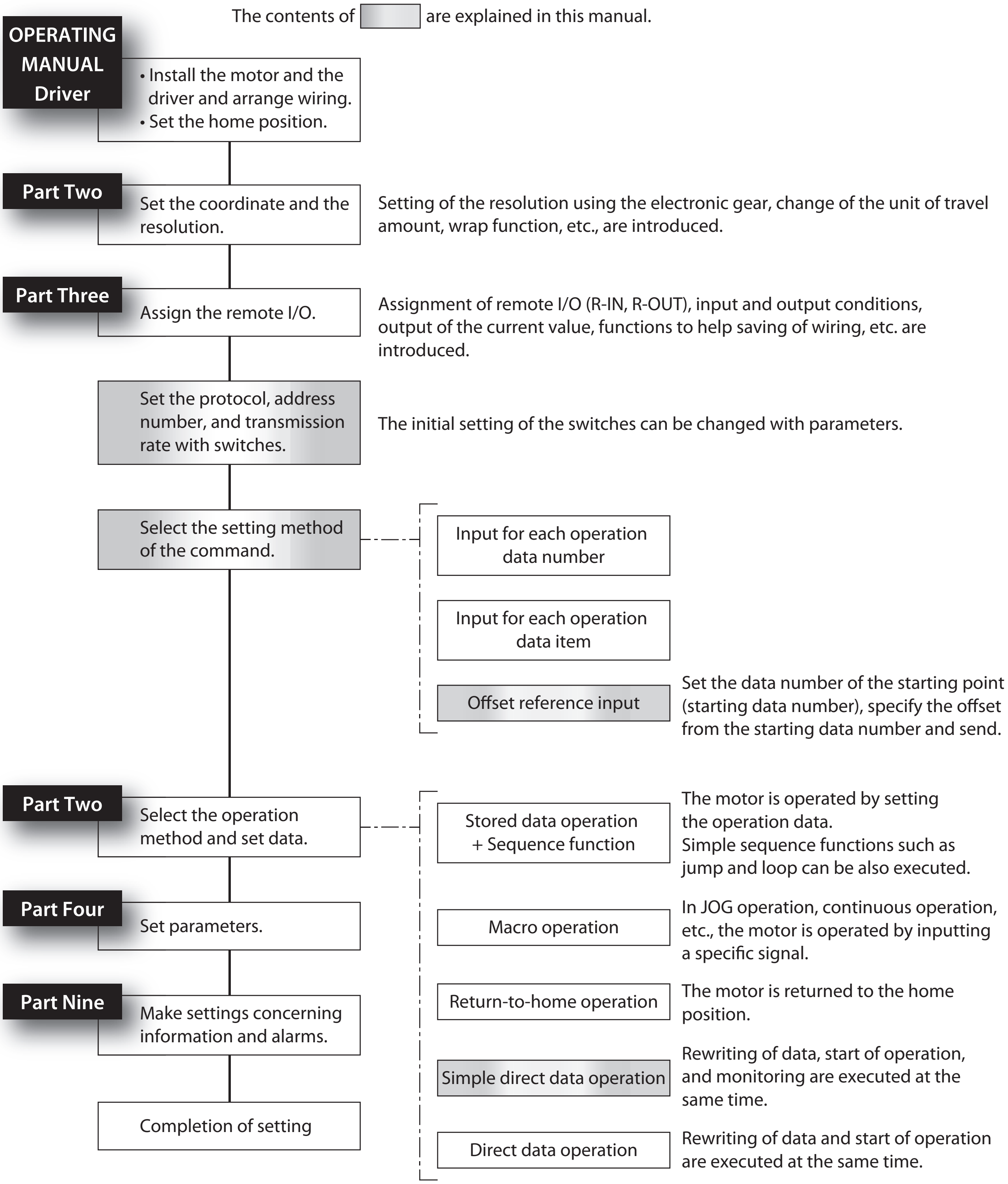
Alarm code	Alarm type	Cause
83h	Communication switch setting error	The setting of the BAUD switch was out of the specification.
84h	RS-485 communication error	The RS-485 communication error occurred in succession for the number of times set in the "Communication error detection (Modbus)" parameter.
85h	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

1 Flow of setting required for control via industrial network



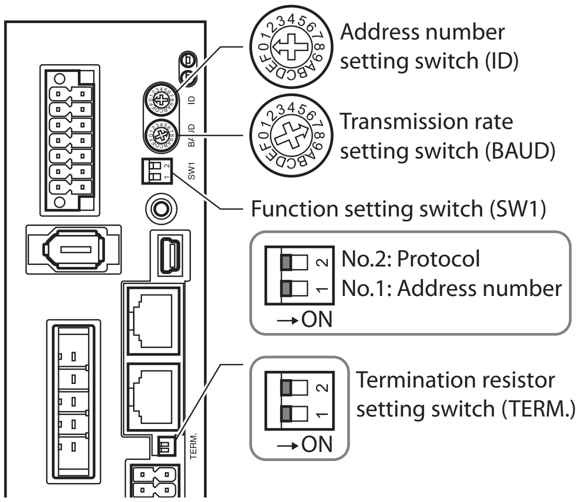
2 Setting of switches

The following figure shows the status of factory setting.

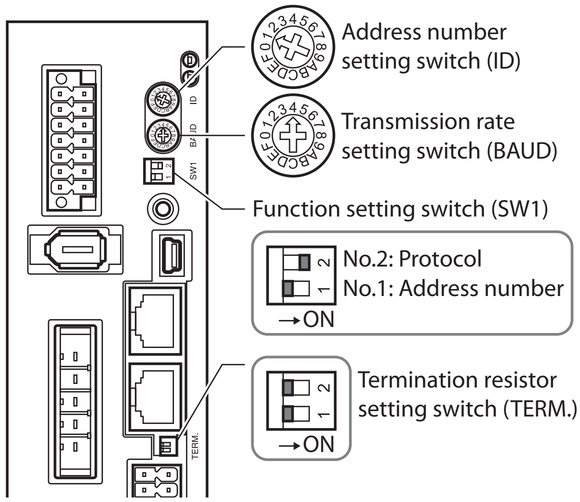
Note Be sure to turn off the driver power before setting the switches. If the switches are set while the power is still on, the new setting will not become effective.

■ AC power input driver

● Built-in controller type

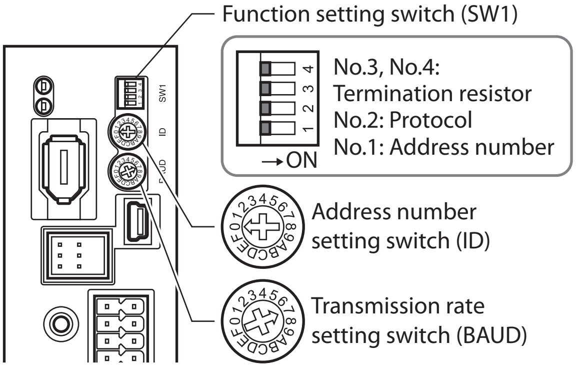


● Pulse input type with RS-485 communication interface

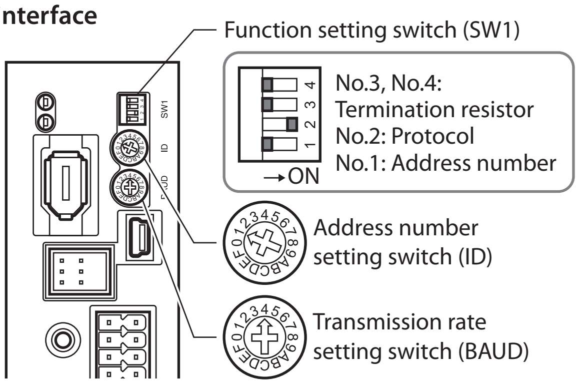


■ DC power input driver

● 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.

memo The BAUD switch can point anywhere.

2-4 Termination resistor

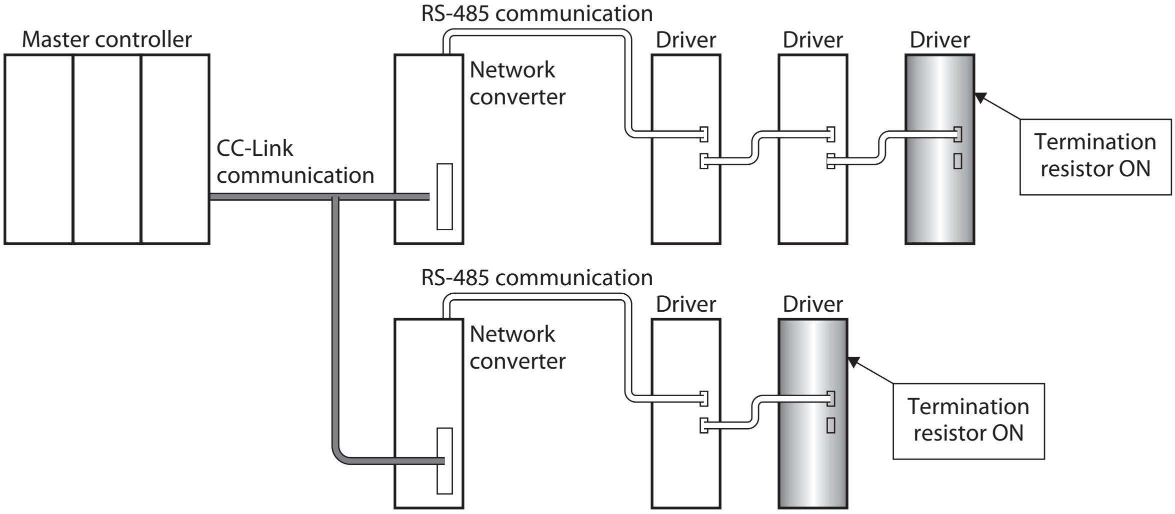
For the driver that is most distant from the network converter (termination), set the termination register (120 Ω) of RS-485 communication.
For the AC power input driver, turn both No.1 and No. 2 of the TERM switch ON.
For the DC power input driver, turn both No. 3 and No. 4 of the SW1 switch ON.

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

Note 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.

STEP1	Installation and connection ⇨ p.324

↓

STEP2	Setting of **NETC02-CC** ⇨ p.325

↓

STEP3	Setting of driver ⇨ p.326

↓

STEP4	Power cycle and check of LED ⇨ p.326

↓

Setting of data with selecting the command execution method

Command selection method ⇨ p.327

This is a method to execute with setting the command code, address number, and data.
Read and write of data, monitor, and each command of maintenance are executed by the request signal "D-REQ."

Command fixation method ⇨ p.334

This is a method to execute with reading and writing data.The command code and address number are fixed.
Write of data is started by the request signal "WR-REQ," and read of data and monitor are started by the request signal "RD-REQ."

■ 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	×2
Remote device station	4 station occupied

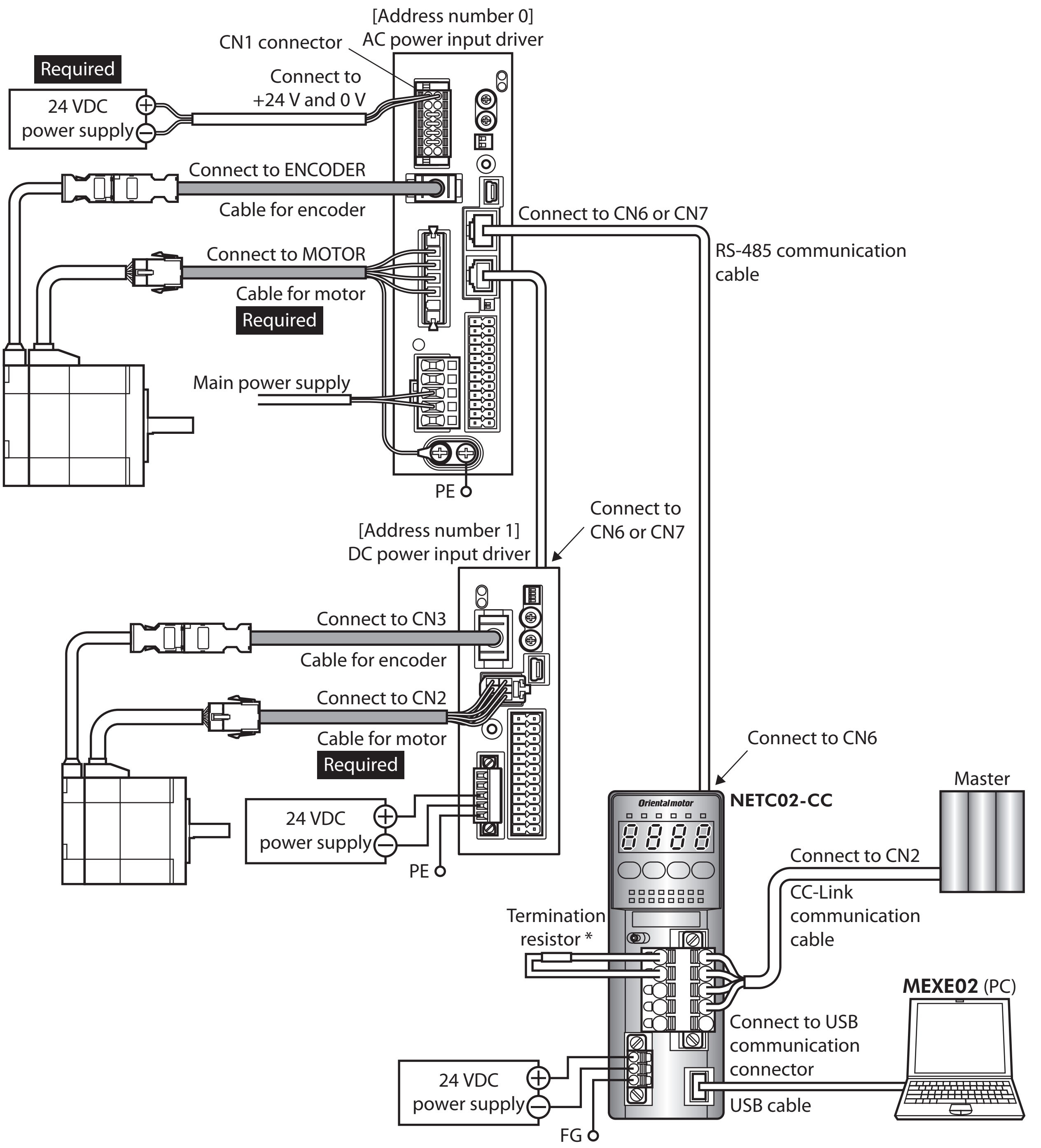
Setting of CC-Link master

CC-Link baud rate	10 Mbps
STATION No.	No.0

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

memo 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



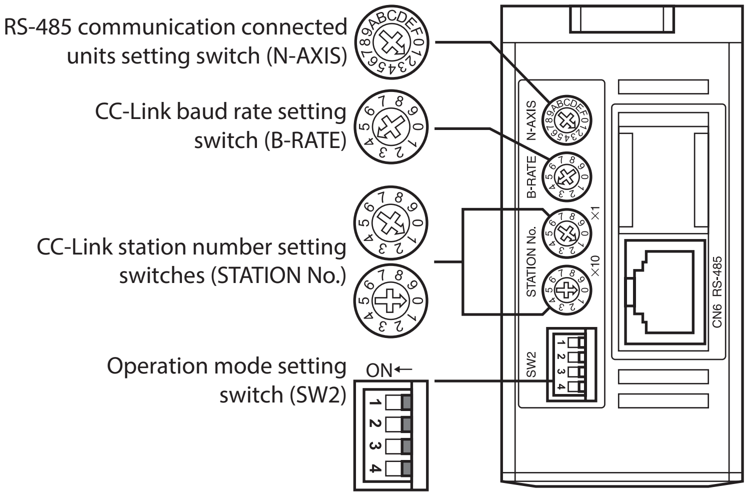
* The termination resistor does not come with the product. (110 Ω, 1/2 W)

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 ×1 to "1" and the ×10 to "0" of the STATION No.	1 (×1: 1, ×10: 0)
Operation mode: OFF	Set No.1 to No.4 to "OFF"	All OFF

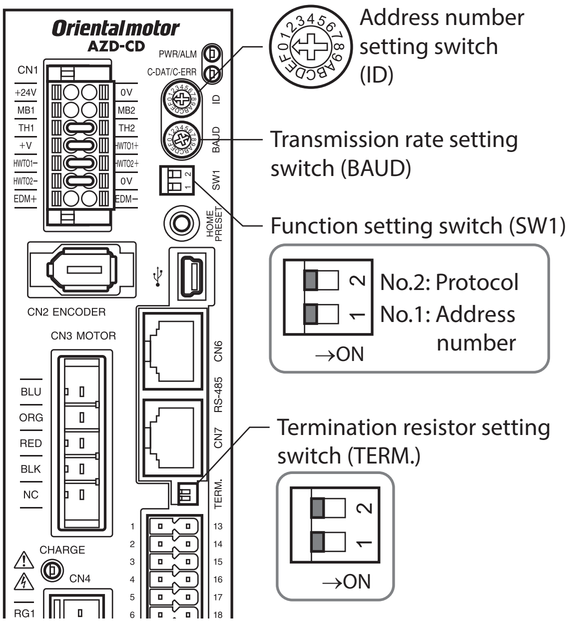


STEP 3 Set the switches of the driver

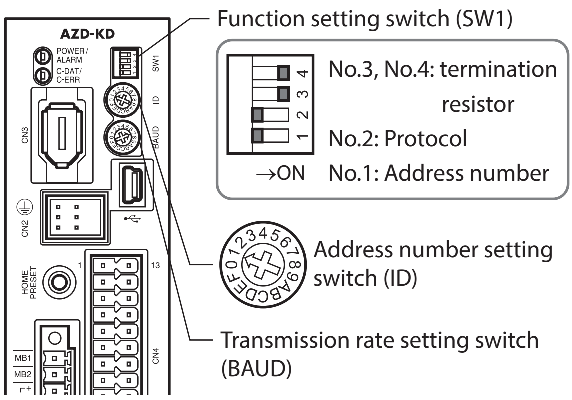
Set the following with the switches of the driver. The status becomes as shown in the following figures after setting.

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**



● **DC power input driver**

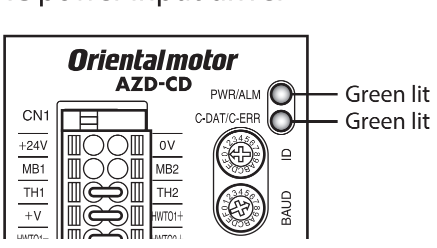


memo Setting of transmission rate is not required. It is fixed to 625,000 bps in the "Baudrate (NETC)" parameter. The BAUD switch can point anywhere.

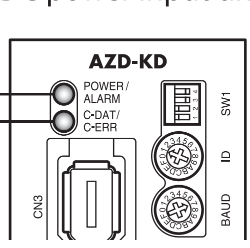
STEP 4 Cycle the power and check the LED

Check that the LED of the driver and **NETC02-CC** are as shown in the figure.

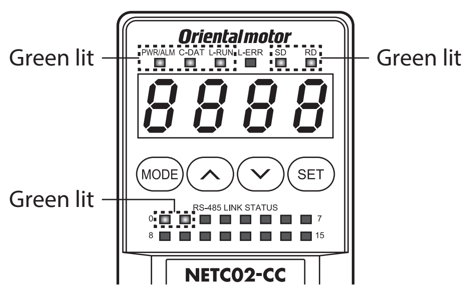
■ AC power input driver



■ 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.

STEP1	Check an operation	Execute continuous operation in the reverse direction, and check if the operation is performed.
STEP2	Perform positioning operation	Set the position data, and check if the operation is performed.
STEP3	Monitor the detection position	Check if positioning operation in the STEP 2 was properly performed.
STEP4	Non-volatile memory write	Write the position data to the non-volatile memory.

■ 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.

1. 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	

2. 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	

memo If not operated, check the setting of the switches, and assignments of remote I/O and remote register.

STEP 2 Perform positioning operation

1. In order to make easier to check that the operation was properly performed when positioning operation was performed, set the position information to "0."
   1) 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)

memo Unless "1" is set to the data area, the command is not executed.

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-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	Write completed
1	D-END1	RX1082	1	

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	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	Write execution
1	D-REQ1	RY1082	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-END0	RX1080	1	Write completed
1	D-END1	RX1082	1	

   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	Write completed
1	D-REQ1	RY1082	0	

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	End of monitor
1	D-REQ3	RY1086	0	

STEP 4 Write the position information to the non-volatile memory.

memo 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	Write execution
1	D-REQ1	RY1082	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-END0	RX1080	1	Write completed
1	D-END1	RX1082	1	

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	Write completed
1	D-REQ1	RY1082	0	

memo 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.

STEP1	**Check an operation**	Execute continuous operation in the reverse direction, and check if the operation is performed.
STEP2	**P-PRESET execution**	Set the present position to "0."
STEP3	**Monitor the value of the driver**	Read the monitor of the detection position and the value of the position No.0.
STEP4	**Perform positioning operation**	Set the data of the position No.0 to execute positioning operation.
STEP5	**Change of the position data**	Change the data of the position No.0.

■ 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	
	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.

1. 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	

2. 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	

memo 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)

1. Set the present position to "0" using the maintenance command "P-PRESET execution."

Note The maintenance command is performed with the command selection method.

1) 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)

memo Unless "1" is set to the data area, the command is not executed.

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-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	Write completed
1	D-END1	RX1082	1	

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	Write completed
1	D-REQ1	RY1082	0	

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	WR-REQ0	RY1090	1	Start of write
1				

   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	WR-DAT0	RX1090	1	During write
1				

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	

memo 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

1. 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)

2. 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.

STEP1	**Installation and connection** ⇨ p.341	
↓		
STEP2	**Setting of NETC01-ECT** ⇨ p.342	Parameters are enabled after the power is cycled.
↓		
STEP3	**Setting of driver** ⇨ p.343	
↓		
STEP4	**Power cycle and check of LED** ⇨ p.344	Parameters are enabled after the power is cycled.
↓		
STEP5	**Operation of motor** ⇨ p.344	

- **Operation condition**

Here, the motor is supposed to be operated under the following conditions.

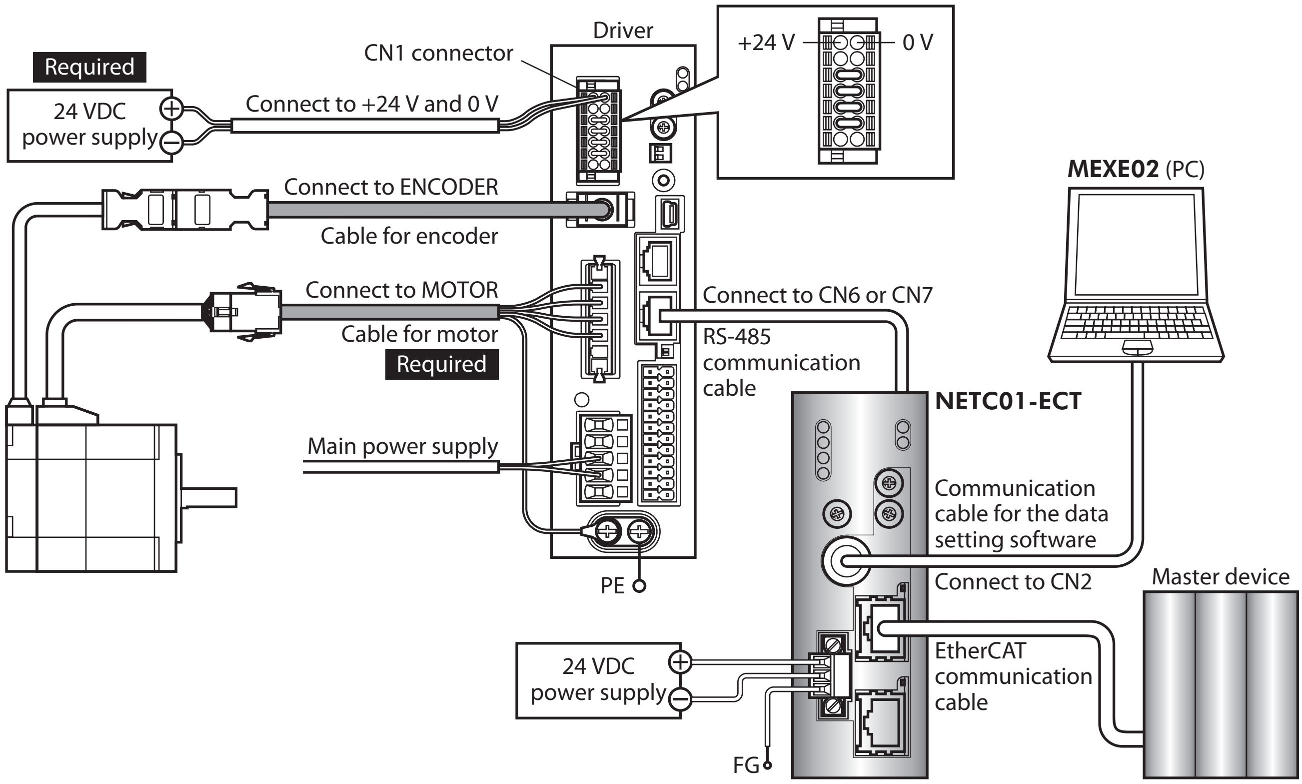
- **NETC01-ECT** node address: 1
- Number of divers connected: One
- Driver address number: 0
- Driver termination resistor: Enabled

Note
- 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.

memo The termination resistor for the **NETC01-ECT** is built into the product. This product can be used without setting the termination resistor.

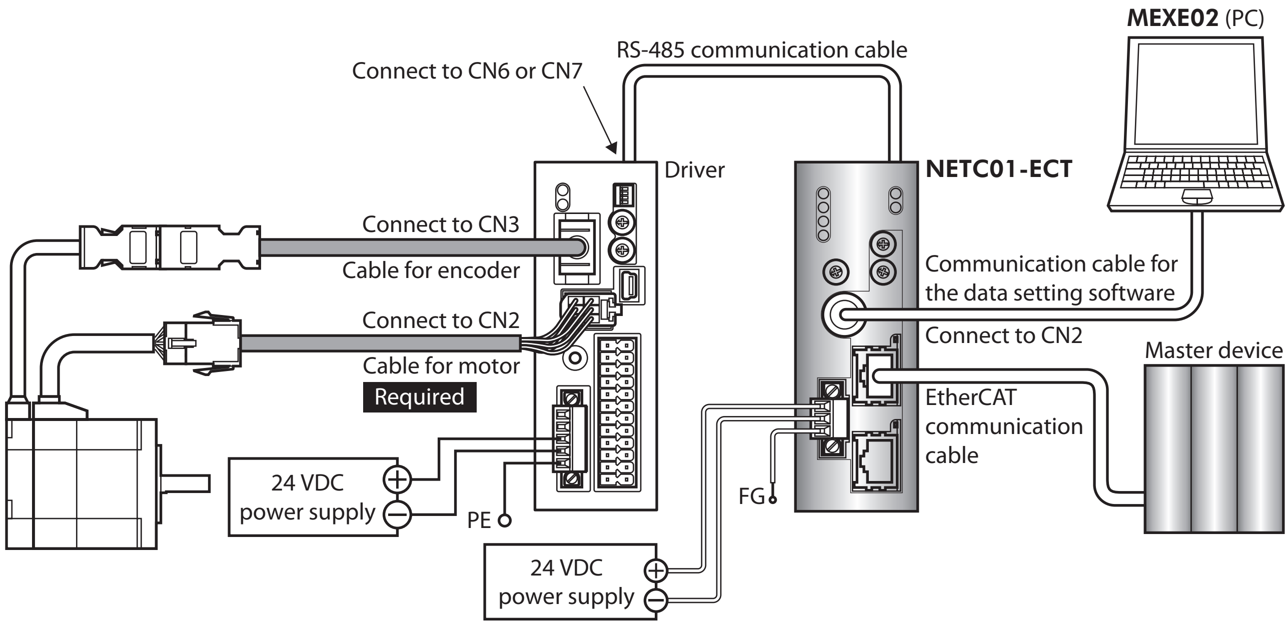
STEP 1 Check the installation and connection

■ 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

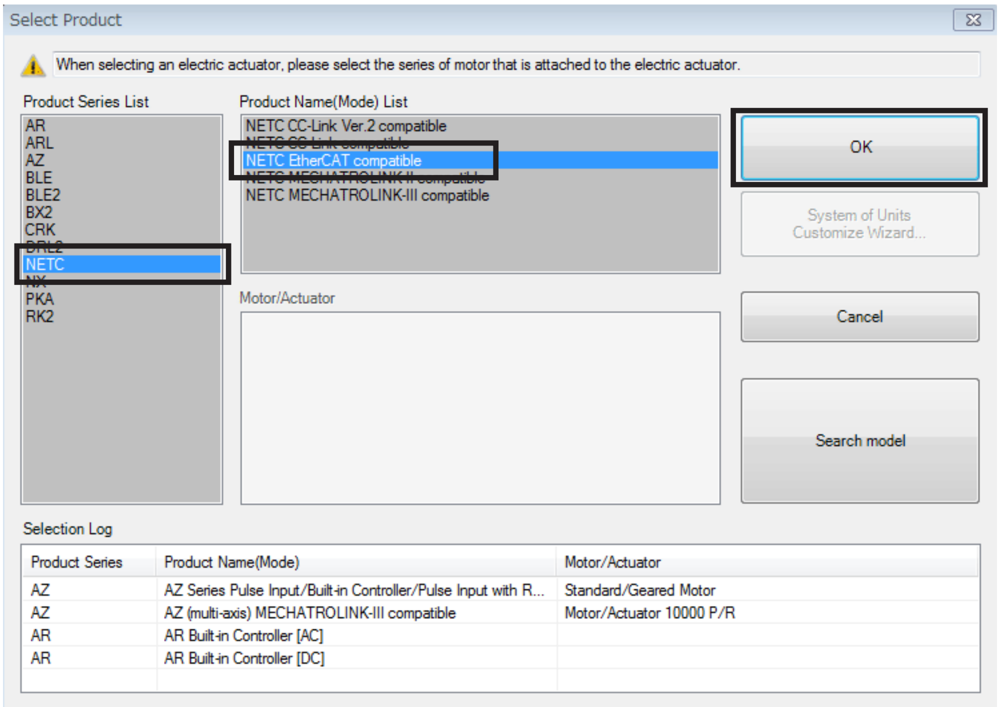


Cables represented in gray color are accessories. Use the cable for encoder when the length of the encoder cable of motor is not enough.

