Oriental motor

HM-60505-4

αSTEP AZ Series / Motorized Actuator equipped with AZ Series

mini Driver

Ethernet Type

USER MANUAL

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 Introduction

2 Hardware

3 Modbus TCP/UDP communication

4 CC-Link IE Field Network Basic communication

5 Parameter ID lists

6 Troubleshooting

7 Reference materials

1 Introduction

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

◆**Table of contents**

1 Before using the product

Only qualified personnel of electrical and mechanical engineering should work with the product.
Use the product properly after thoroughly reading the section "4 Safety precautions" on p.13. In addition, be sure to observe the contents described in warning, caution, and note in this manual.
The product described in this manual is designed and manufactured to be incorporated in general industrial equipment. Do not use it for any other purpose. Oriental Motor Co., Ltd. is not responsible for any compensation for damage caused through failure to observe this warning.

Note

- Security related precautions
  This product does not have security mechanisms such as authentication or encryption. We are not responsible for any problems that may arise directly or indirectly from cyber attacks on this product.
  For cyber attacks (unauthorized access, computer viruses, denial of service attacks, etc.) on this product, take appropriate measures to protect your entire system.
  Separate the network from the office or other information networks with a router, firewall, etc., and use this product within the network that has appropriate security measures in place. This product is designed and intended to be used in such a network.
- Communications
  Do not use this product to communicate with remote locations. This product may not operate as expected due to communication problems caused by the network usage environment, load, or communication cable conditions. Determine the countermeasure method throughout your entire system so that it works to the safety side even if communication delays or interruptions occur.

2 About operating manuals

2-1 Related operating manuals

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

- **AZ** Series / Motorized Actuator equipped with **AZ** Series mini Driver Ethernet Type USER MANUAL (this document)
- **AZ** Series / Motorized Actuator equipped with **AZ** Series OPERATING MANUAL Function Edition

Read the following operating manuals for motors and motorized actuators.

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

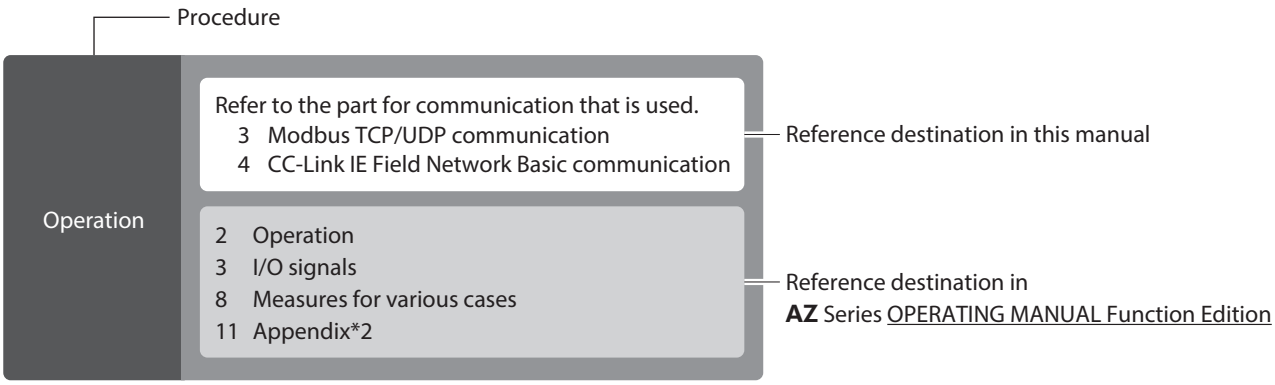
2-2 How to use operating manuals

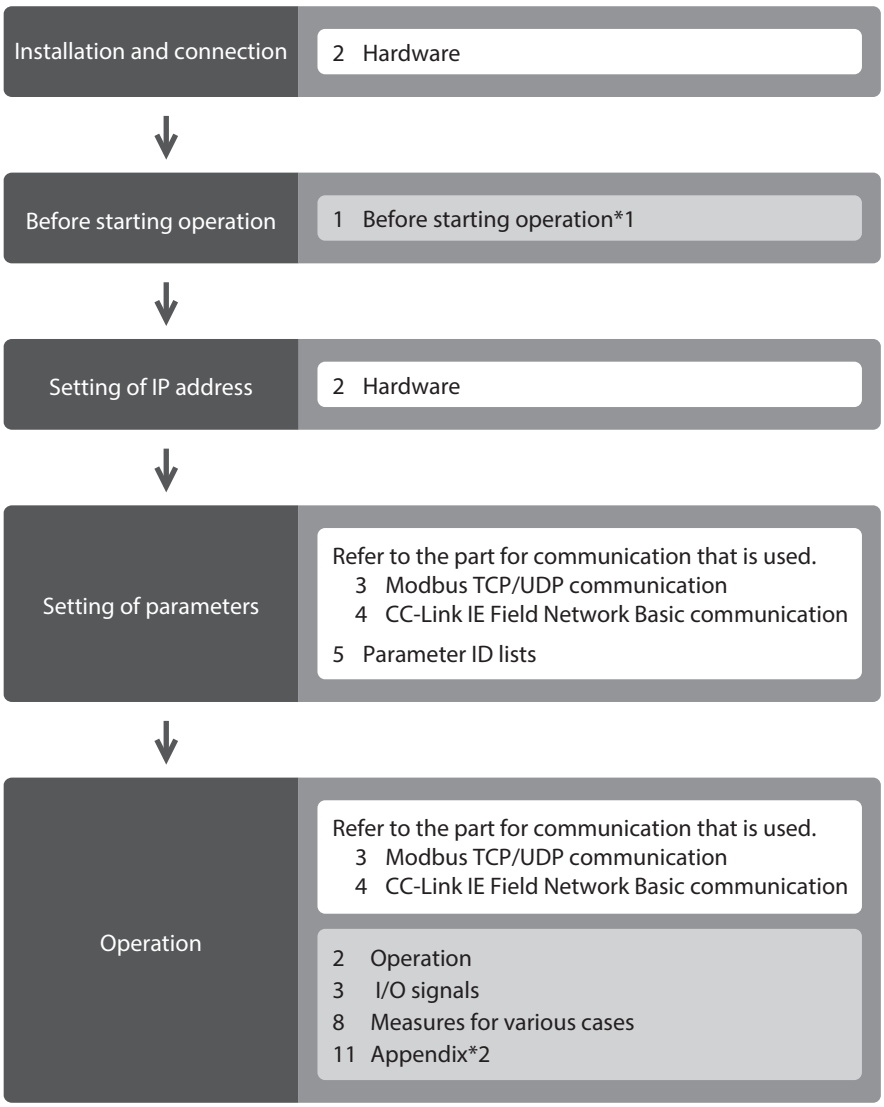
To use the product, read this manual together with the **AZ** Series OPERATING MANUAL Function Edition.
This manual describes the contents specific to the mini Driver Ethernet type, and the **AZ** Series OPERATING MANUAL Function Edition describes the contents common to the **AZ** Series products. Refer to the **AZ** Series OPERATING MANUAL Function Edition for the contents not included in this manual.
Reference destinations are indicated according to the flow of use.

■ How to read reference destinations

The title name of the operating manual is described in the reference destination.

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





*1 When a motorized actuator is used, the following contents cannot be operated via Ethernet. Use the **MEXE02** support software.
- Copying the fixed value (parameter) of the ABZO sensor to driver
- Creation of recovery data file and method of recovery

*2 Refer to this manual for "LEDs of the driver." (⇨p.21)

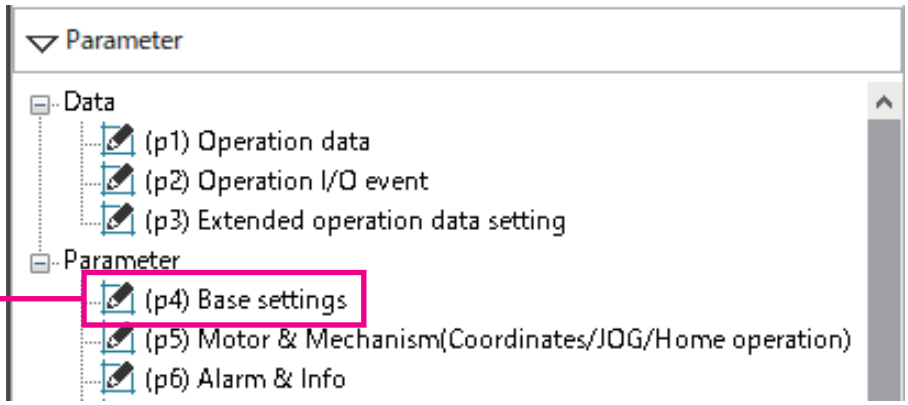
■ Description of power supplies

This manual describes contents when a main power supply and a control power supply are used.
The mini Driver can also be used with a main power supply only. When using it with only the main power supply, replace "main power supply and control power supply" or "control power supply" with "main power supply" to read this manual.

2-3 Screen display of MEXE02 software

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

Example of description



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

8-1 (p4) Base setting parameters

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

3 Overview of the product

The **AZ** Series mini Driver Ethernet type is the dedicated driver for the **AZ** Series products.

■ Compatible with Ethernet

- This driver is compatible with Modbus TCP, Modbus UDP, and CC-Link IE Field Network Basic.
- This driver can be controlled not only by an Ethernet-compatible PLC (Programmable Logic Controller), but also by a personal computer or single-board computer.
- Direct data operation can be started and operation data and parameters can be set via Ethernet.

■ Setting methods of operation data and parameters

Operation data and parameters can be set via Ethernet or using the **MEXE02** software.
This manual describes how to set operation data and parameters via Ethernet.

■ Equipped with direct data operation function

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

■ Connection of the MEXE02 software via Ethernet

A PC on which the **MEXE02** software has been installed can be connected to the driver via Ethernet. Since a USB cable connection is not required, the wiring can be simplified. To connect the **MEXE02** software via Ethernet, it is necessary to make the settings in advance. Refer to p.190 for details.

■ Equipped with the communication program creation support function with a host controller (Modbus TCP and Modbus UDP)

The contents of Modbus TCP and Modbus UDP frames, the status of transmission and reception, and a communication error can be monitored with the **MEXE02** software. In addition, using the Ethernet frame test function can perform a test transmission of Modbus TCP and Modbus UDP frames.

■ Providing the CSP+ file (CC-Link IE Field Network Basic)

The CSP+ file (Control & Communication System Profile Plus file) is a profile that describes information specific to CC-Link Family compatible devices. Importing the CSP+ file to the host controller can configure the CC-Link IE Field Network Basic before the driver is delivered.
For details, contact your nearest Oriental Motor sales office.

4 Safety precautions

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

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

⚠WARNING

General

- Do not use the product in explosive or corrosive environments, in the presence of flammable gases, in areas subjected to splashing water, or near combustible materials. Doing so may result in fire, electric shock, or injury.
- Assign qualified personnel to the task of installing, wiring, operating, inspecting, and troubleshooting the product. Handling by unqualified personnel may result in fire, electric shock, injury, or damage to equipment.
- Do not transport, install, connect, or inspect the product while the power is supplied. Doing so may result in electric shock.
- Do not touch the driver while the power is on. Doing so may result in fire or electric shock.
- When an alarm of the driver is generated (any of the driver's protective functions is triggered), remove the cause before resetting the alarm (protective function). Continuing operation without correcting the cause of the problem may cause the motor and driver to malfunction, resulting in injury or damage to equipment.

Installation

- Install the driver in an enclosure. Failure to do so may result in electric shock or injury.

Connection

- Observe the product specifications for the power supply voltage of the driver. Failure to do so may result in fire or electric shock.
- Connect the product securely according to the connection diagram. Failure to do so may result in fire or electric shock.
- Do not forcibly bend, pull, or pinch the connection cable. Doing so may result in fire or electric shock.

Operation

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

Repair, disassembly, and modification

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

⚠CAUTION

General

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

Installation

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

Operation

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

4-1 Security related precautions

- This product does not have security mechanisms such as authentication or encryption. We are not responsible for any problems that may arise directly or indirectly from cyber attacks on this product.
- For cyber attacks (unauthorized access, computer viruses, denial of service attacks, etc.) on this product, take appropriate measures to protect your entire system.
- Separate the network from the office or other information networks with a router, firewall, etc., and use this product within the network that has appropriate security measures in place. This product is designed and intended to be used in such a network.

4-2 Communications

Do not use this product to communicate with remote locations. This product may not operate as expected due to communication problems caused by the network usage environment, load, or communication cable conditions. Determine the countermeasure method throughout your entire system so that it works to the safety side even if communication delays or interruptions occur.

5 Precautions for use

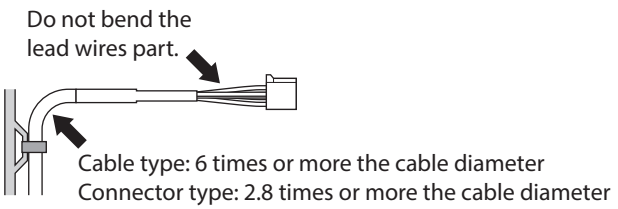
This chapter explains restrictions and requirements the user should consider when using the product.

- **Always use Oriental Motor cables to connect a motor and a driver.**
  Refer to p.36 for the cable models.
- **When conducting the insulation resistance measurement or the dielectric strength test, be sure to separate the connection between the motor and the driver.**
  Conducting the insulation resistance measurement or the dielectric strength test with the motor and driver connected may result in damage to the product.
- **Note on connecting a main power supply and a control power supply whose positive terminals are grounded**
  The USB port on the driver is not electrically insulated. When grounding the positive terminals of a main power supply and a control power supply, do not connect any equipment (PC, etc.) whose negative terminal is grounded. Doing so may cause the driver and this equipment to short, damaging both. When connecting, do not ground equipment.
- **Saving data to non-volatile memory**
  Do not turn off the main power supply and the control power supply while writing the data to non-volatile memory, and do not turn them off for five seconds after writing is completed. Doing so may abort writing the data and cause an alarm of EEPROM error to generate. Non-volatile memory can be rewritten approximately 100,000 times.
- **Noise elimination measures**
  Refer to p.30 for noise elimination measures.
- **Regeneration**
  When operating a large load inertia at a high speed, the regenerative energy generated may increase the voltage of the main power supply, causing an alarm of Overvoltage to generate. To prevent damage to the driver, reconsider the operating conditions so that regenerative voltage does not generate.
- **Static electricity measures for the driver**
  The driver uses components that are sensitive to static electricity. Take measures against static electricity as it may cause the driver to malfunction or be damaged.

■ Notes when the connection cable is used

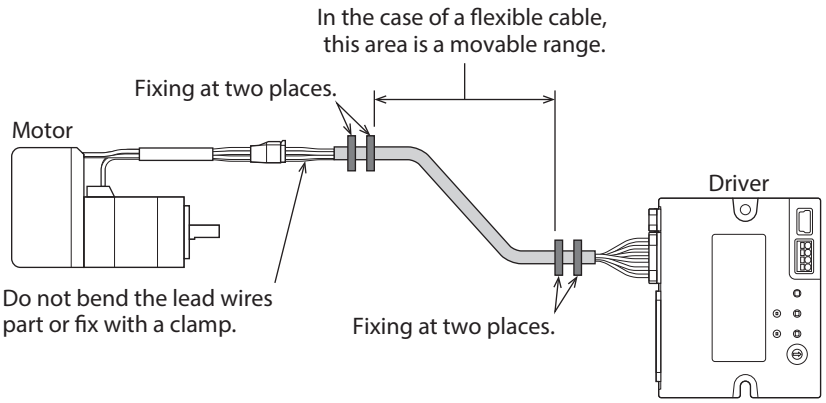
Note the following points when an Oriental Motor cable is used.

- **When inserting the connector**
  Hold the connector body, and insert it straight and securely. Inserting the connector in an inclined state may result in damage to terminals or a connection failure.
- **When pulling out the connector**
  Pull out the connector in straight while releasing the lock part of the connector. Pulling out the connector with holding the cable may result in damage to the connector.
- **Bending radius of cable**
  - Use the cable in a condition where the bending radius of the cable is as follows.
    Cable type: 6 times or more the cable diameter
    Connector type: 2.8 times or more the cable diameter
  - Do not bend the lead wires part or secure with a clamp, etc. Doing so may result in damage to the connector.



- **How to fix the cable**

  Fix the cable at two places near the connectors as shown in the figure, or fix it with a wide clamp in order to take measures to prevent the connectors from being stressed.



2 Hardware

This part explains the names and functions of each part of the driver, installation and connection methods, etc.

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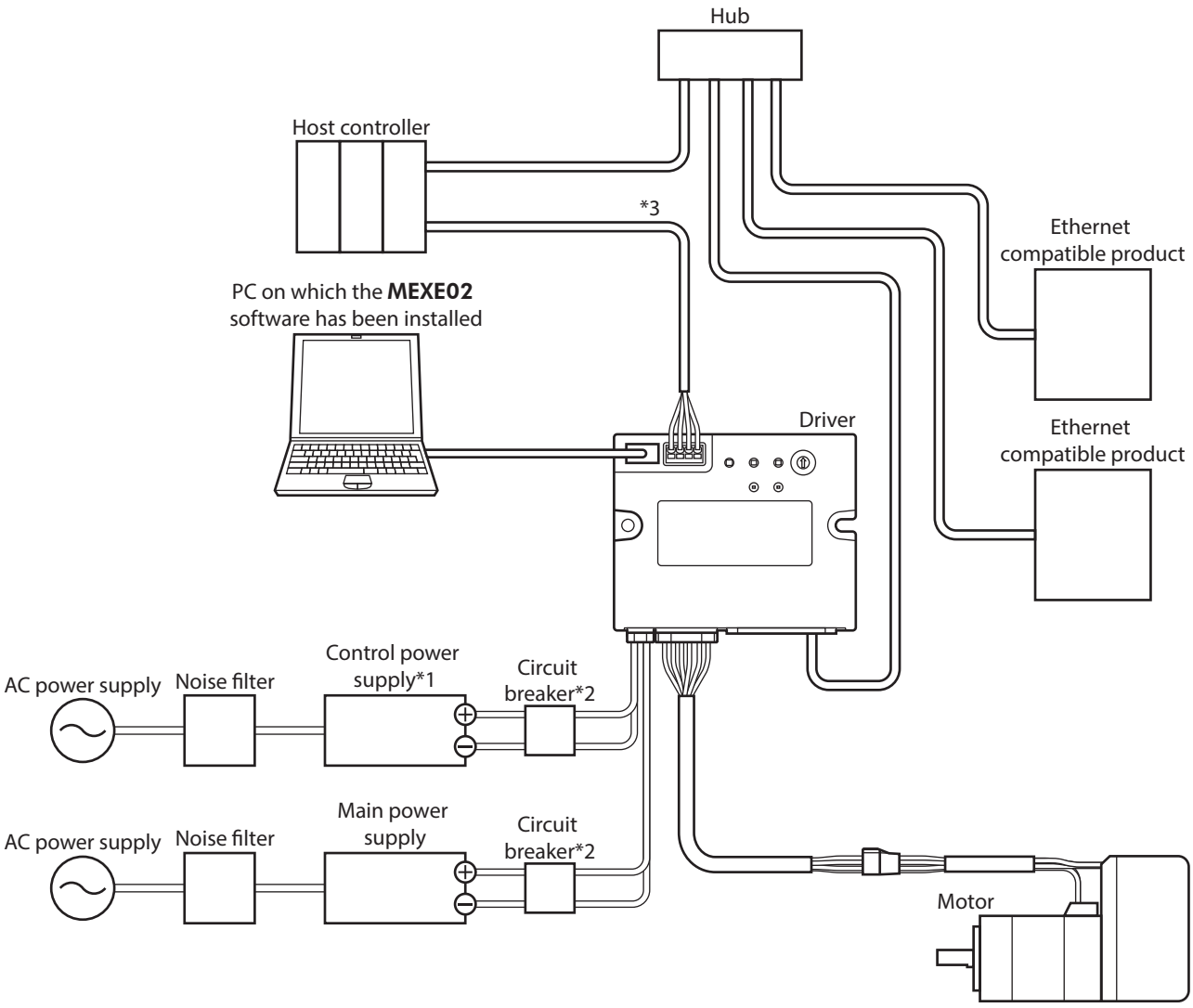
1 System configuration



*1 Connecting a control power supply allows you to continue monitoring even if the main power supply is shut off. Connect it as necessary.
*2 It is recommended that a circuit breaker or a circuit protector is connected because incorrect wiring of the power supply may cause the internal input circuit to short-circuit.
*3 Connect when using direct inputs or sensors.

2 Preparation

This chapter explains the items you should check and the name and function of each part.

2-1 Checking the product

Verify that the items listed below are included. Report any missing or damaged items to the Oriental Motor sales office from which you purchased the product.

- Driver .....1 unit
- Instructions and Precautions for Safe Use.....1 copy

2-2 How to identify the product model

Check the driver model against the model shown on the nameplate. Refer to "2-4 Information about nameplate" on p.20 for how to identify the nameplate.

AZD - K R EN
1 2 3 4

1	Series	**AZD**: **AZ** Series driver
2	Power supply input	**K**: DC input
3	Shape	**R**: Compact
4	Type	**EN**: Ethernet

2-3 Products that can be combined

Products with which the driver can be combined are listed below. Check the model name of the product with the nameplate.

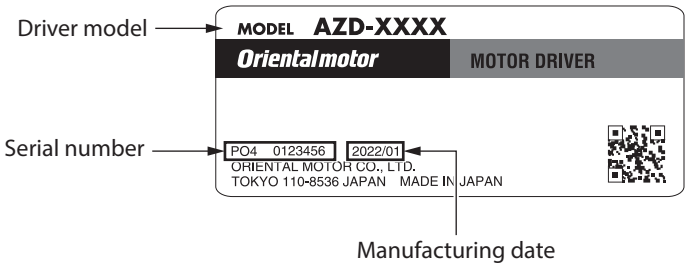
Power supply type	Product type	Applicable Series	Model name representing Series name*1	Example of model name
DC input	Stepping motor	**AZ** Series	**AZM**	**AZM46AK**
	Motorized actuator	**EAC** Series*2	**EACM**	**EACM2E05AZAK**
		EAS Series*2	**EASM**	**EASM4NXD005AZAK**
		EZS Series*2	**EZSM**	**EZSM6D005AZAK**
		DR Series	**DR**	**DR28G2.5B03-AZAKU**
		DRS2 Series	**DRSM**	**DRSM60-05A4AZAK**
		DGII Series*2	**DGM** **DGB** **DGR**	**DGM85R-AZAK** **DGB85R12-AZAKR** **DGR85R36-AZAKHR**
		EH Series*2	**EH**	**EH4-AZAKH**
		L Series*2	**LM**	**LM4F150AZAK-1**

*1 The driver described in this manual can be combined with products that begin with these model names.

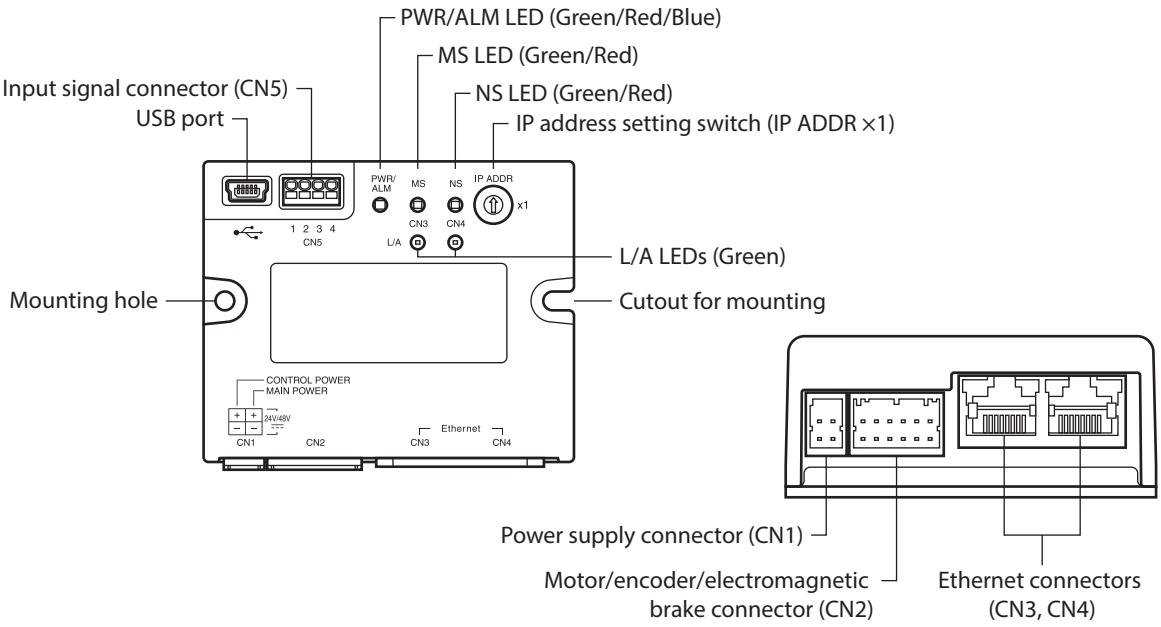
*2 For these motorized actuators, the equipped motors have been evaluated to affix the CE Marking. The model name of the equipped motor can be checked as follows.
EAC Series, **EAS** Series, **EZS** Series: Check with the motor nameplate.
DGII Series, **EH** Series, **L** Series: Check with "P/N (Motor P/N)" described on the actuator nameplate.

2-4 Information about nameplate

The figure shows an example.



2-5 Names and functions of parts



Type	Name	Sign	Description
LED	PWR/ALM LED (Green/Red/Blue)	PWR/ALM	This LED indicates the status of the driver.
	MS LED (Green/Red)	MS	This LED indicates the operating status of Ethernet.
	NS LED (Green/Red)	NS	This LED indicates the communication status of Ethernet.
	L/A LEDs (Green)	L/A	These LEDs indicate the LINK/ACT status of Ethernet.
Switch	IP address setting switch	IP ADDR ×1	Sets the IP address. Factory setting: 0 (×1: 0)
Connector	Power supply connector (CN1)	+, –	Connects a main power supply and a control power supply.
	Motor/encoder/electromagnetic brake connector (CN2)	–	Connects the motor, the encoder, and the electromagnetic brake.
	USB port		Connects a PC on which the **MEXE02** software has been installed. (USB2.0 mini-B port)
	Ethernet connectors (CN3, CN4)	–	Connects the Ethernet cable.
	Input signal connector (CN5)	–	Connects when using direct inputs or sensors.