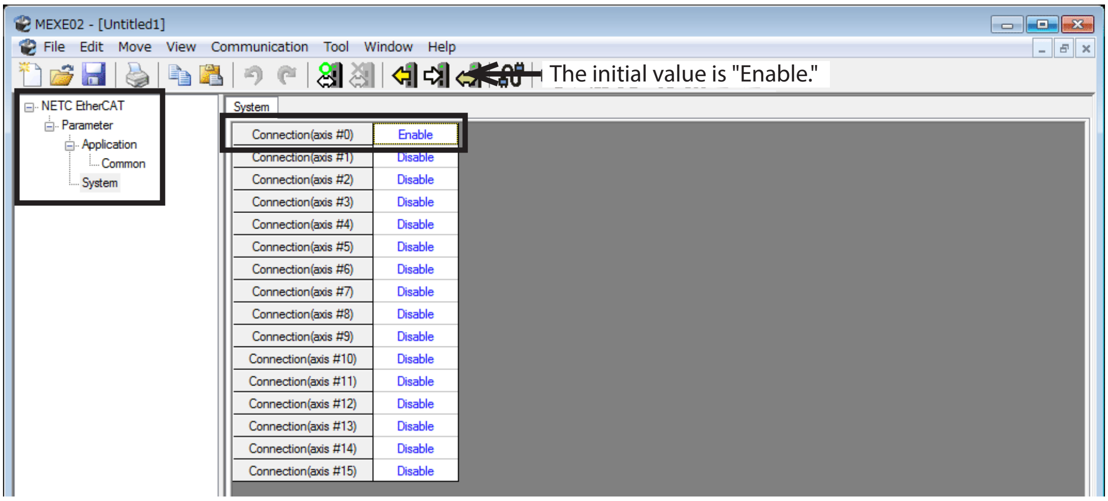
STEP 2 Set the parameters and switches of the NETC01-ECT

Set the parameters and switches of the **NETC01-ECT**.

1. 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.
2. Start the **MEXE02** and set the parameters.
   Select the **NETC01-ECT**.



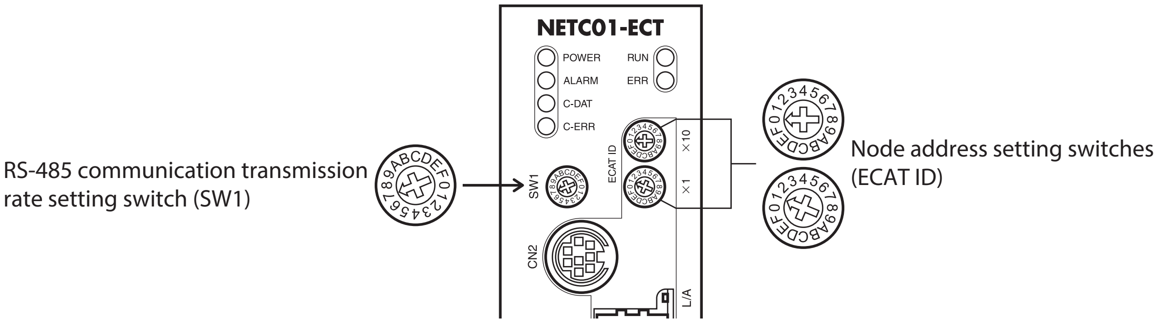
3. Set the "Connection (axis #)" parameter of the driver connected to the **NETC01-ECT** to "Enable" using the **MEXE02**.
   The initial value in the "Connection (axis #0)" parameter is set to "Enable." When the connected driver is 1 unit and the address number of the driver is "0," it is not required 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**. **Setting range** Disable Enable	Enable
	Connection (axis #1) to Connection (axis #15)		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 ×10 to "0" and the ×1 to "1" of the ECAT ID	1 (×10: 0, ×1: 1)



5. Turn off the **NETC01-ECT** power.

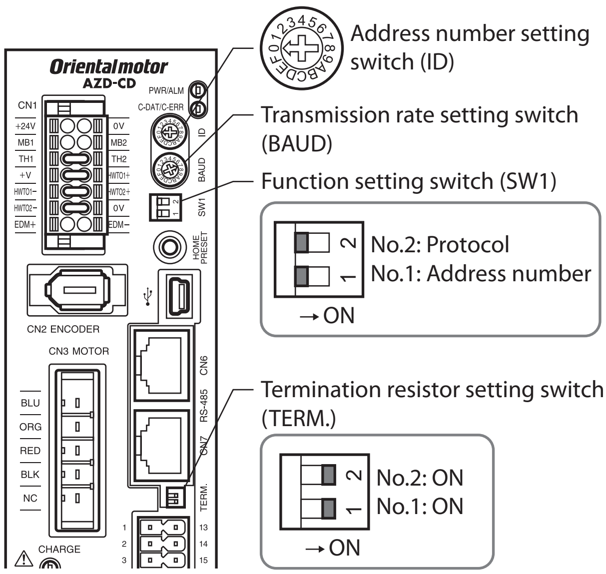
memo
- When multiple drivers are connected, set connection parameters as many as the drivers.
- To activate the changed "Connection (axis #)" parameter, cycling the power supply is required.
- For the SW1, always set to "7." If the switch is set to the dial of "8" or higher, the communication switch 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

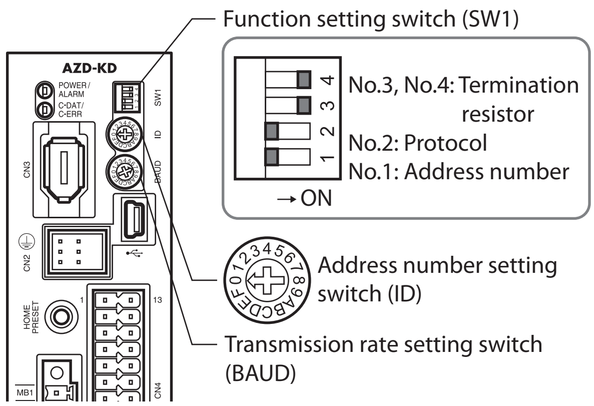
Set the following with the switches of the driver. For the protocol, select "OFF" (network converter). The status becomes as shown in the following figures after setting.

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

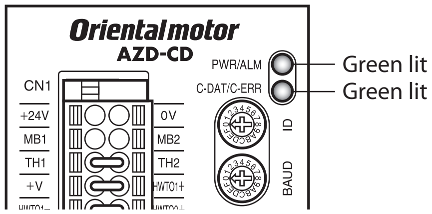


memo
- For the address number, set the one with the "Connection (axis #)" parameter of the **NETC01-ECT** set to "Enable."
- For the **AZ** Series, the transmission rate does not require to set. It is fixed to 625,000 bps in the "Baudrate(NETC)" parameter. The BAUD switch can point anywhere.

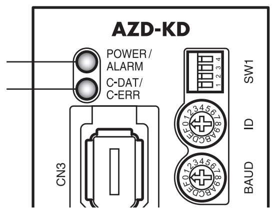
STEP 4 Cycle the power and check the LED

Check that the LED of the driver and **NETC01-ECT** are as shown in the figure.

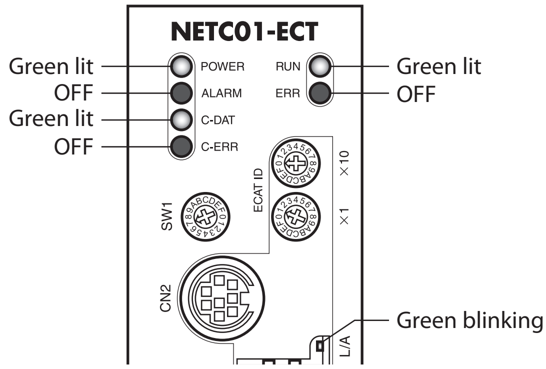
■ AC power input driver



■ 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							
2600h	0	–	U8	R	Number of Sub-index: 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
					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

memo
- 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
					ALM-RST	FREE	STOP	ZHOME	START	M2	M1	M0
	2	I/O Command (upper)	U8	RW	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	RW	Command code: 2068h (monitor of detection speed [Hz])							
	3	Data	INT32	RW	Reserved (not used)							
	4	TRIG	U8	RW	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]
					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
					ALM-RST	FREE	STOP	ZHOME	START	M2	M1	M0
	2	I/O Command (upper)	U8	RW	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.

memo The monitor is continued to update while the TRIG of the remote monitor command is being ON.

[Remote monitor response of **NETC01-ECT**]

<table>
<tr><th>CoE Index</th><th>Sub-Index</th><th>Item</th><th>Type</th><th>Access</th><th colspan="8">Description</th></tr>
<tr><td rowspan="6">2B00h
(Address number 0)</td><td>0</td><td>–</td><td>U8</td><td>R</td><td colspan="8">Sub-index number: 4</td></tr>
<tr><td>1</td><td>Axis</td><td>U8</td><td>R</td><td colspan="8">Address number response: 0</td></tr>
<tr><td>2</td><td>Command</td><td>U16</td><td>R</td><td colspan="8">Command code response: 2068h</td></tr>
<tr><td>3</td><td>Data</td><td>INT32</td><td>R</td><td colspan="8">Monitor data: 1000</td></tr>
<tr><td rowspan="2">4</td><td rowspan="2">Status</td><td rowspan="2">U8</td><td rowspan="2">R</td><td>bit[7]</td><td>bit[6]</td><td>bit[5]</td><td>bit[4]</td><td>bit[3]</td><td>bit[2]</td><td>bit[1]</td><td>bit[0]</td></tr>
<tr><td>–</td><td>–</td><td>–</td><td>–</td><td>Command Error</td><td>Axis Error</td><td>STATUS</td><td>TRIG_R</td></tr>
</table>

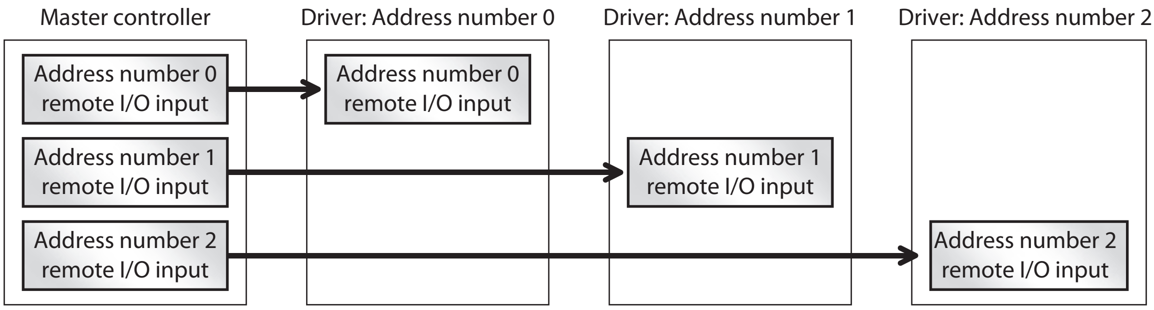
4. Turn the TRIG OFF again to finish the monitor.

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.

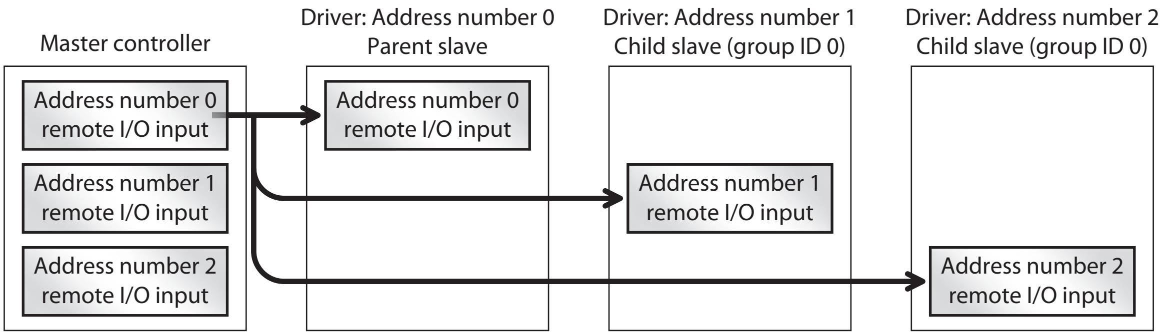
- **Example) When the group function is disabled**

Remote I/O is input separately to all the drivers.



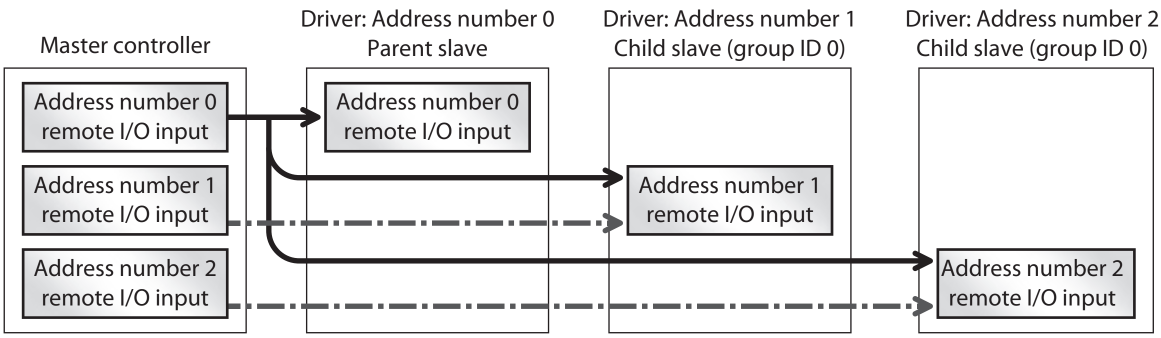
- **Example) When the group function is enabled (all the remote I/O are input collectively)**

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.



memo 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.

memo 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 READ	Command code WRITE	Name	Description	Initial value
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.351) 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)	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
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)		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		
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.

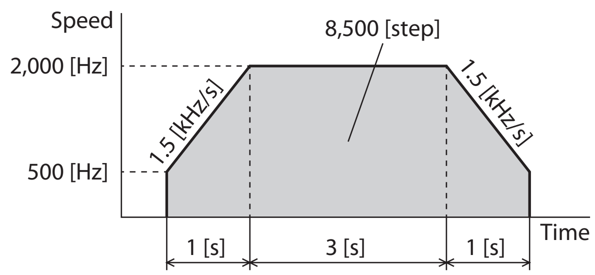
Operation type	Position	Operating speed	Starting/changing speed rate	Stopping deceleration	Operating current
Absolute positioning	0 step (initial value)	2,000 Hz	1.5 kHz/s	1.5 kHz/s	100.0%

■ 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.

memo 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**)		
Address No.	Description	Setting example
RWw00	Command code	4149 (1035h)
RWw01	Address number	0
RWw02	Data	8,500 steps (target position)
RWw03		

RWr (**NETC02-CC** to Master)		
Address No.	Description	Setting example
RWr00	Command code response	4149 (1035h)
RWr01	Address number response	0
RWr02	Data	0 to 8,500 steps (monitoring of command position)
RWr03		

memo 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

<table>
<tr><th>CoE Index</th><th>Sub-Index</th><th>Item</th><th>Type</th><th>Access</th><th colspan="8">Description</th></tr>
<tr><td rowspan="6">2800h (Address number 0)</td><td>0</td><td>–</td><td>U8</td><td>R</td><td colspan="8">Sub-index number: 4</td></tr>
<tr><td>1</td><td>Axis</td><td>U8</td><td>RW</td><td colspan="8">Reserved (not used)</td></tr>
<tr><td>2</td><td>Command</td><td>U16</td><td>RW</td><td colspan="8">Command code: 4149 (1035h)</td></tr>
<tr><td>3</td><td>Data</td><td>INT32</td><td>RW</td><td colspan="8">Data: 8500 step (target position)</td></tr>
<tr><td rowspan="2">4</td><td rowspan="2">TRIG</td><td rowspan="2">U8</td><td rowspan="2">RW</td><td>bit[7]</td><td>bit[6]</td><td>bit[5]</td><td>bit[4]</td><td>bit[3]</td><td>bit[2]</td><td>bit[1]</td><td>bit[0]</td></tr>
<tr><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>TRIG</td></tr>
</table>

Remote register response

<table>
<tr><th>CoE Index</th><th>Sub-Index</th><th>Item</th><th>Type</th><th>Access</th><th colspan="8">Description</th></tr>
<tr><td rowspan="6">2900h (Address number 0)</td><td>0</td><td>–</td><td>U8</td><td>R</td><td colspan="8">Sub-index number: 4</td></tr>
<tr><td>1</td><td>Axis</td><td>U8</td><td>R</td><td colspan="8">Reserved (not used)</td></tr>
<tr><td>2</td><td>Command</td><td>U16</td><td>R</td><td colspan="8">Command code response: 4149 (1035h)</td></tr>
<tr><td>3</td><td>Data</td><td>INT32</td><td>R</td><td colspan="8">Data response: 0 to 8500 step (monitoring of command position)</td></tr>
<tr><td rowspan="2">4</td><td rowspan="2">Status</td><td rowspan="2">U8</td><td rowspan="2">R</td><td>bit[7]</td><td>bit[6]</td><td>bit[5]</td><td>bit[4]</td><td>bit[3]</td><td>bit[2]</td><td>bit[1]</td><td>bit[0]</td></tr>
<tr><td>–</td><td>–</td><td>–</td><td>–</td><td>Command Error</td><td>Axis Error</td><td>STATUS</td><td>TRIG_R</td></tr>
</table>

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.

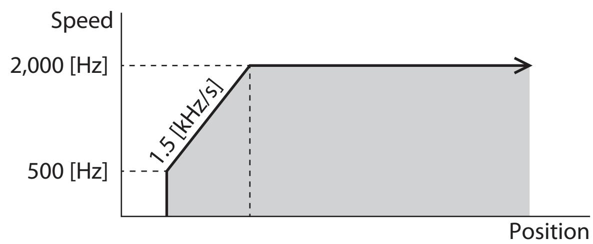
Operation type	Position	Operating speed	Starting/changing speed rate	Stopping deceleration	Operating current
Continuous operation (Position control)	0 step	0 Hz (initial value)	1.5 kHz/s	1.5 kHz/s	100.0%

■ 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.

memo
- 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**)		
Address No.	Description	Setting example
RWw00	Command code	4150 (1036h)
RWw01	Address number	0
RWw02	Data	2,000 Hz (speed)
RWw03		

RWr (**NETC02-CC** to Master)		
Address No.	Description	Setting example
RWr00	Command code response	4150 (1036h)
RWr01	Address number response	0
RWr02	Data	0 to 2,000 Hz (monitoring of command speed [Hz])
RWr03		

memo 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

<table>
<tr><th>CoE Index</th><th>Sub-Index</th><th>Item</th><th>Type</th><th>Access</th><th colspan="8">Description</th></tr>
<tr><td rowspan="6">2800h (Address number 0)</td><td>0</td><td>–</td><td>U8</td><td>R</td><td colspan="8">Sub-index number: 4</td></tr>
<tr><td>1</td><td>Axis</td><td>U8</td><td>RW</td><td colspan="8">Reserved (not used)</td></tr>
<tr><td>2</td><td>Command</td><td>U16</td><td>RW</td><td colspan="8">Command code: 4150 (1036h)</td></tr>
<tr><td>3</td><td>Data</td><td>INT32</td><td>RW</td><td colspan="8">Data: 2000 step (speed)</td></tr>
<tr><td rowspan="2">4</td><td rowspan="2">TRIG</td><td rowspan="2">U8</td><td rowspan="2">RW</td><td>bit[7]</td><td>bit[6]</td><td>bit[5]</td><td>bit[4]</td><td>bit[3]</td><td>bit[2]</td><td>bit[1]</td><td>bit[0]</td></tr>
<tr><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>TRIG</td></tr>
</table>

Remote register response

<table>
<tr><th>CoE Index</th><th>Sub-Index</th><th>Item</th><th>Type</th><th>Access</th><th colspan="8">Description</th></tr>
<tr><td rowspan="6">2900h (Address number 0)</td><td>0</td><td>–</td><td>U8</td><td>R</td><td colspan="8">Sub-index number: 4</td></tr>
<tr><td>1</td><td>Axis</td><td>U8</td><td>R</td><td colspan="8">Reserved (not used)</td></tr>
<tr><td>2</td><td>Command</td><td>U16</td><td>R</td><td colspan="8">Command code response: 4150 (1036h)</td></tr>
<tr><td>3</td><td>Data</td><td>INT32</td><td>R</td><td colspan="8">Data response: 0 to 2000 Hz (monitoring of command speed [Hz])</td></tr>
<tr><td rowspan="2">4</td><td rowspan="2">Status</td><td rowspan="2">U8</td><td rowspan="2">R</td><td>bit[7]</td><td>bit[6]</td><td>bit[5]</td><td>bit[4]</td><td>bit[3]</td><td>bit[2]</td><td>bit[1]</td><td>bit[0]</td></tr>
<tr><td>–</td><td>–</td><td>–</td><td>–</td><td>Command Error</td><td>Axis Error</td><td>STATUS</td><td>TRIG_R</td></tr>
</table>

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 (or 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	• 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.	• 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	• 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**.

Note 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.

Table of contents

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 immediately .... Executes the recalculation and setup as soon as the parameter is written.
- Effective after stopping the operation .... Executes the recalculation and setup after stopping the operation.
- Effective after executing the configuration .... Executes 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.

memo
- 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.362)	–	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.419, assignment of input signals ⇨ p.429)

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-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]

■ 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

[ ]: Initial value. They can be changed by parameters. (Parameters ⇨ p.419, assignment of output signals ⇨ p.430)

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]

3 Group commands

These are commands related to group send. The set values are stored in RAM.

Modbus communication register address Upper	Modbus communication register address Lower	Name	Description	Initial value	R/W	Industrial network command code READ	Industrial network command code 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 READ	Industrial network command code WRITE	Description							
25 (0019h)	4121 (1019h)	bit15	bit14	bit13	bit12	bit11	bit10	bit9	bit8
		–	–	–	–	–	–	–	–
		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)

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.

Note 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.369)	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	Enable
Input signal	Enable	Disable	Enable

memo 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 (008C)	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	Shows the oldest alarm record.	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	Shows communication error code records.	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.378)	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.473)	8301 (206Dh)
222 (00DEh)	223 (00DFh)	Target position	• Shows the target command position in the following operations in an absolute coordinate. – 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. – 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.378)	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 (00FCh)	253 (00FDh)	Odometer	Shows the cumulative travel distance of the motor with the number of revolutions. (1=0.1 kRev) It cannot 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 Upper	Lower	Name	Description	Industrial network command code
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 α 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 Upper	Modbus communication register address Lower	Name	Description	Industrial network command code
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. Value of READ / SW1-No.2 / SW1-No.1: 0 / ON / ON 1 / OFF / ON 2 / ON / OFF 3 / OFF / OFF	8357 (20A5h)
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.379)	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 Upper	Modbus communication register address Lower	Name	Description	Industrial network command code
2632 (0A48h)	2633 (0A49h)	Information generating time record 5	Shows the records of the time when information was generated.	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		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		9518 (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)	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.	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)		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 Upper	Modbus communication register address Lower	Name	Description	Industrial network command code
2976 (0BA0h)	2977 (0BA1h)	Latch monitor status (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.	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)		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 0000 0001	I/O (user setting)
00000002h	0000 0000 0000 0000 0000 0000 0000 0010	Position deviation
00000004h	0000 0000 0000 0000 0000 0000 0000 0100	Driver temperature
00000008h	0000 0000 0000 0000 0000 0000 0000 1000	Motor temperature
00000010h	0000 0000 0000 0000 0000 0000 0001 0000	Overvoltage
00000020h	0000 0000 0000 0000 0000 0000 0010 0000	Undervoltage
00000040h	0000 0000 0000 0000 0000 0000 0100 0000	Overload time
00000100h	0000 0000 0000 0000 0000 0001 0000 0000	Speed
00000200h	0000 0000 0000 0000 0000 0010 0000 0000	Operation start error
00000400h	0000 0000 0000 0000 0000 0100 0000 0000	ZHOME start error
00000800h	0000 0000 0000 0000 0000 1000 0000 0000	Preset being required
00002000h	0000 0000 0000 0000 0010 0000 0000 0000	Electronic gear setting error
00004000h	0000 0000 0000 0000 0100 0000 0000 0000	Wrap setting error
00008000h	0000 0000 0000 0000 1000 0000 0000 0000	RS-485 communication error
00010000h	0000 0000 0000 0001 0000 0000 0000 0000	Prohibition for forward direction operation
00020000h	0000 0000 0000 0010 0000 0000 0000 0000	Prohibition for reverse direction operation
00040000h	0000 0000 0000 0100 0000 0000 0000 0000	Cumulative load 0
00080000h	0000 0000 0000 1000 0000 0000 0000 0000	Cumulative load 1
00100000h	0000 0000 0001 0000 0000 0000 0000 0000	Tripmeter
00200000h	0000 0000 0010 0000 0000 0000 0000 0000	Odometer
10000000h	0001 0000 0000 0000 0000 0000 0000 0000	Operation start restricted mode
20000000h	0010 0000 0000 0000 0000 0000 0000 0000	I/O test mode
40000000h	0100 0000 0000 0000 0000 0000 0000 0000	Configuration request
80000000h	1000 0000 0000 0000 0000 0000 0000 0000	Reboot request

■ Direct I/O

The following are the bit arrangements of direct I/O.

<table>
<tr><th>Modbus communication register address</th><th colspan="8">Description</th><th>Industrial network command code</th></tr>
<tr><td rowspan="4">212
(00D4h)</td><td>bit15</td><td>bit14</td><td>bit13</td><td>bit12</td><td>bit11</td><td>bit10</td><td>bit9</td><td>bit8</td><td rowspan="8">8298
(206Ah)</td></tr>
<tr><td>BSG</td><td>ASG</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>bit7</td><td>bit6</td><td>bit5</td><td>bit4</td><td>bit3</td><td>bit2</td><td>bit1</td><td>bit0</td></tr>
<tr><td>–</td><td>–</td><td>DOUT5</td><td>DOUT4</td><td>DOUT3</td><td>DOUT2</td><td>DOUT1</td><td>DOUT0</td></tr>
<tr><td rowspan="4">213
(00D5h)</td><td>bit15</td><td>bit14</td><td>bit13</td><td>bit12</td><td>bit11</td><td>bit10</td><td>bit9</td><td>bit8</td></tr>
<tr><td>VIR-IN3</td><td>VIR-IN2</td><td>VIR-IN1</td><td>VIR-IN0</td><td>–</td><td>EXT-IN</td><td>DIN9</td><td>DIN8</td></tr>
<tr><td>bit7</td><td>bit6</td><td>bit5</td><td>bit4</td><td>bit3</td><td>bit2</td><td>bit1</td><td>bit0</td></tr>
<tr><td>DIN7</td><td>DIN6</td><td>DIN5</td><td>DIN4</td><td>DIN3</td><td>DIN2</td><td>DIN1</td><td>DIN0</td></tr>
</table>

■ I/O status

The following are the bit arrangements of internal I/O.