2-6 Indication of LEDs

■ PWR/ALM LED

This LED indicates the status of the driver.

LED status	Description
No light	The main power supply and the control power supply are not turned on.
Green light	The main power supply and/or the control power supply are turned on.
Blinking red	An alarm is being generated. The alarm item generated can be checked by counting the number of times the LED blinks. The LED is lit in green when the alarm is reset.
Blinking blue	• Information is being generated. The LED is lit in green when the information is cleared. • Remote operation is being executed with the **MEXE02** software. The LED is lit in green when remote operation is completed.
Repeating "Green → Red → Simultaneously lit(*) → No light"	This is the driver simulation mode.

* Green and red colors may overlap and it may be visible to orange.

■ MS LED

This LED indicates the operating status of Ethernet.

LED status	Description
No light	The main power supply and the control power supply are not turned on.
Green light	The driver operates properly.
Blinking red	The internal setting data is damaged. Execute [Restore to factory settings (including communication settings)] under the [Communication] menu with the **MEXE02** software. After that, turn on the main power supply and the control power supply again.
Red light	An internal error was detected. Turn off and then turn on the main power supply and the control power supply.

■ NS LED

This LED indicates the communication status of Ethernet.

● Modbus TCP/UDP

LED status	Description
No light	Modbus TCP or Modbus UDP communication is not being performed.
Green light*1	The LED is lit for approximately one second in the following cases. • When a connection is established (Modbus TCP) • When a connection is lost (Modbus TCP) • When a Modbus TCP frame or a Modbus UDP frame is properly received
Red light*2	This LED is lit for approximately one second when a communication error occurs while a Modbus TCP frame or a Modbus UDP frame is being received.

*1 Depending on the connection status or the frame reception interval, the LED may appear to be lit for a second or more, or it may appear to blink.

*2 If communication errors occur consecutively, the LED may appear to blink, or it may appear to be lit for a second or more.

● CC-Link IE Field Network Basic

LED Status	Description
No light	This is in an offline state. Communication has not been established.
Green light	This is in an online state. Communication has been established.

■ L/A LED

These LEDs indicate the LINK/ACT status of Ethernet.

LED status	Description
No light	• This is in an offline state. • No Ethernet frame is sent or received.
Blinking	• This is in an online state. • An Ethernet frame is sent and received.
Light	• This is in an online state. • No Ethernet frame is sent or received.

3 Installation

This chapter explains the installation location and installation method of the driver.

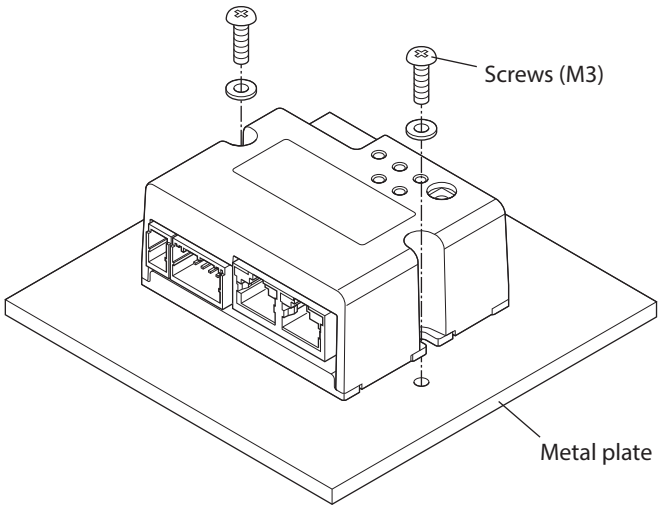
3-1 Installation location

The driver is designed and manufactured to be incorporated in equipment. Install it in a well-ventilated location that provides easy access for inspection. The location must also satisfy the following conditions:

- Inside an enclosure that is installed indoors (provide vent holes)
- Operating ambient temperature: 0 to +50 °C [+32 to 122 °F] (non-freezing)
- Operating ambient humidity: 85 % or less (non-condensing)
- Area free of explosive atmosphere, toxic gas (such as sulfuric gas), or liquid
- Area not exposed to direct sun
- Area free of excessive amount of dust, iron particles or the like
- Area not subject to splashing water (rain, water droplets), oil (oil droplets) or other liquids
- Area free of excessive salt
- Area not subject to continuous vibration or excessive shocks
- Area free of excessive electromagnetic noise (from welders, power machinery, etc.)
- Area free of radioactive materials, magnetic fields, or vacuum
- Up to 1,000 m (3,000 ft.) above sea level

3-2 Installation method

The driver can be installed in any direction.
Install the driver onto a flat metal plate offering high heat conductivity [material: aluminum, 150×150×2 mm (5.91x5.91x0.08 in.) or equivalent].
When installing the driver, use the mounting holes and the cutouts for mounting to secure on the metal plate with two screws (M3: not included).

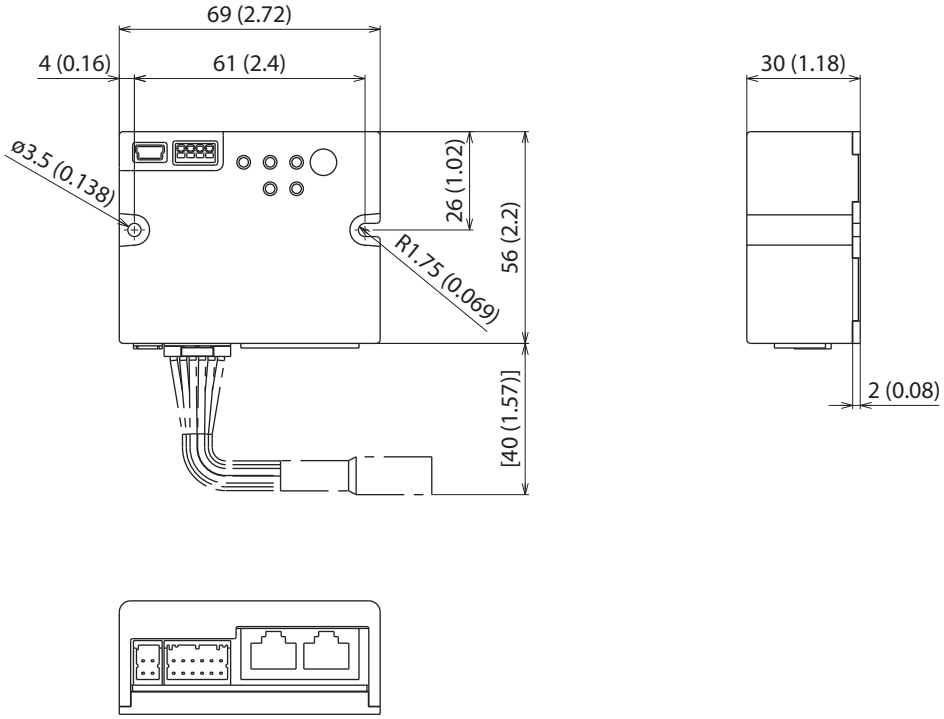


Note

- Install the driver in an enclosure.
- Do not install any equipment that generates a large amount of heat or noise near the driver.
- Do not install the driver underneath a host controller or other equipment sensitive to heat.
- If the ambient temperature of the driver exceeds 50 °C (122 °F), reconsider the ventilation conditions such as providing forced cooling by using fans.

■ Dimensions [Unit: mm (in.)]

Mass: 0.11 kg (0.24 lb.)

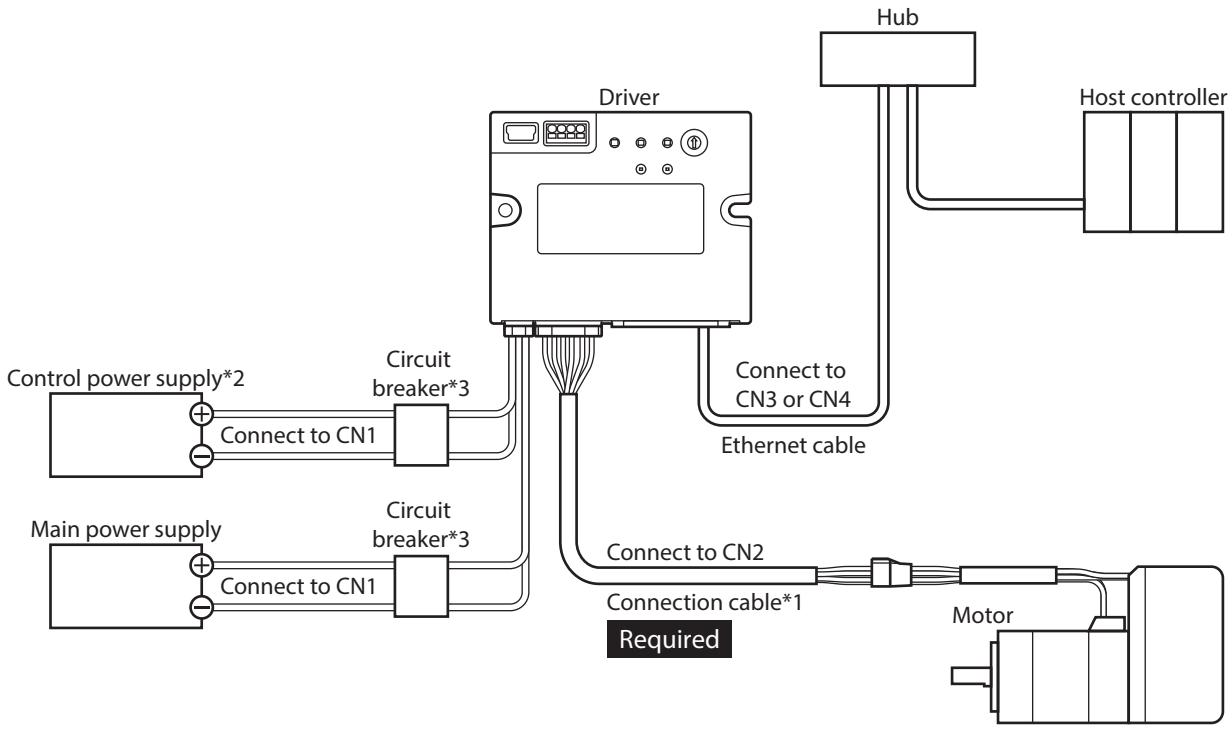


4 Connection

This chapter explains a connection example of a driver and a motor, connection methods of a main power supply and a control power supply, and so on.
Noise suppression measures and installation and wiring methods to comply with the EMC Directive/Regulations are also explained.

4-1 Connection example

The figure shows an example when the **AZM14** motor is connected.



*1 It is an Oriental motor cable. Purchase is required separately.
*2 Connecting a control power supply allows you to continue monitoring even if the main power supply is shut off. Connect it as necessary.
*3 It is recommended that a circuit breaker or a circuit protector is connected because incorrect wiring may cause the internal input circuit to short-circuit.

Note

- Connect the connectors securely. Insecure connections may cause malfunction or damage to the motor or the driver.
- When connecting the cables, secure them so that no load is applied to the connectors. Applying a load to the connector may result in a connection failure, causing the driver to malfunction.
- Keep 10 m (32.8 ft.) or less for the wiring distance between a motor and a driver. Exceeding 10 m (32.8 ft.) in the wiring distance may result in increase of the electrical noise emitted from the driver.
- Keep 2 m (6.6 ft.) or less for the cable length of the main power supply and control power supply cables.

memo

- Before connecting or disconnecting a connector, turn off the main power supply and the control power supply, and check the PWR/ALM LED has been turned off.
- When disconnecting the connector, pull out while pressing the latches on the connector with fingers.

4-2 Connecting the main power supply and the control power supply (CN1)

Connect a main power supply to the CN1 connector.
Connecting a control power supply allows you to continue monitoring even if the main power supply is shut off.
Connect it as necessary.

Note Make sure the polarity of the power supply before connecting. Connection with incorrect polarity may cause damage to the driver.

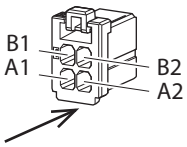
■ Applicable connector

Type	Part number	Applicable lead wire
Connector housing	1-1827864-2 (TE Connectivity)	• Wire size AWG 22 (0.34 to 0.37 mm^2) AWG 20 (0.51 to 0.53 mm^2) AWG 18 (0.85 to 0.87 mm^2) • Outer diameter of wire insulation: ø1.4 to 2.2 mm (0.06 to 0.09 in.) • Stripping length of wire insulation: 1.7 to 2.3 mm (0.07 to 0.09 in.)
Contact	1827589-2 (TE Connectivity)	
Designated crimp tool	2119142-1 (TE Connectivity)	

■ Pin assignment

The figure shows the view from the insertion side of lead wire.
Insert the lead wires with crimped contacts in the direction of the arrow.

Pin No.	Name	Description
B1	Control power supply	+24 VDC / +48 VDC
A1	GND	Ground for control power supply



Pin No.	Name	Description
B2	Main power supply	+24 VDC / +48 VDC
A2	GND	Ground for main power supply

memo A1 and A2 are not electrically insulated.

■ Voltage specifications

The voltage specifications of power supply input include the rated voltage and the allowable operating voltage.
The voltage specifications are common for the main power supply and the control power supply.

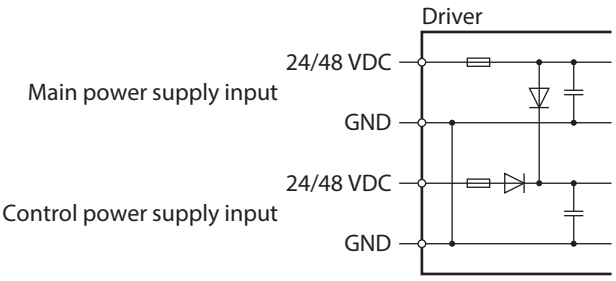
Rated voltage	24 VDC±5 % 48 VDC±5 %
Allowable operating voltage	24 VDC input: 20 to 32 VDC (22.8 to 32 VDC)* 48 VDC input: 40 to 55 VDC

* The value in parentheses ( ) is the one when the electromagnetic brake motor is connected.

memo Set the "Main power mode" parameter to "0: 24 VDC" or "1: 48 VDC" when the main power supply starts up slowly or the voltage of the main power supply is unstable. (⇨p.139)

■ Internal input circuit

The driver can be used with both the main power and control power supplies, or with the main power supply only. When using only the main power supply, the power is supplied from the main power supply to the control power supply circuit inside the driver.



■ Power supply current capacity

● Current capacity for main power supply

The current capacity for the main power supply varies depending on the product combined.
Check the current capacity in reference to the equipped motor model when using the **EAC** Series, **EAS** Series, or **EZS** Series.
The box ☐ in the model indicates an alphabet (**B**, **M**, or **R**) representing the shape of the actuator.

Series	Model	Rated voltage	Power supply current capacity
AZ Series **EAC** Series **EAS** Series **EZS** Series	**AZM14**	24 VDC±5 %	0.4 A or more
	AZM15		0.5 A or more
	AZM24, **AZM26**		1.4 A or more
	AZM46	24 VDC±5 % 48 VDC±5 %	1.6 A or more
	AZM48		2.1 A or more
	AZM66		3.7 A or more
	AZM69		3.5 A or more
DGII Series	**DG☐60**	24 VDC±5 %	1.4 A or more
	DG☐85	24 VDC±5 % 48 VDC±5 %	1.6 A or more
	DG☐130		3.7 A or more
DR Series	**DR20**	24 VDC±5 %	0.4 A or more
	DR28		1.3 A or more
DRS2 Series	**DRSM42**	24 VDC±5 % 48 VDC±5 %	1.5 A or more
	DRSM60		2.6 A or more
EH Series	**EH3**	24 VDC±5 %	0.4 A or more
	EH4		1.4 A or more
L Series	**LM2**, **LM4**	24 VDC±5 % 48 VDC±5 %	3.7 A or more

● Current capacity for control power supply

Rated voltage	Power supply current capacity	
	Without electromagnetic brake	With electromagnetic brake
24 VDC±5 % 48 VDC±5 %	0.15 A	0.4 A*

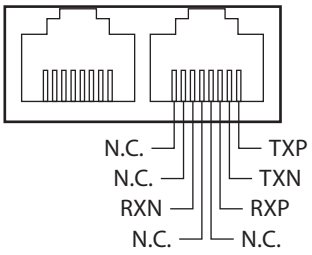
* The **AZM46** type is 0.23 A.

4-3 Connecting the Ethernet cable (CN3, CN4)

Connect the Ethernet cable to the Ethernet connector(s) (CN3, CN4).

■ Pin assignment

Signal name	Description
TXP	Transmitted data +
TXN	Transmitted data –
RXP	Received data +
N.C.	–
N.C.	–
RXN	Received data –
N.C.	–
N.C.	–



■ Communication specifications of Ethernet port

Transmission rate	100 Mbps
Communication mode	Full duplex (Autonegotiation)
Cable specifications	Shielded twisted pair (STP) cable, straight-through/crossover cable, category 5e or higher is recommended
Communication connector	RJ45×2 (Shielded)
Network topology	Star, Tree, Line

4-4 Connecting the USB cable

Using a USB cable with the following specifications, connect a PC on which the **MEXE02** software has been installed to the USB port.

Specifications	USB2.0 (Full speed)
Cable	Length: 3 m (9.8 ft.) or less Shape: A to mini B

memo

- Connect the driver and a PC directly using a USB cable.
- In large electrically noisy environments, use the USB cable with a ferrite core or install a ferrite core on the USB cable.

4-5 Connecting input signals (CN5)

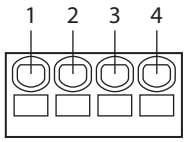
Connects when using direct inputs or sensors.

■ Applicable lead wire and terminal

Applicable lead wire	• Wire size: AWG 26 to 20 (0.14 to 0.5 mm^2) • Lead wire strip length: 6 mm (0.24 in.)
Applicable ferrule terminal	Without sleeve: 0.25 to 0.5 mm^2 With sleeve: 0.25 to 0.34 mm^2

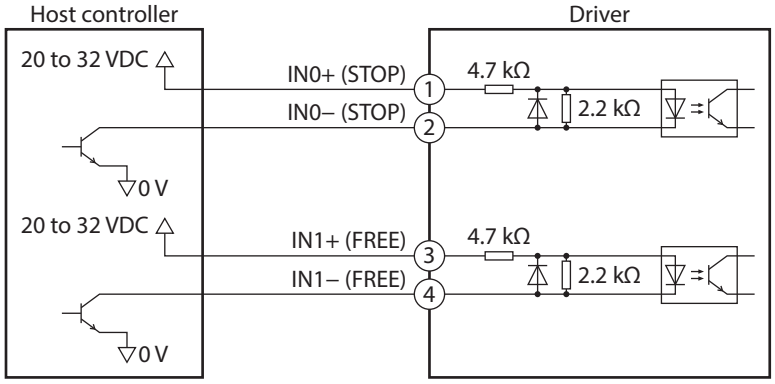
■ Pin assignment

Pin No.	Signal name	Description*
1	IN0+	Control input 0 (STOP)
2	IN0–	
3	IN1+	Control input 1 (FREE)
4	IN1–	



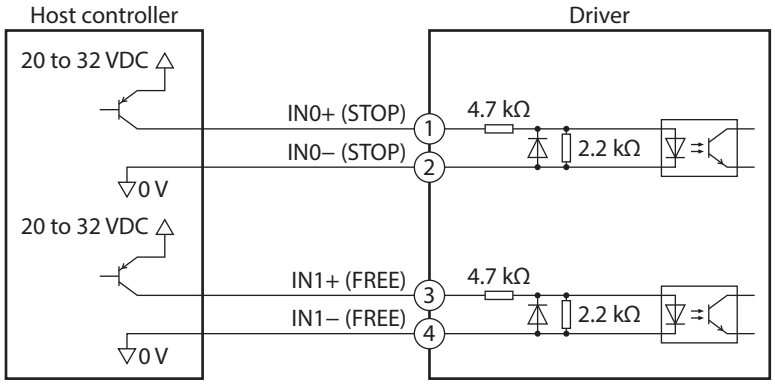
* ( ): Initial value

■ Connection example with a current sink output circuit



* ( ): Initial value

■ Connection example with a current source output circuit



* ( ): Initial value

4-6 Noise elimination measures

There are two types of electrical noise: One is noise that enters the driver from the outside and causes it to malfunction, and the other is noise that is emitted from the driver and causes peripheral equipment to malfunction. For noise entering the driver from the outside, take measures to prevent the driver from malfunctioning. It is necessary to take appropriate measures because the signal lines are very likely to be affected by the noise.
For the noise that is emitted by the driver, take measures to suppress it.

■ Measures to eliminate electrical noise

- Install the driver inside a metal enclosure.
- Use a DC power supply that complies with the EMC Directive/Regulations.
- When relays or electromagnetic switches are used, use noise filters or CR circuits to suppress the surge generated by these devices.
- Keep the cables as short as possible.
- Use shielded twisted pair cables for power lines and signal lines.
- Keep power lines, such as motor and power supply cables, at least 200 mm (7.87 in.) away from signal lines. Also, do not bundle the cables or wire them in parallel. If the power cables and signal cables must cross, cross them at right angles.
- Wrap the cable around a ferrite core. This prevents the propagated noise from entering the driver or from being emitted from the driver. To increase the effect of noise attenuation by the ferrite core, wrap the cable several more turns.
- To ground a shielded cable, use a conductive cable clamp that ensures contact with the entire circumference of the shielded cable, and ground it as close to the equipment as possible.
- Use the shortest, thickest grounding wire possible.
- Choose a large and uniformly conductive surface for the grounding point.
- Ground the motor, driver and other peripheral control equipment so that a potential difference does not occur among the grounds.

4-7 Compliance with the EMC Directive/Regulations

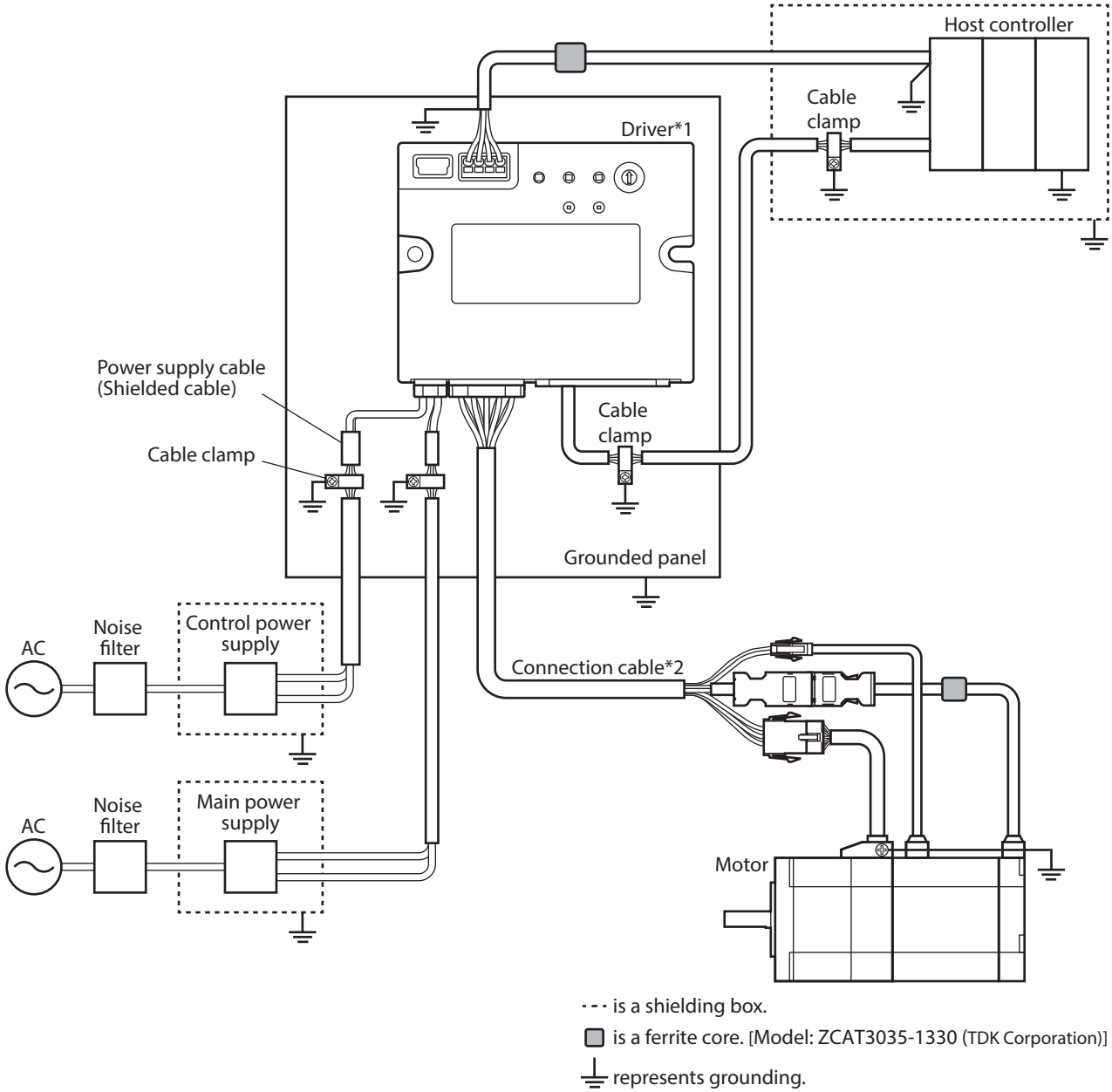
Oriental Motor products are compliant with the EMC Directive/Regulations in accordance with the contents of "4-6 Noise elimination measures" under the terms of "Example of installation and wiring" on p.31. The results of EMC testing of the equipment will vary depending on the type, layout, wiring method, etc. of the parts and components used. Verify compliance with the EMC Directive/Regulations in a condition where all parts and components, including Oriental Motor products, are assembled into the equipment.

⚠CAUTION This equipment is not intended for use in residential environments nor for use on a low-voltage public network supplied in residential premises, and it may not provide adequate protection to radio reception interference in such environments.

Example of installation and wiring

The figure shows an example when the cable type electromagnetic brake motor is used.
When connecting the following products, cover the motor cable with a shielded braided sleeving. Furthermore, EMC tests are performed with a shielded braided sleeving grounded at both ends with cable clamps.

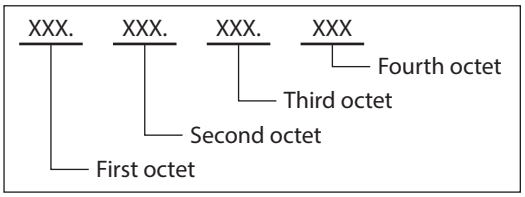
- **AZ** Series: **AZM14**, **AZM15**, **AZM24**, **AZM26**
- **EAC** Series: **EACM2**
- **EAS** Series: **EASM2**
- **DR** Series: **DR20**, **DR28**
- **DGII** Series: **DGM60**, **DGR60**
- **EH** Series: **EH3**, **EH4**



*1 The driver is grounded by making the heat sink contact directly with the grounded panel.
*2 An Oriental Motor cable is used.

5 Setting of IP address

The IP address, subnet mask, and default gateway are configured as shown in the figure, respectively.



Note

- Security related precautions
  This product does not have security mechanisms such as authentication or encryption. We are not responsible for any problems that may arise directly or indirectly from cyber attacks on this product.
  For cyber attacks (unauthorized access, computer viruses, denial of service attacks, etc.) on this product, take appropriate measures to protect your entire system.
  Separate the network from the office or other information networks with a router, firewall, etc., and use this product within the network that has appropriate security measures in place. This product is designed and intended to be used in such a network.
- Communications
  Do not use this product to communicate with remote locations. This product may not operate as expected due to communication problems caused by the network usage environment, load, or communication cable conditions. Determine the countermeasure method throughout your entire system so that it works to the safety side even if communication delays or interruptions occur.

5-1 Setting method of IP address

The following two methods can be used to set the IP address, subnet mask, and default gateway.

Setting method	Setting of IP address setting switch	Specific setting method		
		IP address	Subnet mask	Default gateway
Parameter	0	Parameter	Parameter	Parameter
Use of IP address setting switch and parameter together	1 to E	First octet to third octet: Parameter Forth octet: IP address setting switch	Parameter	Parameter

memo

If the IP address having set in the driver is lost or forgotten, setting the IP address setting switch to "F" will fix the IP address, subnet mask, and default gateway to the following values.

- IP address: 192.168.1.1
- Subnet mask: 255.255.255.0
- Default gateway: 0.0.0.0

5-2 When setting with parameters

Set the IP address setting switch of the driver to "0."

Related parameters

MEXE02 code	Parameter name	Description	Setting range	Initial value
p11	IP Address 1	Sets the first octet of the IP address.	0 to 255	192
	IP Address 2	Sets the second octet of the IP address.		168
	IP Address 3	Sets the third octet of the IP address.		1
	IP Address 4	Sets the fourth of the IP address.		1
	Network Mask 1	Sets the first octet of the subnet mask.	0 to 255	255
	Network Mask 2	Sets the second octet of the subnet mask.		255
	Network Mask 3	Sets the third octet of the subnet mask.		255
	Network Mask 4	Sets the fourth octet of the subnet mask.		0
	Gateway Address 1	Sets the first octet of the default gateway.	0 to 255	0
	Gateway Address 2	Sets the second octet of the default gateway.		0
	Gateway Address 3	Sets the third octet of the default gateway.		0
	Gateway Address 4	Sets the fourth octet of the default gateway.		0

Note Make sure that each IP address is not duplicated. If the IP address is duplicated, communication cannot be performed properly.

5-3 When setting the IP address setting switch and parameter together

■ Setting of IP address

Set the first octet to third octet with the parameters. Set the forth octet with the IP address setting switch.

- **First octet to third octet**

Related parameters

MEXE02 code	Parameter name	Description	Setting range	Initial value
p11	IP Address 1	Sets the first octet of the IP address.	0 to 255	192
	IP Address 2	Sets the second octet of the IP address.		168
	IP Address 3	Sets the third octet of the IP address.		1

- **Fourth octet**

Set the fourth octet of the IP address using the IP address setting switch (IP ADDR ×1).
The IP address setting switch is hexadecimal. Convert the IP address from decimal to hexadecimal to set.

Setting range: 1h to Eh

Setting example

Setting of switch	Value of IP address	Note
1	XXX.XXX.XXX.1	The fourth octet is set to "1."
E	XXX.XXX.XXX.14	The fourth octet is set to "14."

Note
- When the switch has been set, turn off and then turn on the main power supply and the control power supply. The new setting is enabled when the main power supply and the control power supply are turned on again.
- Make sure that each IP address is not duplicated. If the IP address is duplicated, communication cannot be performed properly.

memo When the switch is set to "F," the value of the IP address will be "192.168.1.1" regardless of the setting of the parameter.

■ Setting of subnet mask and default gateway

Set the subnet mask and default gateway with the parameters.

Related parameters

MEXE02 code	Parameter name	Description	Setting range	Initial value
p11	Network Mask 1	Sets the first octet of the subnet mask.	0 to 255	255
	Network Mask 2	Sets the second octet of the subnet mask.		255
	Network Mask 3	Sets the third octet of the subnet mask.		255
	Network Mask 4	Sets the fourth octet of the subnet mask.		0
	Gateway Address 1	Sets the first octet of the default gateway.	0 to 255	0
	Gateway Address 2	Sets the second octet of the default gateway.		0
	Gateway Address 3	Sets the third octet of the default gateway.		0
	Gateway Address 4	Sets the fourth octet of the default gateway.		0

memo When the switch is set to "F," the following values are applied regardless of the setting of the parameter.
- Subnet mask: 255.255.255.0
- Default gateway: 0.0.0.0

6 Inspection and maintenance

6-1 Inspection

It is recommended that the following items be checked periodically after each operation of the motor. If any abnormality occurs, discontinue use of the product and contact your nearest Oriental Motor sales office.

■ Inspection items

- Check to see if the openings in the driver are clogged.
- Check to see if any of the mounting screws secured the driver are loose.
- Check to see if any of the connection parts of the driver is loose.
- Check to see if there is no dust adhering to the driver.
- Check to see if the driver has an abnormal odor or has defects in its appearance.

Note The driver uses semiconductor components. Static electricity may damage the semiconductor components of the driver, so be extremely careful when handling them.

6-2 Warranty

Check on the Oriental Motor Website for the product warranty.

6-3 Disposal

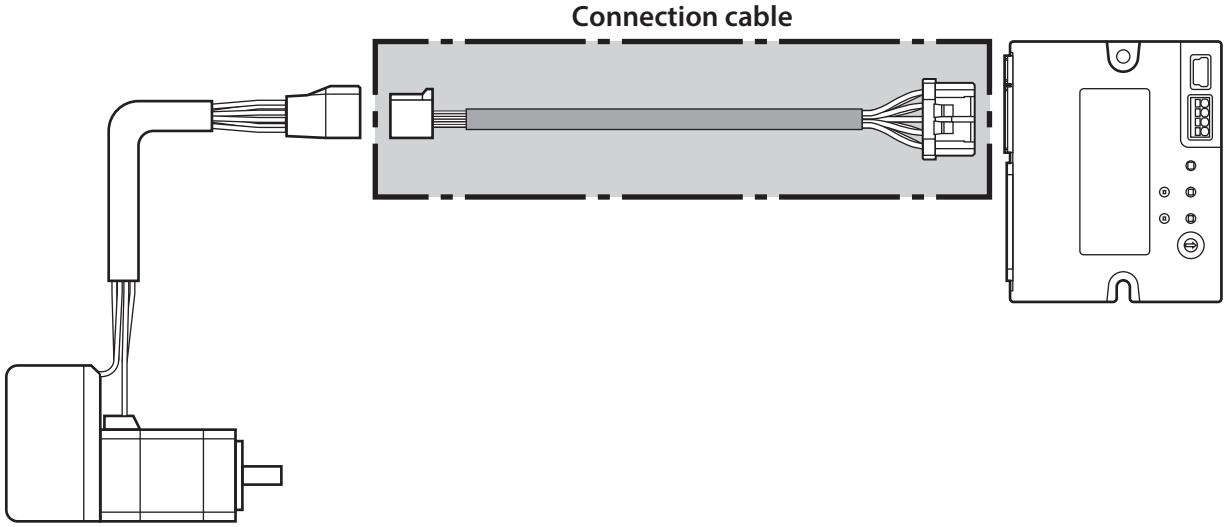
Dispose the product correctly in accordance with laws and regulations, or instructions of local governments.

7 Cables

7-1 Connection cables (For cable type)

■ Connection cables / Flexible connection cables (For AZM14, AZM15, AZM24, AZM26)

These cables are used when connecting a motor and a driver.



memo When installing the motor on a moving part, use a flexible cable.

- **Connection cables For motor/encoder**

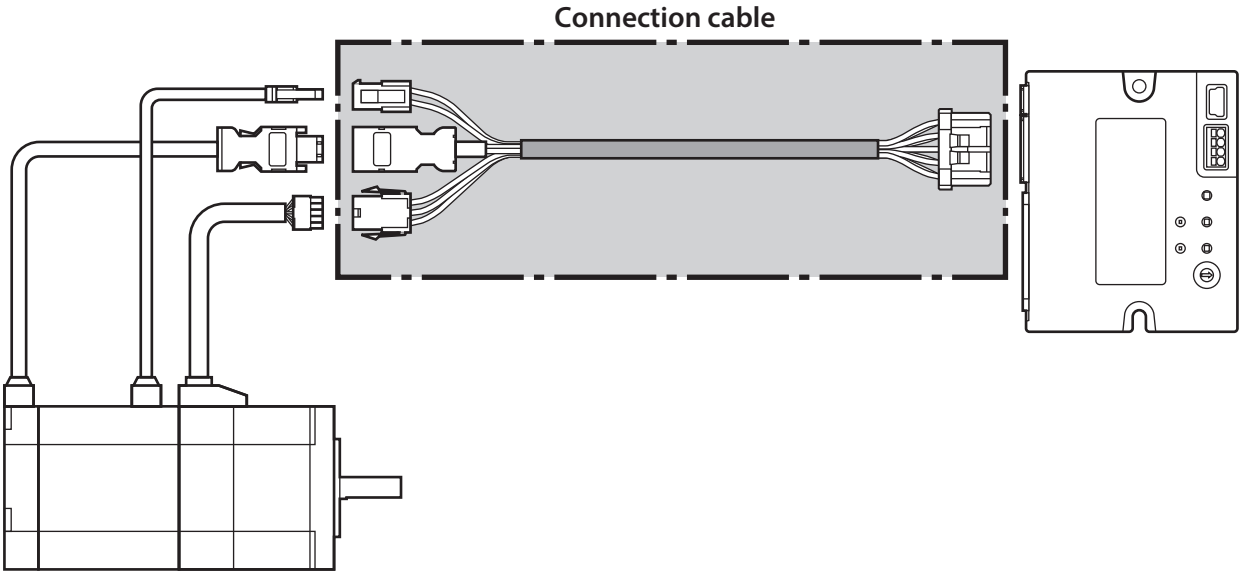
Model	Length [m (ft.)]
CCM005Z2AAF	0.5 (1.6)
CCM010Z2AAF	1 (3.3)
CCM030Z2AAF	3 (9.8)
CCM050Z2AAF	5 (16.4)
CCM100Z2AAF	10 (32.8)

- **Flexible connection cables For motor/encoder**

Model	Length [m (ft.)]
CCM005Z2AAR	0.5 (1.6)
CCM010Z2AAR	1 (3.3)
CCM030Z2AAR	3 (9.8)
CCM050Z2AAR	5 (16.4)
CCM100Z2AAR	10 (32.8)

■ Connection cables / Flexible connection cables (For AZM46, AZM48, AZM66, AZM69)

These cables are used when connecting a motor and a driver.
The figure shows an example when the electromagnetic brake motor is used.



memo When installing the motor on a moving part, use a flexible cable.

● **Connection cable**

For motor/encoder

Model	Length [m (ft.)]
CCM005Z2ABF	0.5 (1.6)
CCM010Z2ABF	1 (3.3)
CCM030Z2ABF	3 (9.8)
CCM050Z2ABF	5 (16.4)
CCM100Z2ABF	10 (32.8)

For motor/encoder/electromagnetic brake

Model	Length [m (ft.)]
CCM005Z2ACF	0.5 (1.6)
CCM010Z2ACF	1 (3.3)
CCM030Z2ACF	3 (9.8)
CCM050Z2ACF	5 (16.4)
CCM100Z2ACF	10 (32.8)

● **Flexible connection cables**

For motor/encoder

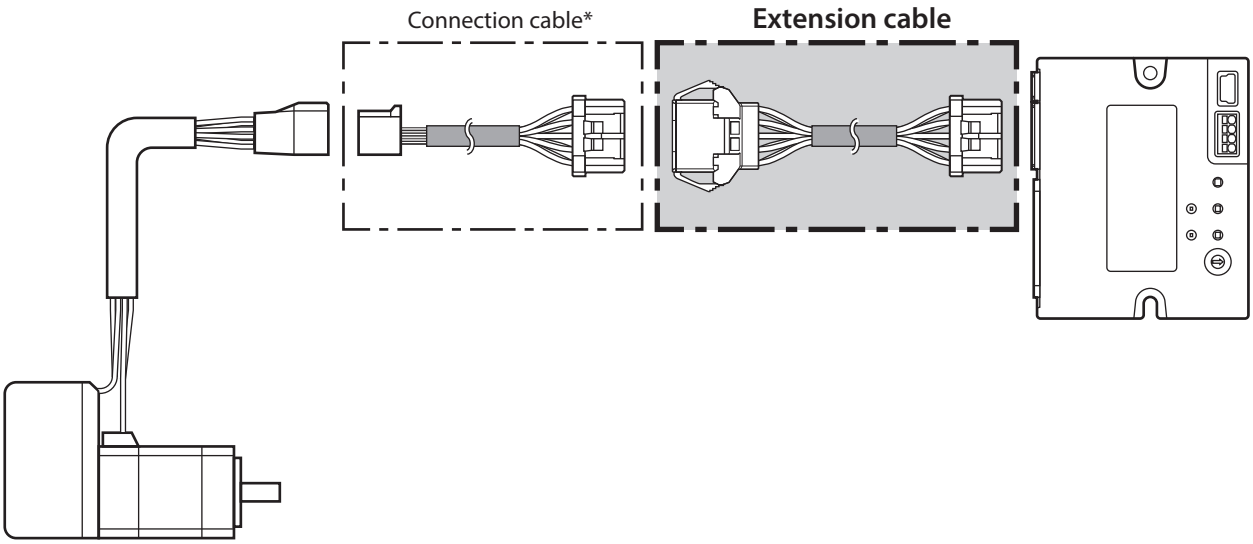
Model	Length [m (ft.)]
CCM005Z2ABR	0.5 (1.6)
CCM010Z2ABR	1 (3.3)
CCM030Z2ABR	3 (9.8)
CCM050Z2ABR	5 (16.4)
CCM100Z2ABR	10 (32.8)

For motor/encoder/electromagnetic brake

Model	Length [m (ft.)]
CCM005Z2ACR	0.5 (1.6)
CCM010Z2ACR	1 (3.3)
CCM030Z2ACR	3 (9.8)
CCM050Z2ACR	5 (16.4)
CCM100Z2ACR	10 (32.8)

■ Extension cables / Flexible extension cables

These cables are used when extending a connection cable (add between the driver and connection cable).
Use if the length of the connection cable used is not enough when extending the distance between a motor and a driver.
The extension cables and the flexible extension cables are common to all motors.
The figure shows an example when the **AZM14** motor is connected.



* Use the connection cable used.

memo
- When installing the motor on a moving part, use a flexible cable.
- When extending the wiring length by connecting an extension cable to the connection cable, make the total cable length 10 m (32.8 ft.) or less.

● **Extension cable**

Model	Length [m (ft.)]
CCM010Z2ADFT	1 (3.3)
CCM030Z2ADFT	3 (9.8)
CCM050Z2ADFT	5 (16.4)

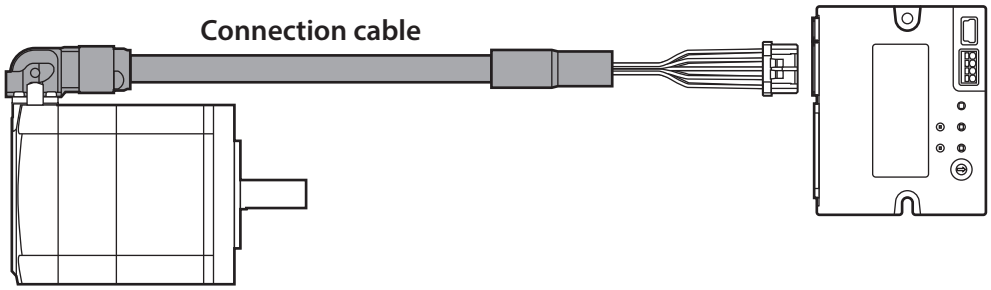
● **Flexible extension cables**

Model	Length [m (ft.)]
CCM010Z2ADRT	1 (3.3)
CCM030Z2ADRT	3 (9.8)
CCM050Z2ADRT	5 (16.4)

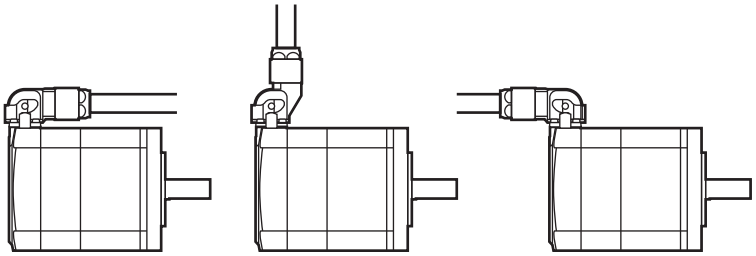
7-2 Connection cables (For connector type)

■ Connection cables / Flexible connection cables

These cables are used when connecting a motor and a driver.



The model name of the connection cable varies depending on the outlet direction from the motor. Refer to the figures below.



Cable outlet direction
Output shaft side

Cable outlet direction
Vertical side

Cable outlet direction
Opposite to output shaft side

memo When installing the motor on a moving part, use a flexible cable.

● Connection cable

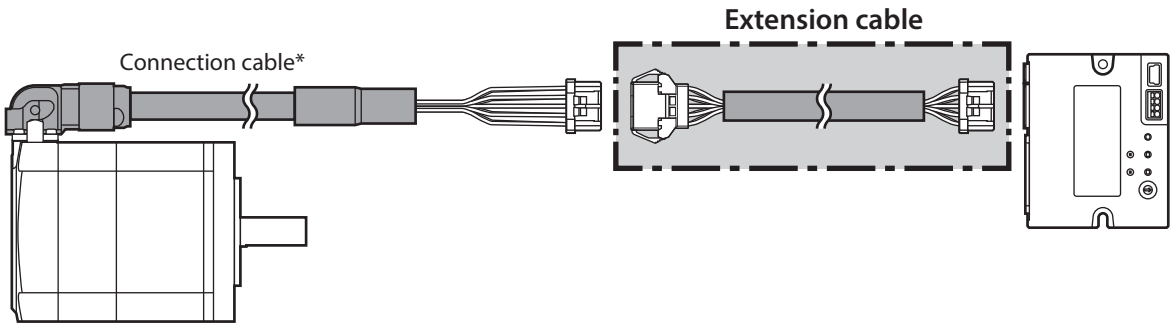
Length [m (ft.)]	Cable outlet direction		
	Output shaft direction	Vertical direction	Opposite to output shaft direction
0.2 (0.7)	**CCM002Z1EFF**	**CCM002Z1EVF**	**CCM002Z1EBF**
0.5 (1.6)	**CCM005Z1EFF**	**CCM005Z1EVF**	**CCM005Z1EBF**
1 (3.3)	**CCM010Z1EFF**	**CCM010Z1EVF**	**CCM010Z1EBF**
2 (6.6)	**CCM020Z1EFF**	**CCM020Z1EVF**	**CCM020Z1EBF**
3 (9.8)	**CCM030Z1EFF**	**CCM030Z1EVF**	**CCM030Z1EBF**
5 (16.4)	**CCM050Z1EFF**	**CCM050Z1EVF**	**CCM050Z1EBF**
7 (23.0)	**CCM070Z1EFF**	**CCM070Z1EVF**	**CCM070Z1EBF**
10 (32.8)	**CCM100Z1EFF**	**CCM100Z1EVF**	**CCM100Z1EBF**

● Flexible connection cables

Length [m (ft.)]	Cable outlet direction		
	Output shaft direction	Vertical direction	Opposite to output shaft direction
0.5 (1.6)	**CCM005Z1EFR**	**CCM005Z1EVR**	**CCM005Z1EBR**
1 (3.3)	**CCM010Z1EFR**	**CCM010Z1EVR**	**CCM010Z1EBR**
2 (6.6)	**CCM020Z1EFR**	**CCM020Z1EVR**	**CCM020Z1EBR**
3 (9.8)	**CCM030Z1EFR**	**CCM030Z1EVR**	**CCM030Z1EBR**
5 (16.4)	**CCM050Z1EFR**	**CCM050Z1EVR**	**CCM050Z1EBR**
7 (23.0)	**CCM070Z1EFR**	**CCM070Z1EVR**	**CCM070Z1EBR**
10 (32.8)	**CCM100Z1EFR**	**CCM100Z1EVR**	**CCM100Z1EBR**

■ Extension cables/Flexible extension cables

These cables are used when extending a connection cable (add between the driver and connection cable).
Use if the length of the connection cable used is not enough when extending the distance between a motor and a driver.



* Use the connection cable used.

memo
- When installing the motor on a moving part, use a flexible cable.
- When extending the wiring length by connecting an extension cable to the connection cable, make the total cable length 10 m (32.8 ft.) or less.

● **Extension cable**

Model	Length [m (ft.)]
CCM010Z2ADFT	1 (3.3)
CCM030Z2ADFT	3 (9.8)
CCM050Z2ADFT	5 (16.4)

● **Flexible extension cables**

Model	Length [m (ft.)]
CCM010Z2ADRT	1 (3.3)
CCM030Z2ADRT	3 (9.8)
CCM050Z2ADRT	5 (16.4)

7-3 Power supply cable

This cable is used when connecting a driver to power supplies.

Model: **LCD06Z2AY** [0.6 m (2 ft.)]

3 Modbus TCP/UDP communication

This part explains how to control using Modbus TCP and Modbus UDP.

◆**Table of contents**

1 Specifications of Modbus TCP and Modbus UDP

Modbus is easy to use and its specification is open to the public, so it is widely used in industrial applications.
Modbus TCP and Modbus UDP are protocols that perform Modbus communication over Ethernet.
Modbus TCP and Modbus UDP use a client-server model. Only the client can issue a query (command). Each server executes the processing requested by the query and returns a response.

- **Modbus TCP**

  Modbus TCP sends and receives a Modbus TCP frame over TCP/IP.
  Modbus TCP performs connection-oriented communication. It automatically performs sequence control and retransmission control over TCP/IP, enabling highly reliable communication.

- **Modbus UDP**

  Modbus UDP sends and receives a Modbus UDP frame over UDP/IP.
  Modbus UDP performs connectionless communication. Data can be sent at high speed because there is no need to establish a connection before communicating. It is necessary to retry sending data from the user application if data cannot be sent or a communication error occurs. The customer can set the timeout and resend times.
  Compared to Modbus TCP, Modbus UDP is a communication with high real-time performance and high flexibility.

1-1 Communication specifications

Number of connections	2
Number of queries that can be accepted simultaneously	1
Support functions	03h, 10h, 17h
Support protocol	Modbus TCP (Initial value), Modbus UDP*1
Port number	502 (Initial value)*2

*1 The protocol can be selected with the "Protocol (Network I/O)" parameter.
*2 The port number can be changed with the "Port number (Modbus TCP/UDP)" parameter.

Note

- The port numbers used in the driver are shown in the table. Make sure that each port number is not duplicated. Proper communication cannot be established if the port number is duplicated. Do not use port numbers 60930, 61450, and 61451 on the customer side, as these are fixed in the driver.

Port number	Description
502 (Initial value)	This is used with Modbus TCP and Modbus UDP (it can be changed).
60930	This is used when the **MEXE02** software is connected via Ethernet (fixed).
61450	This is used with CC-Link IE Field Network Basic (fixed).
61451	This is used with CC-Link IE Field Network Basic (fixed).

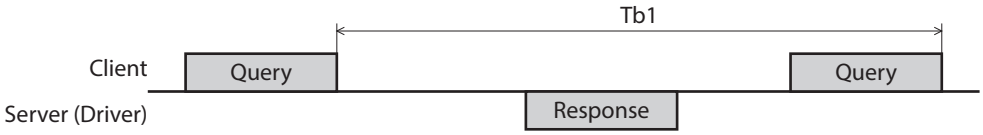
- It is recommended that the default port number (502) be used when using with Modbus TCP and Modbus UDP. If the port number needs to be changed due to security measures or the host controller's requirements, set it within the range of the private port number (49152 to 65535). However, do not use the port numbers that are fixed in the driver (60930, 61450, and 61451).

memo

- In Ethernet, the IP address and port number are used to select the device to communicate with and the service to use.
- When the host controller is connected to the driver via Modbus TCP or Modbus UDP, it communicates with the IP address and port number (initial value: 502) of the driver.
- When the **MEXE02** software is connected to the driver via Ethernet, it communicates with the IP address and port number (60930) of the driver.

1-2 Communication timing

The driver monitors an interval (Tb1) between queries to be received.
When periodic communication is performed between the client and the driver, communication disconnection can be verified by detecting the communication timeout. Refer to p.175 for details on communication timeout.



2 Frame configuration: Modbus application header

A Modbus TCP frame and a Modbus UDP frame are configured as follows.
This chapter describes the Modbus application header.

Modbus application header				Protocol data (PDU)	
Transaction ID	Protocol ID	Message length	Unit ID	Function code	Data
16 bits	16 bits	16 bits	8 bits	8 bits	N × 8 bits

- **Transaction ID**

  The client can set a desired value.
  The server returns the same value as the data received from the client.
  This is used to check the correspondence between a request frame and a response frame.

- **Protocol ID**

  The client sets 0 (Modbus protocol).
  The server returns the same value as the data received from the client.

- **Message length**

  The total number of bytes of the area (unit ID, function code, data) stored after the message length is set.
  The receiver judges the end of the frame with the value set in the message length.

- **Unit ID**

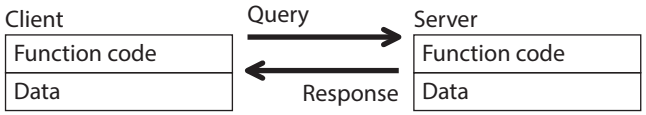
  Not used.
  The client sets 00h (0) or FFh (−1).
  The server returns the same value as the data received from the client.