● Input signals

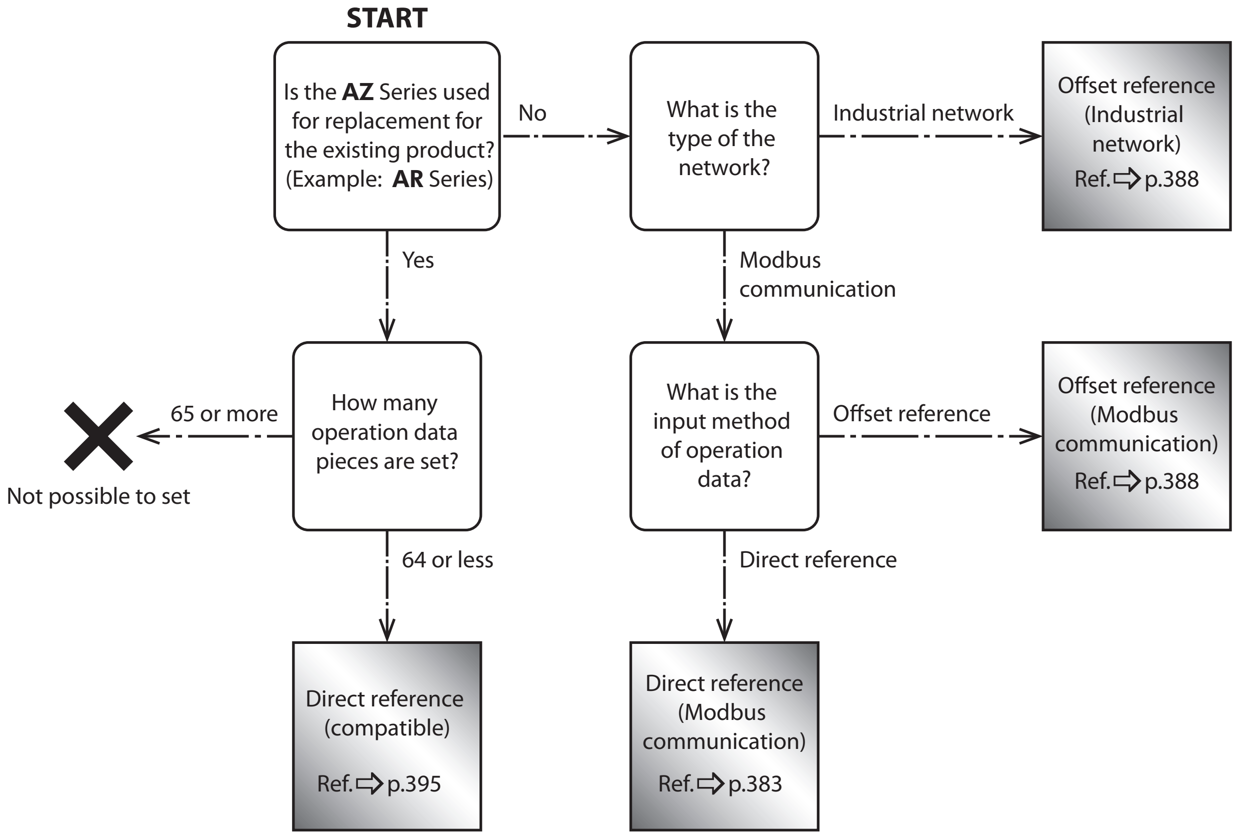
<table>
<tr><th>Modbus communication register address</th><th colspan="8">Description</th><th>Industrial network command code</th></tr>
<tr><td rowspan="4">368
(0170h)</td><td>bit15</td><td>bit14</td><td>bit13</td><td>bit12</td><td>bit11</td><td>bit10</td><td>bit9</td><td>bit8</td><td rowspan="8">8376
(20B8h)</td></tr>
<tr><td>SLIT</td><td>HOMES</td><td>RV-LS</td><td>FW-LS</td><td>RV-BLK</td><td>FW-BLK</td><td>–</td><td>–</td></tr>
<tr><td>bit7</td><td>bit6</td><td>bit5</td><td>bit4</td><td>bit3</td><td>bit2</td><td>bit1</td><td>bit0</td></tr>
<tr><td>SPD-LMT</td><td>CRNT-LMT</td><td>T-MODE</td><td>PLS-DIS</td><td>PLS-XMODE</td><td>CCM</td><td>–</td><td>HMI</td></tr>
<tr><td rowspan="4">369
(0171h)</td><td>bit15</td><td>bit14</td><td>bit13</td><td>bit12</td><td>bit11</td><td>bit10</td><td>bit9</td><td>bit8</td></tr>
<tr><td>–</td><td>INFO-CLR</td><td>LAT-CLR</td><td>ETO-CLR</td><td>–</td><td>EL-PRST</td><td>P-PRESET</td><td>ALM-RST</td></tr>
<tr><td>bit7</td><td>bit6</td><td>bit5</td><td>bit4</td><td>bit3</td><td>bit2</td><td>bit1</td><td>bit0</td></tr>
<tr><td>BREAK-ATSQ</td><td>PAUSE</td><td>STOP</td><td>STOP-COFF</td><td>CLR</td><td>C-ON</td><td>FREE</td><td>Not used</td></tr>
<tr><td rowspan="4">370
(0172h)</td><td>bit15</td><td>bit14</td><td>bit13</td><td>bit12</td><td>bit11</td><td>bit10</td><td>bit9</td><td>bit8</td><td rowspan="4">8377
(20B9h)</td></tr>
<tr><td>–</td><td>–</td><td>RV-PSH</td><td>FW-PSH</td><td>RV-SPD</td><td>FW-SPD</td><td>RV-POS</td><td>FW-POS</td></tr>
<tr><td>bit7</td><td>bit6</td><td>bit5</td><td>bit4</td><td>bit3</td><td>bit2</td><td>bit1</td><td>bit0</td></tr>
<tr><td>RV-JOG-C</td><td>FW-JOG-C</td><td>RV-JOG-P</td><td>FW-JOG-P</td><td>RV-JOG-H</td><td>FW-JOG-H</td><td>RV-JOG</td><td>FW-JOG</td></tr>
<tr><td rowspan="4">371
(0173h)</td><td>bit15</td><td>bit14</td><td>bit13</td><td>bit12</td><td>bit11</td><td>bit10</td><td>bit9</td><td>bit8</td><td rowspan="4">8377
(20B9h)</td></tr>
<tr><td>D-SEL7</td><td>D-SEL6</td><td>D-SEL5</td><td>D-SEL4</td><td>D-SEL3</td><td>D-SEL2</td><td>D-SEL1</td><td>D-SEL0</td></tr>
<tr><td>bit7</td><td>bit6</td><td>bit5</td><td>bit4</td><td>bit3</td><td>bit2</td><td>bit1</td><td>bit0</td></tr>
<tr><td>–</td><td>–</td><td>ZHOME</td><td>HOME</td><td>NEXT</td><td>–</td><td>SSTART</td><td>START</td></tr>
<tr><td rowspan="4">372
(0174h)</td><td>bit15</td><td>bit14</td><td>bit13</td><td>bit12</td><td>bit11</td><td>bit10</td><td>bit9</td><td>bit8</td><td rowspan="4">8378
(20BAh)</td></tr>
<tr><td>R15</td><td>R14</td><td>R13</td><td>R12</td><td>R11</td><td>R10</td><td>R9</td><td>R8</td></tr>
<tr><td>bit7</td><td>bit6</td><td>bit5</td><td>bit4</td><td>bit3</td><td>bit2</td><td>bit1</td><td>bit0</td></tr>
<tr><td>R7</td><td>R6</td><td>R5</td><td>R4</td><td>R3</td><td>R2</td><td>R1</td><td>R0</td></tr>
<tr><td rowspan="4">373
(0175h)</td><td>bit15</td><td>bit14</td><td>bit13</td><td>bit12</td><td>bit11</td><td>bit10</td><td>bit9</td><td>bit8</td><td rowspan="4">8378
(20BAh)</td></tr>
<tr><td>PLSM-REQ</td><td>MON-CLK</td><td>MON-REQ1</td><td>MON-REQ0</td><td>TEACH</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>bit7</td><td>bit6</td><td>bit5</td><td>bit4</td><td>bit3</td><td>bit2</td><td>bit1</td><td>bit0</td></tr>
<tr><td>M7</td><td>M6</td><td>M5</td><td>M4</td><td>M3</td><td>M2</td><td>M1</td><td>M0</td></tr>
<tr><td rowspan="4">374
(0176h)</td><td>bit15</td><td>bit14</td><td>bit13</td><td>bit12</td><td>bit11</td><td>bit10</td><td>bit9</td><td>bit8</td><td rowspan="8">8379
(20BBh)</td></tr>
<tr><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>bit7</td><td>bit6</td><td>bit5</td><td>bit4</td><td>bit3</td><td>bit2</td><td>bit1</td><td>bit0</td></tr>
<tr><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td rowspan="4">375
(0177h)</td><td>bit15</td><td>bit14</td><td>bit13</td><td>bit12</td><td>bit11</td><td>bit10</td><td>bit9</td><td>bit8</td></tr>
<tr><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>bit7</td><td>bit6</td><td>bit5</td><td>bit4</td><td>bit3</td><td>bit2</td><td>bit1</td><td>bit0</td></tr>
<tr><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
</table>

- **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	
	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	
	–	–	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-DRVTMP	INFO-POSERR	INFO-USRIO	

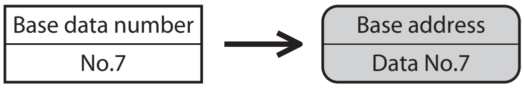
9 Overview of operation data R/W command address arrangement

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.



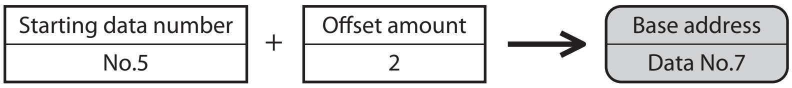
9-1 Overview of direct reference

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.383)



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.388)

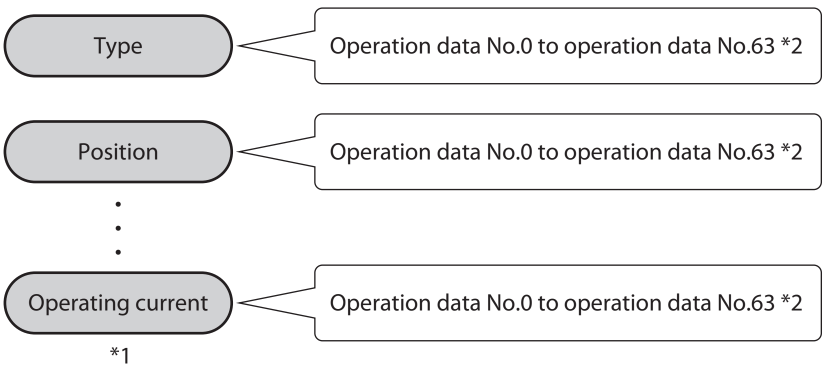


memo
- Up to 32 pieces of operation data can be specified in offset reference. (The offset value is up to 31)
- The set value of the "DATA offset reference origin" parameter is stored in RAM.

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.395)

Note
- 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 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.
Dec	Hex	
12096	2F40	No.93
12160	2F80	No.94
12224	2FC0	No.95
12288	3000	No.96
12352	3040	No.97
12416	3080	No.98
12480	30C0	No.99
12544	3100	No.100
12608	3140	No.101
12672	3180	No.102
12736	31C0	No.103
12800	3200	No.104
12864	3240	No.105
12928	3280	No.106
12992	32C0	No.107
13056	3300	No.108
13120	3340	No.109
13184	3380	No.110
13248	33C0	No.111
13312	3400	No.112
13376	3440	No.113
13440	3480	No.114
13504	34C0	No.115
13568	3500	No.116
13632	3540	No.117
13696	3580	No.118
13760	35C0	No.119
13824	3600	No.120
13888	3640	No.121
13952	3680	No.122
14016	36C0	No.123
14080	3700	No.124
14144	3740	No.125
14208	3780	No.126
14272	37C0	No.127
14336	3800	No.128
14400	3840	No.129
14464	3880	No.130
14528	38C0	No.131
14592	3900	No.132
14656	3940	No.133
14720	3980	No.134
14784	39C0	No.135
14848	3A00	No.136
14912	3A40	No.137

Modbus Communication Base address		Operation data No.
Dec	Hex	
14976	3A80	No.138
15040	3AC0	No.139
15104	3B00	No.140
15168	3B40	No.141
15232	3B80	No.142
15296	3BC0	No.143
15360	3C00	No.144
15424	3C40	No.145
15488	3C80	No.146
15552	3CC0	No.147
15616	3D00	No.148
15680	3D40	No.149
15744	3D80	No.150
15808	3DC0	No.151
15872	3E00	No.152
15936	3E40	No.153
16000	3E80	No.154
16064	3EC0	No.155
16128	3F00	No.156
16192	3F40	No.157
16256	3F80	No.158
16320	3FC0	No.159
16384	4000	No.160
16448	4040	No.161
16512	4080	No.162
16576	40C0	No.163
16640	4100	No.164
16704	4140	No.165
16768	4180	No.166
16832	41C0	No.167
16896	4200	No.168
16960	4240	No.169
17024	4280	No.170
17088	42C0	No.171
17152	4300	No.172
17216	4340	No.173
17280	4380	No.174
17344	43C0	No.175
17408	4400	No.176
17472	4440	No.177
17536	4480	No.178
17600	44C0	No.179
17664	4500	No.180
17728	4540	No.181
17792	4580	No.182

Modbus Communication Base address		Operation data No.
Dec	Hex	
17856	45C0	No.183
17920	4600	No.184
17984	4640	No.185
18048	4680	No.186
18112	46C0	No.187
18176	4700	No.188
18240	4740	No.189
18304	4780	No.190
18368	47C0	No.191
18432	4800	No.192
18496	4840	No.193
18560	4880	No.194
18624	48C0	No.195
18688	4900	No.196
18752	4940	No.197
18816	4980	No.198
18880	49C0	No.199
18944	4A00	No.200
19008	4A40	No.201
19072	4A80	No.202
19136	4AC0	No.203
19200	4B00	No.204
19264	4B40	No.205
19328	4B80	No.206
19392	4BC0	No.207
19456	4C00	No.208
19520	4C40	No.209
19584	4C80	No.210
19648	4CC0	No.211
19712	4D00	No.212
19776	4D40	No.213
19840	4D80	No.214
19904	4DC0	No.215
19968	4E00	No.216
20032	4E40	No.217
20096	4E80	No.218
20160	4EC0	No.219
20224	4F00	No.220
20288	4F40	No.221
20352	4F80	No.222
20416	4FC0	No.223
20480	5000	No.224
20544	5040	No.225
20608	5080	No.226
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 ⇨ p.383)
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) Base address + 1 (lower)	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 + 2 (upper) Base address + 3 (lower)	Position	−2,147,483,648 to 2,147,483,647 steps	0	B
Base address + 4 (upper) Base address + 5 (lower)	Operating speed	−4,000,000 to 4,000,000 Hz	1,000	B
Base address + 6 (upper) Base address + 7 (lower)	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 + 8 (upper) Base address + 9 (lower)	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 + 10 (upper) Base address + 11 (lower)	Operating current	0 to 1,000 (1=0.1%)	1,000	B
Base address + 12 (upper) Base address + 13 (lower)	Drive-complete delay time	0 to 65,535 (1=0.001 s)	0	B
Base address + 14 (upper) Base address + 15 (lower)	Link	0: No link 1: Manual sequential 2: Automatic sequential 3: Continuous form connection	0	B
Base address + 16 (upper) Base address + 17 (lower)	Next data No.	−256: Stop −2: ↓↓ (+2) −1: ↓ (+1) 0 to 255: Operation data number	−1	B
Base address + 18 (upper) Base address + 19 (lower)	Area offset	−2,147,483,648 to 2,147,483,647 steps	0	B
Base address + 20 (upper) Base address + 21 (lower)	Area width	−1: Disable 0 to 4,194,303: Set by 1 step	−1	B

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.383, 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.386.

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.383, 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.386.

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.383, 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.386.

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

memo 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

memo 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.

memo 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.
READ	WRITE	
3072 (C00h)	7168 (1C00h)	Starting data No. + 0
3104 (C20h)	7200 (1C20h)	Starting data No. + 1
3136 (C40h)	7232 (1C40h)	Starting data No. + 2
3168 (C60h)	7264 (1C60h)	Starting data No. + 3
3200 (C80h)	7296 (1C80h)	Starting data No. + 4
3232 (CA0h)	7328 (1CA0h)	Starting data No. + 5
3264 (CC0h)	7360 (1CC0h)	Starting data No. + 6
3296 (CE0h)	7392 (1CE0h)	Starting data No. + 7
3328 (D00h)	7424 (1D00h)	Starting data No. + 8
3360 (D20h)	7456 (1D20h)	Starting data No. + 9
3392 (D40h)	7488 (1D40h)	Starting data No. + 10
3424 (D60h)	7520 (1D60h)	Starting data No. + 11
3456 (D80h)	7552 (1D80h)	Starting data No. + 12
3488 (DA0h)	7584 (1DA0h)	Starting data No. + 13
3520 (DC0h)	7616 (1DC0h)	Starting data No. + 14
3552 (DE0h)	7648 (1DE0h)	Starting data No. + 15

Industrial network base command code		Operation data No.
READ	WRITE	
3584 (E00h)	7680 (1E00h)	Starting data No. + 16
3616 (E20h)	7712 (1E20h)	Starting data No. + 17
3648 (E40h)	7744 (1E40h)	Starting data No. + 18
3680 (E60h)	7776 (1E60h)	Starting data No. + 19
3712 (E80h)	7808 (1E80h)	Starting data No. + 20
3744 (EA0h)	7840 (1EA0h)	Starting data No. + 21
3776 (EC0h)	7872 (1EC0h)	Starting data No. + 22
3808 (EE0h)	7904 (1EE0h)	Starting data No. + 23
3840 (F00h)	7936 (1F00h)	Starting data No. + 24
3872 (F20h)	7968 (1F20h)	Starting data No. + 25
3904 (F40h)	8000 (1F40h)	Starting data No. + 26
3936 (F60h)	8032 (1F60h)	Starting data No. + 27
3968 (F80h)	8064 (1F80h)	Starting data No. + 28
4000 (FA0h)	8096 (1FA0h)	Starting data No. + 29
4032 (FC0h)	8128 (1FC0h)	Starting data No. + 30
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.389)
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.389, command code ⇨ p.390)
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.389, 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.390.
- The operation data No.1 has a value of the operation data No.0 with offset 1 added. From the table on p.389, 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.390.
- 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.

		Base address (operation data No.0)		Offset=1 (operation data No.1)		...	Offset=31 (operation data No.31)	
Setting item	Calculation method	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)

- **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.389, 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.390.
  Similarly, calculate the command codes of the operation data No.33 to No.63.

Setting item	Calculation method	Base address (operation data No.32) Industrial network command code READ	Base address (operation data No.32) Industrial network command code WRITE	Offset=1 (operation data No.33) Industrial network command code READ	Offset=1 (operation data No.33) Industrial network command code WRITE	...	Offset=31 (operation data No.63) Industrial network command code READ	Offset=31 (operation data No.63) Industrial network command code 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) Industrial network command code READ	Base address (operation data No.255) Industrial network command code WRITE	Offset=1 (operation data No.0) Industrial network command code READ	Offset=1 (operation data No.0) Industrial network command code WRITE	...	Offset=31 (operation data No.30) Industrial network command code READ	Offset=31 (operation data No.30) Industrial network command code 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.389, 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.390.

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.389, 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.390.

Base command code 7200 (1C20h)

Setting item	Command code			Set value
	Calculation method	Dec	Hex	
Operation type	Base command code + 0	7200 + 0 = 7200	1C20h	2
Position	Base command code + 1	7200 + 1 = 7201	1C21h	1,000
Operating speed	Base command code + 2	7200 + 2 = 7202	1C22h	1,000
Operating current	Base command code + 5	7200 + 5 = 7205	1C25h	700

● Setting of operation data No.2

From the table on p.389, 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.390.

Base command code 7232 (1C40h)

Setting item	Command code			Set value
	Calculation method	Dec	Hex	
Operation type	Base command code + 0	7232 + 0 = 7232	1C40h	3
Position	Base command code + 1	7232 + 1 = 7233	1C41h	1,000
Operating speed	Base command code + 2	7232 + 2 = 7234	1C42h	1,000
Operating current	Base command code + 5	7232 + 5 = 7237	1C45h	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.

Note
- 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	−4,000,000 to 4,000,000 Hz	1,000	B
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			
1664 (0680h)	1665 (0681h)	Stop 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
1666 (0682h)	1667 (0683h)	Stop No.1			
to	to	to			
1790 (06FEh)	1791 (06FFh)	Stop No.63			
1792 (0700h)	1793 (0701h)	Operating current No.0	0 to 1,000 (1=0.1%)	1,000	B
1794 (0702h)	1795 (0703h)	Operating current No.1			
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			
576 (0240h)	4672 (1240h)	Operating speed No.0	−4,000,000 to 4,000,000 Hz	1,000	B
577 (0241h)	4673 (1241h)	Operating speed No.1			
to	to	to			
639 (027Fh)	4735 (127Fh)	Operating speed No.63			

Industrial network command code READ	Industrial network command code WRITE	Name	Setting range	Initial value	Effective
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)	2	B
641 (0281h)	4737 (1281h)	Type No.1			
to	to	to			
703 (02BFh)	4799 (12BFh)	Type No.63			
768 (0300h)	4864 (1300h)	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
769 (0301h)	4865 (1301h)	Starting/changing rate No.1			
to	to	to			
831 (033Fh)	4927 (133Fh)	Starting/changing rate No.63			
832 (0340h)	4928 (1340h)	Stop 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
833 (0341h)	4929 (1341h)	Stop No.1			
to	to	to			
895 (037Fh)	4991 (137Fh)	Stop No.63			
896 (0380h)	4992 (1380h)	Operating current No.0	0 to 1,000 (1=0.1%)	1,000	B
897 (0381h)	4993 (1381h)	Operating current No.1			
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. ⇨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. ⇨p.400)
Both direct reference and offset reference can be used both in Modbus communication and industrial network.

memo 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)
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.398)
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) Base address + 1 (lower)	Event link	0: No link 1: Manual sequential 2: Automatic sequential 3: Continuous form connection	0	B	Base command code + 0
Base address + 2 (upper) Base address + 3 (lower)	Event jump destination	−256: Stop −2: ↓↓ (+2) −1: ↓ (+1) 0 to 255: Operation data number	−256	B	Base command code + 1
Base address + 4 (upper) Base address + 5 (lower)	Event waiting time	0 to 65,535 (1=0.001 s)	0	B	Base command code + 2
Base address + 6 (upper) Base address + 7 (lower)	Event trigger I/O	Input signal list⇨p.429 Output signal list⇨p.430	0: Not used	B	Base command code + 3
Base address + 8 (upper) Base address + 9 (lower)	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 + 10 (upper) Base address + 11 (lower)	Event trigger counter	0 to 65,535 (1=1 msec or 1=Once)	0	B	Base command code + 5

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)

memo 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	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	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.	−1: Disable 0 to 255: Operation data number	−1	A	2049 (0801h)	6145 (1801h)
4100 (1004h)	4101 (1005h)	Repeat time	−1: Disable 0 to 100,000,000	−1	A	2050 (0802h)	6146 (1802h)

Note 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	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	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)	0: The parameter setting is followed 1: The switch setting is followed	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	1: LPF (speed filter) 2: Moving average filter	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)	0: The parameter setting is followed 1: The switch setting is followed	1	B	299 (012Bh)	4395 (112Bh)
600 (0258h)	601 (0259h)	Smooth drive function	0: Disable 1: Enable	1	C	300 (012Ch)	4396 (112Ch)

Modbus communication register address Upper	Lower	Name	Setting range	Initial value	Effective	Industrial network command code READ	WRITE
602 (025Ah)	603 (025Bh)	Current control mode	0: The setting of the CCM input is followed 1: α 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 Upper	Lower	Name	Setting range	Initial value	Effective	Industrial network command code 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	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	C	2016 (07E0h)	6112 (17E0h)
4034 (0FC2h)	4035 (0FC3h)	Mechanism lead	1 to 32,767	1	C	2017 (07E1h)	6113 (17E1h)
5106 (13F2h)	5107 (13F3h)	Mechanism lead decimal digit setting	0: ×1 mm 1: ×0.1 mm 2: ×0.01 mm 3: ×0.001 mm	0	C	2553 (09F9h)	6649 (19F9h)

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 Upper	Modbus communication register address Lower	Name	Setting range	Initial value	Effective	Industrial network command code READ	Industrial network command code 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 Upper	Modbus communication register address Lower	Name	Setting range	Initial value	Effective	Industrial network command code READ	Industrial network command code 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 Upper	Modbus communication register address Lower	Name	Setting range	Initial value	Effective	Industrial network command code READ	Industrial network command code 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-OVOLT) (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.430	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-DRVTMP))		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))	0: Only the bit output is ON * 1: The bit output and the INFO output are ON and the LED blinks	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		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	
Upper	Lower					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 Upper	Modbus communication register address Lower	Name	Setting range	Initial value	Effective	Industrial network command code READ	Industrial network command code 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 (0EAEh)	3759 (0EAFh)	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	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	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	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		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		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		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		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		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		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.429	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	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.430	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.430	130: ALM-B	C	2149 (0865h)	6245 (1865h)
4320 (10E0h)	4321 (10E1h)	DOUT0 inverting mode	0: Non invert 1: Invert	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.429	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.430	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.429	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.429	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	Output signal list ⇨p.430	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		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 to 65,535	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 Upper	Modbus communication register address Lower	Name	Setting range	Initial value	Effective	Industrial network command code READ	Industrial network command code 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.429	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.430	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 Upper	Modbus communication register address Lower	Name	Setting range	Initial value	Effective	Industrial network command code READ	Industrial network command code WRITE
4736 (1280h)	4737 (1281h)	Virtual input (VIR-IN0) function selection	Input signal list ⇨p.429	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.430	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	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.430	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.430	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	−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 (×1) 4: Phase difference input mode (×2) 5: Phase difference input mode (×4) * 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	D	496 (01F0h)	4592 (11F0h)
994 (03E2h)	995 (03E3h)	RS485-I/F mode selection	−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	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.430	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.430	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	Assignment No.	Signal name	Assignment No.	Signal name
0	Not used	53	RV-JOG-P_R	135	INFO
1	FREE_R	54	FW-JOG-C_R	136	SYS-BSY
2	C-ON_R	55	RV-JOG-C_R	137	ETO-MON
3	CLR_R	56	FW-POS_R	138	IN-POS
4	STOP-COFF_R	57	RV-POS_R	140	TLC
5	STOP_R	58	FW-SPD_R	141	VA
6	PAUSE_R	59	RV-SPD_R	142	CRNT
7	BREAK-ATSQ_R	60	FW-PSH_R	143	AUTO-CD
8	ALM-RST_R	61	RV-PSH_R	144	HOME-END
9	P-PRESET_R	64	M0_R	145	ABSPEN
10	EL-PRST_R	65	M1_R	146	ELPRST-MON
12	ETO-CLR_R	66	M2_R	149	PRST-DIS
13	LAT-CLR_R	67	M3_R	150	PRST-STLD
14	INFO-CLR_R	68	M4_R	151	ORGN-STLD
16	HMI_R	69	M5_R	152	RND-OVF
18	CCM_R	70	M6_R	153	FW-SLS
19	PLS-XMODE_R	71	M7_R	154	RV-SLS
20	PLS-DIS_R	75	TEACH_R	155	ZSG
21	T-MODE_R	76	MON-REQ0_R	156	RND-ZERO
22	CRNT-LMT_R	77	MON-REQ1_R	157	TIM
23	SPD-LMT_R	78	MON-CLK_R	159	MAREA
26	FW-BLK_R	79	PLSM-REQ_R	160	AREA0
27	RV-BLK_R	80	R0_R	161	AREA1
28	FW-LS_R	81	R1_R	162	AREA2
29	RV-LS_R	82	R2_R	163	AREA3
30	HOMES_R	83	R3_R	164	AREA4
31	SLIT_R	84	R4_R	165	AREA5
32	START_R	85	R5_R	166	AREA6
33	SSTART_R	86	R6_R	167	AREA7
35	NEXT_R	87	R7_R	168	MPS
36	HOME_R	88	R8_R	169	MBC
37	ZHOME_R	89	R9_R	170	RG
40	DSEL0_R	90	R10_R	172	EDM
41	DSEL1_R	91	R11_R	173	HWTOIN-MON
42	DSEL2_R	92	R12_R	176	MON-OUT
43	DSEL3_R	93	R13_R	177	PLS-OUTR
44	DSEL4_R	94	R14_R	180	USR-OUT0
45	DSEL5_R	95	R15_R	181	USR-OUT1
46	DSEL6_R	128	CONST-OFF	192	CRNT-LMTD
47	DSEL7_R	129	ALM-A	193	SPD-LMTD
48	FW-JOG_R	130	ALM-B	196	OPE-BSY
49	RV-JOG_R	131	SYS-RDY	197	PAUSE-BSY
50	FW-JOG-H_R	132	READY	198	SEQ-BSY
51	RV-JOG-H_R	133	PLS-RDY	199	DELAY-BSY
52	FW-JOG-P_R	134	MOVE	200	JUMP0-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-DRVTMP
227	INFO-MTRTMP
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.