3 Frame configuration: Protocol data unit

A Modbus TCP frame and a Modbus UDP frame are configured as follows.
This chapter describes the protocol data unit.

Modbus application header				Protocol data (PDU)	
Transaction ID	Protocol ID	Message length	Unit ID	Function code	Data
16 bits	16 bits	16 bits	8 bits	8 bits	N × 8 bits

The message structure of the protocol data unit is as follows.



3-1 Query

The query message structure is shown below.

Function code	Data
8 bits	N × 8 bits

■ Function code

The function codes and message lengths supported by the driver are as follows.

Function code	Functions	Number of registers
03h	Reading from a holding register(s)	1 to 125
10h	Writing to multiple holding registers	1 to 123
17h	Read/write of multiple holding registers	Read: 1 to 125 Write: 1 to 121

■ Data

Set the data related to the function code. The data length varies depending on the function code.

3-2 Response

Responses returned by the server are classified into three types: normal response, no response, and exception response.
The response message structure is the same as the query message structure.

Function code	Data
8 bits	N × 8 bits

■ Normal response

Upon receiving a query from the client, the server executes the requested processing and returns a response corresponding to the function code.

■ No response

The server may not return a response even if the the client sends a query. This state is called no response.
If the server is in a no-response state, it will discard the query. A response will not be sent back.
The causes of no response are listed below.

Cause	Description
Invalid protocol ID	A protocol ID other than 0 was received.
Invalid unit ID	A unit ID other than 00h (0) and FFh (−1) was received.
Invalid message length	The message length did not match.
Invalid IP address	An unauthorized IP address was received.
Frame timeout	The frame specified by the message length could not be received within the set time. (Modbus TCP)
Processing frame	The frame could not be saved in the receive buffer because it was being processed.

■ Exception response

An exception response is returned if the server cannot execute the processing requested by the query. This response is appended with an exception code that indicates the reason why the processing cannot be executed. The message structure of an exception response is as follows.

Function code	Exception code
8 bits	8 bits

● Function code

The function code in an exception response is the sum of the function code in the query and 80h.

Function code of query	Exception response
03h	83h
10h	90h
17h	97h

● Exception code

This code indicates the reason why the processing cannot be executed.

Exception code	Communication error code	Cause	Description
01h	88h	Invalid function	The processing could not be executed due to an unsupported function code.
02h	88h	Invalid data address	The processing could not be executed because the register address was out of range.
03h	8Ch	Invalid data	The processing could not be executed due to invalid data. • The number of registers is 0. • The number of bytes is other than "the number of register × 2." • The number of registers is out of range.

4 Function code

This chapter explains the function codes supported by the driver.
Note that sending a function code other than those introduced here will not execute.

4-1 Reading of a holding register(s) (03h)

Read the upper and lower data at the same time. If not, an invalid value may be read.
When multiple holding registers are read, they are read in order of register address.

■ Example of read

Description	Register address		Value read	
	Hex	Dec	Hex	Dec
Remote I/O (R-OUT)	011Ch	284	1E20h	7712
Operation data number selection_R	011Dh	285	0000h	0
Fixed I/O (OUT)	011Eh	286	0060h	96
Present alarm	011Fh	287	0000h	0
Feedback position (Lower)	0120h	288	0000h	0
Feedback position (Upper)	0121h	289	0000h	
Feedback speed (Hz) (Lower)	0122h	290	0000h	0
Feedback speed (Hz) (Upper)	0123h	291	0000h	
Command position (Lower)	0124h	292	0000h	0
Command position (Upper)	0125h	293	0000h	
Torque monitor	0126h	294	0000h	0
CST operating current	0127h	295	01F4h	500
Information (Lower)	0128h	296	0000h	0
Information (Upper)	0129h	297	0000h	
Reserved*	012Ah	298	0000h	0
Read parameter ID_R	012Bh	299	0C21h	3105
Read/Write status	012Ch	300	0100h	256
Write parameter ID_R	012Dh	301	0C21h	3105
Read data (Lower)	012Eh	302	1388h	5,000
Read data (Upper)	012Fh	303	0000h	
Assignable monitor 0 (Lower)	0130h	304	013Dh	317
Assignable monitor 0 (Upper)	0131h	305	0000h	
Assignable monitor 1 (Lower)	0132h	306	FFFEh	–2
Assignable monitor 1 (Upper)	0133h	307	FFFFh	
Assignable monitor 2 (Lower)	0134h	308	0000h	0
Assignable monitor 2 (Upper)	0135h	309	0000h	
Assignable monitor 3 (Lower)	0136h	310	0000h	0
Assignable monitor 3 (Upper)	0137h	311	0000h	

* Value when read is undefined

- **Query**

Field name		Data	Description
Transaction ID (Upper)		00h	Transaction ID: 0
Transaction ID (Lower)		00h	
Protocol ID (Upper)		00h	Protocol ID: 0
Protocol ID (Lower)		00h	
Message length (Upper)		00h	Message length: 6 bytes
Message length (Lower)		06h	
Unit ID		00h	Unit ID: 0
Function code		03h	Reading of a holding register
Data	Register address (Upper)	01h	Register address to start reading from: 284 [Remote I/O (R-OUT)]
	Register address (Lower)	1Ch	
	Number of registers (Upper)	00h	Number of registers to be read from the starting register address: 28 registers
	Number of registers (Lower)	1Ch	

- **Response**

Field name		Data	Description
Transaction ID (Upper)		00h	Transaction ID: 0
Transaction ID (Lower)		00h	
Protocol ID (Upper)		00h	Protocol ID: 0
Protocol ID (Lower)		00h	
Message length (Upper)		00h	Message length: 59 bytes
Message length (Lower)		3Bh	
Unit ID		00h	Unit ID: 0
Function code		03h	Reading of a holding register
Data	Number of data bytes	38h	Number of data bytes: 56 bytes
	Read value of register address (Upper)	1Eh	Remote I/O (R-OUT)
	Read value of register address (Lower)	20h	
	Read value of register address+1 (Upper)	00h	Operation data number selection_R
	Read value of register address+1 (Lower)	00h	
	Read value of register address+2 (Upper)	00h	Fixed I/O (OUT)
	Read value of register address+2 (Lower)	60h	
	Read value of register address+3 (Upper)	00h	Present alarm
	Read value of register address+3 (Lower)	00h	
	Read value of register address+4 (Upper)	00h	Feedback position (Lower)
	Read value of register address+4 (Lower)	00h	
	Read value of register address+5 (Upper)	00h	Feedback position (Upper)
	Read value of register address+5 (Lower)	00h	
	Read value of register address+6 (Upper)	00h	Feedback speed (Hz) (Lower)
	Read value of register address+6 (Lower)	00h	
	Read value of register address+7 (Upper)	00h	Feedback speed (Hz) (Upper)
	Read value of register address+7 (Lower)	00h	
	Read value of register address+8 (Upper)	00h	Command position (Lower)
	Read value of register address+8 (Lower)	00h	
	Read value of register address+9 (Upper)	00h	Command position (Upper)
	Read value of register address+9 (Lower)	00h	
	Read value of register address+10 (Upper)	00h	Torque monitor
	Read value of register address+10 (Lower)	00h	

Field name		Data	Description
Data	Read value of register address+11 (Upper)	01h	CST operating current
	Read value of register address+11 (Lower)	F4h	
	Read value of register address+12 (Upper)	00h	Information (Lower)
	Read value of register address+12 (Lower)	00h	
	Read value of register address+13 (Upper)	00h	Information (Upper)
	Read value of register address+13 (Lower)	00h	
	Read value of register address+14 (Upper)	00h	Reserved
	Read value of register address+14 (Lower)	00h	
	Read value of register address+15 (Upper)	0Ch	Read parameter ID_R
	Read value of register address+15 (Lower)	21h	
	Read value of register address+16 (Upper)	01h	Read/Write status
	Read value of register address+16 (Lower)	00h	
	Read value of register address+17 (Upper)	0Ch	Write parameter ID_R
	Read value of register address+17 (Lower)	21h	
	Read value of register address+18 (Upper)	13h	Read data (Lower)
	Read value of register address+18 (Lower)	88h	
	Read value of register address+19 (Upper)	00h	Read data (Upper)
	Read value of register address+19 (Lower)	00h	
	Read value of register address+20 (Upper)	01h	Assignable monitor 0 (Lower)
	Read value of register address+20 (Lower)	3Dh	
	Read value of register address+21 (Upper)	00h	Assignable monitor 0 (Upper)
	Read value of register address+21 (Lower)	00h	
	Read value of register address+22 (Upper)	FFh	Assignable monitor 1 (Lower)
	Read value of register address+22 (Lower)	FEh	
	Read value of register address+23 (Upper)	FFh	Assignable monitor 1 (Upper)
	Read value of register address+23 (Lower)	FFh	
	Read value of register address+24 (Upper)	00h	Assignable monitor 2 (Lower)
	Read value of register address+24 (Lower)	00h	
	Read value of register address+25 (Upper)	00h	Assignable monitor 2 (Upper)
	Read value of register address+25 (Lower)	00h	
	Read value of register address+26 (Upper)	00h	Assignable monitor 3 (Lower)
	Read value of register address+26 (Lower)	00h	
	Read value of register address+27 (Upper)	00h	Assignable monitor 3 (Upper)
	Read value of register address+27 (Lower)	00h	

4-2 Writing of multiple holding registers (10h)

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 address. Note that even if an exception response is returned because some data is invalid, such as being outside the specified data range, etc., other data may have been written properly.

■ Example of write

Description	Register address		Value write	
	Hex	Dec	Hex	Dec
Remote I/O (R-IN)	0104h	260	0000h	0
Operation data number selection	0105h	261	0000h	0
Fixed I/O (IN)	0106h	262	0000h	0
Direct data operation operation type	0107h	263	0002h	2
Direct data operation position (Lower)	0108h	264	0000h	0
Direct data operation position (Upper)	0109h	265	0000h	
Direct data operation speed (Lower)	010Ah	266	03E8h	1,000
Direct data operation speed (Upper)	010Bh	267	0000h	
Direct data operation starting/changing rate (Lower)	010Ch	268	4240h	1,000,000
Direct data operation starting/changing rate (Upper)	010Dh	269	000Fh	
Direct data operation stopping rate (Lower)	010Eh	270	4240h	1,000,000
Direct data operation stopping rate (Upper)	010Fh	271	000Fh	
Direct data operation operating current	0110h	272	03E8h	1,000
Direct data operation forwarding destination	0111h	273	0000h	0
Reserved*	0112h	274	0000h	0
Read parameter ID	0113h	275	0C21h	3105
Write request	0114h	276	0001h	1
Write parameter ID	0115h	277	0C21h	3105
Write data (Lower)	0116h	278	1388h	5,000
Write data (Upper)	0117h	279	0000h	

* Fixed at 0 when writing

- **Query**

Field name		Data	Description
Transaction ID (Upper)		00h	Transaction ID: 0
Transaction ID (Lower)		00h	
Protocol ID (Upper)		00h	Protocol ID: 0
Protocol ID (Lower)		00h	
Message length (Upper)		00h	Message length: 47 bytes
Message length (Lower)		2Fh	
Unit ID		00h	Unit ID: 0
Function code		10h	Write of multiple holding registers
Data	Register address (Upper)	01h	Register address to start writing from: 260 [Remote I/O (R-IN)]
	Register address (Lower)	04h	
	Number of registers (Upper)	00h	Number of registers to be written from the starting register address: 20 registers
	Number of registers (Lower)	14h	
	Number of data bytes	28h	Number of data bytes: 40 bytes
	Write value of register address (Upper)	00h	Remote I/O (R-IN)
	Write value of register address (Lower)	00h	
	Write value of register address+1 (Upper)	00h	Operation Data Number Selection
	Write value of register address+1 (Lower)	00h	

Field name		Data	Description
Data	Write value of register address+2 (Upper)	00h	Fixed I/O (IN)
	Write value of register address+2 (Lower)	00h	
	Write value of register address+3 (Upper)	00h	Direct data operation operation type
	Write value of register address+3 (Lower)	02h	
	Write value of register address+4 (Upper)	00h	Direct data operation position (Lower)
	Write value of register address+4 (Lower)	00h	
	Write value of register address+5 (Upper)	00h	Direct data operation position (Upper)
	Write value of register address+5 (Lower)	00h	
	Write value of register address+6 (Upper)	03h	Direct data operation speed (Lower)
	Write value of register address+6 (Lower)	E8h	
	Write value of register address+7 (Upper)	00h	Direct data operation speed (Upper)
	Write value of register address+7 (Lower)	00h	
	Write value of register address+8 (Upper)	42h	Direct data operation starting/changing rate (Lower)
	Write value of register address+8 (Lower)	40h	
	Write value of register address+9 (Upper)	00h	Direct data operation starting/changing rate (Upper)
	Write value of register address+9 (Lower)	0Fh	
	Write value of register address+10 (Upper)	42h	Direct data operation stopping rate (Lower)
	Write value of register address+10 (Lower)	40h	
	Write value of register address+11 (Upper)	00h	Direct data operation stopping rate (Upper)
	Write value of register address+11 (Lower)	0Fh	
	Write value of register address+12 (Upper)	03h	Direct data operation operating current
	Write value of register address+12 (Lower)	E8h	
	Write value of register address+13 (Upper)	00h	Direct data operation forwarding destination
	Write value of register address+13 (Lower)	00h	
	Write value of register address+14 (Upper)	00h	Reserved
	Write value of register address+14 (Lower)	00h	
	Write value of register address+15 (Upper)	0Ch	Read parameter ID
	Write value of register address+15 (Lower)	21h	
	Write value of register address+16 (Upper)	00h	Write request
	Write value of register address+16 (Lower)	01h	
	Write value of register address+17 (Upper)	0Ch	Write Parameter ID
	Write value of register address+17 (Lower)	21h	
	Write value of register address+18 (Upper)	13h	Write data (Lower)
	Write value of register address+18 (Lower)	88h	
	Write value of register address+19 (Upper)	00h	Write data (Upper)
	Write value of register address+19 (Lower)	00h	

● **Response**

Field name		Data	Description
Transaction ID (Upper)		00h	Transaction ID: 0
Transaction ID (Lower)		00h	
Protocol ID (Upper)		00h	Protocol ID: 0
Protocol ID (Lower)		00h	
Message length (Upper)		00h	Message length: 6 bytes
Message length (Lower)		06h	
Unit ID		00h	Unit ID: 0
Function code		10h	Write of multiple holding registers
Data	Register address (Upper)	01h	Register address to start writing from: 260 [Remote I/O (R-IN)]
	Register address (Lower)	04h	
	Number of registers (Upper)	00h	Number of registers to be written from the starting register address: 20 registers
	Number of registers (Lower)	14h	

4-3 Read/write of multiple holding registers (17h)

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

■ Example of read/write

Description	Register address		Value write	
	Hex	Dec	Hex	Dec
Remote I/O (R-IN)	0104h	260	0000h	0
Operation data number selection	0105h	261	0000h	0
Fixed I/O (IN)	0106h	262	0000h	0
Direct data operation operation type	0107h	263	0002h	2
Direct data operation position (Lower)	0108h	264	0000h	0
Direct data operation position (Upper)	0109h	265	0000h	
Direct data operation speed (Lower)	010Ah	266	03E8h	1,000
Direct data operation speed (Upper)	010Bh	267	0000h	
Direct data operation starting/changing rate (Lower)	010Ch	268	4240h	1,000,000
Direct data operation starting/changing rate (Upper)	010Dh	269	000Fh	
Direct data operation stopping rate (Lower)	010Eh	270	4240h	1,000,000
Direct data operation stopping rate (Upper)	010Fh	271	000Fh	
Direct data operation operating current	0110h	272	03E8h	1,000
Direct data operation forwarding destination	0111h	273	0000h	0
Reserved*	0112h	274	0000h	0
Read parameter ID	0113h	275	0C21h	3105
Write request	0114h	276	0001h	1
Write parameter ID	0115h	277	0C21h	3105
Write data (Lower)	0116h	278	1388h	5,000
Write data (Upper)	0117h	279	0000h	

* Fixed at 0 when writing

Description	Register address		Value read	
	Hex	Dec	Hex	Dec
Remote I/O (R-OUT)	011Ch	284	1E20h	7712
Operation data number selection_R	011Dh	285	0000h	0
Fixed I/O (OUT)	011Eh	286	0060h	96
Present alarm	011Fh	287	0000h	0
Feedback position (Lower)	0120h	288	0000h	0
Feedback position (Upper)	0121h	289	0000h	
Feedback speed (Hz) (Lower)	0122h	290	0000h	0
Feedback speed (Hz) (Upper)	0123h	291	0000h	
Command position (Lower)	0124h	292	0000h	0
Command position (Upper)	0125h	293	0000h	
Torque monitor	0126h	294	0000h	0
CST operating current	0127h	295	01F4h	500
Information (Lower)	0128h	296	0000h	0
Information (Upper)	0129h	297	0000h	
Reserved*	012Ah	298	0000h	0
Read parameter ID_R	012Bh	299	0C21h	3105
Read/Write status	012Ch	300	0100h	256
Write parameter ID_R	012Dh	301	0C21h	3105
Read data (Lower)	012Eh	302	1388h	5,000
Read data (Upper)	012Fh	303	0000h	
Assignable monitor 0 (Lower)	0130h	304	013Dh	317
Assignable monitor 0 (Upper)	0131h	305	0000h	
Assignable monitor 1 (Lower)	0132h	306	FFFEh	–2
Assignable monitor 1 (Upper)	0133h	307	FFFFh	
Assignable monitor 2 (Lower)	0134h	308	0000h	0
Assignable monitor 2 (Upper)	0135h	309	0000h	
Assignable monitor 3 (Lower)	0136h	310	0000h	0
Assignable monitor 3 (Upper)	0137h	311	0000h	

* Value when read is undefined

- **Query**

Field name		Data	Description
Transaction ID (Upper)		00h	Transaction ID: 0
Transaction ID (Lower)		00h	
Protocol ID (Upper)		00h	Protocol ID: 0
Protocol ID (Lower)		00h	
Message length (Upper)		00h	Message length: 51 bytes
Message length (Lower)		33h	
Unit ID		00h	Unit ID: 0
Function code		17h	Read/write of multiple holding registers
Data	Read register address (Upper)	01h	Register address to start reading from: 284 [Remote I/O (R-OUT)]
	Read register address (Lower)	1Ch	
	Number of read registers (Upper)	00h	Number of registers to be read from the starting register address: 28 registers
	Number of read registers (Lower)	1Ch	
	Write register address (Upper)	01h	Register address to start writing from: 260 [Remote I/O (R-IN)]
	Write register address (Lower)	04h	

Field name		Data	Description
Data	Number of write registers (Upper)	00h	Number of registers to be written from the starting register address: 20 registers
	Number of write registers (Lower)	14h	
	Number of data bytes	28h	Number of data bytes: 40 bytes
	Write value of write register address (Upper)	00h	Remote I/O (R-IN)
	Write value of write register address (Lower)	00h	
	Write value of register address+1 (Upper)	00h	Operation data number selection
	Write value of register address+1 (Lower)	00h	
	Write value of register address+2 (Upper)	00h	Fixed I/O (IN)
	Write value of register address+2 (Lower)	00h	
	Write value of register address+3 (Upper)	00h	Direct data operation operation type
	Write value of register address+3 (Lower)	02h	
	Write value of register address+4 (Upper)	00h	Direct data operation position (Lower)
	Write value of register address+4 (Lower)	00h	
	Write value of register address+5 (Upper)	00h	Direct data operation position (Upper)
	Write value of register address+5 (Lower)	00h	
	Write value of register address+6 (Upper)	03h	Direct data operation speed (Lower)
	Write value of register address+6 (Lower)	E8h	
	Write value of register address+7 (Upper)	00h	Direct data operation speed (Upper)
	Write value of register address+7 (Lower)	00h	
	Write value of register address+8 (Upper)	42h	Direct data operation starting/changing rate (Lower)
	Write value of register address+8 (Lower)	40h	
	Write value of register address+9 (Upper)	00h	Direct data operation starting/changing rate (Upper)
	Write value of register address+9 (Lower)	0Fh	
	Write value of register address+10 (Upper)	42h	Direct data operation stopping rate (Lower)
	Write value of register address+10 (Lower)	40h	
	Write value of register address+11 (Upper)	00h	Direct data operation stopping rate (Upper)
	Write value of register address+11 (Lower)	0Fh	
	Write value of register address+12 (Upper)	03h	Direct data operation operating current
	Write value of register address+12 (Lower)	E8h	
	Write value of register address+13 (Upper)	00h	Direct data operation forwarding destination
	Write value of register address+13 (Lower)	00h	
	Write value of register address+14 (Upper)	00h	Reserved
	Write value of register address+14 (Lower)	00h	
	Write value of register address+15 (Upper)	0Ch	Read parameter ID
	Write value of register address+15 (Lower)	21h	
	Write value of register address+16 (Upper)	00h	Write request
	Write value of register address+16 (Lower)	01h	
	Write value of register address+17 (Upper)	0Ch	Write parameter ID
	Write value of register address+17 (Lower)	21h	
	Write value of register address+18 (Upper)	13h	Write data (Lower)
	Write value of register address+18 (Lower)	88h	
	Write value of register address+19 (Upper)	00h	Write data (Upper)
	Write value of register address+19 (Lower)	00h	

- **Response**

Field name		Data	Description
Transaction ID (Upper)		00h	Transaction ID: 0
Transaction ID (Lower)		00h	
Protocol ID (Upper)		00h	Protocol ID: 0
Protocol ID (Lower)		00h	
Message length (Upper)		00h	Message length: 59 bytes
Message length (Lower)		3Bh	
Unit ID		00h	Unit ID: 0
Function code		17h	Read/write of multiple holding registers
Data	Number of data bytes	38h	Number of data bytes: 56 bytes
	Read value of register address (Upper)	1Eh	Remote I/O (R-OUT)
	Read value of register address (Lower)	20h	
	Read value of register address+1 (Upper)	00h	Operation data number selection_R
	Read value of register address+1 (Lower)	00h	
	Read value of register address+2 (Upper)	00h	Fixed I/O (OUT)
	Read value of register address+2 (Lower)	60h	
	Read value of register address+3 (Upper)	00h	Present alarm
	Read value of register address+3 (Lower)	00h	
	Read value of register address+4 (Upper)	00h	Feedback position (Lower)
	Read value of register address+4 (Lower)	00h	
	Read value of register address+5 (Upper)	00h	Feedback position (Upper)
	Read value of register address+5 (Lower)	00h	
	Read value of register address+6 (Upper)	00h	Feedback speed (Hz) (Lower)
	Read value of register address+6 (Lower)	00h	
	Read value of register address+7 (Upper)	00h	Feedback speed (Hz) (Upper)
	Read value of register address+7 (Lower)	00h	
	Read value of register address+8 (Upper)	00h	Command position (Lower)
	Read value of register address+8 (Lower)	00h	
	Read value of register address+9 (Upper)	00h	Command position (Upper)
	Read value of register address+9 (Lower)	00h	
	Read value of register address+10 (Upper)	00h	Torque monitor
	Read value of register address+10 (Lower)	00h	
	Read value of register address+11 (Upper)	01h	CST operating current
	Read value of register address+11 (Lower)	F4h	
	Read value of register address+12 (Upper)	00h	Information (Lower)
	Read value of register address+12 (Lower)	00h	
	Read value of register address+13 (Upper)	00h	Information (Upper)
	Read value of register address+13 (Lower)	00h	
	Read value of register address+14 (Upper)	00h	Reserved
	Read value of register address+14 (Lower)	00h	
	Read value of register address+15 (Upper)	0Ch	Read parameter ID_R
	Read value of register address+15 (Lower)	21h	
	Read value of register address+16 (Upper)	01h	Read/Write status
	Read value of register address+16 (Lower)	00h	
	Read value of register address+17 (Upper)	0Ch	Write parameter ID_R
	Read value of register address+17 (Lower)	21h	
	Read value of register address+18 (Upper)	13h	Read data (Lower)
	Read value of register address+18 (Lower)	88h	

Field name		Data	Description
Data	Read value of register address+19 (Upper)	00h	Read data (Upper)
	Read value of register address+19 (Lower)	00h	
	Read value of register address+20 (Upper)	01h	Assignable monitor 0 (Lower)
	Read value of register address+20 (Lower)	3Dh	
	Read value of register address+21 (Upper)	00h	Assignable monitor 0 (Upper)
	Read value of register address+21 (Lower)	00h	
	Read value of register address+22 (Upper)	FFh	Assignable monitor 1 (Lower)
	Read value of register address+22 (Lower)	FEh	
	Read value of register address+23 (Upper)	FFh	Assignable monitor 1 (Upper)
	Read value of register address+23 (Lower)	FFh	
	Read value of register address+24 (Upper)	00h	Assignable monitor 2 (Lower)
	Read value of register address+24 (Lower)	00h	
	Read value of register address+25 (Upper)	00h	Assignable monitor 2 (Upper)
	Read value of register address+25 (Lower)	00h	
	Read value of register address+26 (Upper)	00h	Assignable monitor 3 (Lower)
	Read value of register address+26 (Lower)	00h	
	Read value of register address+27 (Upper)	00h	Assignable monitor 3 (Upper)
	Read value of register address+27 (Lower)	00h	

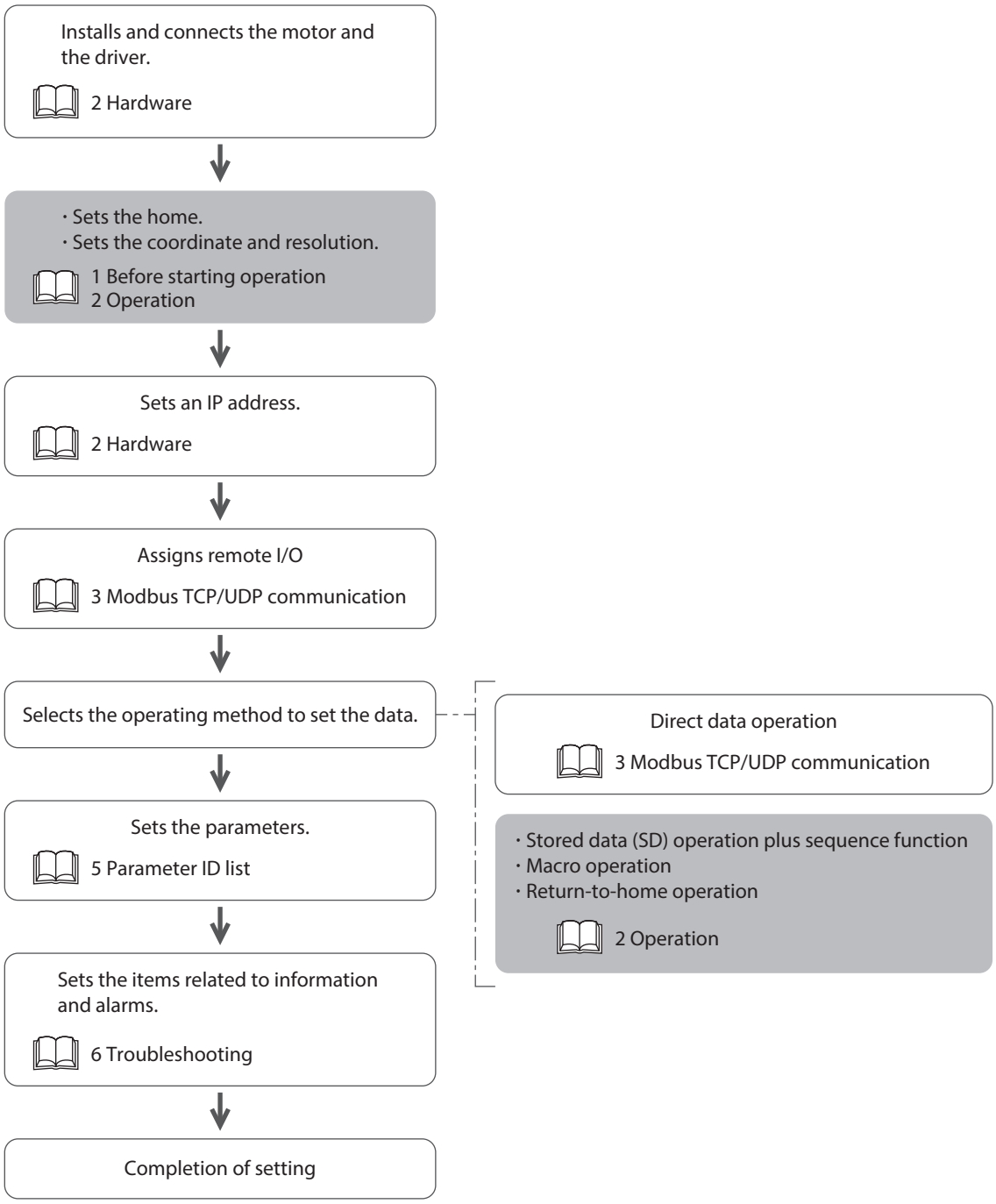
5 Flow of Modbus TCP and Modbus UDP communication

[ ] : Describes in this manual.

For details of [ ], refer to the **AZ** Series OPERATING MANUAL Function Edition.

: The title of the reference description.

memo Be sure to turn off the main power supply and the control power supply of the driver before setting the switch. Setting the switch while the main power supply and the control power supply are in an on-state will not enable the new setting.



6 Guidance

If you are new to this product, read this chapter to understand the operating methods along with the operation flow. This is an example of how to set operation data and start the motor using the host controller.

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

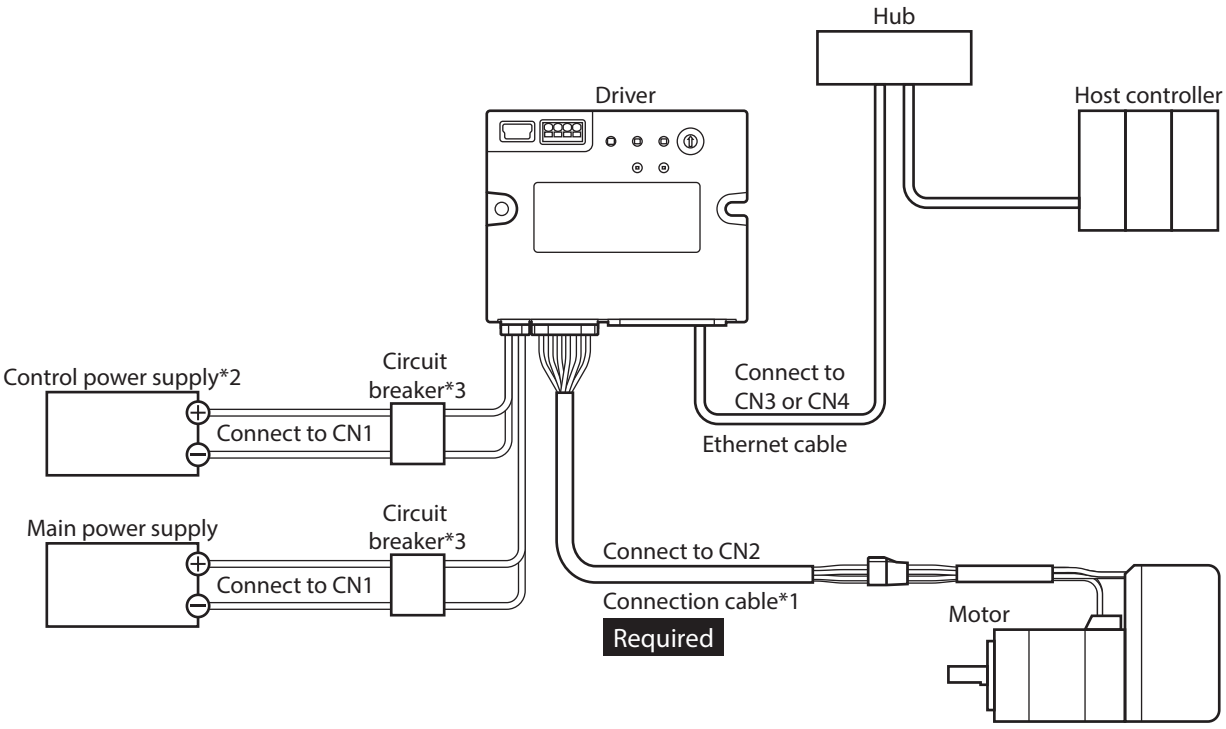
- **Operating conditions**

This operation is performed under the following conditions.

- Number of drivers connected: 1 unit
- IP address: 192.168.1.2
- Port number: 502
- Protocol: Modbus TCP

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

STEP 1 Check the installation and the connection.



*1 It is an Oriental Motor cable. Purchase is required separately.
*2 Connecting a control power supply allows you to continue monitoring even if the main power supply is shut off. Connect it as necessary.
*3 It is recommended that a circuit breaker or a circuit protector is connected because incorrect wiring may cause the internal input circuit to short-circuit.

STEP 2 Make preparations for operation.

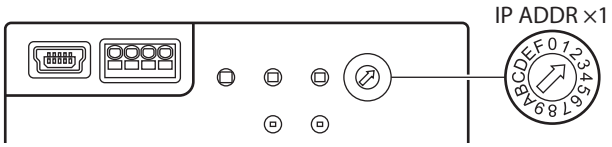
Refer to "Before starting operation" in the **AZ** Series OPERATING MANUAL Function Edition.

STEP 3 Set an IP address.

In this example, use the IP address setting switch (IP ADDR ×1) on the driver to set the fourth octet of the IP address. The first through third octets remain at their initial values.

1. Turn off the main power supply and the control power supply.
2. Set the IP address setting switch as follows.

   Setting: 2 (192.168.1.2)



3. Turn on the main power supply and the control power supply again.

Note Be sure to turn off the main power supply and the control power supply of the driver before setting the switch. Setting the switch while the main power supply and the control power supply are in an on-state will not enable the new setting.

STEP 4 The host controller starts the motor

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

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

Descriptions are given with the host controller as the subject.

1. Establish a connection.
2. Set the following operation data. (Function code: 10h)

• Output (Host controller → Driver)

Register address		Byte	Description	Setting value	Note
Hex	Dec				
0115h	277	34, 35	Write parameter ID	0C21h	Parameter ID of "Position" of operation data No.1: 3105
0116h	278	36, 37	Write data (Lower)	1388h	Position: 5,000 steps
0117h	279	38, 39	Write data (Upper)	0000h	

3. Turn the WR-REQ ON. (Function code: 10h)
The operation data is set in the driver. When the setting is completed, the WR-END is turned ON. (Function code: 03h)

• Output (Host controller → Driver)

Register address		Byte	Description	Bit	Signal name	Setting value
Hex	Dec					
0114h	276	32, 33	Write request	0	WR-REQ	0001h

• Input (Driver → Host controller)

Register address		Byte	Description	Bit	Signal name	Response
Hex	Dec					
012Ch	300	32, 33	Read/Write status	8	WR-END	0100h
012Dh	301	34, 35	Write parameter ID_R	–	–	0C21h

4. Turn the WR-REQ OFF. (Function code: 10h)
The WR-END is returned to OFF. (Function code: 03h)

• Output (Host controller → Driver)

Register address		Byte	Description	Bit	Signal name	Setting value
Hex	Dec					
0114h	276	32, 33	Write request	0	WR-REQ	0000h

• Input (Driver → Host controller)

Register address		Byte	Description	Bit	Signal name	Response
Hex	Dec					
012Ch	300	32, 33	Read/Write status	8	WR-END	0000h

5. Check that the READY has been turned ON. (Function code: 03h)

• Input (Driver → Host controller)

Register address		Byte	Description	Bit	Signal name	Response
Hex	Dec					
011Eh	286	4, 5	Fixed I/O (OUT)	5	READY	0060h

6. Select the operation data No. 1. (Function code: 10h)

• Output (Host controller → Driver)

Register address		Byte	Description	Bit	Signal name	Setting value
Hex	Dec					
0105h	261	2, 3	Operation data number selection	0	M0	0001h

7. Turn the START ON. (Function code: 10h)
Positioning operation is started.

• Output (Host controller → Driver)

Register address		Byte	Description	Bit	Signal name	Setting value
Hex	Dec					
0106h	262	4, 5	Fixed I/O (IN)	3	START	0008h

8. Check that the READY has been turned OFF. (Function code: 10h)

• Input (Driver → Host controller)

Register address		Byte	Description	Bit	Signal name	Response
Hex	Dec					
011Eh	286	4, 5	Fixed I/O (OUT)	5	READY	004Bh

9. Turn the START OFF. (Function code: 10h)

• Output (Host controller → Driver)

Register address		Byte	Description	Bit	Signal name	Setting value
Hex	Dec					
0106h	262	4, 5	Fixed I/O (IN)	3	START	0000h

memo

- When using Modbus TCP, disconnect the connection first before terminating communication between the driver and the host controller. If communication is terminated in a state where the connection is established, the driver connection will be in a half-open state.
- If the connections are established and disconnected every time data is sent or received, the communication efficiency is reduced.

STEP 5 Were you able to operate?

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

- Is the PWR/ALM LED blinking in red?
  An alarm is being generated. Refer to p.168 for details.
- Are the main power supply, the control power supply, the motor, and the Ethernet cable connected securely?
- Is the MS LED lit in red?
  An error inside the driver is being detected. Turn off and then turn on the main power supply and the control power supply.
- Is the MS LED blinking in red?
  The internal setting data is damaged. Refer to p.21 for details.
- Is the NS LED unlit?
  Modbus TCP communication is not being made. Check the IP address and port number of the host controller and the driver.
- Is the NS LED lit in red?
  A communication error is being detected. Refer to p.164 for details.
  If communication errors occur in succession, the LED may appear to blink.

7 Registers

In this manual, READ and WRITE are represented as follows.

- R: READ
- W: WRITE
- R/W: READ/WRITE

7-1 Register address list

Register address		Direction	Area	Word	Byte	Name	R/W
Hex	Dec						
0100h	256	Output	Communication support	0	0, 1	Reserved*1	R/W
0101h	257			1	2, 3	Reserved*1	R/W
0102h	258			2	4, 5	Communication timeout (For setting)	R/W
0103h	259			3	6, 7	Loopback input	R/W
0104h	260		I/O data	0	0, 1	Remote I/O (R-IN)	R/W
0105h	261			1	2, 3	Operation data number selection	R/W
0106h	262			2	4, 5	Fixed I/O (IN)	R/W
0107h	263			3	6, 7	Direct data operation operation type	R/W
0108h	264			4	8, 9	Direct data operation position (Lower)	R/W
0109h	265			5	10, 11	Direct data operation position (Upper)	R/W
010Ah	266			6	12, 13	Direct data operation speed (Lower)	R/W
010Bh	267			7	14, 15	Direct data operation speed (Upper)	R/W
010Ch	268			8	16, 17	Direct data operation starting/ changing rate (Lower)	R/W
010Dh	269			9	18, 19	Direct data operation starting/ changing rate (Upper)	R/W
010Eh	270			10	20, 21	Direct data operation stopping rate (Lower)	R/W
010Fh	271			11	22, 23	Direct data operation stopping rate (Upper)	R/W
0110h	272			12	24, 25	Direct data operation operating current	R/W
0111h	273			13	26, 27	Direct data operation forwarding destination	R/W
0112h	274			14	28, 29	Reserved*1	R/W
0113h	275			15	30, 31	Read parameter ID	R/W
0114h	276			16	32, 33	Write request	R/W
0115h	277			17	34, 35	Write parameter ID	R/W
0116h	278			18	36, 37	Write data (Lower)	R/W
0117h	279			19	38, 39	Write data (Upper)	R/W

Register address		Direction	Area	Word	Byte	Name	R/W
Hex	Dec						
0118h	280	Input	Communication support	0	0, 1	Reserved*2	R
0119h	281			1	2, 3	Reserved*2	R
011Ah	282			2	4, 5	Communication timeout (Display of setting contents)	R
011Bh	283			3	6, 7	Loopback output	R
011Ch	284		I/O data	0	0, 1	Remote I/O (R-OUT)	R
011Dh	285			1	2, 3	Operation data number selection_R	R
011Eh	286			2	4, 5	Fixed I/O (OUT)	R
011Fh	287			3	6, 7	Present alarm	R
0120h	288			4	8, 9	Feedback position (Lower)	R
0121h	289			5	10, 11	Feedback position (Upper)	R
0122h	290			6	12, 13	Feedback speed (Hz) (Lower)	R
0123h	291			7	14, 15	Feedback speed (Hz) (Upper)	R
0124h	292			8	16, 17	Command position (Lower)	R
0125h	293			9	18, 19	Command position (Upper)	R
0126h	294			10	20, 21	Torque monitor	R
0127h	295			11	22, 23	CST operating current	R
0128h	296			12	24, 25	Information (Lower)	R
0129h	297			13	26, 27	Information (Upper)	R
012Ah	298			14	28, 29	Reserved*2	R
012Bh	299			15	30, 31	Read parameter ID_R	R
012Ch	300			16	32, 33	Read/Write status	R
012Dh	301			17	34, 35	Write parameter ID_R	R
012Eh	302			18	36, 37	Read data (Lower)	R
012Fh	303			19	38, 39	Read data (Upper)	R
0130h	304			20	40, 41	Assignable monitor 0 (Lower)	R
0131h	305			21	42, 43	Assignable monitor 0 (Upper)	R
0132h	306			22	44, 45	Assignable monitor 1 (Lower)	R
0133h	307			23	46, 47	Assignable monitor 1 (Upper)	R
0134h	308			24	48, 49	Assignable monitor 2 (Lower)	R
0135h	309			25	50, 51	Assignable monitor 2 (Upper)	R
0136h	310			26	52, 53	Assignable monitor 3 (Lower)	R
0137h	311			27	54, 55	Assignable monitor 3 (Upper)	R

*1 Fixed at 0 when writing
*2 Value when read is undefined

Note For I/O data, set all data first. If only some data is set, the data that is not set will be undefined, which may cause the driver to malfunction.

- **Order of 32-bit data**

The order of Word (2 bytes) of 32-bit data (4 bytes) is sorted from lower to upper (initial value). The order of Word can be sorted from upper to lower using the "32-bit data word order (Modbus TCP/UDP)" parameter.

Example) From lower to upper

Register address		Direction	Area	Word	Byte	Name	R/W
Hex	Dec						
0108h	264	Output	I/O data	4	8, 9	Direct data operation position (Lower)	R/W
0109h	265			5	10, 11	Direct data operation position (Upper)	R/W

Example) From upper to lower

Register address		Direction	Area	Word	Byte	Name	R/W
Hex	Dec						
0108h	264	Output	I/O data	4	8, 9	Direct data operation position (Upper)	R/W
0109h	265			5	10, 11	Direct data operation position (Lower)	R/W

- **About I/O data processing**

Use the function codes to change or check the values in the I/O data area.
- When changing the value: 10h or 17h of the function code
- When checking the value: 03h or 17h of the function code

Data write, data read, and the operation command are executed when the value of the I/O data area is changed.
For details, refer to data write (p.74), data read (p.75), and examples of executing operation (p.77).

memo
- If multiple operation commands are set, the operation command of direct data operation is prioritized.
- If the operation commands for remote I/O (R-IN) and fixed I/O (IN) are set at the same time, operation will be as follows.
  - If the same operation command is set: The motor will start.
  - If different operation commands are set: The motor will not start, and information of Start operation error will be generated.

7-2 Communication support

Communication support is an area where the function to support communication, such as communication timeout, loopback test, etc.

- **Communication support (Output)**

Register address		Direction	Area	Word	Byte	Name	R/W
Hex	Dec						
0100h	256	Output	Communication support	0	0, 1	Reserved*	R/W
0101h	257			1	2, 3	Reserved*	R/W
0102h	258			2	4, 5	Communication timeout (For setting)	R/W
0103h	259			3	6, 7	Loopback input	R/W

* Fixed at 0 when writing

- **Communication support (Input)**

Register address		Direction	Area	Word	Byte	Name	R/W
Hex	Dec						
0118h	280	Input	Communication support	0	0, 1	Reserved*	R
0119h	281			1	2, 3	Reserved*	R
011Ah	282			2	4, 5	Communication timeout (Display of setting contents)	R
011Bh	283			3	6, 7	Loopback output	R

* Value when read is undefined

- **Communication timeout**

The driver monitors an interval between queries to be received. If the frame is not properly received after the time set in the "Communication timeout (For setting)" has elapsed, it is judged as a communication timeout and an alarm of Network bus error is generated.

Direction	Bit	Name	Description	Setting range	Initial value
Output	0 to 15	Communication timeout (For setting)	This is used to set the condition under which a communication timeout is detected. It is enabled when the "Communication timeout (Modbus TCP/UDP)" parameter is set to "−1: Set by Modbus." It is updated immediately when the value is changed.	0: Not monitored 1 to 65,535 ms	0
Input	0 to 15	Communication timeout (Display of setting contents)	The present setting value of "Communication timeout (For setting)" is displayed.	0: Not monitored 1 to 65,535 ms	0

Related parameter

MEXE02 code	Name	Description	Setting range	Initial value
p11	Communication timeout (Modbus TCP/UDP)	Sets the condition under which a communication timeout is detected. If the frame is not properly received after the set time has elapsed, it is judged as a communication timeout and an alarm of Network bus error is generated.	−1: Set by Modbus 0: Not monitored 1 to 65,535 ms	−1

- **Loopback input, loopback output**

The "loopback input" and "loopback output" are areas that can be freely set by the customer.
Use for a communication test (parroting), etc.

Direction	Bit	Name	Description	Setting range	Initial value
Output	0 to 15	Loopback input	This is an area that can be freely set by the customer. Use for a communication test (parroting), etc.	0 to 65,535	0
Input	0 to 15	Loopback output	The present value of the "loopback input" is displayed.	0 to 65,535	0

7-3 I/O data (Input)

Data transferred from the driver to the host controller is called I/O data (Input).

■ I/O data (Input) format

Contents of I/O data (Input) are as follows.

Register address		Byte	Size (byte)	Name
Hex	Dec			
011Ch	284	0, 1	2	Remote I/O (R-OUT)
011Dh	285	2, 3	2	Operation data number selection_R
011Eh	286	4, 5	2	Fixed I/O (OUT)
011Fh	287	6, 7	2	Present alarm
0120h	288	8, 9	2	Feedback position (Lower)
0121h	289	10, 11	2	Feedback position (Upper)
0122h	290	12, 13	2	Feedback speed (Hz) (Lower)
0123h	291	14, 15	2	Feedback speed (Hz) (Upper)
0124h	292	16, 17	2	Command position (Lower)
0125h	293	18, 19	2	Command position (Upper)
0126h	294	20, 21	2	Torque monitor
0127h	295	22, 23	2	CST operating current
0128h	296	24, 25	2	Information (Lower)
0129h	297	26, 27	2	Information (Upper)
012Ah	298	28, 29	2	Reserved (Value when read is undefined)
012Bh	299	30, 31	2	Read parameter ID_R
012Ch	300	32, 33	2	Read/Write status
012Dh	301	34, 35	2	Write parameter ID_R
012Eh	302	36, 37	2	Read data (Lower)
012Fh	303	38, 39	2	Read data (Upper)
0130h	304	40, 41	2	Assignable monitor 0 (Lower)
0131h	305	42, 43	2	Assignable monitor 0 (Upper)
0132h	306	44, 45	2	Assignable monitor 1 (Lower)
0133h	307	46, 47	2	Assignable monitor 1 (Upper)
0134h	308	48, 49	2	Assignable monitor 2 (Lower)
0135h	309	50, 51	2	Assignable monitor 2 (Upper)
0136h	310	52, 53	2	Assignable monitor 3 (Lower)
0137h	311	54, 55	2	Assignable monitor 3 (Upper)

■ Details of I/O data (Input)

● Remote I/O (R-OUT)

This is the I/O that is accessed via Ethernet.
The assignments of signals can be changed using the "R-OUT output function" parameters.

Bit	Name	Description	Initial value
0	R-OUT0	A response to a signal assigned with the "R-OUT output function" parameter is output.	64: M0_R
1	R-OUT1		65: M1_R
2	R-OUT2		66: M2_R
3	R-OUT3		32: START_R
4	R-OUT4		144: HOME-END
5	R-OUT5		132: READY
6	R-OUT6		135: INFO
7	R-OUT7		129: ALM-A
8	R-OUT8		136: SYS-BSY
9	R-OUT9		160: AREA0
10	R-OUT10		161: AREA1
11	R-OUT11		162: AREA2
12	R-OUT12		157: TIM
13	R-OUT13		134: MOVE
14	R-OUT14		138: IN-POS
15	R-OUT15		140: TLC

● Operation data number selection_R

Bit	Name	Description
0	M0_R	A response to an input signal is output.
1	M1_R	
2	M2_R	
3	M3_R	
4	M4_R	
5	M5_R	
6	M6_R	
7	M7_R	
8 to 15	Reserved	0 is returned.

- **Fixed I/O (OUT)**

This is the I/O that is accessed via Ethernet. Assignments of signals cannot be changed.

Bit	Name	Description
0	SEQ-BSY	This is output when stored data (SD) operation is being performed.
1	MOVE	This is output while the motor operates.
2	IN-POS	This is output when positioning operation is completed.
3	START_R	A response to an input signal is output.
4	HOME-END	This is output when high-speed return-to-home operation or return-to-home operation is completed, or position preset is executed.
5	READY	This is output when the driver is ready to operate.
6	DCMD-RDY	This is output when direct data operation is ready to execute.
7	ALM-A	The alarm status of the driver is output. (Normally open)
8	TRIG_R	A response to an input signal is output.
9	TRIG-MODE_R	A response to an input signal is output.
10	SET-ERR	This is output when an error occurs in any of the settings of the operation type, position, speed, starting/changing speed rate, stopping rate, operating current, or forwarding destination for direct data operation.
11	EXE-ERR	This is output when direct data operation has failed to be executed.
12	DCMD-FULL	This is output when data is being written to the buffer area of direct data operation.
13	STOP_R	A response to an input signal is output.
14	Reserved	0 is returned.
15	TLC	This is output when the output torque reaches the upper limit value.

- **Present alarm**

Bit	Name	Description
0 to 15	Present alarm	This indicates the alarm code presently being generated.

- **Feedback position**

Bit	Name	Description
0 to 31	Feedback position	This indicates the present feedback position. (step) When the wrap function is enabled, the value on the wrap coordinates is indicated.

- **Feedback speed**

Bit	Name	Description
0 to 31	Feedback speed	This indicates the present feedback speed. (Hz)

- **Command position**

Bit	Name	Description
0 to 31	Command position	This indicates the present command position. (step) When the wrap function is enabled, the value on the wrap coordinates is indicated.

- **Torque monitor**

Bit	Name	Description
0 to 15	Torque monitor	This indicates the torque presently generated as a percentage of the maximum holding torque. (1=0.1 %)

- **CST operating current**

Bit	Name	Description
0 to 15	CST operating current	This indicates the operating current of the α control (CST) mode. (1=0.1 %)

- **Information**

Bit	Name	Description
0 to 31	Information	This indicates the information code presently being generated.

- **Read parameter ID_R**

Bit	Name	Description
0 to 15	Read parameter ID_R	This indicates a response of the read parameter ID.

- **Read/Write status**

Bit	Name	Description
0 to 6	Reserved	0 is returned.
7	RD-ERR	This is output when an error occurred in reading. If reading is properly performed, the RD-ERR is turned OFF.
8	WR-END	A response to the WR-REQ is output. The WR-END is also turned ON while the WR-REQ is ON. OFF: Write request waiting ON: Write completed
9	SYS-BSY	This is output when the driver is in internal processing state.
10	Reserved	0 is returned.
11	WR-SET-ERR	This is output when the write parameter ID or the write data is out of the setting range.
12	WR-IF-ERR	This is output when writing cannot be executed because user I/F communication is in progress.
13	WR-NV-ERR	This is output when writing cannot be performed because non-volatile memory processing is in progress.
14	WR-EXE-ERR	This is output when a command cannot be executed.
15	WR-ERR	This is output when an error occurred in writing. When the WR-REQ is turned OFF or writing is performed properly, the WR-ERR is also turned OFF.

- **Write parameter ID_R**

Bit	Name	Description
0 to 15	Write parameter ID_R	This indicates a response of the write parameter ID .

- **Read data**

Bit	Name	Description
0 to 31	Read data	This indicates the value of the parameter shown in the parameter ID_R.

- **Assignable monitor**

Bit	Name	Description
0 to 31	Assignable monitor n*	This indicates the value of the parameter set in the "Assignable monitor address n" parameter.

* n: 0 to 3

7-4 I/O data (Output)

Data transferred from the host controller to the driver is called I/O data (Output).