Table of contents

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.

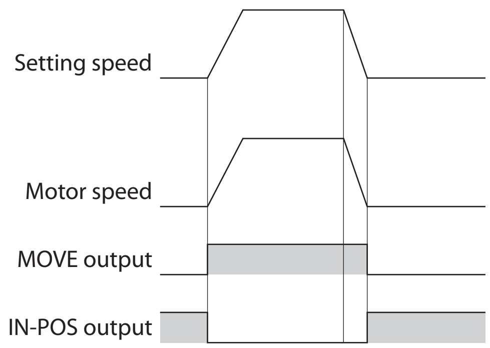
Related parameters

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

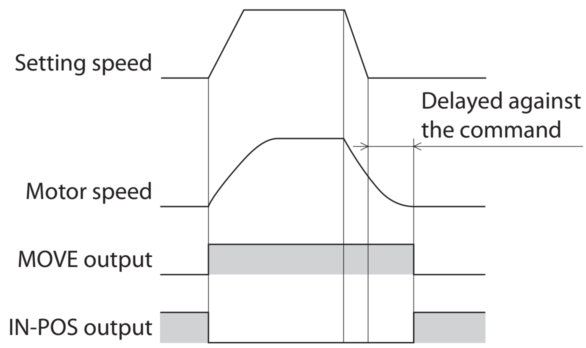
■ LPF (speed filter)

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

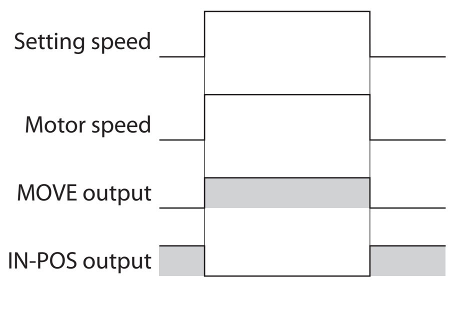
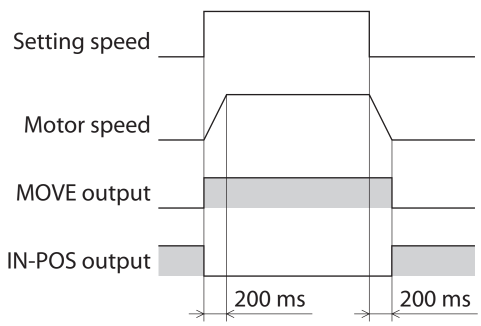
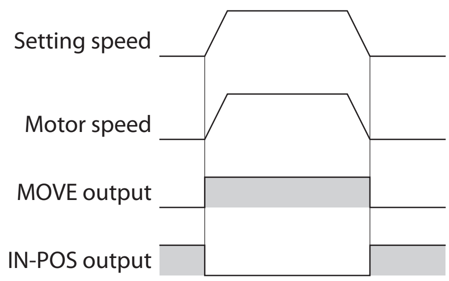
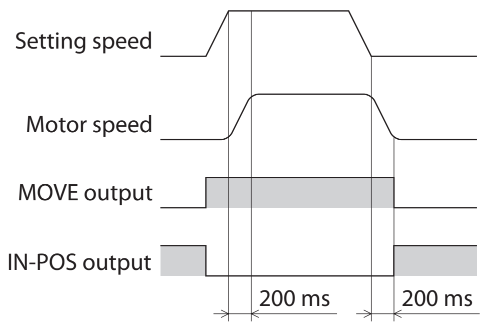


• When the "Command filter time constant" parameter is 200 ms



■ 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.

<table>
<tr><th></th><th>When the "Command filter time constant" parameter is 0 ms</th><th>When the "Command filter time constant" parameter is 200 ms</th></tr>
<tr><td>Rectangular operation (drive without acceleration/ deceleration time)</td><td>
</td><td>
</td></tr>
<tr><td>Trapezoidal operation</td><td>
</td><td>
</td></tr>
</table>

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	Sets the frequency of the vibration to be controlled. **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.)	1,000
	Resonance suppression control gain	Sets the gain of resonance suppression control. When the value is increased, the response to the deviation is increased. **Setting range** −500 to 500	0

memo 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 α control mode and the servo emulation mode.
Use in the α 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 α 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: α 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 α control mode. **Setting range** 0 to 1,000 (1=0.1%)	1,000

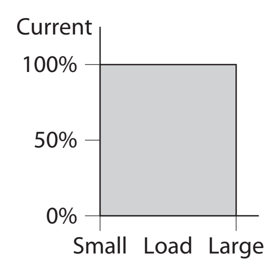
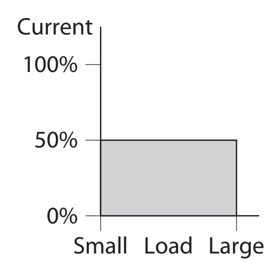
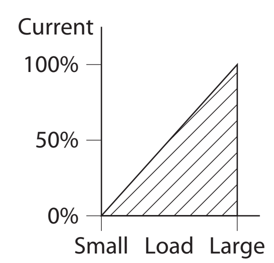
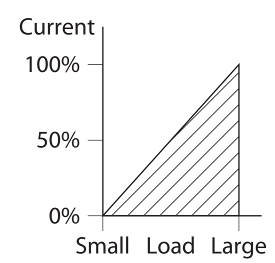
memo
- About CCM input
  When the "Current control mode" parameter is set to "The setting of the CCM input is followed," select the current control mode with the CCM input. When the CCM input is turned ON, the mode is switched to the servo emulation mode. When it is turned OFF, the mode is switched to the α control mode. Normally, the CCM input is OFF, and the mode is the α control mode.

■ Servo emulation mode

● Difference between α control mode and servo emulation mode

The α 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 α control mode.

When the operating current is 100% and the stop current is 50%

α control mode		Servo emulation mode *	
During operation	At standstill	During operation	At standstill
			

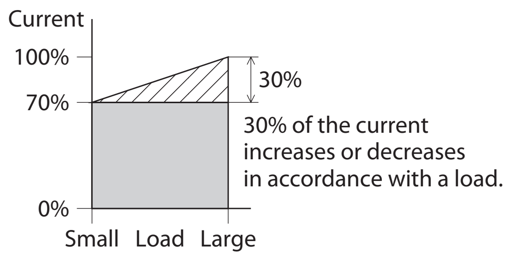
* The SVE ratio is set to 100%.

● 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:
Operating current 100% × SVE ratio 30% = 30%

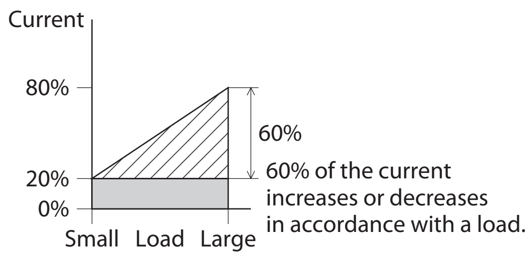
Out of 100% of the operating current, 30% is the servo emulation mode and 70% is the α control mode.



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:
Operating current 80% × SVE ratio 75% = 60%

Out of 80% of the operating current, 60% is the servo emulation mode and 20% is the α control mode.



Example 3: When the operating current is 100%, the stop current is 50%, and the SVE ratio is 30%

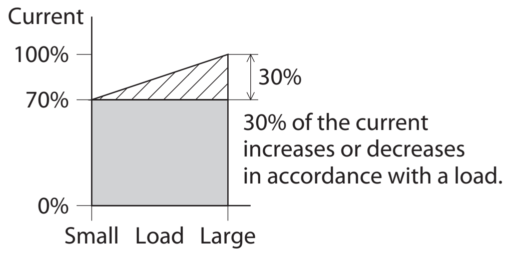
The ratio to be controlled in the servo emulation mode is:
Operating current 100% × SVE ratio 30% = 30%

Out of 100% of the operating current, 30% is the servo emulation mode and 70% is the α control mode.

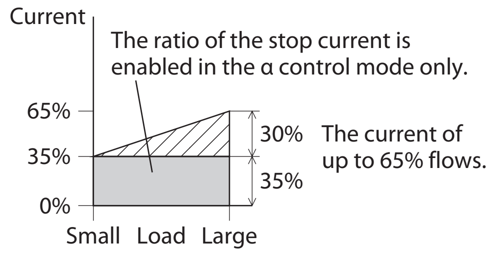
30% is the servo emulation mode because the ratio of the servo emulation mode in the operating current is not changed at standstill.
At this time, the current to be controlled in the α control mode is:
Stop current 50% × (100% − SVE ratio 30%) = 35%

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. Increasing the value will make the deviation between the command position and the actual position smaller. An excessively high value may enlarge overshooting of the motor or cause hunting. **Setting range** 1 to 50	10
	SVE speed loop gain	Adjusts the motor response in reaction to the speed deviation. Increasing the value will make the deviation between the command speed and the actual speed smaller. An excessively high value may enlarge overshooting of the motor or cause 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 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

memo 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

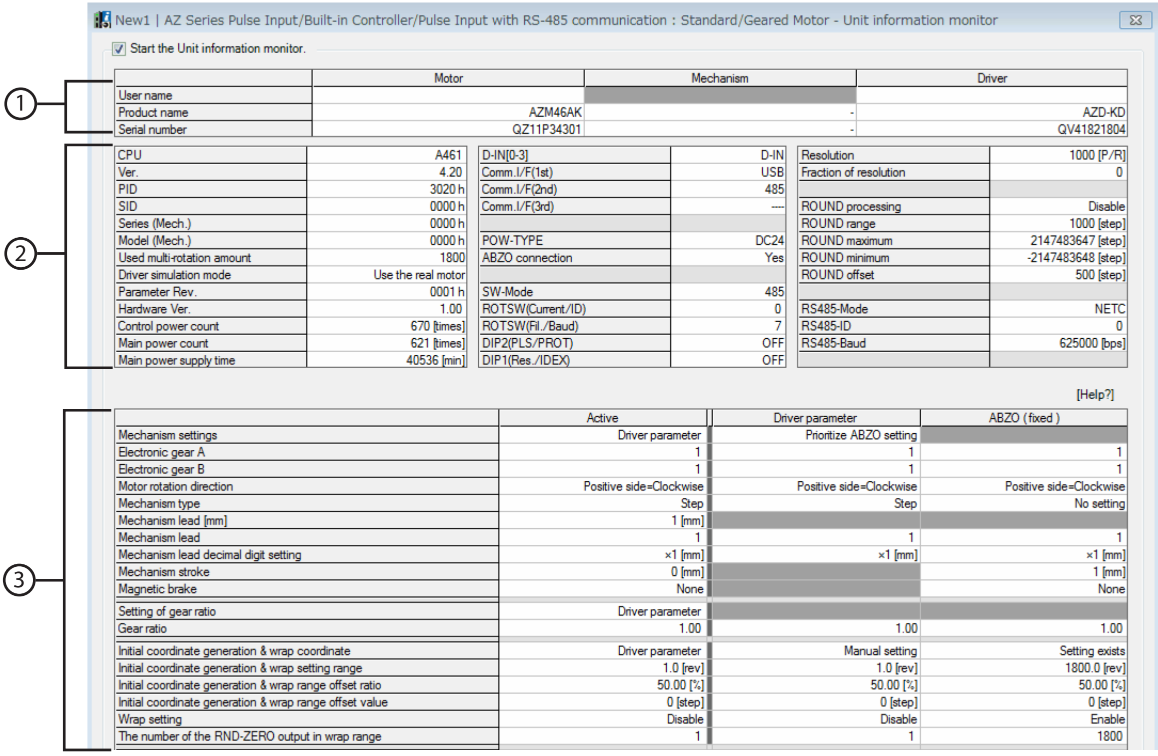
Modbus communication register address		Name	Description	Initial value	R/W	Industrial network command code	
Upper	Lower					READ	WRITE
64 (0040h)	65 (0041h)	Backup DATA access key	Inputs the key code to access the backup area. (⇨ Following table)	0	R/W	32 (0020h)	4128 (1020h)
66 (0042h)	67 (0043h)	Backup 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

<table>
<tr><th>Area</th><th colspan="2">Description</th></tr>
<tr><td rowspan="5">1</td><td colspan="2">Product information area</td></tr>
<tr><td>Main monitored items</td><td>Description</td></tr>
<tr><td>User name</td><td>An arbitrary name can be given with a parameter.</td></tr>
<tr><td>Product name</td><td>The name of the product connected to the MEXE02 is displayed.</td></tr>
<tr><td>Serial number</td><td>This is a serial number assigned to each product.
It is written at the time of factory shipment and cannot be changed.</td></tr>
<tr><td rowspan="5">2</td><td colspan="2">Driver information area</td></tr>
<tr><td>Main monitored items</td><td>Description</td></tr>
<tr><td>Control power supply count</td><td>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</td></tr>
<tr><td>Main power supply count</td><td>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</td></tr>
<tr><td>Main power supply time</td><td>The total time while the main power supply was turned on</td></tr>
</table>

<table>
<tr><th>Area</th><th colspan="2">Description</th></tr>
<tr><td rowspan="5">3</td><td colspan="2">Motor and mechanism information area
Gray colored cells represent that the value is not set.</td></tr>
<tr><td>Main monitored items</td><td>Description</td></tr>
<tr><td>Active</td><td>Parameter value presently used</td></tr>
<tr><td>Driver parameter</td><td>Parameter value set in the driver using the MEXE02 or communication</td></tr>
<tr><td>ABZO (fixed)</td><td>Parameter value stored in the ABZO sensor
This is the fixed value. It cannot be changed.</td></tr>
</table>

[Help?]

		Active	Driver parameter	ABZO (fixed)
	Mechanism settings	Driver parameter	Prioritize ABZO setting	
	Electronic gear A	0	0	0
	Electronic gear B	0	0	0
	Motor rotation direction	Positive side=Counterclockwise	Positive side=Counterclockwise	Positive side=Counterclockwise
*	Mechanism type	Step	Step	No setting
	Mechanism lead [mm]	0 [mm]		
	Mechanism lead	0	0	0
	Mechanism lead decimal digit setting	×1 [mm]	×1 [mm]	×1 [mm]
	Mechanism stroke	0 [mm]		0 [mm]
	Magnetic brake	None		None
	Setting of gear ratio	Driver parameter		
	Gear ratio	0.00	Prioritize ABZO setting	0.00
	Initial coordinate generation & wrap coordinate	Driver parameter	Prioritize ABZO setting	No setting
	Initial coordinate generation & wrap setting range	0.0 [rev]	0.0 [rev]	0.0 [rev]
	Initial coordinate generation & wrap range offset ratio	0.00 [%]	0.00 [%]	0.00 [%]
	Initial coordinate generation & wrap range offset value	0 [step]	0 [step]	0 [step]
	Wrap setting	Disable	Disable	Disable
	The number of the RND-ZERO output in wrap range	0	0	0
	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]		0 [r/min]
	Maximum Operating speed	0 [r/min]		0 [r/min]
	Maximum pushing speed	0 [r/min]		0 [r/min]
	Maximum pushing return-to-home speed	0 [r/min]		0 [r/min]
	Maximum push current	Pushing not possible		Pushing not possible
	JOG/HOME/ZHOME operation setting	Driver parameter	Prioritize ABZO setting	No setting
	(JOG/HOME/ZHOME)Command filter time	0 [ms]	0 [ms]	0 [ms]
	(JOG/HOME/ZHOME)Operating RUN current	0.0 [%]	0.0 [%]	0.0 [%]
	(JOG) Travel amount	0 [step]	0 [step]	0 [step]
	(JOG) Operating speed	0 [Hz]	0 [Hz]	0 [r/min]
	(JOG) Acceleration/deceleration	0.000 [kHz/s]	0.000 [kHz/s]	0.000 [s]
	(JOG) Starting speed	0 [Hz]	0 [Hz]	0 [r/min]
	(JOG) Operating speed (high)	0 [Hz]	0 [Hz]	0 [r/min]
	(ZHOME) Operation speed	0 [Hz]	0 [Hz]	0 [r/min]
	(ZHOME) Acceleration/deceleration	0.000 [kHz/s]	0.000 [kHz/s]	0.000 [s]
	(ZHOME) Starting speed	0 [Hz]	0 [Hz]	0 [r/min]
	(HOME) Home-seeking mode	2-sensor	2-sensor	2-sensor
	(HOME) Starting direction	Negative side	Negative side	Negative side
	(HOME) Acceleration/deceleration	0.000 [kHz/s]	0.000 [kHz/s]	0.000 [s]
	(HOME) Starting speed	0 [Hz]	0 [Hz]	0 [r/min]
	(HOME) Operating speed	0 [Hz]	0 [Hz]	0 [r/min]
	(HOME) Last speed	0 [Hz]	0 [Hz]	0 [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	0 [step]	0 [step]	0.000 [rev]
	(HOME) Operating amount in uni-directional home-seeking	0 [step]	0 [step]	0.000 [rev]
	(HOME) Operating current for push motion home-seeking	0.0 [%]	0.0 [%]	0.0 [%]
	(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	0 [ms]	0 [ms]	0 [ms]
	(HOME) Backward steps in push motion home-seeking	0 [step]	0 [step]	0.000 [rev]

Note

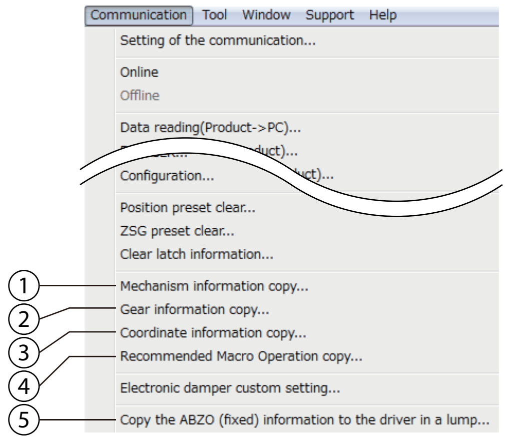
* About "Mechanism type"
If the value stored in the ABZO sensor is "No setting," the driver parameter is used.
When the value stored in the ABZO sensor is any of "rev," "mm," of "deg," the ABZO (fixed value) is used.

5 Copying the setting value of the ABZO sensor to a driver

The fixed value stored in the ABZO sensor can be copied to the driver.

■ 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.



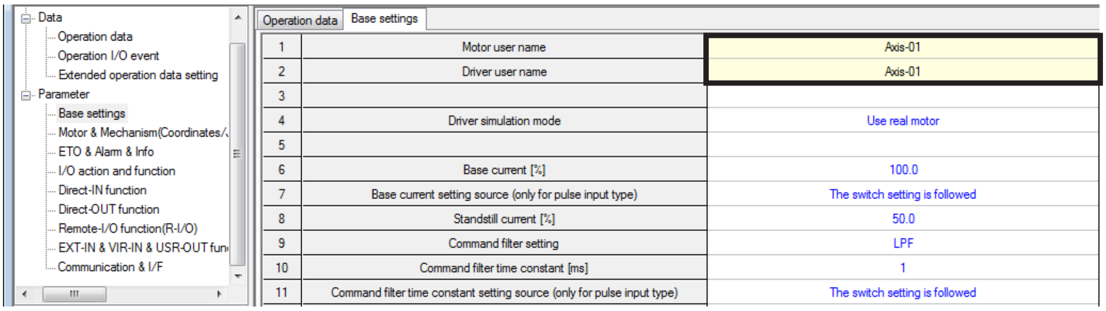
[Help?]

	Active	Driver parameter	ABZO (fixed)
Mechanism settings	Driver parameter	Prioritize ABZO setting	
Electronic gear A	0	0	0
Electronic gear B	0	0	0
Motor rotation direction	Positive side=Counterclockwise	Positive side=Counterclockwise	Positive side=Counterclockwise
Mechanism type	Step	Step	No setting
Mechanism lead [mm]	0 [mm]		
Mechanism lead	0	0	0
Mechanism lead decimal digit setting	×1 [mm]	×1 [mm]	×1 [mm]
Mechanism stroke	0 [mm]		0 [mm]
Magnetic brake	None		None
Setting of gear ratio	Driver parameter		
Gear ratio	0.00	Prioritize ABZO setting	0.00
Initial coordinate generation & wrap coordinate	Driver parameter	Prioritize ABZO setting	No setting
Initial coordinate generation & wrap setting range	0.0 [rev]	0.0 [rev]	0.0 [rev]
Initial coordinate generation & wrap range offset ratio	0.00 [%]	0.00 [%]	0.00 [%]
Initial coordinate generation & wrap range offset value	0 [step]	0 [step]	0 [step]
Wrap setting	Disable	Disable	Disable
The number of the RND-ZERO output in wrap range	0	0	0
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]		0 [r/min]
Maximum Operating speed	0 [r/min]		0 [r/min]
Maximum pushing speed	0 [r/min]		0 [r/min]
Maximum pushing return-to-home speed	0 [r/min]		0 [r/min]
Maximum push current	Pushing not possible		Pushing not possible
JOG/HOME/ZHOME operation setting	Driver parameter	Prioritize ABZO setting	No setting
(JOG/HOME/ZHOME)Command filter time	0 [ms]	0 [ms]	0 [ms]
(JOG/HOME/ZHOME)Operating RUN current	0.0 [%]	0.0 [%]	0.0 [%]
(JOG) Travel amount	0 [step]	0 [step]	0 [step]
(JOG) Operating speed	0 [Hz]	0 [Hz]	0 [r/min]
(JOG) Acceleration/deceleration	0.000 [kHz/s]	0.000 [kHz/s]	0.000 [s]
(JOG) Starting speed	0 [Hz]	0 [Hz]	0 [r/min]
(JOG) Operating speed (high)	0 [Hz]	0 [Hz]	0 [r/min]
(ZHOME) Operation speed	0 [Hz]	0 [Hz]	0 [r/min]
(ZHOME) Acceleration/deceleration	0.000 [kHz/s]	0.000 [kHz/s]	0.000 [s]
(ZHOME) Starting speed	0 [Hz]	0 [Hz]	0 [r/min]
(HOME) Home-seeking mode	2-sensor	2-sensor	2-sensor
(HOME) Starting direction	Negative side	Negative side	Negative side
(HOME) Acceleration/deceleration	0.000 [kHz/s]	0.000 [kHz/s]	0.000 [s]
(HOME) Starting speed	0 [Hz]	0 [Hz]	0 [r/min]
(HOME) Operating speed	0 [Hz]	0 [Hz]	0 [r/min]
(HOME) Last speed	0 [Hz]	0 [Hz]	0 [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	0 [step]	0 [step]	0.000 [rev]
(HOME) Operating amount in uni-directional home-seeking	0 [step]	0 [step]	0.000 [rev]
(HOME) Operating current for push motion home-seeking	0.0 [%]	0.0 [%]	0.0 [%]
(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	0 [ms]	0 [ms]	0 [ms]
(HOME) Backward steps in push motion home-seeking	0 [step]	0 [step]	0.000 [rev]

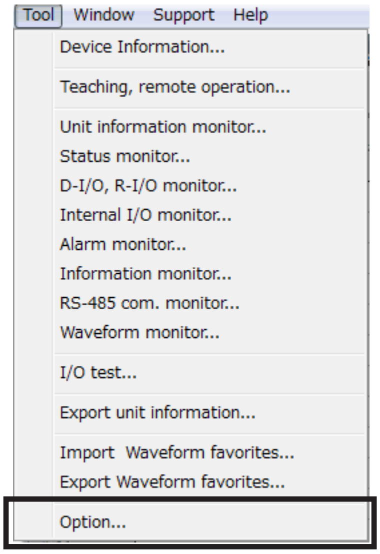
Note After writing the parameter (example: electronic gear, etc.), which was changed to [Manual setting] and set, from the **MEXE02** to the driver, even if the fixed value of the ABZO sensor is copied, the parameter that was changed with the manual setting does not return to the fixed value.

6 Indicating the warning before writing data

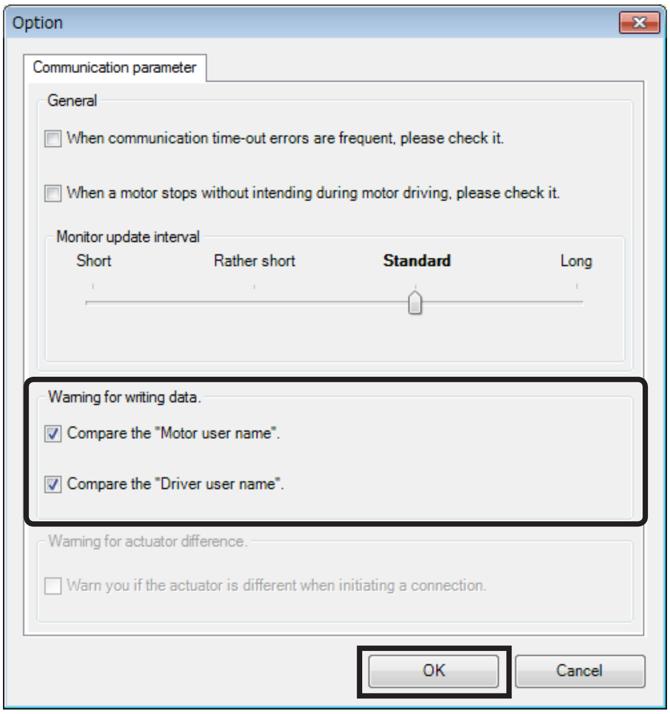
A desired name (user name) for the motor or driver can be set using the base setting parameter.
If the user name is set, it can prevent from overwriting the data to a wrong product when the **MEXE02** data is written to the driver.



1. Click [Option] from the [Tool] menu.

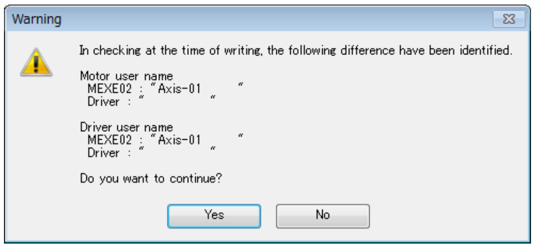


2. Select the user name to be compared from "Warning for writing data," and click [OK].



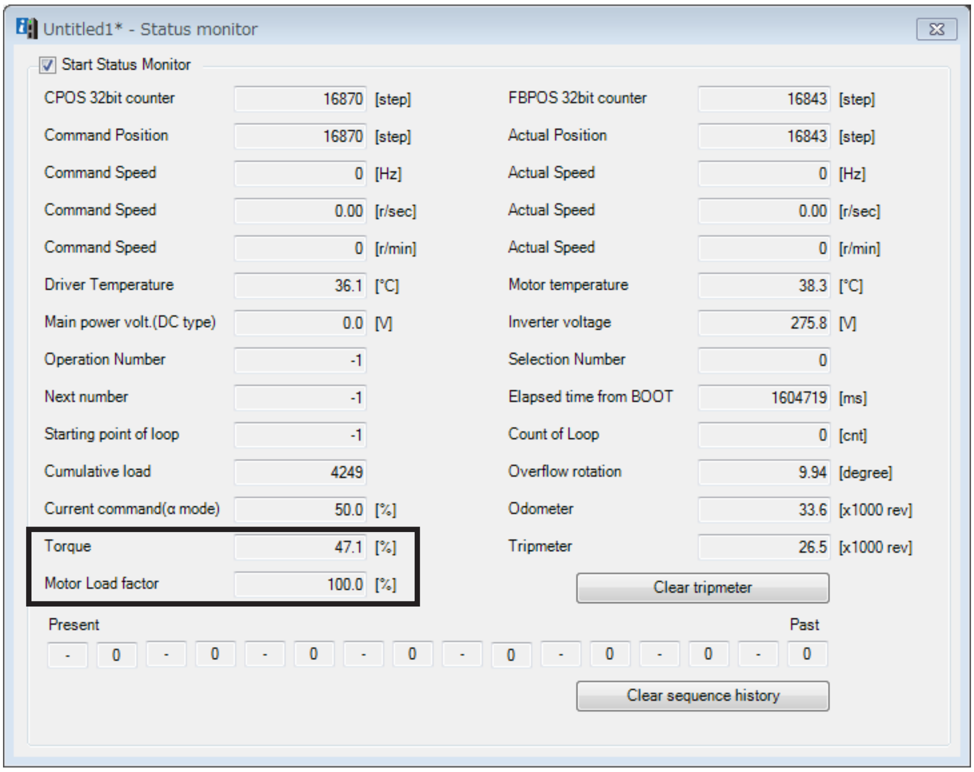
■ When writing data

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] of [No] after checking the product.
[Yes]: Writing data is executed.
[No]: Writing data is discontinued.