■ I/O data (Output) format

Contents of I/O data (Output) are as follows.

Register address		Byte	Size (byte)	Name
Hex	Dec			
0104h	260	0, 1	2	Remote I/O (R-IN)
0105h	261	2, 3	2	Operation data number selection
0106h	262	4, 5	2	Fixed I/O (IN)
0107h	263	6, 7	2	Direct data operation operation type
0108h	264	8, 9	2	Direct data operation position (Lower)
0109h	265	10, 11	2	Direct data operation position (Upper)
010Ah	266	12, 13	2	Direct data operation speed (Lower)
010Bh	267	14, 15	2	Direct data operation speed (Upper)
010Ch	268	16, 17	2	Direct data operation starting/changing rate (Lower)
010Dh	269	18, 19	2	Direct data operation starting/changing rate (Upper)
010Eh	270	20, 21	2	Direct data operation stopping rate (Lower)
010Fh	271	22, 23	2	Direct data operation stopping rate (Upper)
0110h	272	24, 25	2	Direct data operation operating current
0111h	273	26, 27	2	Direct data operation forwarding destination
0112h	274	28, 29	2	Reserved (Write 0 when writing)
0113h	275	30, 31	2	Read parameter ID
0114h	276	32, 33	2	Write request
0115h	277	34, 35	2	Write parameter ID
0116h	278	36, 37	2	Write data (Lower)
0117h	279	38, 39	2	Write data (Upper)

■ Details of I/O data (Output)

● Remote I/O (R-IN)

This is the I/O that is accessed via Ethernet.
The assignments of signals can be changed using the "R-IN input function" parameters.

Bit	Name	Description	Initial value
0	R-IN0	These are used to execute the signal assigned with the "R-IN input function" parameter.	0: Not used
1	R-IN1		
2	R-IN2		
3	R-IN3		
4	R-IN4		
5	R-IN5		
6	R-IN6		
7	R-IN7		
8	R-IN8		
9	R-IN9		
10	R-IN10		
11	R-IN11		
12	R-IN12		
13	R-IN13		
14	R-IN14		
15	R-IN15		

● Operation data number selection

Bit	Name	Description	Initial value
0	M0	The operation data number is selected using eight bits.	0
1	M1		
2	M2		
3	M3		
4	M4		
5	M5		
6	M6		
7	M7		
8 to 15	Reserved	A value is disregarded.	0

- **Fixed I/O (IN)**

This is the I/O that is accessed via Ethernet.
Assignments of signals cannot be changed.
The status of each signal indicates "0: OFF" and "1: ON" (except for Bit 9).
Refer to the **AZ** Series OPERATING MANUAL Function Edition, for details on signals.

Bit	Name	Description	Initial value
0	FW-JOG	This is used to execute JOG operation in the forward direction.	0
1	RV-JOG	This is used to execute JOG operation in the reverse direction.	
2	Reserved	A value is disregarded.	
3	START	This is used to execute stored data (SD) operation.	
4	ZHOME	This is used to execute high-speed return-to-home operation.	
5	STOP	This is used to stop the motor.	
6	FREE	This is used to shut off the motor current to put the motor in a non-excitation state. When an electromagnetic brake motor is used, the electromagnetic brake is in a state of releasing the motor shaft.	
7	ALM-RST	This is used to reset the alarm presently being generated.	
8	TRIG	This is used to execute direct data operation.	
9	TRIG-MODE	This is used to set the judgment criterion for the TRIG. 0: Start at ON edge 1: Start at ON level	
10	Reserved	A value is disregarded.	
11	Reserved	A value is disregarded.	
12	FW-JOG-P	This is used to execute inching operation in the forward direction.	
13	RV-JOG-P	This is used to execute inching operation in the reverse direction.	
14	FW-POS	This is used to execute continuous operation in the forward direction.	
15	RV-POS	This is used to execute continuous operation in the reverse direction.	

- **Direct data operation operation type**

Bit	Name	Description	Setting range	Initial value
0 to 15	Direct data operation operation type	This is used to set the operation type.	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 positioning push-motion 21: Incremental positioning push-motion (based on command position) 22: Incremental positioning push-motion (based on feedback position)	2

- **Direct data operation position**

Bit	Name	Description	Setting range	Initial value
0 to 31	Direct data operation position	This is used to set the target position.	–2,147,483,648 to 2,147,483,647 steps	0

- **Direct data operation speed**

Bit	Name	Description	Setting range	Initial value
0 to 31	Direct data operation speed	This is used to set the operating speed.	–4,000,000 to 4,000,000 Hz	1,000

- **Direct data operation starting/changing rate**

Bit	Name	Description	Setting range	Initial value
0 to 31	Direct data operation starting/changing rate	This is used to set the acceleration/deceleration rate or the acceleration/deceleration time when starting or changing the speed.	1 to 1,000,000,000 (1=0.001)*	1,000,000

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

- **Direct data operation stopping rate**

Bit	Name	Description	Setting range	Initial value
0 to 31	Direct data operation stopping rate	This is used to set the deceleration rate or the deceleration time when stopping.	1 to 1,000,000,000 (1=0.001)*	1,000,000

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

- **Direct data operation operating current**

Bit	Name	Description	Setting range	Initial value
0 to 15	Direct data operation operating current	This is used to set the operating current.	0 to 1,000 (1=0.1 %)	1,000

- **Direct data operation forwarding destination**

Bit	Name	Description	Setting range	Initial value
0 to 15	Direct data operation forwarding destination	This is used to select the stored area when the next direct data is transferred during direct data operation.	0: Execution memory 1: Buffer memory	0

- **Read parameter ID**

Bit	Name	Description	Initial value
0 to 15	Read parameter ID	This is used to set the parameter ID to be read from.	0

- **Write request**

Bit	Name	Description	Setting range	Initial value
0	WR-REQ	This is used to set the write request.	0: Disable 1: Write request (ON edge)	0
1 to 15	Reserved	A value is disregarded.	–	0

- **Write parameter ID**

Bit	Name	Description	Initial value
0 to 15	Write parameter ID	This is used to set the parameter ID to be written to.	0

● **Write data**

Bit	Name	Description	Initial value
0 to 31	Write data	This is used to set a value to be written to the parameter specified by the write parameter ID.	0

7-5 Data writing

This section explains the flow how data is written from the host controller to the driver over Ethernet.

■ Area of I/O data used

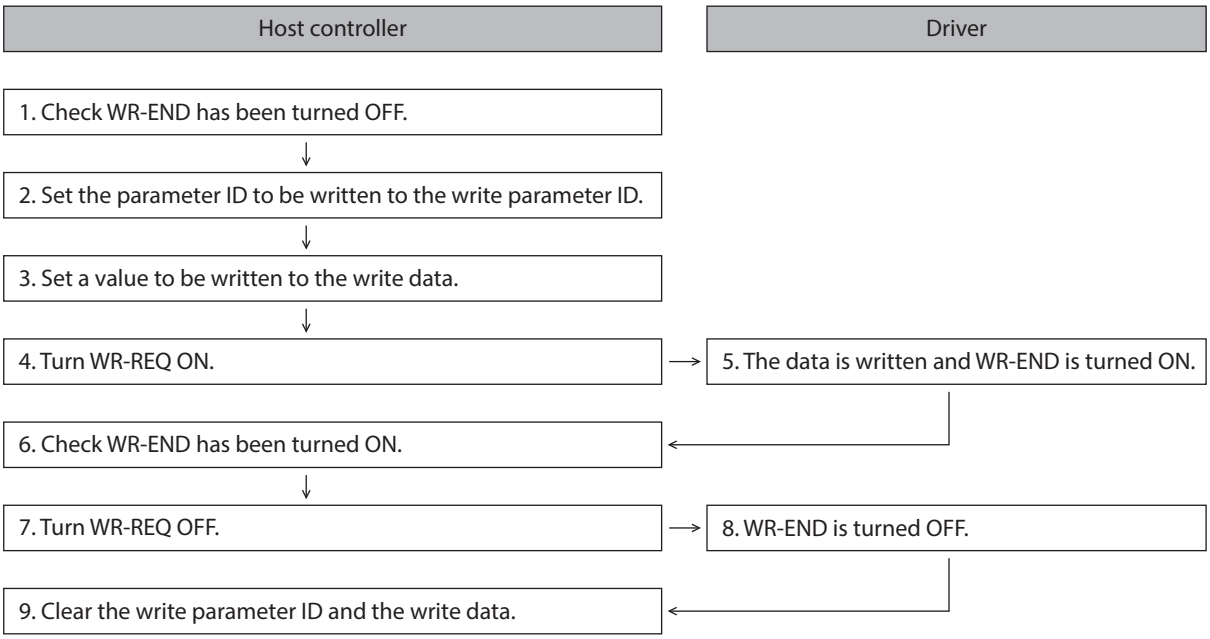
Input (Transfer from driver to host controller)

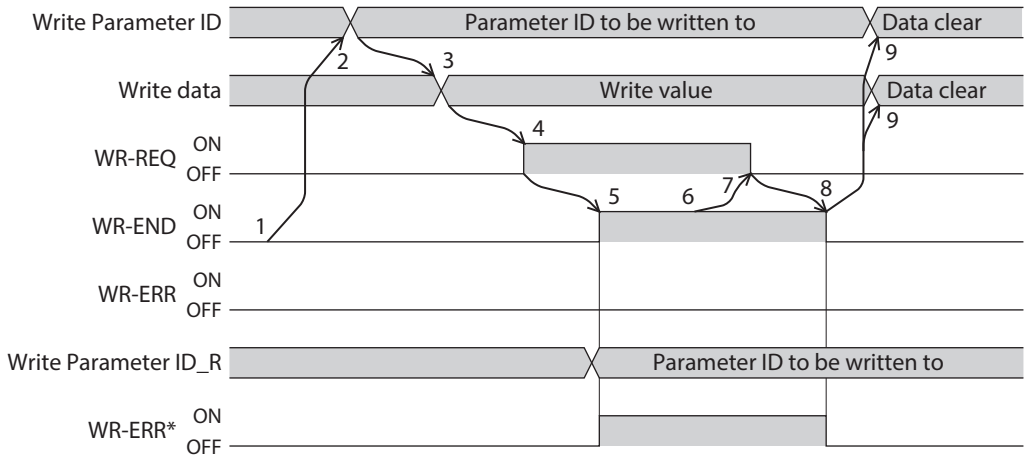
Byte	Description
32, 33	Read/Write status
34, 35	Write parameter ID_R

Output (Transfer from host controller to driver)

Byte	Description
32, 33	Write request
34, 35	Write parameter ID
36, 37	Write data (Lower)
38, 39	Write data (Upper)

■ Flow in which data is written





* If an error occurs while data is being written, the WR-END and the WR-ERR are simultaneously turned ON.

7-6 Data reading

This section explains the flow of how the data is read from the driver to the host controller over Ethernet.
There are the following two methods to read data.

- Use an area of "Read data"
- Use an area of "Assignable monitor"

■ When an area of read data is used

● Area of I/O data used

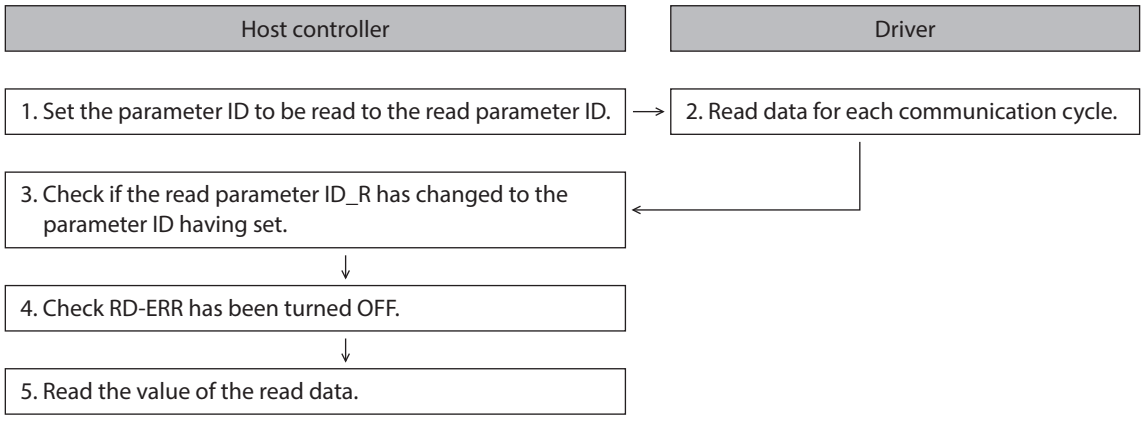
Input (Transfer from driver to host controller)

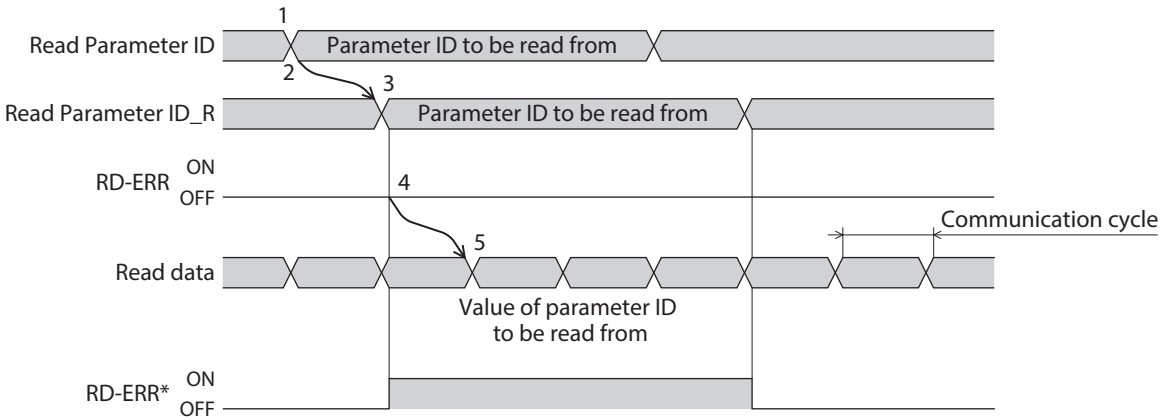
Byte	Description
30, 31	Read parameter ID_R
32, 33	Read/Write status
36, 37	Read data (Lower)
38, 39	Read data (Upper)

Output (Transfer from host controller to driver)

Byte	Description
30, 31	Read parameter ID

● Flow in which data is read





* If the parameter ID that is out of the setting range is set to the read parameter ID, the RD-ERR will be turned ON at the same time when the read parameter ID_R is updated.

■ When an area of assignable monitor is used

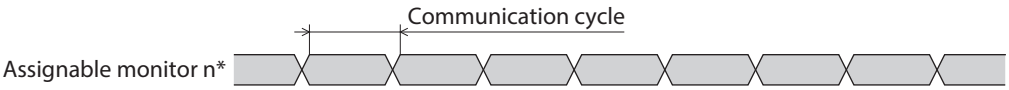
- **Area of I/O data used**

Input (Transfer from driver to host controller)

Byte	Description
40 to 55	Assignable monitor 0 to assignable monitor 3

- **Flow in which data is read**

Host controller	Driver
Set the "Assignable monitor address" parameter	→ Read the parameter value set in the "Assignable monitor address" parameter for each communication cycle.



* n: 0 to 3

- **Related parameters**

MEXE02 code	Name	Description	Setting range	Initial value
p11	Assignable monitor address 0	These are used to set the parameter ID to be displayed on the assignable monitor.	Set from items of "3 Monitor commands" on p.123.	124: Driver temperature
	Assignable monitor address 1			125: Motor temperature
	Assignable monitor address 2			109: Cumulative load monitor
	Assignable monitor address 3			127: Tripmeter

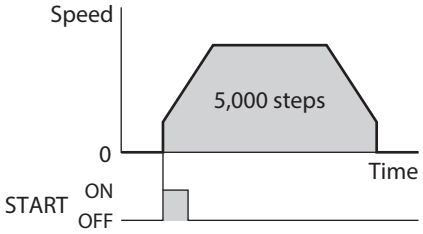
8 Examples of executing operation

This chapter describes operations that use the write data area to set operation data.
The method to execute operation is common to fixed I/O and remote I/O.

8-1 Positioning operation

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

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



- **Operation processing flow**

Descriptions are given with the host controller as the subject.

1. Establish a connection.
2. Set the following operation data.

• Output (Host controller → Driver)

Register address		Byte	Description	Setting value	Note
Hex	Dec				
0115h	277	34, 35	Write parameter ID	0C21h	Parameter ID of "Position" of operation data No.1: 3105
0116h	278	36, 37	Write data (Lower)	1388h	Position: 5,000 steps
0117h	279	38, 39	Write data (Upper)	0000h	

3. Turn the WR-REQ ON.
The operation data is set in the driver. When the setting is completed, the WR-END is turned ON.

• Output (Host controller → Driver)

Register address		Byte	Description	Bit	Signal name	Setting value
Hex	Dec					
0114h	276	32, 33	Write request	0	WR-REQ	0001h

• Input (Driver → Host controller)

Register address		Byte	Description	Bit	Signal name	Response
Hex	Dec					
012Ch	300	32, 33	Read/Write status	8	WR-END	0100h
012Dh	301	34, 35	Write parameter ID_R	–	–	0C21h

4. Turn the WR-REQ OFF.
   The WR-END is returned to OFF.

   • Output (Host controller → Driver)

Register address		Byte	Description	Bit	Signal name	Setting value
Hex	Dec					
0114h	276	32, 33	Write request	0	WR-REQ	0000h

   • Input (Driver → Host controller)

Register address		Byte	Description	Bit	Signal name	Response
Hex	Dec					
012Ch	300	32, 33	Read/Write status	8	WR-END	0000h

5. Check that the READY has been turned ON.

   • Input (Driver → Host controller)

Register address		Byte	Description	Bit	Signal name	Response
Hex	Dec					
011Eh	286	4, 5	Fixed I/O (OUT)	5	READY	0060h

6. Select the operation data No. 1.

   • Output (Host controller → Driver)

Register address		Byte	Description	Bit	Signal name	Setting value
Hex	Dec					
0105h	261	2, 3	Operation data number selection	0	M0	0001h

7. Turn the START ON.
   Positioning operation is started.

   • Output (Host controller → Driver)

Register address		Byte	Description	Bit	Signal name	Setting value
Hex	Dec					
0106h	262	4, 5	Fixed I/O (IN)	3	START	0008h

8. Check that the READY has been turned OFF.

   • Input (Driver → Host controller)

Register address		Byte	Description	Bit	Signal name	Response
Hex	Dec					
011Eh	286	4, 5	Fixed I/O (OUT)	5	READY	004Bh

9. Turn the START OFF.

   • Output (Host controller → Driver)

Register address		Byte	Description	Bit	Signal name	Setting value
Hex	Dec					
0106h	262	4, 5	Fixed I/O (IN)	3	START	0000h

memo

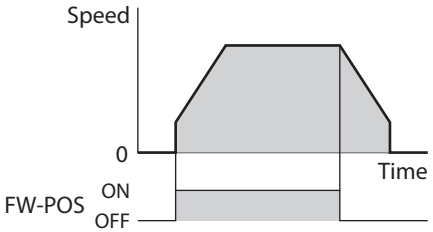
- When using Modbus TCP, disconnect the connection first before terminating communication between the driver and the host controller. If communication is terminated in a state where the connection is established, the driver connection will be in a half-open state.
- If the connections are established and disconnected every time data is sent or received, the communication efficiency is reduced.

8-2 Continuous operation

As an example, this section explains how to execute the following continuous operation.

Setting example

- Operation data number: 0
- Rotation direction: Forward direction
- Other settings: Initial values



Operation processing flow

Descriptions are given with the host controller as the subject.

1. Establish a connection.
2. Check the READY has been turned ON.

• Input (Driver → Host controller)

Register address		Byte	Description	Bit	Signal name	Response
Hex	Dec					
011Eh	286	4, 5	Fixed I/O (OUT)	5	READY	0060h

3. Set the operation data No.0.

• Output (Host controller → Driver)

Register address		Byte	Description	Setting value
Hex	Dec			
0105h	261	2, 3	Operation data number selection	0000h

4. Turn the FW-POS ON.
   Continuous operation is started.

• Output (Host controller → Driver)

Register address		Byte	Description	Bit	Signal name	Setting value
Hex	Dec					
0106h	262	4, 5	Fixed I/O (IN)	14	FW-POS	4000h

5. Turn the FW-POS OFF.
   The motor decelerates to a stop.

• Output (Host controller → Driver)

Register address		Byte	Description	Bit	Signal name	Setting value
Hex	Dec					
0106h	262	4, 5	Fixed I/O (IN)	14	FW-POS	0000h

memo

- When using Modbus TCP, disconnect the connection first before terminating communication between the driver and the host controller. If communication is terminated in a state where the connection is established, the driver connection will be in a half-open state.
- If the connections are established and disconnected every time data is sent or received, the communication efficiency is reduced.

9 Direct data operation

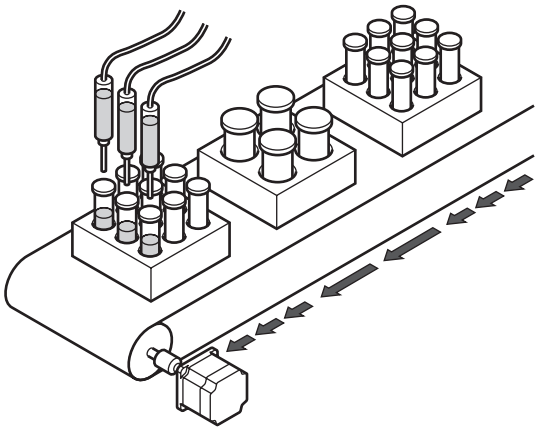
9-1 Overview of direct data operation

Direct data operation is a function can start operation at the same time as rewriting of the data. It is suitable for applications where the setting of the operation data is frequently changed, such as changing the speed or travel amount according to a load.
Direct data operation is executed with the TRIG of fixed I/O (IN).
A condition to execute direct data operation can be selected from the following two types using the TRIG-MODE of fixed I/O (IN).

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

■ Application example 1 of direct data operation

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



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

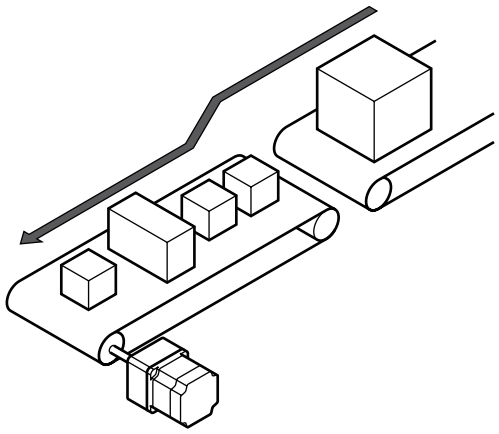
  Descriptions are given with the host controller as the subject.

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

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

■ Application example 2 of direct data operation

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



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

  Descriptions are given with the host controller as the subject.

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

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

9-2 I/O data (Output) and parameters required for direct data operation

- **Related I/O data (Output)**

  Refer to p.71 for details on I/O data (Output).

Register address		Byte	Name	Setting range	Initial value
Hex	Dec				
0107h	263	6, 7	Direct data operation operation type	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 positioning push-motion 21: Incremental positioning push-motion (based on command position) 22: Incremental positioning push-motion (based on feedback position)	2
0108h	264	8, 9	Direct data operation position (Lower)	–2,147,483,648 to 2,147,483,647 steps	0
0109h	265	10, 11	Direct data operation position (Upper)		

Register address		Byte	Name	Setting range	Initial value
Hex	Dec				
010Ah	266	12, 13	Direct data operation speed (Lower)	−4,000,000 to 4,000,000 Hz	1,000
010Bh	267	14, 15	Direct data operation speed (Upper)		
010Ch	268	16, 17	Direct data operation starting/changing rate (Lower)	1 to 1,000,000,000 (1=0.001)*	1,000,000
010Dh	269	18, 19	Direct data operation starting/changing rate (Upper)		
010Eh	270	20, 21	Direct data operation stopping rate (Lower)	1 to 1,000,000,000 (1=0.001)*	1,000,000
010Fh	271	22, 23	Direct data operation stopping rate (Upper)		
0110h	272	24, 25	Direct data operation operating current	0 to 1,000 (1=0.1 %)	1,000
0111h	273	26, 27	Direct data operation forwarding destination	0: Execution memory 1: Buffer memory	0

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

- **Related parameter**

MEXE02 code	Name	Description	Setting range	Initial value
p4	Direct data operation trigger setting	Sets the trigger to execute direct data operation. The trigger setting is enabled only when the TRIG-MODE is set to "1: Start at ON level."	−6: Operation type −5: Position −4: Speed −3: Starting/changing rate −2: Stopping rate −1: Operating current 0: Disable 1: Apply all data	1

■ Trigger setting

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

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

  Direct data operation is disabled.

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

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

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

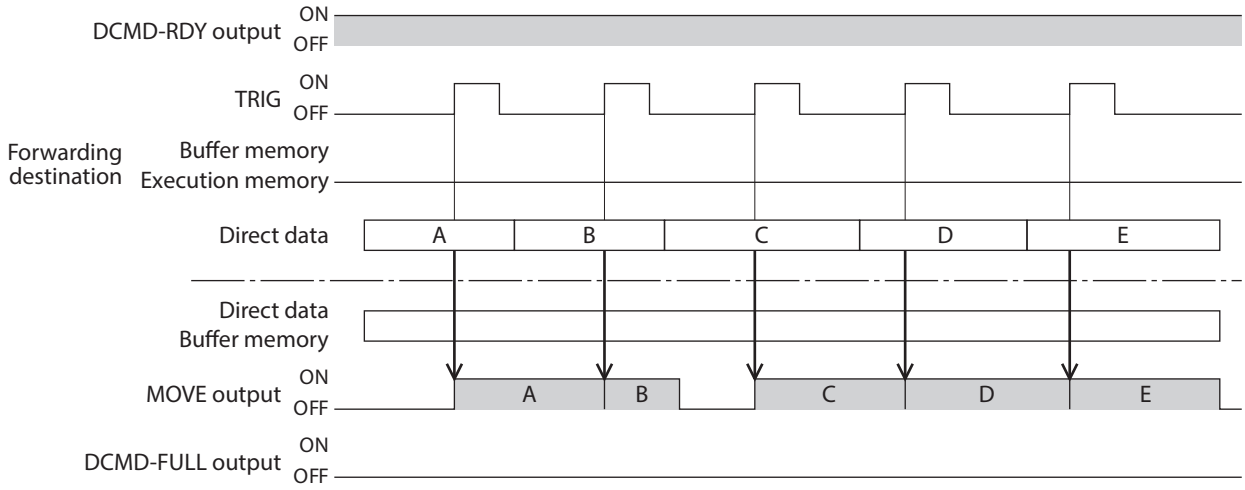
  When the TRIG is turned from OFF to ON, direct data operation is started. After that, only if the data corresponding to the trigger is changed, the motor will start rotating. Even if data other than the trigger is changed, the motor will not start rotating.