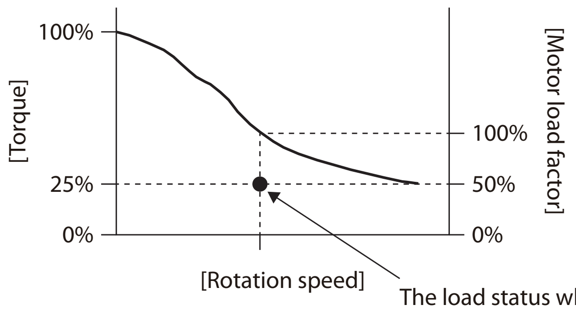


7 Monitoring of load factor

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.



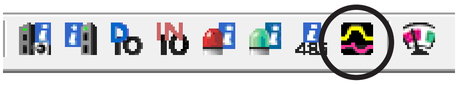
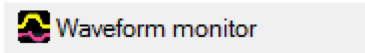
The load status when the torque is indicated to be 25% and the motor load factor 50% at a certain rotation speed.

memo 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

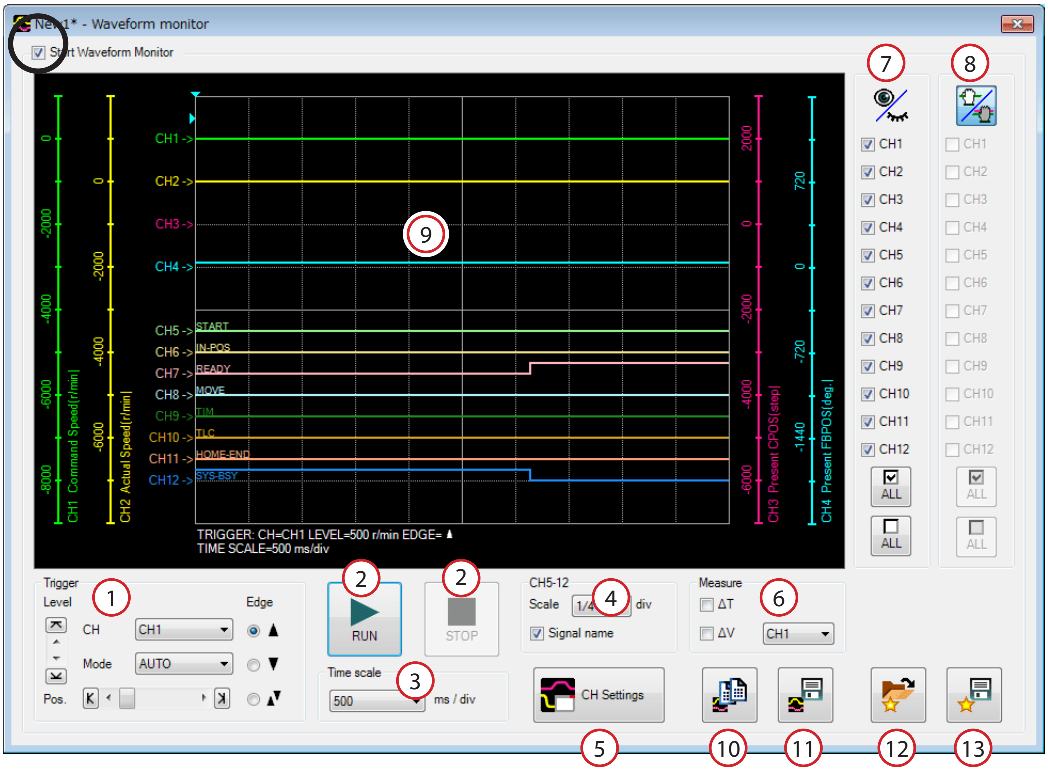
The waveform monitor is provided as one of the monitor functions of the **MEXE02**.
The waveform monitor is a function to output the output signal as a waveform in addition to the command speed and feedback speed of the motor.
Since each output signal such as READY, MOVE and TLC can be monitored simultaneously 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.

1. Click the [Waveform monitor] icon in the toolbar or click the [Waveform monitor] short-cut button.


Or


   The waveform monitor window appears.

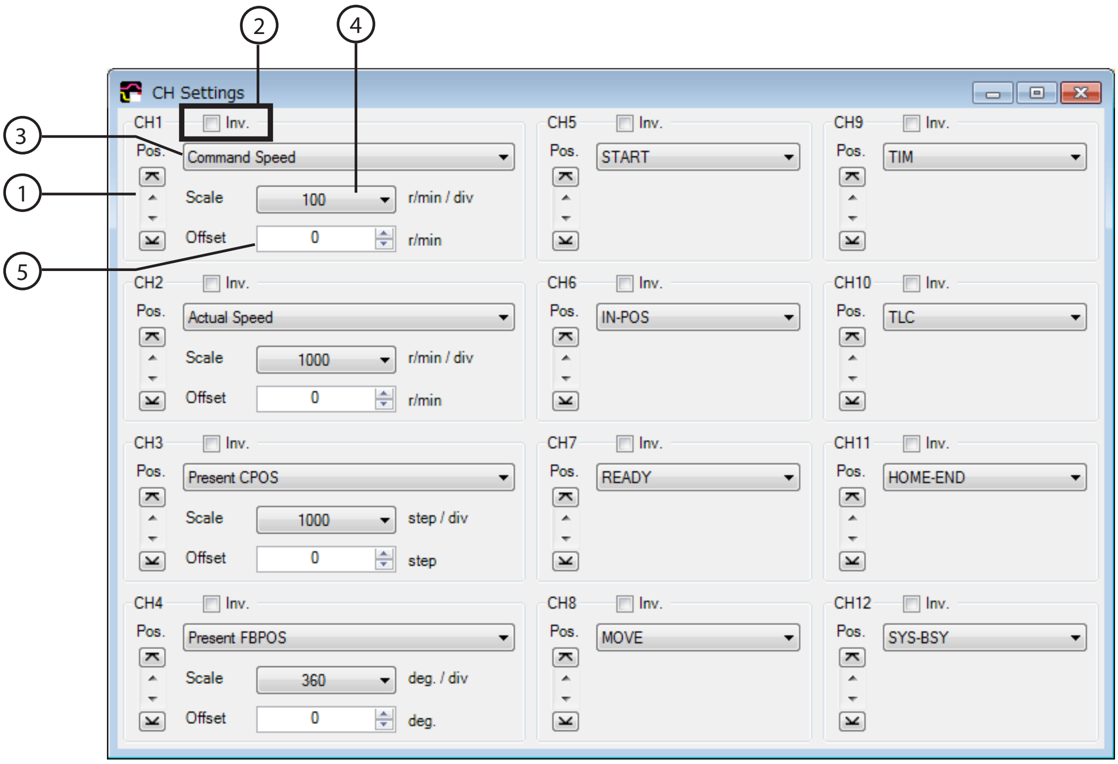
2. Click "Start waveform monitor."
   The buttons on the window are enabled, allowing you to prepare for measurement of the waveform monitor.



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	Sets the display method for CH5 to CH12. 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.

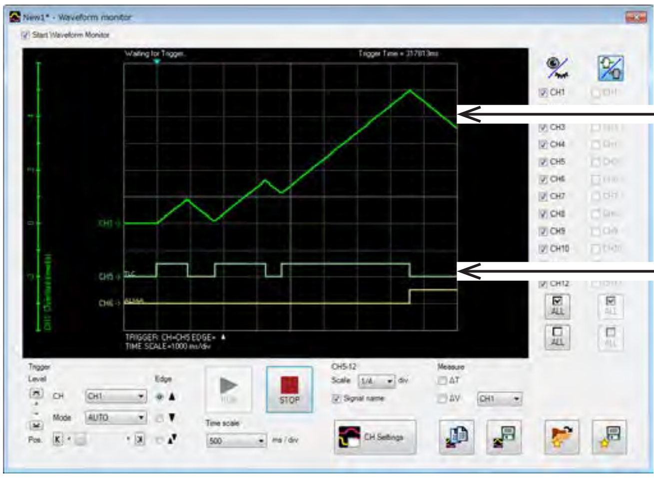


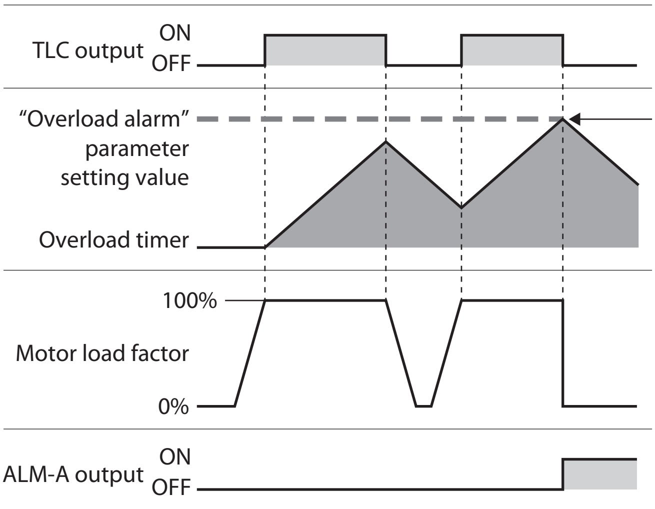
1	Moves the display position of the waveform up and down.
2	Shows the measured item inverted.
3	Selects the item to be measured. The CH1 to CH4 are items for the command speed, feedback speed and others, and the CH5 to CH12 are items for I/O signals.
4	Selects the display size (for CH1 to CH4 only). 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."

memo 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.





9 Alarm and information

This chapter explains the alarm function and the information function.
It also explains functions that help maintenance of the equipment.

Table of contents

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 ⇨p.464)

- 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.

Note
- Some alarms cannot be reset with the ALM-RST input, the **MEXE02**, or RS-485 communication. Check "1-4 Alarm list" on p. 453 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	Overvoltage [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	• 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.	• 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)	• The power supply voltage exceeded the allowable value. • A large inertial load was suddenly stopped. • Vertical operation was performed.	• 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**.	Not possible	Non-excitation

Alarm code	Number of LED blinks	Alarm type	Cause	Remedial action	Reset using the ALM-RST input	Motor excitation *
22h	3	Overvoltage (DC power input driver)	• The power supply voltage exceeded the allowable value. • A large inertial load was suddenly stopped. • Vertical operation was performed.	• 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 overheat	The detection temperature of the ABZO sensor reached the upper limit of the specified value.	• 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.	• 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.	• 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.	Execute one of the following operations. If the same alarm is still generated, the ABZO sensor is damaged. Contact the Oriental Motor sales office. • Reset the Z-phase with the maintenance command "ZSG-PRESET." • Execute "Clear tripmeter" of the **MEXE02** 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.459 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)	• Regeneration unit is not connected correctly. • Regeneration unit was overheated extraordinarily.	• 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

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	• 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.	• 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	• 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.	• 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.	• 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.	• 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.	• Check the travel amount (position). • After resetting the alarm, escape from the sensor by operation or by manual.	Possible	Excitation

Alarm code	Number of LED blinks	Alarm type	Cause	Remedial action	Reset using the ALM-RST input	Motor excitation *
70h	7	Operation data error	• 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. • Push-motion operation or push-motion return-to-home operation was performed with the **DGII** Series.	• Check the operation data. • Check the wrap setting. • Push-motion operation as well as push-motion return-to-home operation cannot be performed with the **DGII** Series. (Sub code of the operation data error ⇨ p.461)	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	• 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.	• 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

Alarm code	Number of LED blinks	Alarm type	Cause	Remedial action	Reset using the ALM-RST input	Motor excitation *
85h	7	RS-485 communication timeout	• 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.	• Check the connection between the master controller and driver. • Check the connection with the network converter.	Possible	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

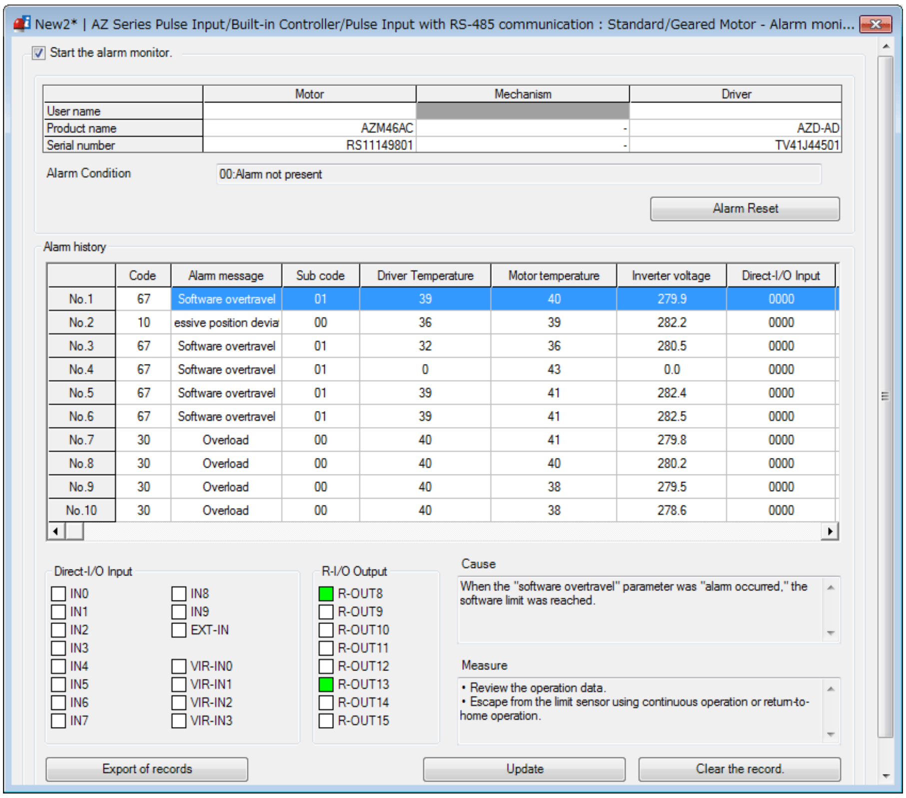
■ About causes of the motor combination error (alarm code 45h)

An alarm of the motor combination error is generated in the following conditions.

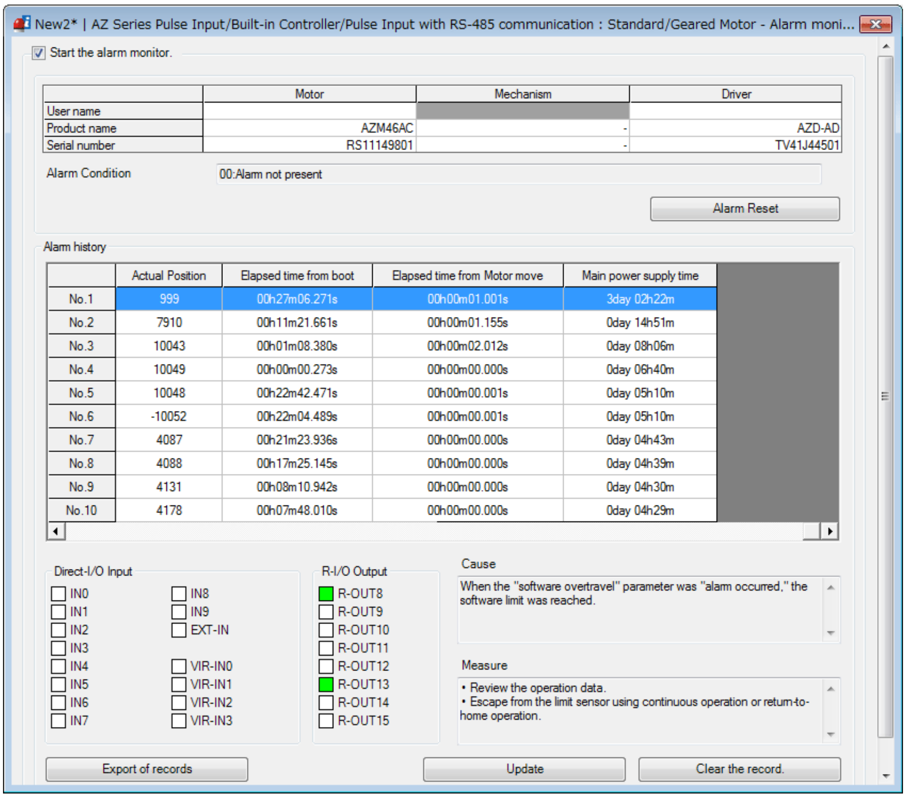
- When the motor for a DC power supply was connected to the AC power input driver.
- When the motor for an AC power supply was connected to the DC power input driver.
- When the motorized actuator was connected to the driver which version was earlier than Ver.2.02.
- When the motor of frame size 20 mm (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.
- When the motorized actuator, which includes a decimal point in the lead of the ball screw (example: lead 2.5 mm), is connected to the driver which version is ver. 4.10 or before.

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.

memo 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.

The value (fixed value) set in the ABZO sensor can be checked on the unit information monitor.

[Help?]

	Active	Driver parameter	ABZO (fixed)
Mechanism settings	Driver parameter	Prioritize ABZO setting	
Electronic gear A	0	0	0
Electronic gear B	0	0	0
Motor rotation direction	Positive side=Counterclockwise	Positive side=Counterclockwise	Positive side=Counterclockwise
Mechanism type	Step	Step	No setting
Mechanism lead [mm]	0 [mm]		
Mechanism lead	0	0	0
Mechanism lead decimal digit setting	×1 [mm]	×1 [mm]	×1 [mm]
Mechanism stroke	0 [mm]		0 [mm]
Magnetic brake	None		None
Setting of gear ratio	Driver parameter		
Gear ratio	0.00	Prioritize ABZO setting	0.00
Initial coordinate generation & wrap coordinate	Driver parameter	Prioritize ABZO setting	No setting
Initial coordinate generation & wrap setting range	0.0 [rev]	0.0 [rev]	0.0 [rev]
Initial coordinate generation & wrap range offset ratio	0.00 [%]	0.00 [%]	0.00 [%]
Initial coordinate generation & wrap range offset value	0 [step]	0 [step]	0 [step]
Wrap setting	Disable	Disable	Disable
The number of the RND-ZERO output in wrap range	0	0	0
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]		0 [r/min]
Maximum Operating speed	0 [r/min]		0 [r/min]
Maximum pushing speed	0 [r/min]		0 [r/min]
Maximum pushing return-to-home speed	0 [r/min]		0 [r/min]
Maximum push current	Pushing not possible		Pushing not possible
JOG/HOME/ZHOME operation setting	Driver parameter	Prioritize ABZO setting	No setting
(JOG/HOME/ZHOME)Command filter time	0 [ms]	0 [ms]	0 [ms]
(JOG/HOME/ZHOME)Operating RUN current	0.0 [%]	0.0 [%]	0.0 [%]
(JOG) Travel amount	0 [step]	0 [step]	0 [step]
(JOG) Operating speed	0 [Hz]	0 [Hz]	0 [r/min]
(JOG) Acceleration/deceleration	0.000 [kHz/s]	0.000 [kHz/s]	0.000 [s]
(JOG) Starting speed	0 [Hz]	0 [Hz]	0 [r/min]
(JOG) Operating speed (high)	0 [Hz]	0 [Hz]	0 [r/min]
(ZHOME) Operation speed	0 [Hz]	0 [Hz]	0 [r/min]
(ZHOME) Acceleration/deceleration	0.000 [kHz/s]	0.000 [kHz/s]	0.000 [s]
(ZHOME) Starting speed	0 [Hz]	0 [Hz]	0 [r/min]
(HOME) Home-seeking mode	2-sensor	2-sensor	2-sensor
(HOME) Starting direction	Negative side	Negative side	Negative side
(HOME) Acceleration/deceleration	0.000 [kHz/s]	0.000 [kHz/s]	0.000 [s]
(HOME) Starting speed	0 [Hz]	0 [Hz]	0 [r/min]
(HOME) Operating speed	0 [Hz]	0 [Hz]	0 [r/min]
(HOME) Last speed	0 [Hz]	0 [Hz]	0 [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	0 [step]	0 [step]	0.000 [rev]
(HOME) Operating amount in uni-directional home-seeking	0 [step]	0 [step]	0.000 [rev]
(HOME) Operating current for push motion home-seeking	0.0 [%]	0.0 [%]	0.0 [%]
(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	0 [ms]	0 [ms]	0 [ms]
(HOME) Backward steps in push motion home-seeking	0 [step]	0 [step]	0.000 [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 ramge** 0: ABZO setting is followed 1: Disable	0

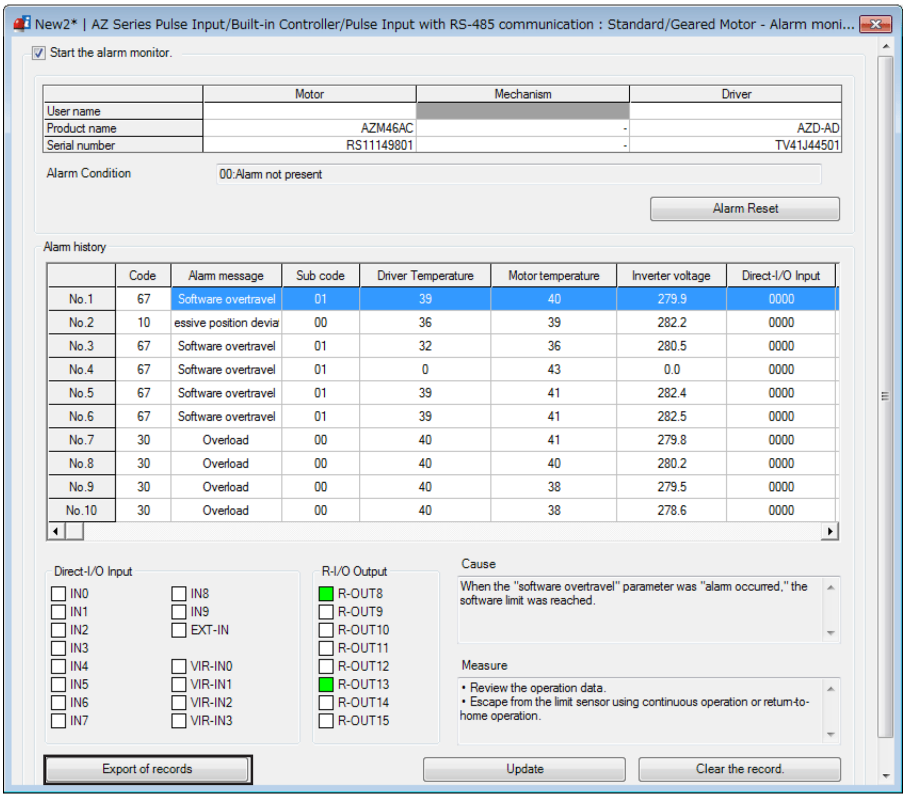
● Information shown in "Operation information 0" and "Operation information 1"

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

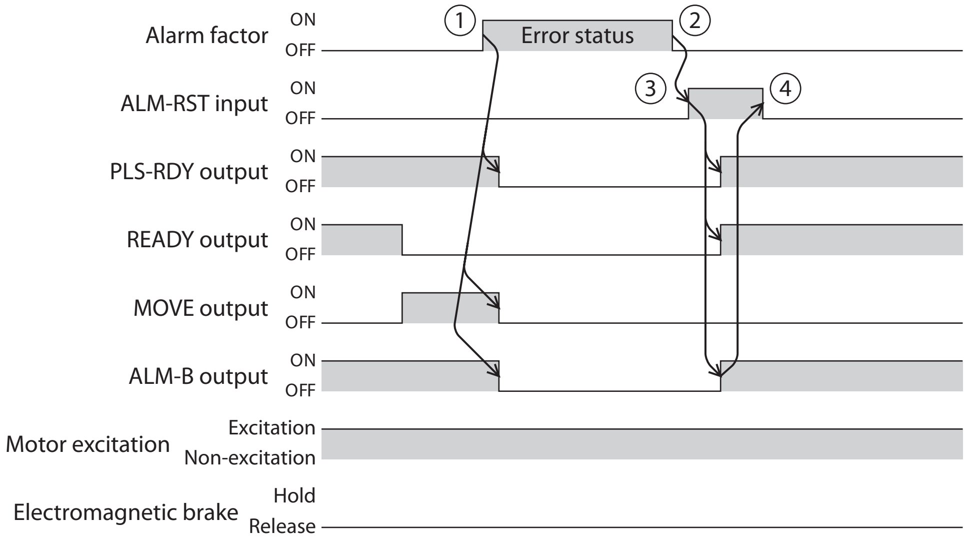
Up to 10 generated alarms in order of the latest to oldest can be exported in CSV format. (effective for **MEXE02** of Ver.3.40 or later)

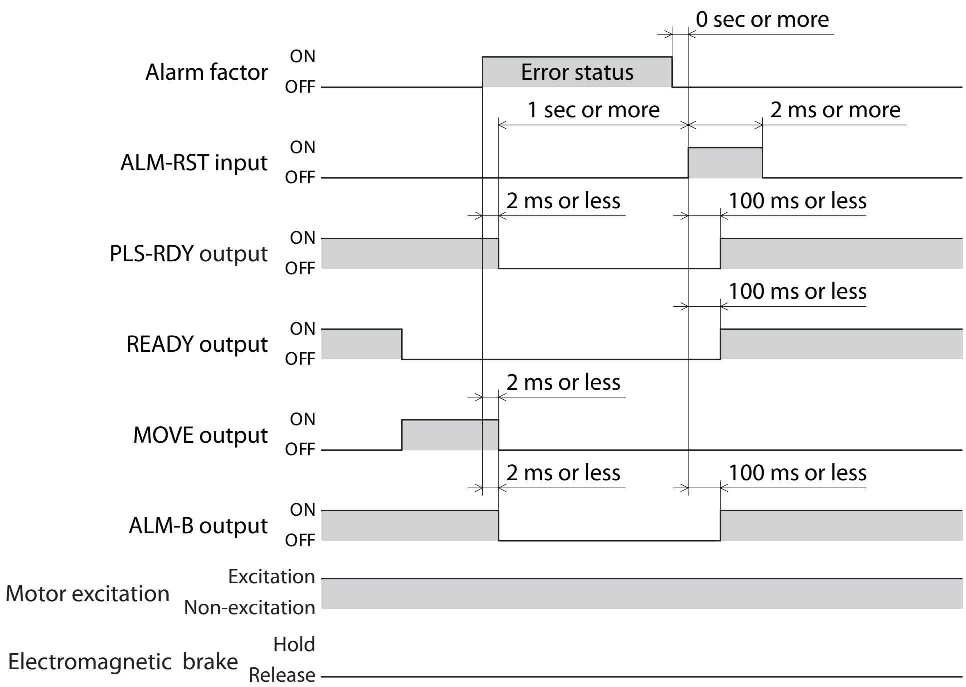


1-6 Timing charts

■ When the motor remains excited even if an alarm is generated

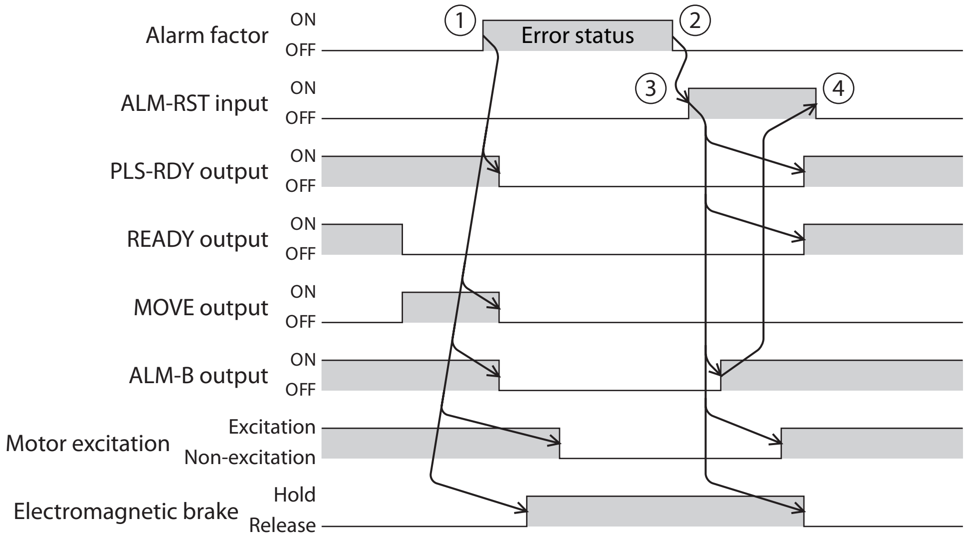
1. When an error occurs, the ALM-B output, MOVE output, and PLS-RDY output are turned OFF.
   At the same time, the motor stops immediately.
2. When you release the alarm, stop the pulse input. When the alarm is released while inputting pulses, the motor is started suddenly, causing injury or damage to the equipment.
3. 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.
4. Check that the ALM-B output has been turned ON and turn the ALM-RST input OFF.

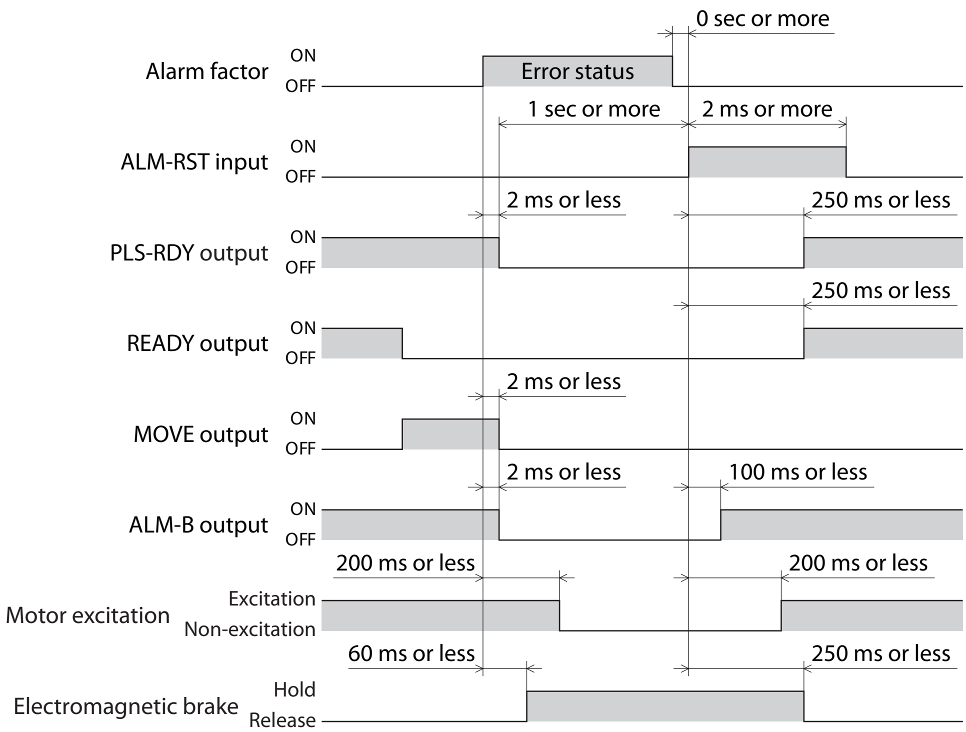




■ When the motor is not excited after an alarm is generated

1. 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.
2. 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.
3. 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.
4. 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.469)

● 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 (or 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.430	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-DRVTMP)	Sets the generation condition of the driver temperature information (INFO-DRVTMP). **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
	Overvoltage 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
	Overvoltage 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
ETO and Alarm and Info	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))	**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 (Position deviation information (INFO-POSERR))		
	INFO action (Driver temperature information (INFO-DRVTMP))		
	INFO action (Motor temperature information (INFO-MTPTMP))		
	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))		
	INFO action (Start ZHOME error information (INFO-ZHOME))		
	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**.

Note: 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-DRVTMP	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-MTRTMP	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	• 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	• 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	• 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	• 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	• 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	• 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.

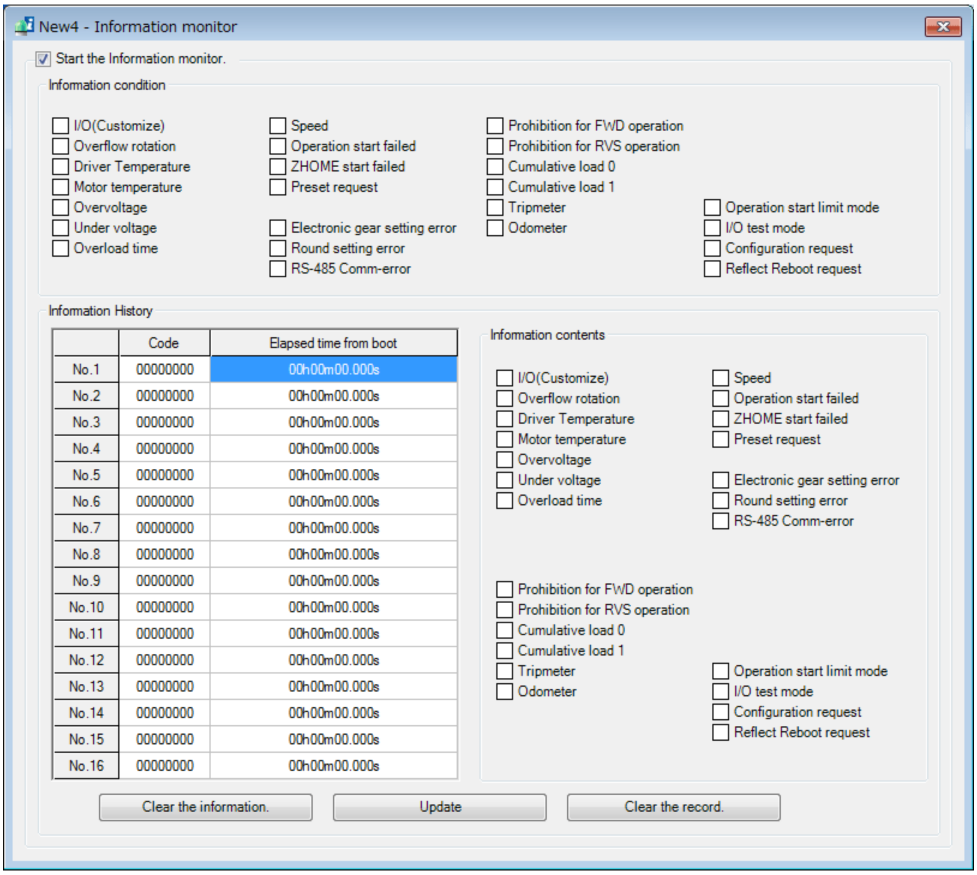
Contents of information	Information bit output signal	Cause	Releasing condition
Tripmeter	INFO-TRIP	The travel distance of the motor exceeded the value set in the "tripmeter information" parameter.	After performing one of the following operations, the travel distance (Tripmeter) of the motor became lower 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. • Data was written to the driver from the **MEXE02**. • "Return to factory setting" was executed with the **MEXE02**.	• Teaching, remote operation was released. • Configuration was complete. • Writing data was completed. • Data was returned to the factory setting.
I/O test mode	INFO-IOTEST	• "I/O test" was executed with the **MEXE02.** • Configuration was executed.	• The I/O test mode was released. • Configuration was complete.
Configuration request	INFO-CFG	The parameter that required executing the configuration was changed.	Configuration is executed.
Reboot request	INFO-RBT	The parameter that required rebooting was changed.	Reboot was performed.

memo 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. There are the following two possible reasons that the preset was failed.

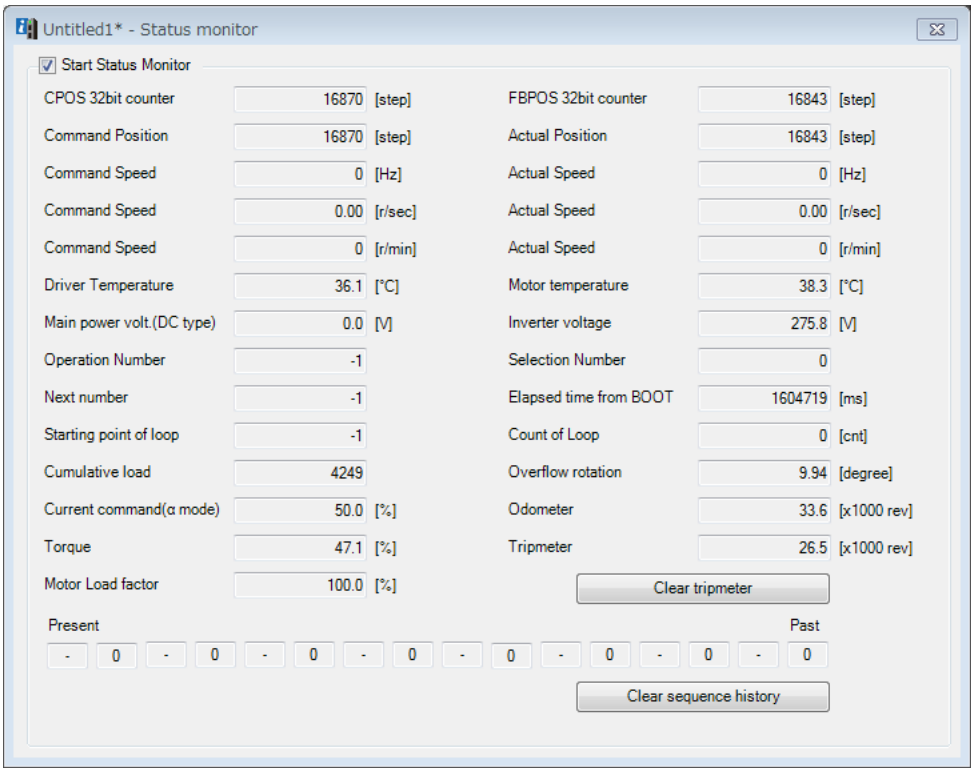
- The ABZO sensor is not connected to the driver.
- The preset was executed in a state where the position deviation between the command position and feedback position is 1.8° or more.
  The position deviation can be checked on the status monitor screen of the **MEXE02**.

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

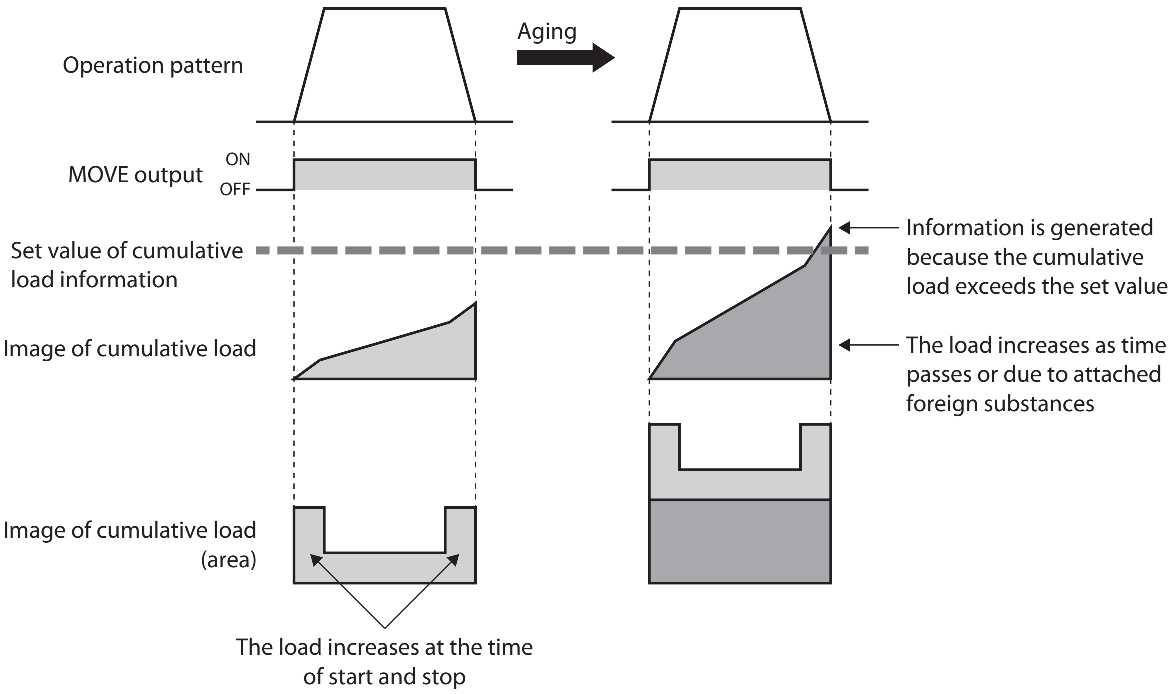
Various functions of the **AZ** Series are also helpful for maintenance of the equipment.

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.

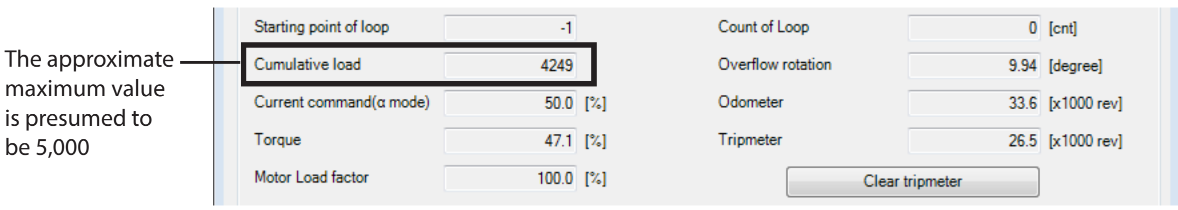
■ Concept of cumulative load

As the operating time of equipment passes, a friction force and load will increase by adhesion of rusts or foreign objects, deterioration of greases and others. 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.



2. Set the maximum value decided in step 1 for information.

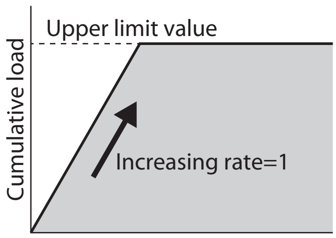
Overvoltage information (INFO-OVOLT) (DC input type driver) [V]	63.0
Undervoltage information (INFO-OVOLT) (DC input type driver) [V]	18.0
Overload time information (INFO-OLTIME) [s]	5.0
Overspeed information (INFO-SPD) [r/min]	4500
Cumulative load 0 information (INFO-CULD0)	5000
Cumulative load 1 information (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

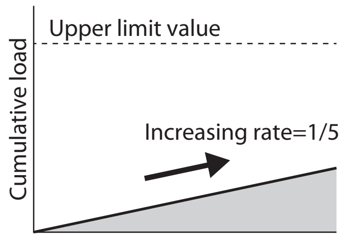
The upper limit value of cumulative load count is 2,147,483,647.
If linking and loop are repeated or the operating time is long, the cumulative load increases. Control may become difficult or the upper limit value of count may be exceeded.
In this case, use the "cumulative load value count divisor" parameter. 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"

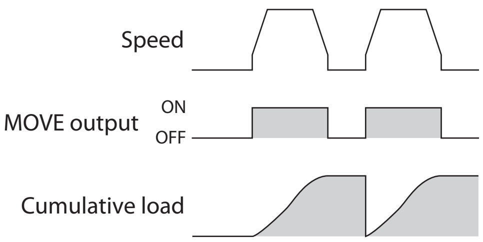


Increase slows down because the count value of the cumulative load is divided by "5"

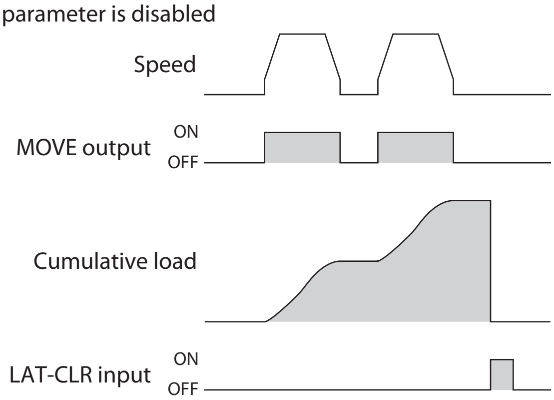
■ About "cumulative load value auto clear" parameter

- 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



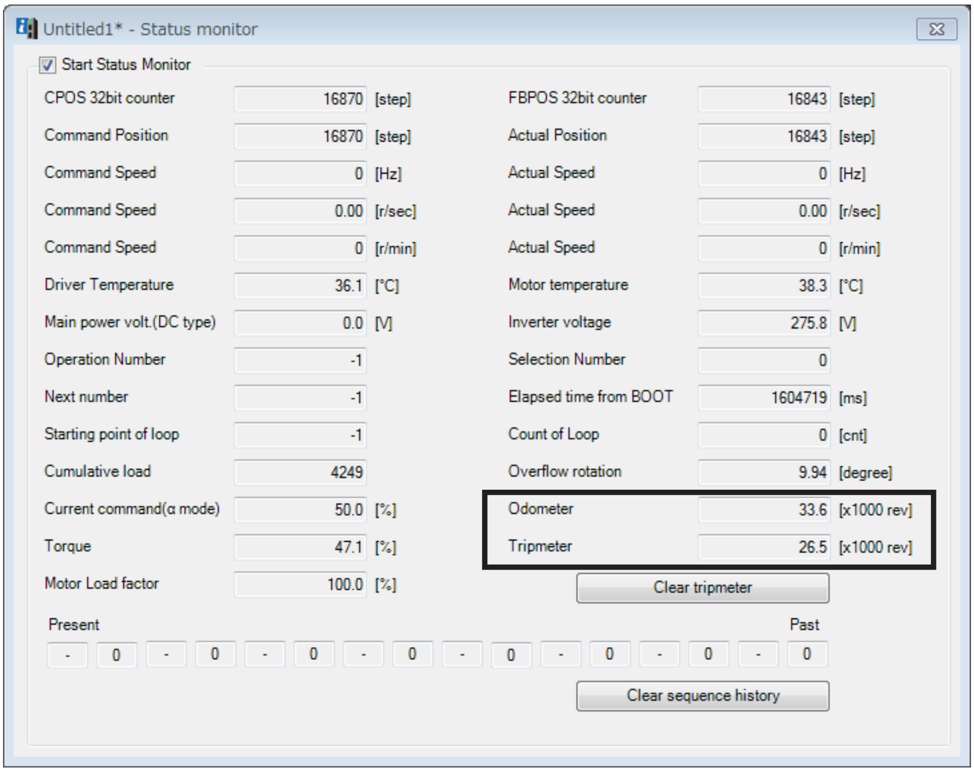
  - When the "cumulative load value auto clear" parameter is disabled



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 position........Command position for when a latch trigger generated
- Actual position ....Actual position for when a latch trigger generated
- Target position ....Target 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 count........................When latched while performing loop operation or the extended loop function, the number of loops for when latched is saved.

memo All the operation information latched is cleared if the power is turn 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.

memo 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.

memo 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.

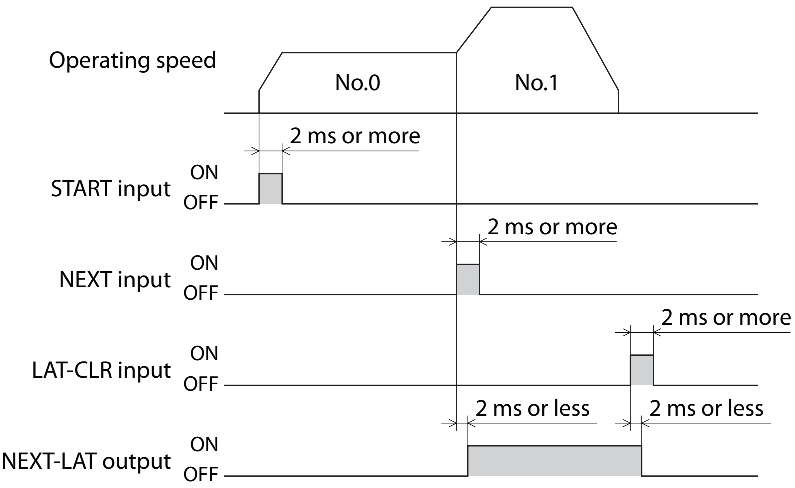
● NEXT-LAT output (⇨p.217)

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 image

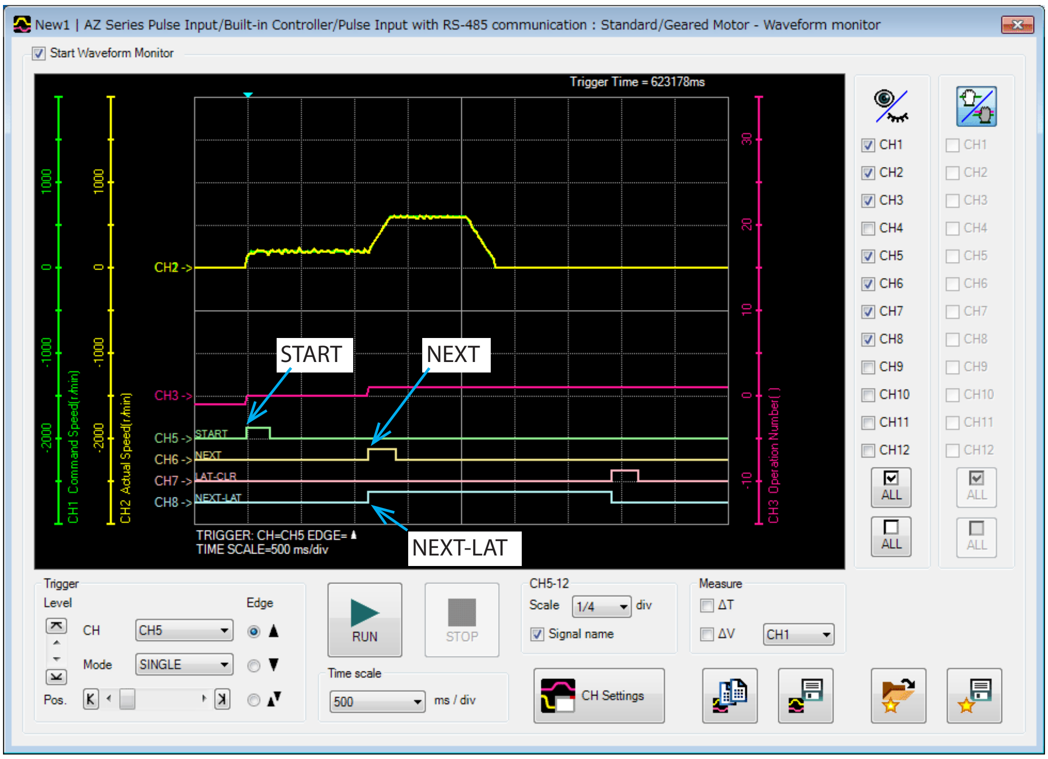


Operation data

	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

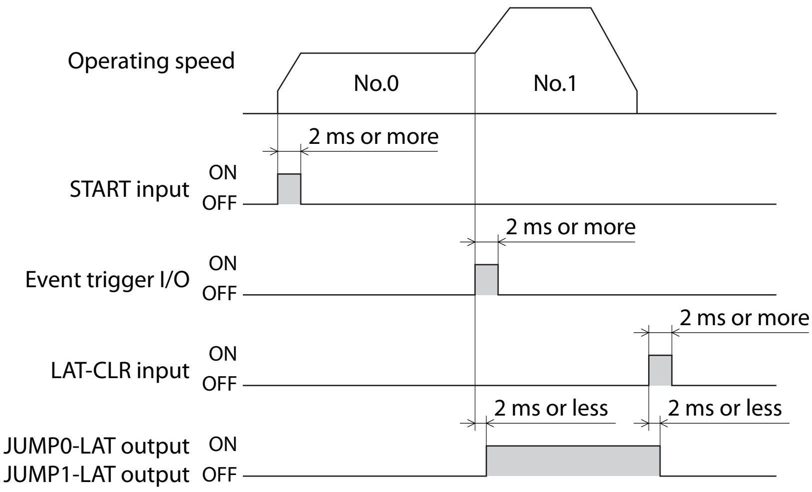
Stopping deceleration [kHz/s]	Operating current [%]	Drive-complete delay time [s]	Link	Next data No.
1000.000	30.0	0.000	Continuous form connection	1
1000.000	30.0	0.000	No link	Stop

Waveform monitor (MEXE02)



- **Latch by the JUMP input**

Operation image



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

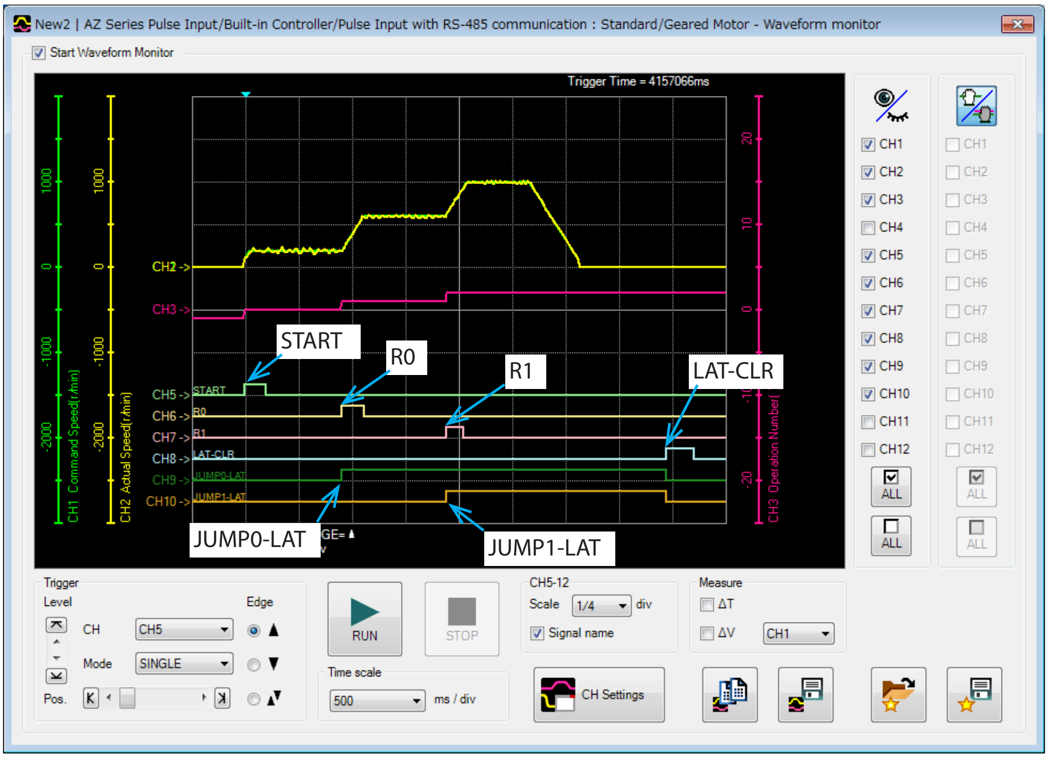
Stopping deceleration [kHz/s]	Operating current [%]	Drive-complete delay time [s]	Link	Next data No.
1000.000	30.0	0.000	No link	+1
1000.000	30.0	0.000	No link	+1
1000.000	30.0	0.000	No link	Stop

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

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

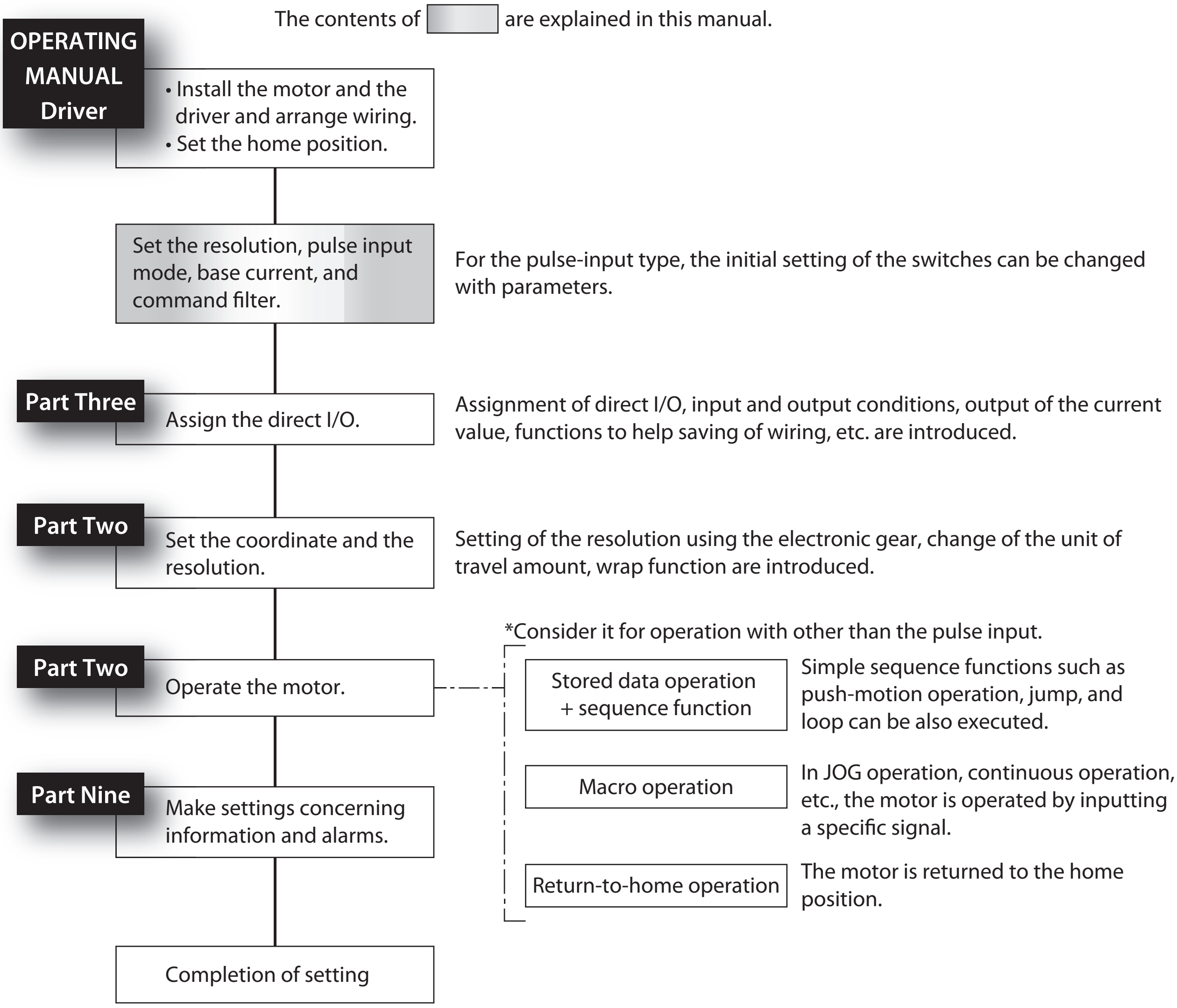
memo When the "status" in the latch monitor is 1 (in latch status), the operation information will not be overwritten even if a latch trigger generates.