■ Forwarding destination

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

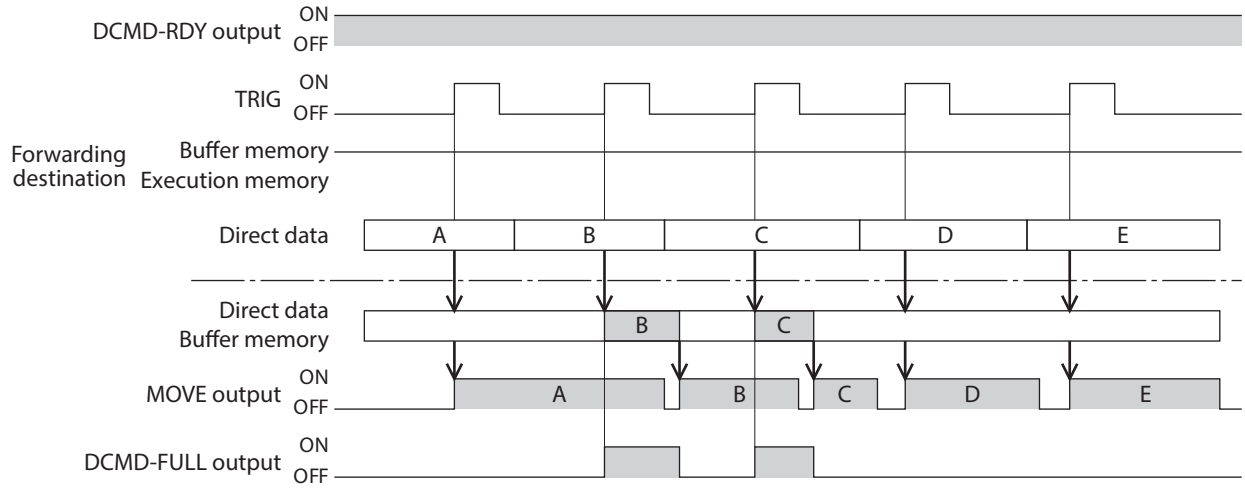
- **When the forwarding destination is set to "0: Execution memory"**

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



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

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



memo The direct data cannot be written to the buffer memory in a state where the DCMD-FULL output is ON.

9-3 Operation example

A condition to execute direct data operation can be selected from the ON edge or ON level of the TRIG of fixed I/O (IN). A condition can be selected with the TRIG-MODE of fixed I/O (IN).

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

■ When direct data operation is executed at ON edge of TRIG

As an example, this section explains how to execute the following direct data operation.

● Setting example

- Operation type: Incremental positioning (Based on command position)
- Position: 5,000 steps
- Speed: 1,000 Hz
- Starting/changing speed rate: 1,000 kHz/s
- Stopping rate: 1,000 kHz/s
- Operating current: 100 %
- Forwarding destination: Execution memory
- Other settings: Initial values

● Operation processing flow

Descriptions are given with the host controller as the subject.

1. Establish a connection.
2. Check the DCMD-RDY has been turned ON.

• Input (Driver → Host controller)

Register address		Byte	Description	Bit	Signal name	Response
Hex	Dec					
011Eh	286	4, 5	Fixed I/O (OUT)	6	DCMD-RDY	0060h

3. Set the following data.

• Output (Host controller → Driver)

Register address		Byte	Description	Setting value	Note
Hex	Dec				
0106h	262	4, 5	TRIG-MODE [bit 9 of fixed I/O (IN)]	0000h	Start at ON edge
0107h	263	6, 7	Direct data operation operation type	0002h	Incremental positioning (Based on command position)
0108h	264	8, 9	Direct data operation position (Lower)	1388h	5,000 steps
0109h	265	10, 11	Direct data operation position (Upper)	0000h	
010Ah	266	12, 13	Direct data operation speed (Lower)	03E8h	1,000 Hz
010Bh	267	14, 15	Direct data operation speed (Upper)	0000h	
010Ch	268	16, 17	Direct data operation starting/ changing rate (Lower)	4240h	1,000 kHz/s
010Dh	269	18, 19	Direct data operation starting/ changing rate (Upper)	000Fh	
010Eh	270	20, 21	Direct data operation stopping rate (Lower)	4240h	1,000 kHz/s
010Fh	271	22, 23	Direct data operation stopping rate (Upper)	000Fh	
0110h	272	24, 25	Direct data operation operating current	03E8h	100.0 %
0111h	273	26, 27	Direct data operation forwarding destination	0000h	Execution memory

4. Turn the TRIG ON.
   Direct data operation is started.

   • Output (Host controller → Driver)

Register address		Byte	Description	Bit	Signal name	Setting value
Hex	Dec					
0106h	262	4, 5	Fixed I/O (IN)	8	TRIG	0100h

5. Check that the TRIG_R has been turned ON.

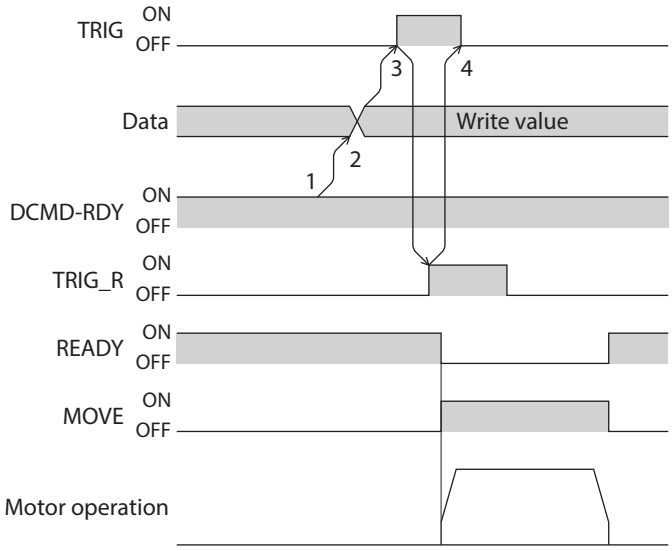
   • Input (Driver → Host controller)

Register address		Byte	Description	Bit	Signal name	Response
Hex	Dec					
011Eh	286	4, 5	Fixed I/O (OUT)	8	TRIG_R	0142h

6. Turn the TRIG OFF.

   • Output (Host controller → Driver)

Register address		Byte	Description	Bit	Signal name	Setting value
Hex	Dec					
0106h	262	4, 5	Fixed I/O (IN)	8	TRIG	0000h



■ When direct data operation is executed at ON level of TRIG

This section explains how to execute the following direct data operation with setting the trigger to "Position." Set the trigger with the "Direct data operation trigger setting" parameter.

● Setting example

- Position of operation 1: 7,000 steps
- Position of operation 2: 3,000 steps
- Operation type: Incremental positioning (Based on command position)
- Speed: 1,000 Hz
- Starting/changing speed rate: 1,000 kHz/s
- Stopping rate: 1,000 kHz/s
- Operating current: 100 %
- Forwarding destination: Execution memory
- Other settings: Initial values

● Operation processing flow

Descriptions are given with the host controller as the subject.

1. Establish a connection.
2. Sets the following parameters.

• Output (Host controller → Driver)

Register address		Byte	Description	Setting value	Note
Hex	Dec				
0115h	277	34, 35	Write parameter ID	6114h	Parameter ID of "Direct data operation trigger setting": 24852
0116h	278	36, 37	Write data (Lower)	FFFBh	Position: –5
0117h	279	38, 39	Write data (Upper)	FFFFh	

3. Turn the WR-REQ ON.
The parameter information is set in the driver. When the setting is completed, the WR-END is turned ON.

• Output (Host controller → Driver)

Register address		Byte	Description	Bit	Signal name	Setting value
Hex	Dec					
0114h	276	32, 33	Write request	0	WR-REQ	0001h

• Input (Driver → Host controller)

Register address		Byte	Description	Bit	Signal name	Response
Hex	Dec					
012Ch	300	32, 33	Read/Write status	8	WR-END	0100h
012Dh	301	34, 35	Write parameter ID_R	–	–	6114h

4. Turn the WR-REQ OFF.
The WR-END is returned to OFF.

• Output (Host controller → driver)

Register address		Byte	Description	Bit	Signal name	Setting value
Hex	Dec					
0114h	276	32, 33	Write request	0	WR-REQ	0000h

• Input (Driver → Host controller)

Register address		Byte	Description	Bit	Signal name	Response
Hex	Dec					
012Ch	300	32, 33	Read/Write status	8	WR-END	0000h

5. Check that the DCMD-RDY has been turned ON.

• Input (Driver → Host controller)

Register address		Byte	Description	Bit	Signal name	Response
Hex	Dec					
011Eh	286	4, 5	Fixed I/O (OUT)	6	DCMD-RDY	0060h

6. Set the following data.

• Output (Host controller → Driver)

Register address		Byte	Description	Setting value	Note
Hex	Dec				
0106h	262	4, 5	TRIG-MODE [bit 9 of fixed I/O (IN)]	0200h	Start at ON level
0107h	263	6, 7	Direct data operation operation type	0002h	Incremental positioning (Based on command position)
0108h	264	8, 9	Direct data operation position (Lower)	1B58h	7,000 steps
0109h	265	10, 11	Direct data operation position (Upper)	0000h	
010Ah	266	12, 13	Direct data operation speed (Lower)	03E8h	1,000 Hz
010Bh	267	14, 15	Direct data operation speed (Upper)	0000h	
010Ch	268	16, 17	Direct data operation starting/ changing rate (Lower)	4240h	1,000 kHz/s
010Dh	269	18, 19	Direct data operation starting/ changing rate (Upper)	000Fh	
010Eh	270	20, 21	Direct data operation stopping rate (Lower)	4240h	1,000 kHz/s
010Fh	271	22, 23	Direct data operation stopping rate (Upper)	000Fh	
0110h	272	24, 25	Direct data operation operating current	03E8h	100.0 %
0111h	273	26, 27	Direct data operation forwarding destination	0000h	Execution memory

7. Turn the TRIG ON while the TRIG-MODE is in an ON state.
Direct data operation of the operation 1 is started.

• Output (Host controller → Driver)

Register address		Byte	Description	Bit	Signal name	Setting value
Hex	Dec					
0106h	262	4, 5	Fixed I/O (IN)	8	TRIG	0300h

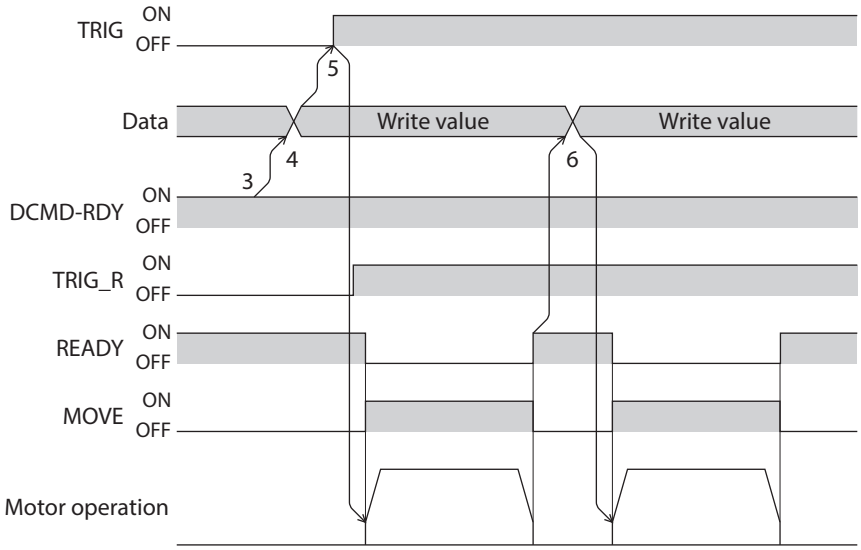
8. Check the operation 1 is completed, and set the following data.
Direct data operation of the operation 2 is started.

• Output (Host controller → Driver)

Register address		Byte	Description	Setting value	Note
Hex	Dec				
0108h	264	8, 9	Direct data operation position (Lower)	0BB8h	3,000 steps
0109h	265	10, 11	Direct data operation position (Upper)	0000h	

memo

- To execute direct data operation of the operation 2, set a different value from the operation 1 in the "Position" of the operation 2.
- If a value other than the "Position" is changed, direct data operation of the operation 2 will not be executed.


TRIG
ON
OFF
5
Data
Write value
Write value
3
4
6
DCMD-RDY
ON
OFF
TRIG_R
ON
OFF
READY
ON
OFF
MOVE
ON
OFF
Motor operation

4 CC-Link IE Field Network Basic communication

This part explains how to control via CC-Link IE Field Network Basic.

◆**Table of contents**

1 Specifications of CC-Link IE Field Network Basic

1-1 Communication specifications

Communication standards	UDP/IP
Station type	Remote station
Number of occupied stations	1 station
IP address	The same network address is used for both the master station and the remote station. (Recommended value of subnet mask: 255.255.255.0)
Transmission method	• Command request: Directed broadcast (Master station → Remote station) • Command response: Unicast (Remote station → Master station)
Port number	• 61450: Cyclic data • 61451: NodeSearch dedicated to CC-Link IE Field Network Basic*

* IPAddressSet is not supported.

Note

The port numbers used in the driver are shown in the table. Make sure that each port number is not duplicated. Proper communication cannot be established if the port number is duplicated. Do not use port numbers 60930, 61450, and 61451 on the customer side, as these are fixed in the driver.

Port number	Description
502 (Initial value)	This is used with Modbus TCP and Modbus UDP (it can be changed).
60930	This is used when the **MEXE02** software is connected via Ethernet (fixed).
61450	This is used with CC-Link IE Field Network Basic (fixed).
61451	This is used with CC-Link IE Field Network Basic (fixed).

memo

- When controlling the product via CC-Link IE Field Network Basic, set the "Protocol (Network I/O)" parameter to "3: CC-Link IE Field Network Basic."
- In Ethernet, the IP address and port number are used to select the device to communicate with and the service to use.
- When the master station is connected to the remote station via CC-Link IE Field Network Basic, it communicates with the IP address and port numbers (61450, 61451) of the remote station.
- When the **MEXE02** software is connected to the remote station via Ethernet, it communicates with the IP address and port number (60930) of the remote station.

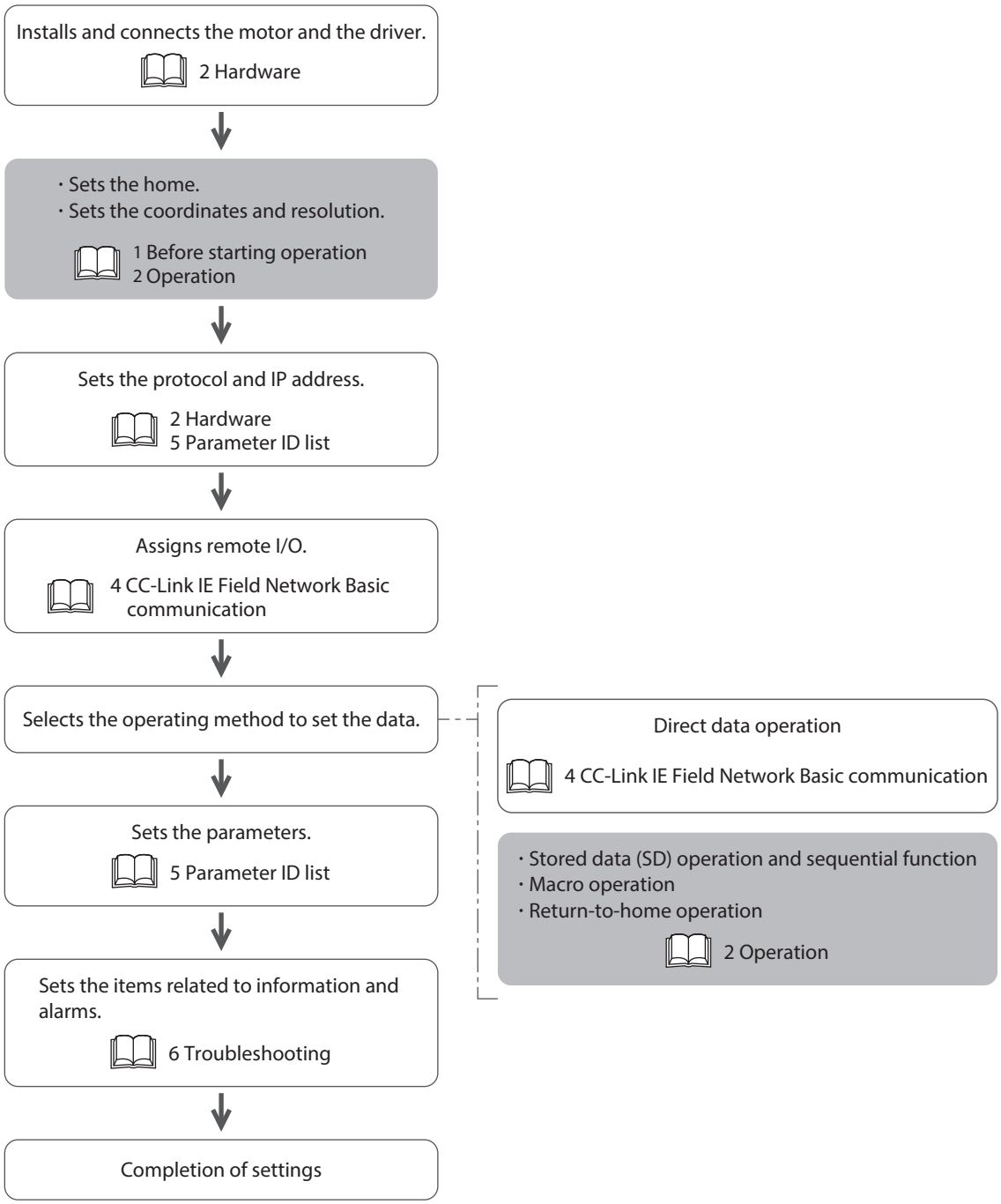
2 Flow of CC-Link IE Field Network Basic communication

[ ] : Describes in this manual.

For details of [ ], refer to the **AZ** Series OPERATING MANUAL Function Edition.

: The title of the reference description.

memo Be sure to turn off both the main power supply and the control power supply of the driver before setting the switch. Setting the switch while the main power supply and the control power supply are in an on-state will not enable the new setting.



3 Guidance

If you are new to this product, read this chapter to understand the operating methods and procedures.
This is an example of how to set operation data and start the motor using the master station.

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

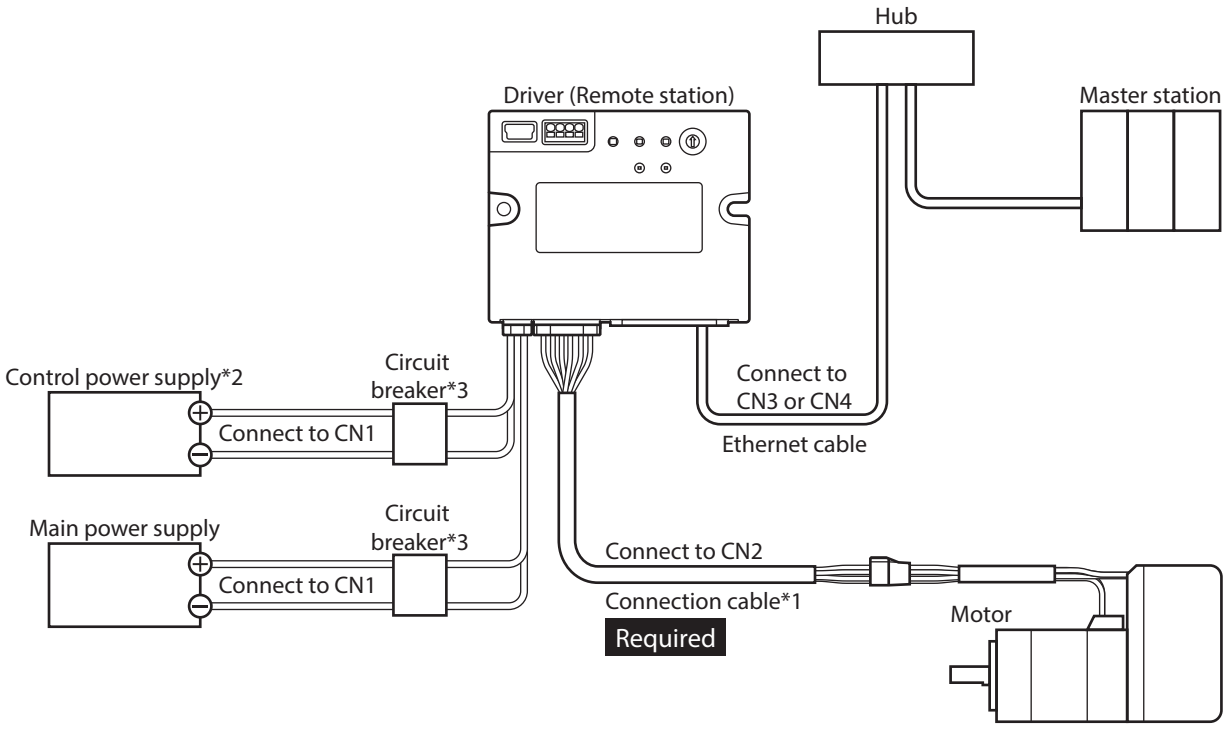
- **Operating conditions**

This operation is performed under the following conditions.

- Number of drivers connected: 1 unit
- IP address: 192.168.1.2
- Protocol: CC-Link IE Field Network Basic

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

STEP 1 Check the installation and the connection.



*1 It is an Oriental Motor cable. Purchase is required separately.
*2 Connecting a control power supply allows you to continue monitoring even if the main power supply is shut off. Connect it as necessary.
*3 It is recommended that a circuit breaker or a circuit protector is connected because incorrect wiring may cause the internal input circuit to short-circuit.

STEP 2 Make preparations for operation.

Refer to "Before starting operation" in the **AZ** Series OPERATING MANUAL Function Edition.

STEP 3 Set the protocol and IP address.

■ Setting of protocol

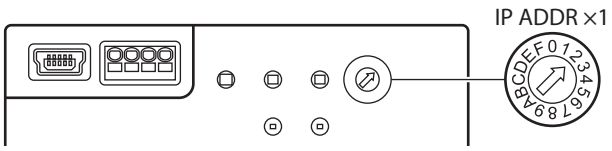
Set the "Protocol (Network I/O)" parameter to "3: CC-Link IE Field Network Basic" with the **MEXE02** software.

■ Setting of IP address

In this example, use the IP address setting switch (IP ADDR ×1) on the driver to set the fourth octet of the IP address. The first through third octets remain at their initial values.

1. Turn off the main power supply and the control power supply.
2. Set the IP address setting switch as follows.

   Setting: 2 (192.168.1.2)



3. Turn on the main power supply and the control power supply again.

Note Be sure to turn off both the main power supply and the control power supply of the driver before setting the switch. Setting the switch while the main power supply and the control power supply are in an on-state will not enable the new setting.

STEP 4 The master station starts the motor.

As an example, this section explains how to execute the following positioning operation.
In the operation processing flow, the start address is described as RWw00 and RWr00. The actual start address varies depending on the station number setting of CC-Link IE Field Network Basic.

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

Descriptions are given with the master station as the subject.

1. Establish communication.
2. Set the following operation data.

   • Remote register (Master station → Remote station)

Address	Item	Setting value	Note
RWw11	Write parameter ID	0C21h	Parameter ID of "Position" of operation data No.1: 3105
RWw12	Write data (Lower)	1388h	Position: 5,000 steps
RWw13	Write data (Upper)	0000h	

3. Turn the WR-REQ ON.
   The operation data is set in the remote station. When the setting is completed, the WR-END is turned ON.

   • Remote register (Master station → Remote station)

Address	Item	Bit	Signal name	Setting value
RWw10	Write request	0	WR-REQ	0001h

   • Remote register (Remote station → Master station)

Address	Item	Bit	Signal name	Response
RWr10	Read/Write status	8	WR-END	0100h
RWr11	Write parameter ID_R	–	–	0C21h

4. Turn the WR-REQ OFF.
   The WR-END is returned to OFF.

   • Remote register (Master station → Remote station)

Address	Item	Bit	Signal name	Setting value
RWw10	Write request	0	WR-REQ	0000h

   • Remote register (Remote station → Master station)

Address	Item	Bit	Signal name	Response
RWr10	Read/Write status	8	WR-END	0000h

5. Check that the READY has been turned ON.

   • Remote register (Remote station → Master station)

Address	Item	Bit	Signal name	Response
RWr02	Fixed I/O (OUT)	5	READY	0460h*

* The SET-ERR of Bit 10 is in an ON state because the starting/changing rate and stopping rate of direct data operation are set to "0." Direct data operation is not executed here, so operation is not affected.

6. Select the operation data No. 1.

   • Remote register (Master station → Remote station)

Address	Item	Bit	Signal name	Setting value
RWw01	Operation data number selection	0	M0	0001h

7. Turn the START ON.
   Positioning operation is started.

   • Remote register (Master station → Remote station)

Address	Item	Bit	Signal name	Setting value
RWw02	Fixed I/O (IN)	3	START	0008h

8. Check that the READY has been turned OFF.

   • Remote register (Remote station → Master station)

Address	Item	Bit	Signal name	Response
RWr02	Fixed I/O (OUT)	5	READY	044Bh*

* The SET-ERR of Bit 10 is in an ON state because the starting/changing rate and stopping rate of direct data operation are set to "0." Direct data operation is not executed here, so operation is not affected.

9. Turn the START OFF.

   • Remote register (Master station → Remote station)

Address	Item	Bit	Signal name	Setting value
RWw02	Fixed I/O (IN)	3	START	0000h

STEP 5 Were you able to operate?