10 Extended setting for pulse-input operation

This part explains how to extend the function of the pulse-input operation.

Table of contents

1 Flow of operation and extended setting



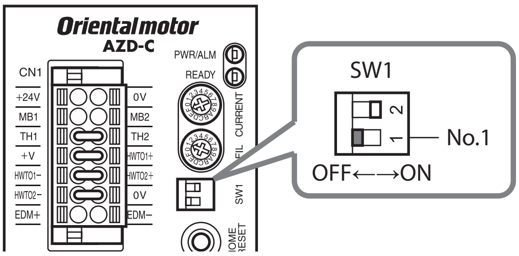
2 Setting with switches (only for pulse-input type)

2-1 Resolution

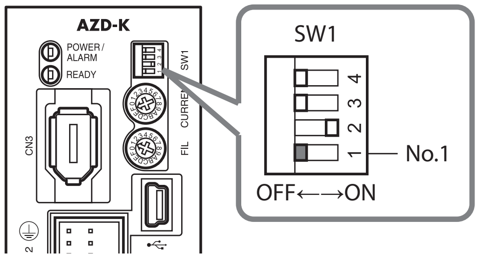
Set the resolution per revolution of the motor output shaft using the SW1-No.1.

Factory setting: OFF

● AC power input driver



● DC power input driver

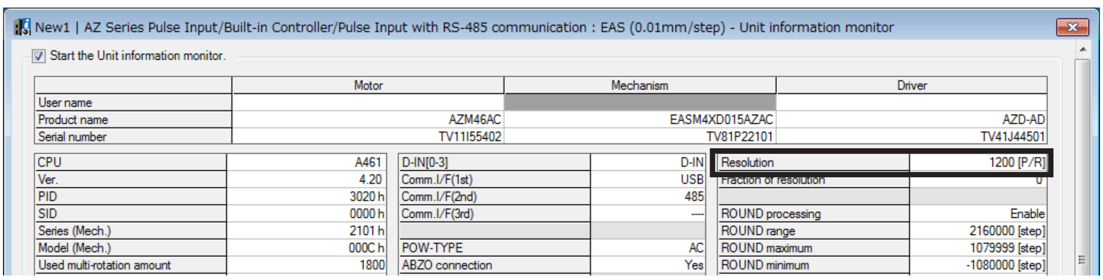


Note When motorized actuators are used, do not change the switch (factory setting: OFF). If the switch is set to ON, the actuator may cause an unexpected movement.

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.

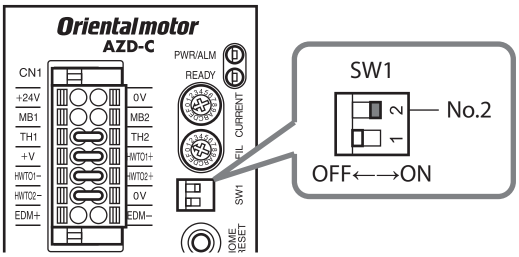


2-2 Pulse input mode

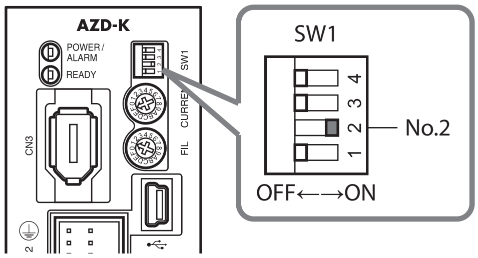
Set a desired pulse input mode of the driver according to the pulse output mode of the controller used with the driver. Set with SW1-No.2

OFF: 2-pulse input mode
ON: 1-pulse input mode

● AC power input driver



● DC power input driver



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.
- 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.488.

■ Pulse signal

Input a pulse with sharp rising and falling edges as shown in the figures. Refer to p.489.

2-3 Operating current

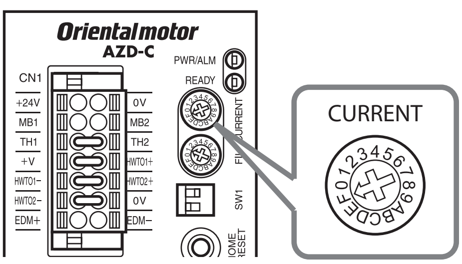
The motor operating current is calculated based on the base current rate (%).
Set the base current rate using the CURRENT switch.

Operating current = CURRENT switch set value × "Operating current" value set for the operation data number

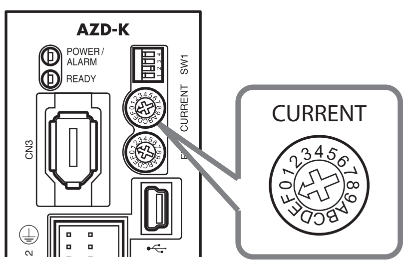
Factory setting: F (100%)

Note
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

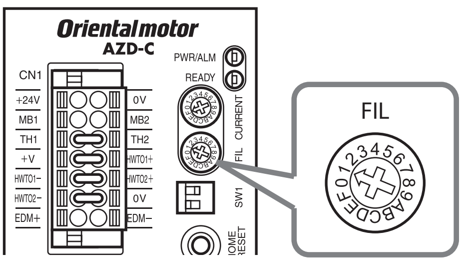
MEXE02 tree view	Name	Description	Initial value
Base setting	Base current setting source (only for pulse input type)	Selects the setting method of the base current rate. **Setting range** 0: The parameter setting is followed 1: The switch setting is followed	1

2-4 Command filter

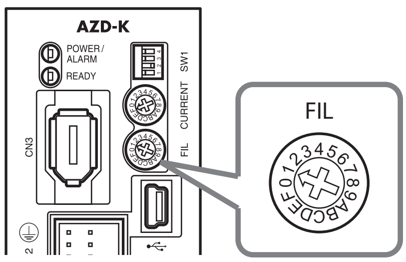
Set the command filter using the FIL switch.

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.

Note
- 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 (×1) 4: Phase difference input mode (×2) 5: Phase difference input mode (×4)	0

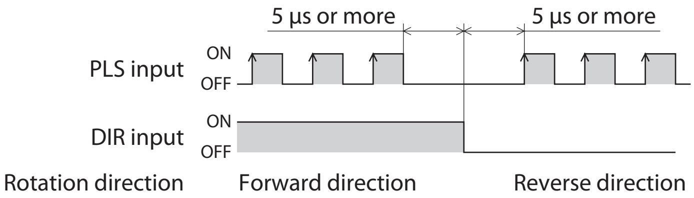
* If "0: The switch setting is followed" is selected using the pulse-input type with RS-485 communication interface, the 2-pulse input mode will be set.

■ 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.

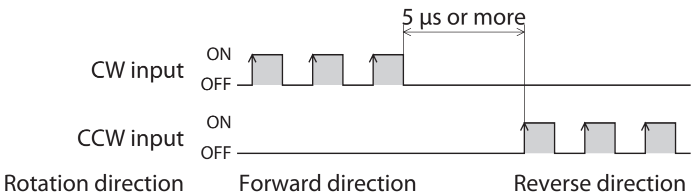
● 1-pulse input mode

Pulses are input via the PLS input and the rotation direction is selected using the DIR input.



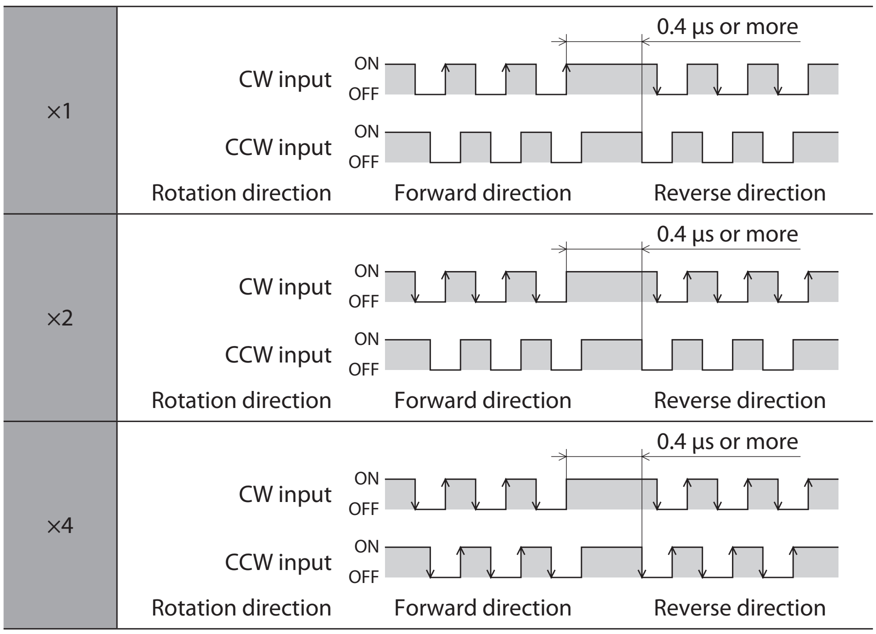
● 2-pulse input mode

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)

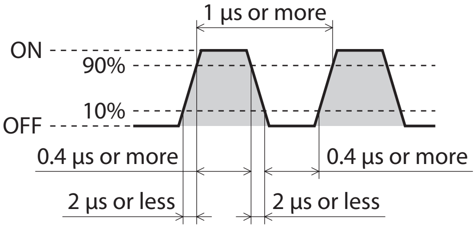
The motor rotates in the forward direction when the CCW input phase is delayed by 90° against the CW input. The motor rotates in the reverse direction when the CCW input phase is advanced by 90° against the CW input.



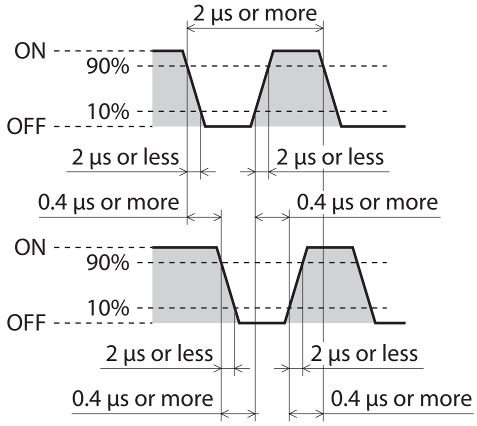
■ Pulse signal

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.

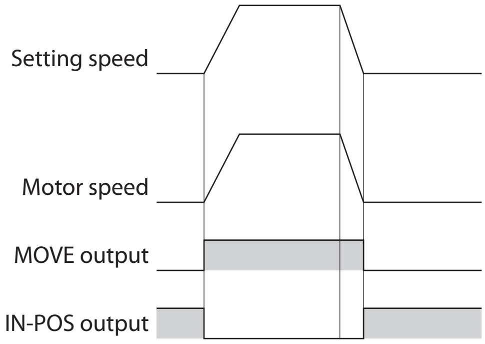
Related parameters

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

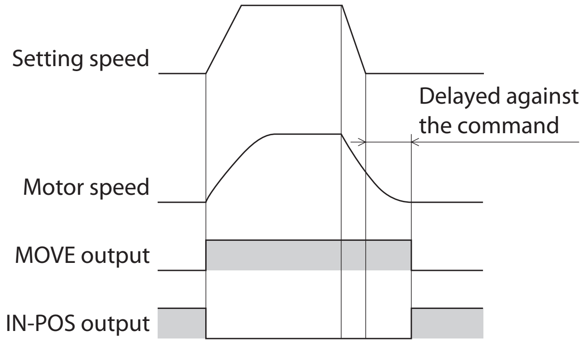
- **LPF (speed filter)**

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

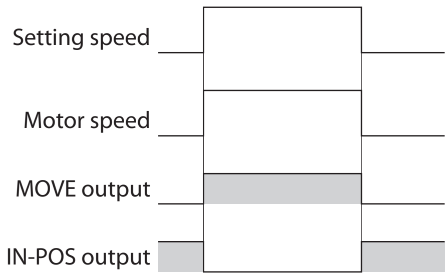
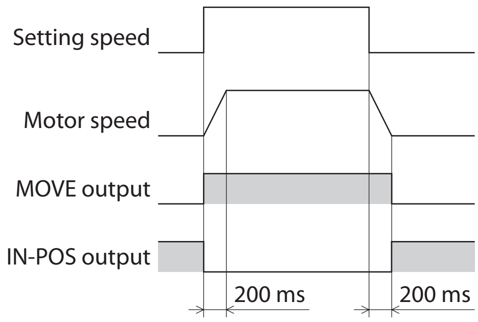
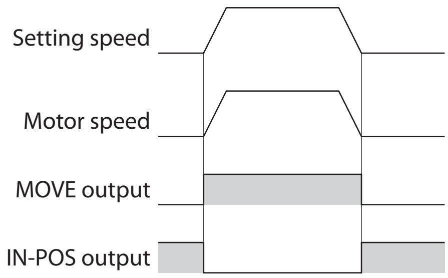
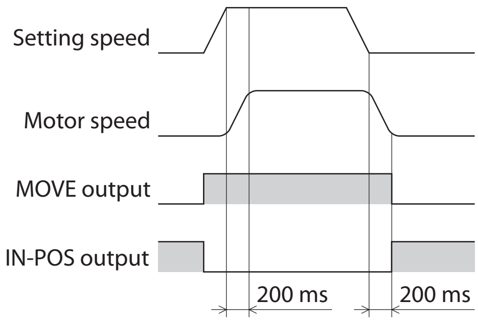


• When the "Command filter time constant" parameter is 200 ms



- **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)		
Trapezoidal operation		

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

Note: 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

memo: 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	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 when the pulse request function is used. **Setting range** 1 to 10,000 (1=0.1 kHz)	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

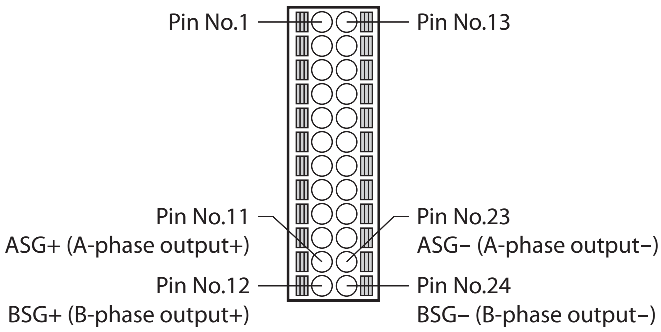
Related parameters

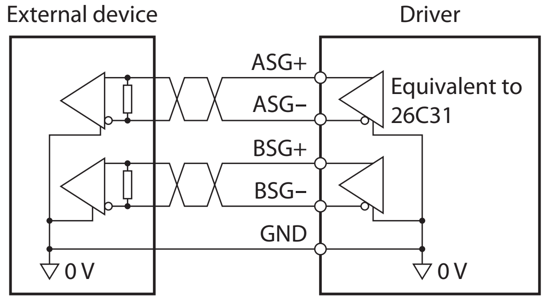
MEXE02 tree view	Parameter name	Description	Initial value
I/O action and function	PLS-LOST check algorithm	Selects whether the count is increased or decreased according to the rotation direction when the number of disabled pulses is counted. **Setting range** 0: Unsigned 1: Signed	0

- **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: CN5
DC power input driver: CN4





Note The A-phase/B-phase outputs are differential outputs. For the input circuit of the external device, connect the one that supports differential outputs.

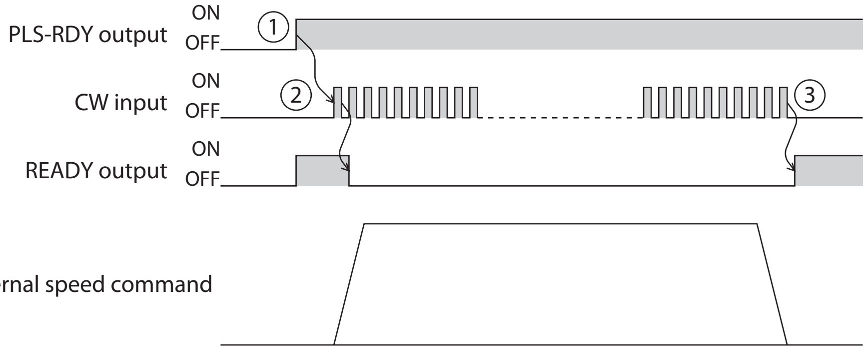
Related parameters

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. **Setting range** Output signal list ⇨ p.430	128: CONST-OFF
	Differential output (EXT-OUTB) function selection on I/O mode		
	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. **Setting range** 0: Non invert 1: Invert	0
	Differential output (EXT-OUTB) inverting mode on I/O mode		
	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. **Setting range** 0 to 250 ms	0
	Differential output (EXT-OUTB) OFF delay time on I/O mode		

memo 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

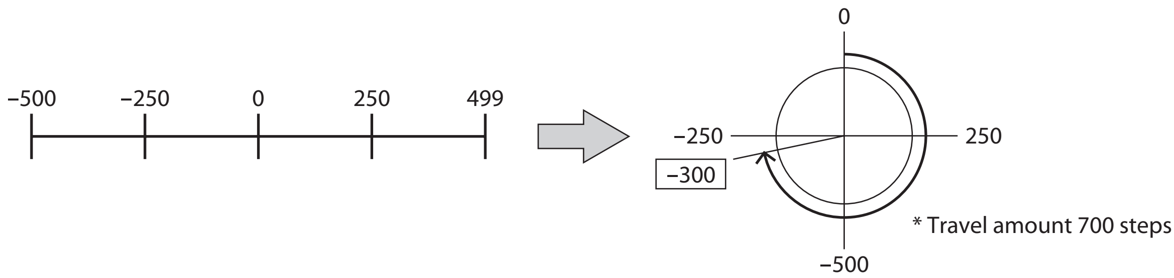
Since the wrap range is −500 to 499 steps, the present position coordinate is output as follows.

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 ⇨p.453)

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

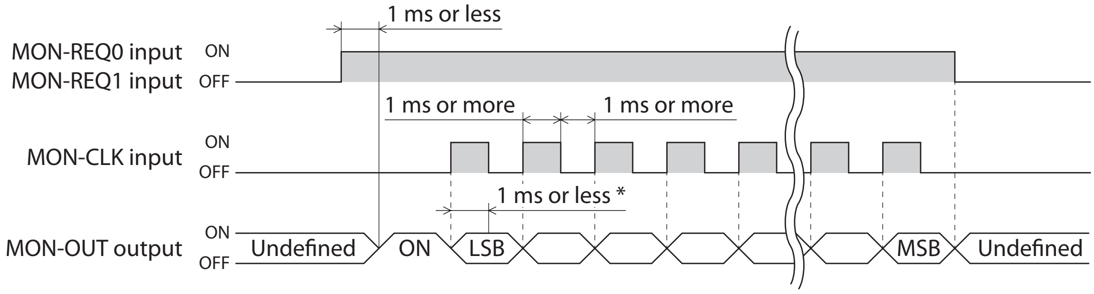
Feedback position : 300 steps = 0000 0000 0000 0000 0000 0001 0010 1100
Alarm code : 66h = 0110 0110
Checksum : 0000 0000 + 0000 0000 + 0000 0001 + 0010 1100 + 0110 0110 = 1001 0011

Data output from the driver

0011 0100 1000 0000 0000 0000 0000 0000	0110 0110	1100 1001
Feedback position	Alarm code	Checksum

■ Timing chart

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, output can be canceled.



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

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

5-2 Pulse request function

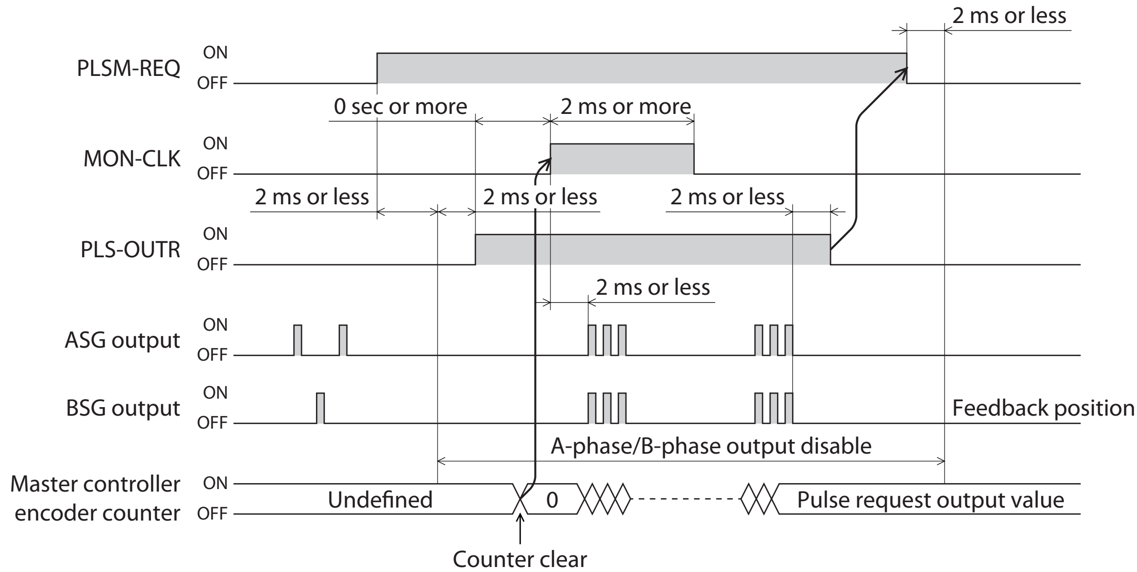
The pulse request function is a function to transmit the present position (absolute position) to the master controller by using the A-phase and B-phase outputs. When the encoder counter of the master controller and the A-phase and B-phase outputs of the driver are connected and the pulse request function 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

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.



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 motors and the hollow rotary actuator **DGII** Series. Doing so may cause damage to the motor or gear part.

6-1 Preparation for operation

■ Assignment of input/output signals

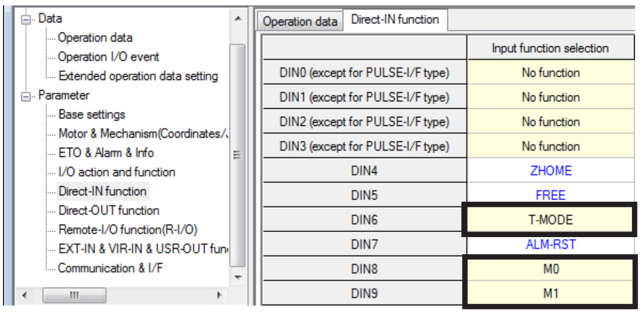
Assign signals used in push-motion operation to the direct I/O (DIN, DOUT) of the driver.

● Signals used in push-motion operation

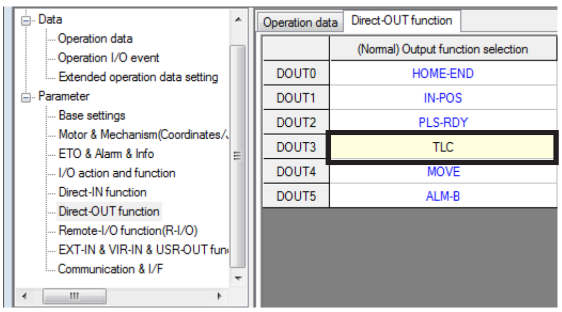
Signal name	Description
T-MODE input	When push-motion operation is performed, turn the T-MODE input ON. The overload alarm will be disabled.
M0 to M7 input	Select the operation data number. The value of the operating current set in the selected operation data number will be applied.
TLC output	If the 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



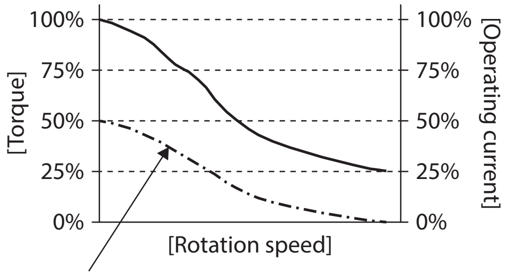
Output signals



memo 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

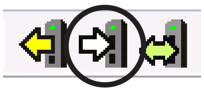
MEXE02 tree view	Parameter name	Description	Initial value
Base setting	Automatic current cutback function	Sets the automatic current cutback function to switch to the stop current when the motor stops. **Setting range** 0: The automatic current cutback function is disabled (Heat generation at the time 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

memo 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.

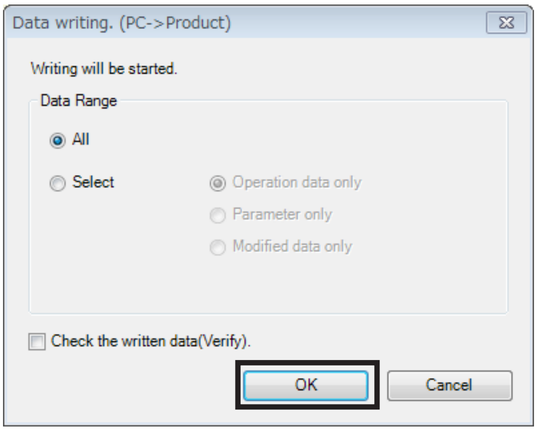
■ Data write

The data or parameter created in the **MEXE02** can be written to the driver.

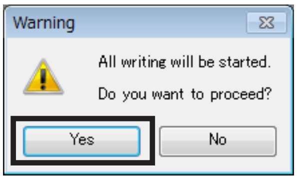
1. Click the [Data writing] icon in the toolbar.



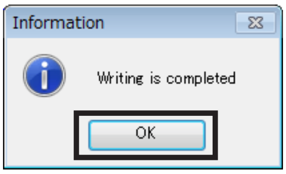
2. Select data to be written and click [OK].



3. Click [Yes].
   Data writing starts.



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



6-2 Performing the push-motion operation

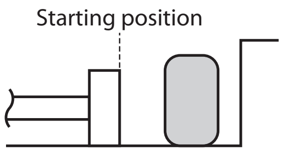
As an example, this section explains how to perform push-motion operation in the positive direction.

Setting example

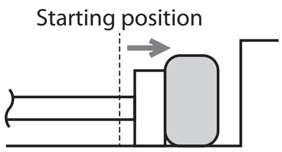
- Operation data No.0: Operating current (output torque) 30%
- Operation data No.1: Operating current (output torque) 50%
- Current setting during motor standstill at T-MODE: Operating current
- CW/CCW pulse: 10,000 pulse

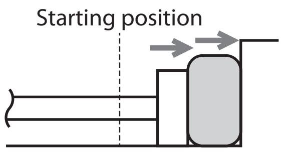
Operation procedure

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.

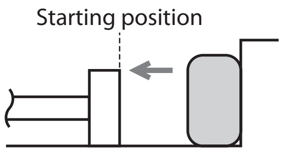


4. Input 10,000 pulses of the CW pulse in the positive direction to start pushing.
   When the output torque reaches 50% (the setting value of the operation data No.1), the TLC output is turned ON.





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.

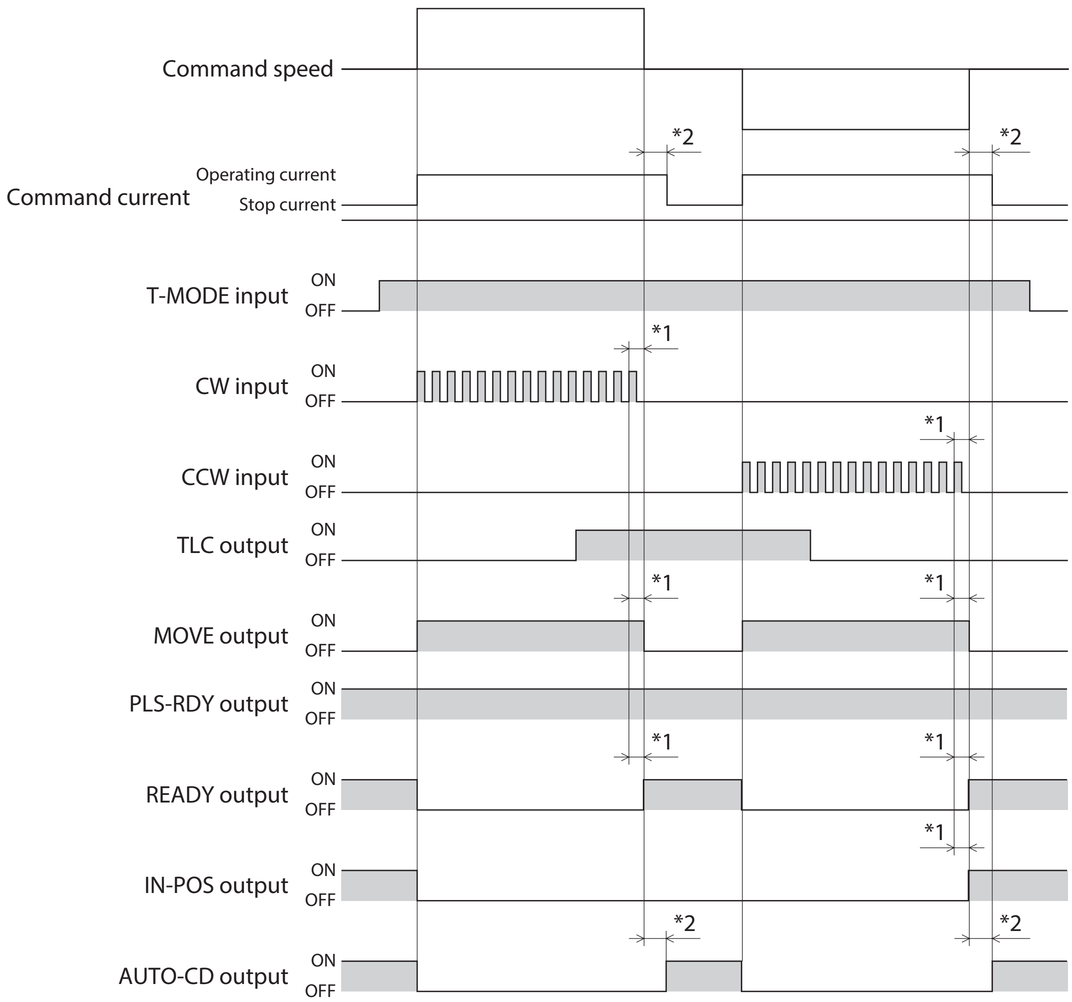


Note

- 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

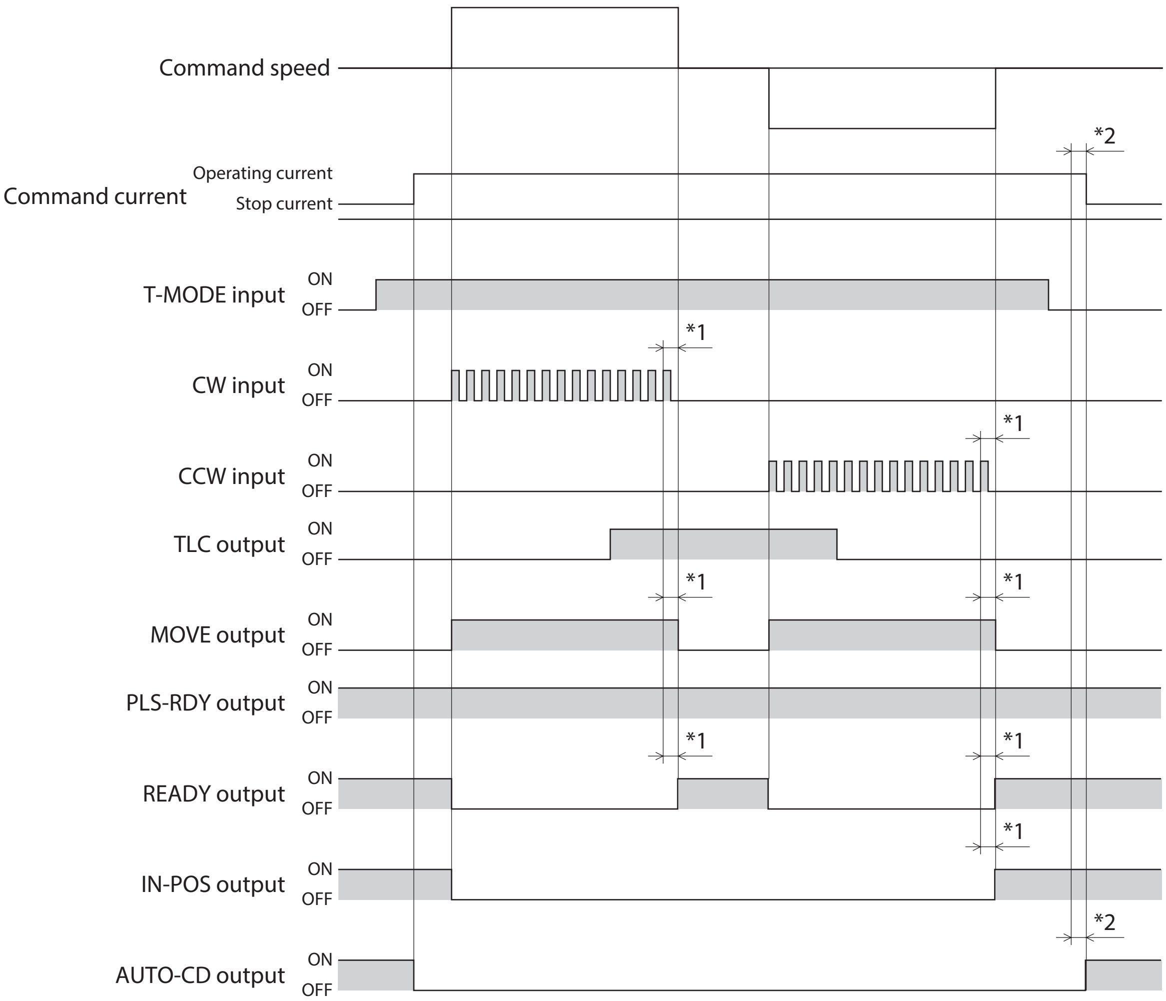
6-3 Timing chart

■ 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.

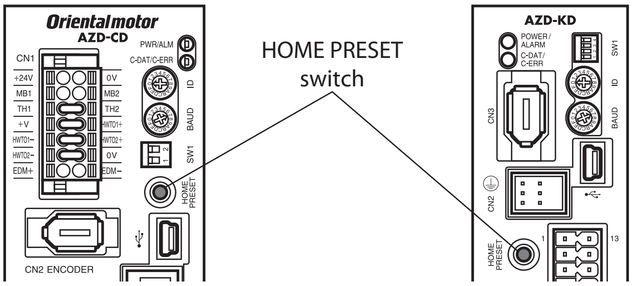
11 Appendix

Table of contents

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



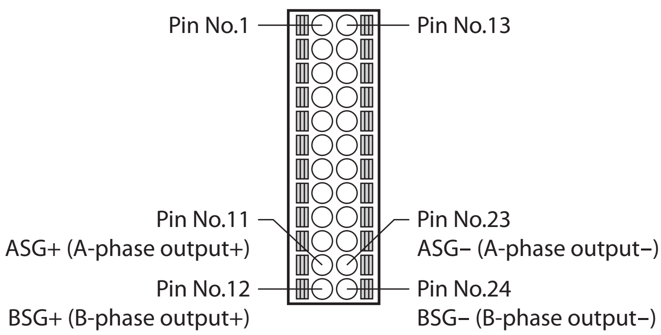
Related parameters

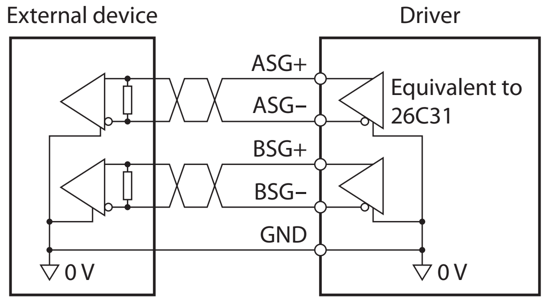
MEXE02 tree view	Parameter name	Description	Initial value
EXT-IN and VIR-IN and USR-OUT function	Extended input (EXT-IN) function selection	Selects the input signal to be assigned to the HOME PRESET switch. **Setting range** Input signal list ⇨ p.429	9: P-PRESET
	Extended input (EXT-IN) inverting mode	**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





Note 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. **Setting range** Output signal list ⇨ p.430	128: CONST-OFF
	Differential output (EXT-OUTB) function selection on I/O mode		
	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. **Setting range** 0: Non invert 1: Invert	0
	Differential output (EXT-OUTB) inverting mode on I/O mode		
	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. **Setting range** 0 to 250 ms	0
	Differential output (EXT-OUTB) OFF delay time on I/O mode		

Change of assignments of A-phase/B-phase outputs

memo 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.

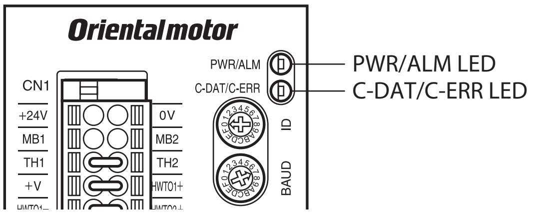
3 LEDs on the driver

You can check various conditions of the driver by the lighting state or the number of blinking of LEDs on the driver.

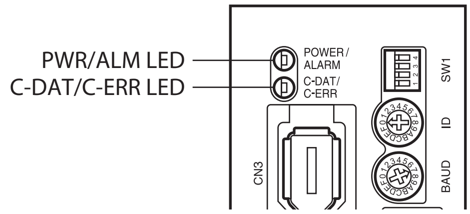
3-1 Lighting state of LEDs

- **Built-in controller type, pulse-input type with RS-485 communication interface**

[AC power input driver]

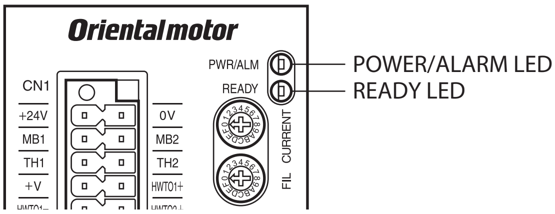


[DC power input driver]

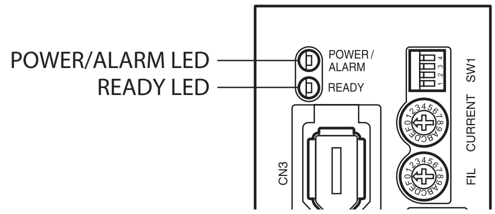


- **Pulse-input type**

[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		• 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		The interlock was released by holding down the HOME PRESET switch. Red and green colors may overlap and it may be visible to orange. The LED is lit in green when the time set in the "Extended input (EXT-IN) interlock releasing time" parameter is elapsed.
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.430	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.430	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.

Note

- 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.

memo

- 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.442)

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

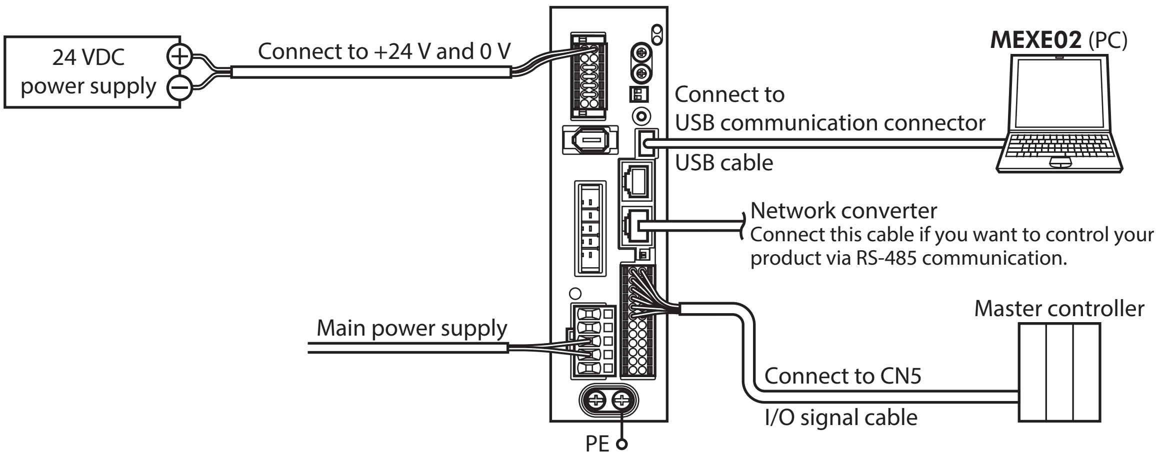
4-1 Preparation and operating procedure of the driver simulation mode

■ preparation

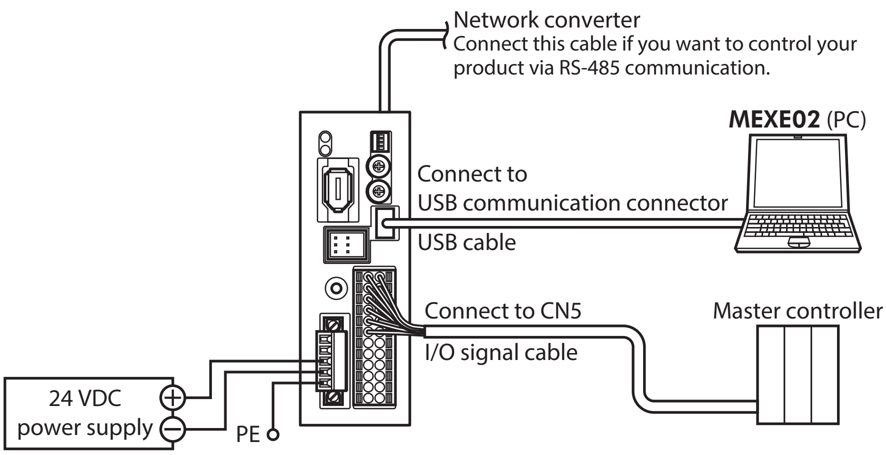
● When the motor is not connected

Note When a simulation for a motorized actuators is performed, be sure to connect the actuator to the driver. (⇨ p.513)

AC power input

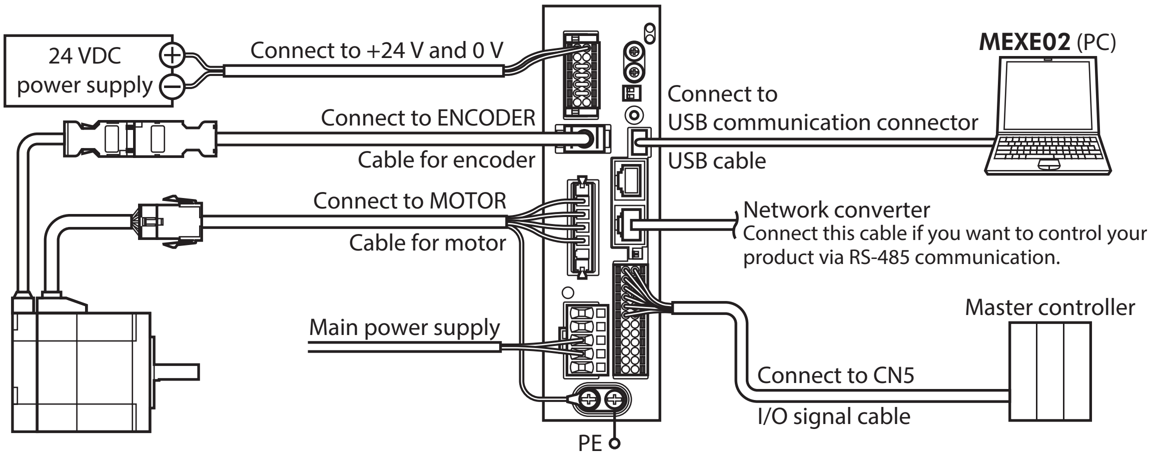


DC power input

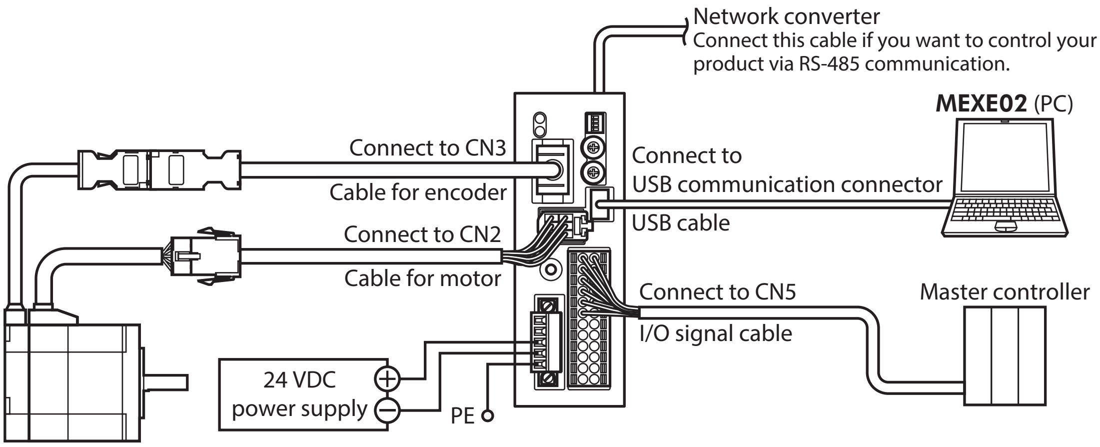


- **When the motor is connected**

AC power input



DC power input

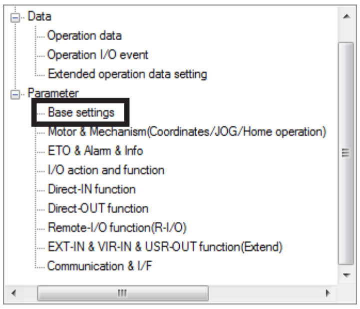


■ Operating procedure

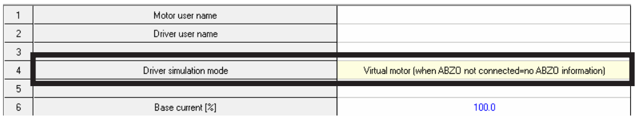
This section explains how to simulate a driver operation without connecting a motor using the **MEXE02**.

1. Turn on the control power supply and main power supply of the driver.

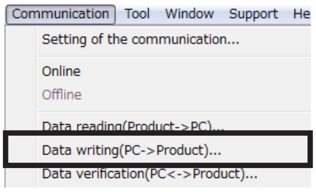
2. Click the "Base settings" under "Parameter" in the tree view.
   The base setting parameters are shown.



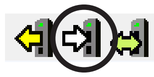
3. Set the "Driver simulation mode" parameter to "Virtual motor."



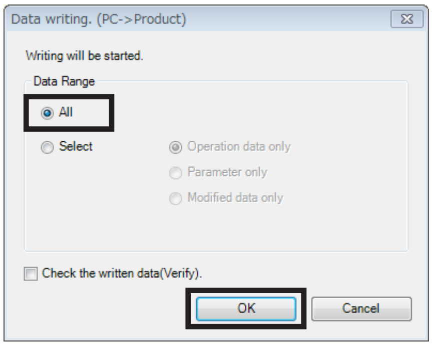
4. Write to the driver in the following steps.
   1) Click the [Data writing (PC → product)] from the [Communication] menu or click the [Data writing (PC → product)] icon in the toolbar.



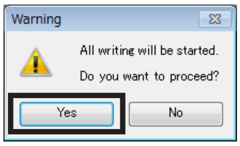
or



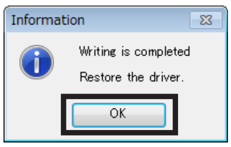
   2) Select the [All], and click [OK].



   3) Click [Yes].
      Writing data is started.



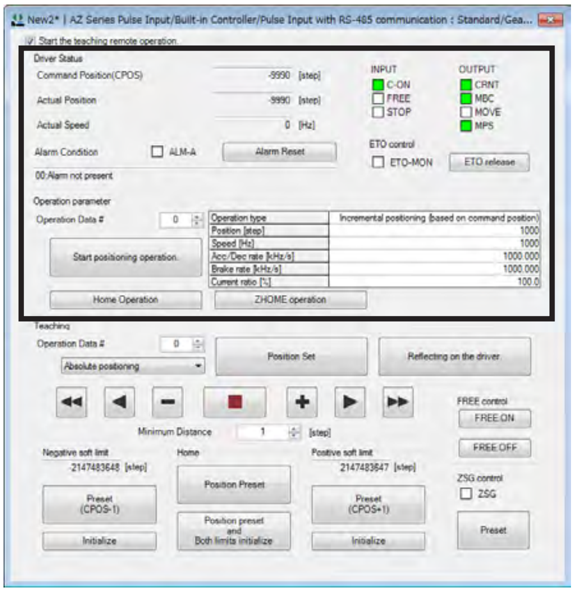
   4) After it is completed, click [OK].



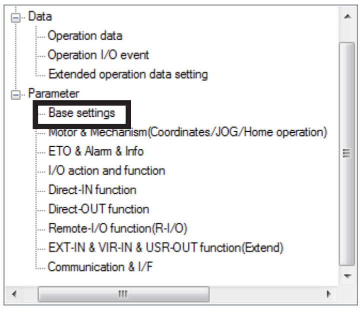
   5) Cycle the control power supply and main power supply of the driver.

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

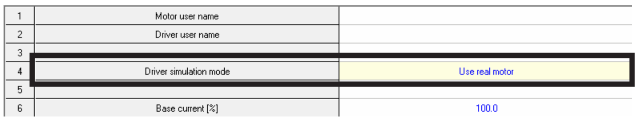
6. Execute positioning operation, etc. with "Teaching, remote operation."
   The command position and the feedback position are increased/decreased without connecting the motor.
   The status can be checked also on the monitor windows of I/O and status.



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.

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.

memo 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. • 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. • 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. • 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

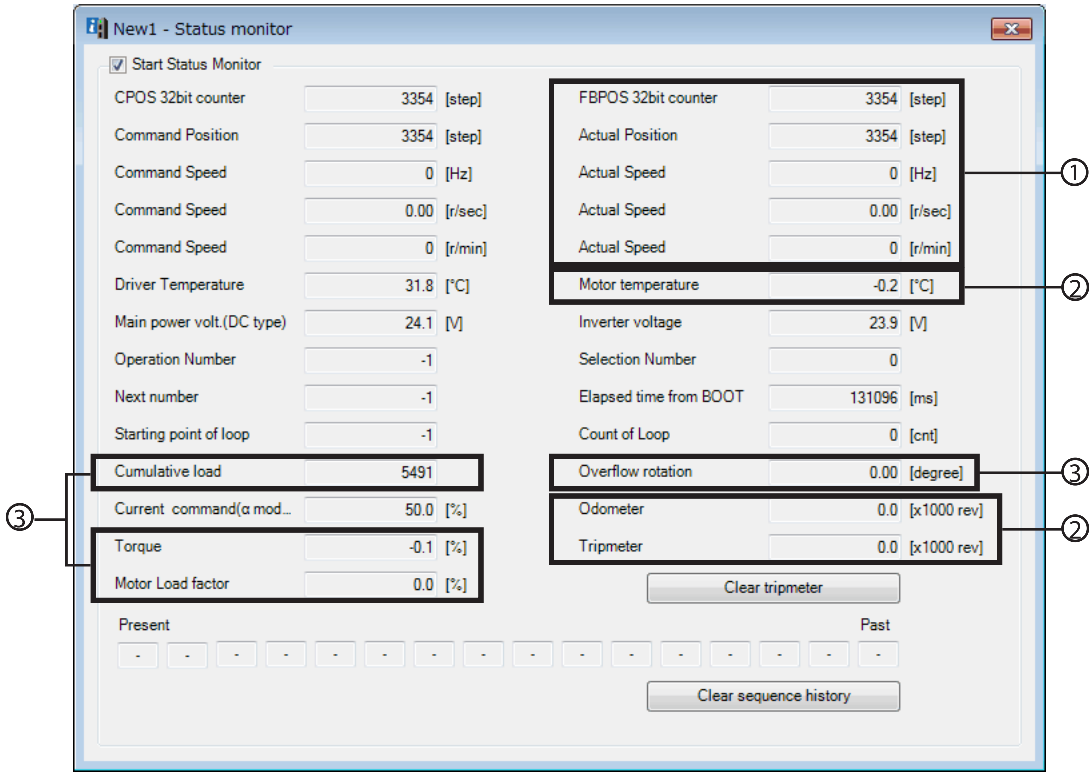
Coordinate generation (When the motor is connected)

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.302)

■ 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)

memo
- 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)

memo 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.

memo 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

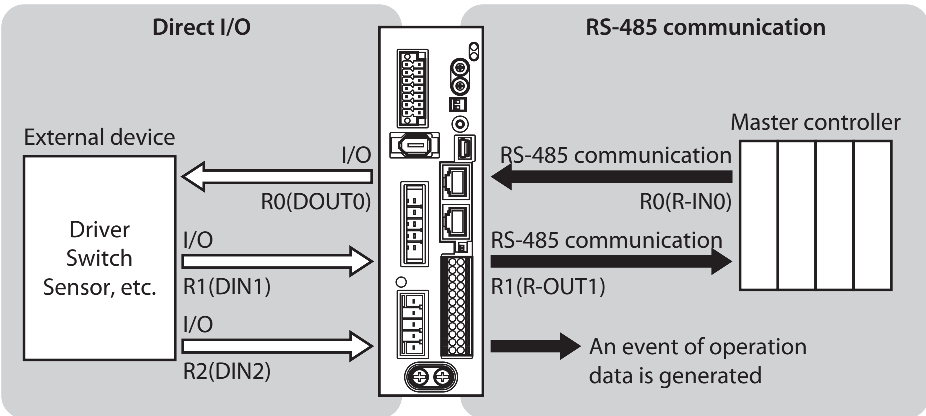
Assign the R0 input to the DOUT0 output and R-IN0.
When R-IN0 is set to 1, the DOUT0 output is turned ON. When R-IN0 is set to 0, the DOUT0 output is turned OFF.

● 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.429	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.430	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.429	Varies depending on input
	Output function	Selects the output signal to be assigned to remote I/O. **Setting range** Output signal list ⇨ p.430	Varies depending on output

■ Revision record

Revision number	Revised contents
First edition	
Second edition	• 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	• 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	• Amendment for adding models • Revision of words and terms • Addition of "Export of alarm records" • Correction of minor erroneous descriptions
Fifth edition	• 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
Sixth edition	• Addition of "Expansion of supported contents" • Addition of "Mechanism lead decimal digit setting" parameter • Addition of function codes in "5 Method of control via Modbus RTU (RS-485 communication)" • Addition of descriptions about ABZO information copy • Correction of minor erroneous descriptions

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