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

- Is the PWR/ALM LED blinking in red?
  An alarm is being generated. Refer to p.168 for details.
- Are the main power supply, the control power supply, the motor, and the Ethernet cable connected securely?
- Is the MS LED lit in red?
  An error inside the driver is being detected. Turn off the main power supply and the control power supply, then turn them on again.
- Is the MS LED blinking red?
  The internal setting data is damaged. Refer to p.21 for details.
- Is the NS LED unlit?
  Communication is not being performed via CC-Link IE Field Network Basic. Check the following settings.
  • Setting of the protocol and IP address of the remote station
  • Setting of the master station

4 Registers

4-1 Remote I/O

The start address is described as RY00 and RX00 in the tables.

Address	Direction	Name
RY00 to RY0F	Master station → Remote station	Loopback input
RY10 to RY1F		Reserved*
RY20 to RY2F		
RY30 to RY3F		

* Fixed at 0 when writing

Address	Direction	Name
RX00 to RX0F	Remote station → Master station	Loopback output
RX10 to RX1F		Reserved*
RX20 to RX2F		
RX30 to RX3F		

* Value when read is undefined

- **Loopback input, loopback output**

The "loopback input" and "loopback output" are areas that can be set by the customer as desired.
Use for a communication test (parroting), etc.

Direction	Bit	Name	Description	Setting range	Initial value
Master station → Remote station	0 to 15	Loopback input	This is an area that can be set by the customer as desired. Use for a communication test (parroting), etc.	0 to 65,535	0
Remote station → Master station	0 to 15	Loopback output	The present value of the "loopback input" is displayed.	0 to 65,535	0

4-2 Remote register (Master station → Remote station)

■ Data format

The start address is described as RWw00 in the table. The actual start address varies depending on the station number setting of CC-Link IE Field Network Basic.

Address	Direction	Name
RWw00	Master station → Remote station	Remote I/O (R-IN)
RWw01		Operation data number selection
RWw02		Fixed I/O (IN)
RWw03		Direct data operation operation type
RWw04		Direct data operation position (Lower)
RWw05		Direct data operation position (Upper)
RWw06		Direct data operation speed (Lower)
RWw07		Direct data operation speed (Upper)
RWw08		Direct data operation starting/changing rate (Lower)
RWw09		Direct data operation starting/changing rate (Upper)
RWw0A		Direct data operation stopping rate (Lower)
RWw0B		Direct data operation stopping rate (Upper)
RWw0C		Direct data operation operating current
RWw0D		Direct data operation forwarding destination
RWw0E		Reserved*
RWw0F		Read parameter ID
RWw10		Write request
RWw11		Write parameter ID
RWw12		Write data (Lower)
RWw13		Write data (Upper)
RWw14		Reserved*
RWw15		
RWw16		
RWw17		
RWw18		
RWw19		
RWw1A		
RWw1B		
RWw1C		
RWw1D		
RWw1E		
RWw1F		

* Fixed at 0 when writing

■ Details of data

● Remote I/O (R-IN)

This is the I/O that is accessed via Ethernet.
The assignments of signals can be changed using the "R-IN input function" parameters.

Bit	Name	Description	Initial value
0	R-IN0	These are used to execute the signal assigned with the "R-IN input function" parameter.	0: No function
1	R-IN1		
2	R-IN2		
3	R-IN3		
4	R-IN4		
5	R-IN5		
6	R-IN6		
7	R-IN7		
8	R-IN8		
9	R-IN9		
10	R-IN10		
11	R-IN11		
12	R-IN12		
13	R-IN13		
14	R-IN14		
15	R-IN15		

● Operation data number selection

Bit	Name	Description	Initial value
0	M0	These eight bits are used to select an operation data number.	0
1	M1		
2	M2		
3	M3		
4	M4		
5	M5		
6	M6		
7	M7		
8 to 15	Reserved	A value is disregarded.	0

- **Fixed I/O (IN)**

This is the I/O that is accessed via Ethernet.
Assignments of signals cannot be changed.
The status of each signal indicates "0: OFF" and "1: ON" (except for Bit 9).
Refer to the **AZ** Series OPERATING MANUAL Function Edition, for details on signals.

Bit	Name	Description	Initial value
0	FW-JOG	This is used to execute JOG operation in the forward direction.	0
1	RV-JOG	This is used to execute JOG operation in the reverse direction.	
2	Reserved	A value is disregarded.	
3	START	This is used to execute stored data (SD) operation.	
4	ZHOME	This is used to execute high-speed return-to-home operation.	
5	STOP	This is used to stop the motor.	
6	FREE	This is used to shut off the motor current to put the motor in a non-excitation state. When an electromagnetic brake motor is used, the electromagnetic brake is in a state of releasing the motor shaft.	
7	ALM-RST	This is used to reset the alarm presently being generated.	
8	TRIG	This is used to execute direct data operation.	
9	TRIG-MODE	This is used to set the judgment criterion for TRIG. 0: Start at ON edge 1: Start at ON level	
10	Reserved	A value is disregarded.	
11	Reserved	A value is disregarded.	
12	FW-JOG-P	This is used to execute inching operation in the forward direction.	
13	RV-JOG-P	This is used to execute inching operation in the reverse direction.	
14	FW-POS	This is used to execute continuous operation in the forward direction.	
15	RV-POS	This is used to execute continuous operation in the reverse direction.	

- **Direct data operation operation type**

Bit	Name	Description	Setting range	Initial value
0 to 15	Direct data operation operation type	This is used to set the operation type.	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 positioning push-motion 21: Incremental positioning push-motion (based on command position) 22: Incremental positioning push-motion (based on feedback position)	2

- **Direct data operation position**

Bit	Name	Description	Setting range	Initial value
0 to 31	Direct data operation position	This is used to set the target position.	−2,147,483,648 to 2,147,483,647 steps	0

- **Direct data operation speed**

Bit	Name	Description	Setting range	Initial value
0 to 31	Direct data operation speed	This is used to set the operating speed.	−4,000,000 to 4,000,000 Hz	1,000

- **Direct data operation starting/changing rate**

Bit	Name	Description	Setting range	Initial value
0 to 31	Direct data operation starting/changing rate	This is used to set the acceleration/deceleration rate or the acceleration/deceleration time when starting or changing the speed.	1 to 1,000,000,000 (1=0.001)*	1,000,000

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

- **Direct data operation stopping rate**

Bit	Name	Description	Setting range	Initial value
0 to 31	Direct data operation stopping rate	This is used to set the deceleration rate or the deceleration time when stopping.	1 to 1,000,000,000 (1=0.001)*	1,000,000

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

- **Direct data operation operating current**

Bit	Name	Description	Setting range	Initial value
0 to 15	Direct data operation operating current	This is used to set the operating current.	0 to 1,000 (1=0.1 %)	1,000

- **Direct data operation forwarding destination**

Bit	Name	Description	Setting range	Initial value
0 to 15	Direct data operation forwarding destination	This is used to select the stored area when the next direct data is transferred during direct data operation.	0: Execution memory 1: Buffer memory	0

- **Read parameter ID**

Bit	Name	Description	Initial value
0 to 15	Read parameter ID	This is used to set the parameter ID to be read from.	0

- **Write request**

Bit	Name	Description	Setting range	Initial value
0	WR-REQ	This is used to set the write request.	0: Disable 1: Write request (ON edge)	0
1 to 15	Reserved	A value is disregarded.	–	0

- **Write parameter ID**

Bit	Name	Description	Initial value
0 to 15	Write parameter ID	This is used to set the parameter ID to be written to.	0

- **Write data**

Bit	Name	Description	Initial value
0 to 31	Write data	This is used to set a value to be written to the parameter specified by the write parameter ID.	0

4-3 Remote register (Remote station → Master station)

■ Data format

The start address is described as RWr00 in the table. The actual start address varies depending on the station number setting of CC-Link IE Field Network Basic.

Address	Direction	Name
RWr00	Remote station → Master station	Remote I/O (R-OUT)
RWr01		Operation data number selection_R
RWr02		Fixed I/O (OUT)
RWr03		Present alarm
RWr04		Feedback position (Lower)
RWr05		Feedback position (Upper)
RWr06		Feedback speed (Hz) (Lower)
RWr07		Feedback speed (Hz) (Upper)
RWr08		Command position (Lower)
RWr09		Command position (Upper)
RWr0A		Torque monitor
RWr0B		CST operating current
RWr0C		Information (Lower)
RWr0D		Information (Upper)
RWr0E		Reserved*
RWr0F		Read parameter ID_R
RWr10		Read/Write status
RWr11		Write parameter ID_R
RWr12		Read data (Lower)
RWr13		Read data (Upper)
RWr14		Assignable monitor 0 (Lower)
RWr15		Assignable monitor 0 (Upper)
RWr16		Assignable monitor 1 (Lower)
RWr17		Assignable monitor 1 (Upper)
RWr18		Assignable monitor 2 (Lower)
RWr19		Assignable monitor 2 (Upper)
RWr1A		Assignable monitor 3 (Lower)
RWr1B		Assignable monitor 3 (Upper)
RWr1C		Reserved*
RWr1D		
RWr1E		
RWr1F		

* Value when read is undefined

■ Details of data

● Remote I/O (R-OUT)

This is the I/O that is accessed via Ethernet.
The assignments of signals can be changed using the "R-OUT output function" parameters.

Bit	Name	Description	Initial Value
0	R-OUT0	A response to a signal assigned with the "R-OUT output function" parameter is output.	64: M0_R
1	R-OUT1		65: M1_R
2	R-OUT2		66: M2_R
3	R-OUT3		32: START_R
4	R-OUT4		144: HOME-END
5	R-OUT5		132: READY
6	R-OUT6		135: INFO
7	R-OUT7		129: ALM-A
8	R-OUT8		136: SYS-BSY
9	R-OUT9		160: AREA0
10	R-OUT10		161: AREA1
11	R-OUT11		162: AREA2
12	R-OUT12		157: TIM
13	R-OUT13		134: MOVE
14	R-OUT14		138: IN-POS
15	R-OUT15		140: TLC

● Operation data number selection_R

Bit	Name	Description
0	M0_R	A response to an input signal is output.
1	M1_R	
2	M2_R	
3	M3_R	
4	M4_R	
5	M5_R	
6	M6_R	
7	M7_R	
8 to 15	Reserved	0 is returned.

- **Fixed I/O (OUT)**

This is the I/O that is accessed via Ethernet. Assignments of signals cannot be changed.

Bit	Name	Description
0	SEQ-BSY	This is output when stored data (SD) operation is being performed.
1	MOVE	This is output while the motor operates.
2	IN-POS	This is output when positioning operation is completed.
3	START_R	A response to an input signal is output.
4	HOME-END	This is output when high-speed return-to-home operation or return-to-home operation is completed, or position preset is executed.
5	READY	This is output when the remote station is ready to operate.
6	DCMD-RDY	This is output when direct data operation is ready to execute.
7	ALM-A	The alarm status of the remote station is output. (Normally open)
8	TRIG_R	A response to an input signal is output.
9	TRIG-MODE_R	A response to an input signal is output.
10	SET-ERR	This is output when an error occurs in any of the settings of the operation type, position, speed, starting/changing speed rate, stopping rate, operating current, or forwarding destination for direct data operation.
11	EXE-ERR	This is output when direct data operation has failed to be executed.
12	DCMD-FULL	This is output when data is being written to the buffer area of direct data operation.
13	STOP_R	A response to an input signal is output.
14	Reserved	0 is returned.
15	TLC	This is output when the output torque reaches the upper limit value.

- **Present alarm**

Bit	Name	Description
0 to 15	Present alarm	This indicates the alarm code presently being generated.

- **Feedback position**

Bit	Name	Description
0 to 31	Feedback position	This indicates the present feedback position. (step) When the wrap function is enabled, the value on the wrap coordinates is indicated.

- **Feedback speed**

Bit	Name	Description
0 to 31	Feedback speed	This indicates the present feedback speed. (Hz)

- **Command position**

Bit	Name	Description
0 to 31	Command position	This indicates the present command position. (step) When the wrap function is enabled, the value on the wrap coordinates is indicated.

- **Torque monitor**

Bit	Name	Description
0 to 15	Torque monitor	This indicates the torque presently generated as a percentage of the maximum holding torque. (1=0.1 %)

- **CST operating current**

Bit	Name	Description
0 to 15	CST operating current	This indicates the operating current of the α control (CST) mode. (1=0.1 %)

- **Information**

Bit	Name	Description
0 to 31	Information	This indicates the information code presently being generated.

- **Read parameter ID_R**

Bit	Name	Description
0 to 15	Read parameter ID_R	This indicates a response of the read parameter ID.

- **Read/Write status**

Bit	Name	Description
0 to 6	Reserved	0 is returned.
7	RD-ERR	This is output when an error occurred in reading. If reading is performed properly, the RD-ERR is also turned OFF.
8	WR-END	A response to the WR-REQ is output. The WR-END is also turned ON while the WR-REQ is ON. OFF: Write request waiting ON: Write completed
9	SYS-BSY	This is output when the remote station is in an internal processing state.
10	Reserved	0 is returned.
11	WR-SET-ERR	This is output when the write parameter ID or the write data is out of the setting range.
12	WR-IF-ERR	This is output when writing cannot be executed because user I/F communication is in progress.
13	WR-NV-ERR	This is output when writing cannot be performed because non-volatile memory processing is in progress.
14	WR-EXE-ERR	This is output when a command cannot be executed.
15	WR-ERR	This is output when an error occurred in writing. When the WR-REQ is turned OFF or writing is performed properly, the WR-ERR is also turned OFF.

- **Write parameter ID_R**

Bit	Name	Description
0 to 15	Write parameter ID_R	This indicates a response of the write parameter ID.

- **Read data**

Bit	Name	Description
0 to 31	Read data	This indicates the value of the parameter shown in the parameter ID_R.

- **Assignable monitor**

Bit	Name	Description
0 to 31	Assignable monitor n*	This indicates the value of the parameter set in the "Assignable monitor address n" parameter.

* n: 0 to 3

4-4 Data writing

■ Area of the remote register to be used

Transfer from the remote station to the master station

Address	Description
RWr10	Read/Write status
RWr11	Write parameter ID_R

Transfer from the master station to the remote station

Address	Description
RWw10	Write request
RWw11	Write parameter ID
RWw12	Write data (Lower)
RWw13	Write data (Upper)

■ Flow that data is written to

Refer to p.74 for the flow that data is written to. When reading, replace "host controller" with "master station" and "driver" with "remote station."

4-5 Data reading

There are the following two methods to read data.
- Use an area of "Read data"
- Use an area of "Assignable monitor"

■ When an area of read data is used

● Area of the remote register to be used

Transfer from the remote station to the master station

Address	Description
RWr0F	Read parameter ID_R
RWr10	Read/Write status
RWr12	Read data (Lower)
RWr13	Read data (Upper)

Transfer from the master station to the remote station

Address	Description
RWw0F	Read parameter ID

● Flow that data is read from

Refer to p.75 for the flow that data is read from. When reading, replace "host controller" with "master station" and "driver" with "remote station."

■ When an area of assignable monitor is used

- **Area of the remote register to be used**

  Transfer from the remote station to the master station

Address	Description
RWr14	Assignable monitor 0 (Lower)
RWr15	Assignable monitor 0 (Upper)
RWr16	Assignable monitor 1 (Lower)
RWr17	Assignable monitor 1 (Upper)
RWr18	Assignable monitor 2 (Lower)
RWr19	Assignable monitor 2 (Upper)
RWr1A	Assignable monitor 3 (Lower)
RWr1B	Assignable monitor 3 (Upper)

- **Flow that data is read from**

  Refer to p.76 for the flow that data is read from. When reading, replace "host controller" with "master station" and "driver" with "remote station."

- **Related parameters**

MEXE02 code	Name	Description	Setting range	Initial value
p11	Assignable monitor address 0	These are used to set the parameter ID to be displayed on the assignable monitor.	To set, select from items in "3 Monitor commands" on p.123.	124: Driver temperature
	Assignable monitor address 1			125: Motor temperature
	Assignable monitor address 2			109: Cumulative load monitor
	Assignable monitor address 3			127: Tripmeter

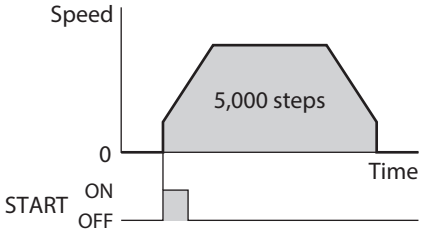
5 Examples of executing operation

This chapter describes operations that use the write data area to set operation data.
The method to execute operation is common to fixed I/O and remote I/O.

5-1 Positioning operation

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

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



- **Operation processing flow**

Descriptions are given with the master station as the subject.

1. Establish communication.
2. Set the following operation data.

• Remote register (Master station → Remote station)

Address	Description	Setting value	Note
RWw11	Write parameter ID	0C21h	Parameter ID of "Position" of operation data No.1: 3105
RWw12	Write data (Lower)	1388h	Position: 5,000 steps
RWw13	Write data (Upper)	0000h	

3. Turn the WR-REQ ON.
   The operation data is set in the remote station. When the setting is completed, the WR-END is turned ON.

• Remote register (Master station → Remote station)

Address	Description	Bit	Signal name	Setting value
RWw10	Write request	0	WR-REQ	0001h

• Remote register (Remote station → Master station)

Address	Description	Bit	Signal name	Response
RWr10	Read/Write status	8	WR-END	0100h
RWr11	Write parameter ID_R	–	–	0C21h

4. Turn the WR-REQ OFF.
   The WR-END is returned to OFF.

• Remote register (Master station → Remote station)

Address	Description	Bit	Signal name	Setting value
RWw10	Write request	0	WR-REQ	0000h

• Remote register (Remote station → Master station)

Address	Description	Bit	Signal name	Response
RWr10	Read/Write status	8	WR-END	0000h

5. Check that the READY has been turned ON.

• Remote register (Remote station → Master station)

Address	Description	Bit	Signal name	Response
RWr02	Fixed I/O (OUT)	5	READY	0460h*

* The SET-ERR of Bit 10 is in an ON state because the starting/changing rate and stopping rate of direct data operation are set to "0." Direct data operation is not executed here, so operation is not affected.

6. Select the operation data No. 1.

• Remote register (Master station → Remote station)

Address	Description	Bit	Signal name	Setting value
RWw01	Operation data number selection	0	M0	0001h

7. Turn the START ON.
Positioning operation is started.

• Remote register (Master station → Remote station)

Address	Description	Bit	Signal name	Setting value
RWw02	Fixed I/O (IN)	3	START	0008h

8. Check that the READY has been turned OFF.

• Remote register (Remote station → Master station)

Address	Description	Bit	Signal name	Response
RWr02	Fixed I/O (OUT)	5	READY	044Bh*

* The SET-ERR of Bit 10 is in an ON state because the starting/changing rate and stopping rate of direct data operation are set to "0." Direct data operation is not executed here, so operation is not affected.

9. Turn the START OFF.

• Remote register (Master station → Remote station)

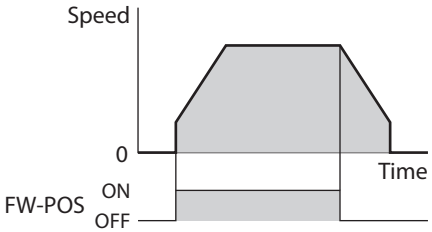
Address	Description	Bit	Signal name	Setting value
RWw02	Fixed I/O (IN)	3	START	0000h

5-2 Continuous operation

As an example, this section explains how to execute the following continuous operation.

● Setting example

- Operation data number: 0
- Rotation direction: Forward direction
- Other settings: Initial values



● Operation processing flow

Descriptions are given with the master station as the subject.

1. Establish communication.
2. Check that the READY has been turned ON.

   • Remote register (Remote station → Master station)

Address	Description	Bit	Signal name	Response
RWr02	Fixed I/O (OUT)	5	READY	0460h*

* The SET-ERR of Bit 10 is in an ON state because the starting/changing rate and stopping rate of direct data operation are set to "0." Direct data operation is not executed here, so operation is not affected.

3. Set the operation data No. 0.

   • Remote register (Master station → Remote station)

Address	Description	Setting value
RWw01	Operation data number selection	0000h

4. Turn the FW-POS ON.
   Continuous operation is started.

   • Remote register (Master station → Remote station)

Address	Description	Bit	Signal name	Setting value
RWw02	Fixed I/O (IN)	14	FW-POS	4000h

5. Turn the FW-POS OFF.
   The motor decelerates to a stop.

   • Remote register (Master station → Remote station)

Address	Description	Bit	Signal name	Setting value
RWw02	Fixed I/O (IN)	14	FW-POS	0000h

6 Direct data operation

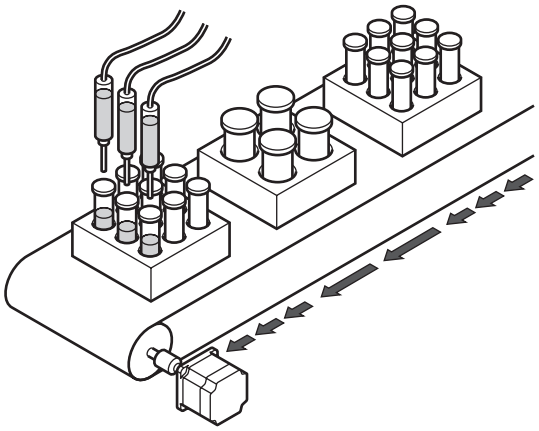
6-1 Overview of direct data operation

Direct data operation is a function that enables operation to start at the same time as the rewriting of the data. It is suitable for applications where the setting of the operation data is frequently changed, such as changing the speed or travel amount according to a load.
Direct data operation is executed with the TRIG of fixed I/O (IN).
A condition to execute direct data operation can be selected from the following two types using the TRIG-MODE of fixed I/O (IN).

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

■ Application example 1 of direct data operation

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



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

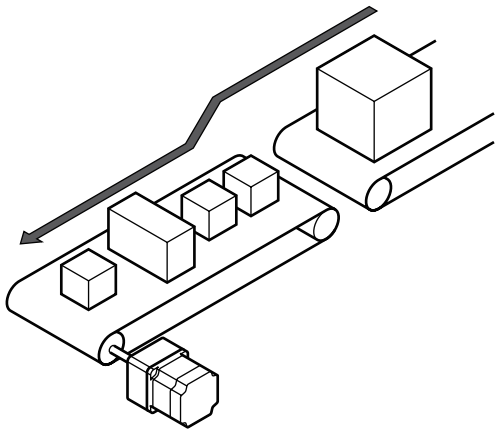
  Descriptions are given with the master station as the subject.

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

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

■ Application example 2 of direct data operation

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



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

  Descriptions are given with the master station as the subject.

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

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

6-2 Remote registers and parameters required for direct data operation

- **Related remote registers (Master station → Remote station)**

  Refer to p.97 for details on the remote register (master station → remote station).

Address	Name	Setting range	Initial value
RWw03	Direct data operation operation type	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 positioning push-motion 21: Incremental positioning push-motion (based on command position) 22: Incremental positioning push-motion (based on feedback position)	2
RWw04	Direct data operation position (Lower)	–2,147,483,648 to 2,147,483,647 steps	0
RWw05	Direct data operation position (Upper)		
RWw06	Direct data operation speed (Lower)	–4,000,000 to 4,000,000 Hz	1,000
RWw07	Direct data operation speed (Upper)		

Address	Name	Setting range	Initial value
RWw08	Direct data operation starting/changing rate (Lower)	1 to 1,000,000,000 (1=0.001)*	1,000,000
RWw09	Direct data operation starting/changing rate (Upper)		
RWw0A	Direct data operation stopping rate (Lower)	1 to 1,000,000,000 (1=0.001)*	1,000,000
RWw0B	Direct data operation stopping rate (Upper)		
RWw0C	Direct data operation operating current	0 to 1,000 (1=0.1 %)	1,000
RWw0D	Direct data operation forwarding destination	0: Execution memory 1: Buffer memory	0

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

- **Related parameter**

MEXE02 code	Name	Description	Setting range	Initial value
p4	Direct data operation trigger setting	Sets the trigger to execute direct data operation. The trigger setting is enabled only when the TRIG-MODE is set to "1: Start at ON level."	−6: Operation type −5: Position −4: Speed −3: Starting/changing rate −2: Stopping rate −1: Operating current 0: Disable 1: Apply all data	1

■ Trigger setting

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

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

  Direct data operation is disabled.

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

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

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

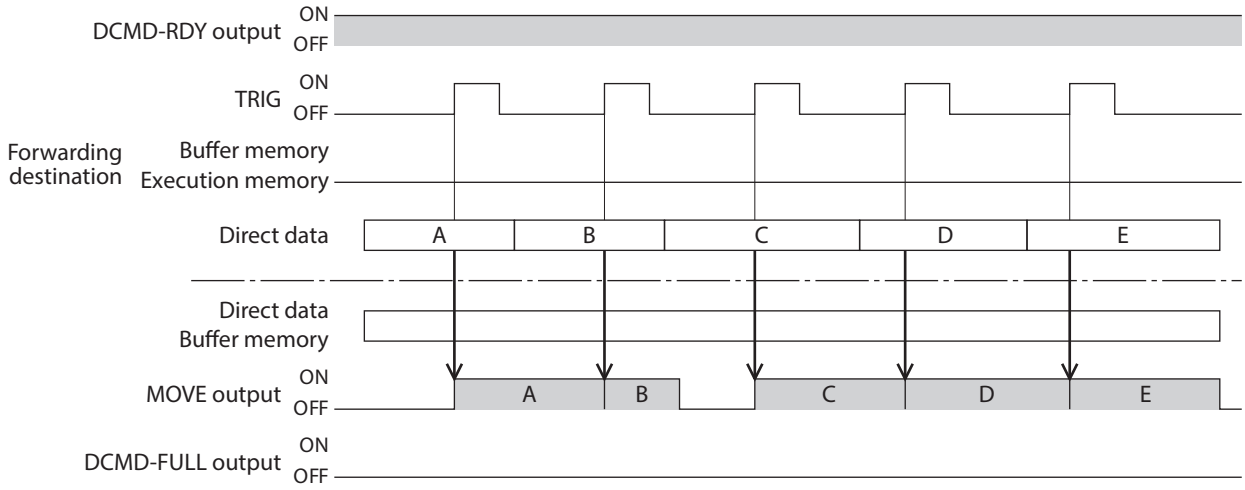
  When the TRIG is turned from OFF to ON, direct data operation is started. After that, only if the data corresponding to the trigger is changed, the motor will start rotating. Even if data other than the trigger is changed, the motor will not start rotating.

■ Forwarding destination

This is used to select the stored area when the next direct data is transferred during direct data operation.

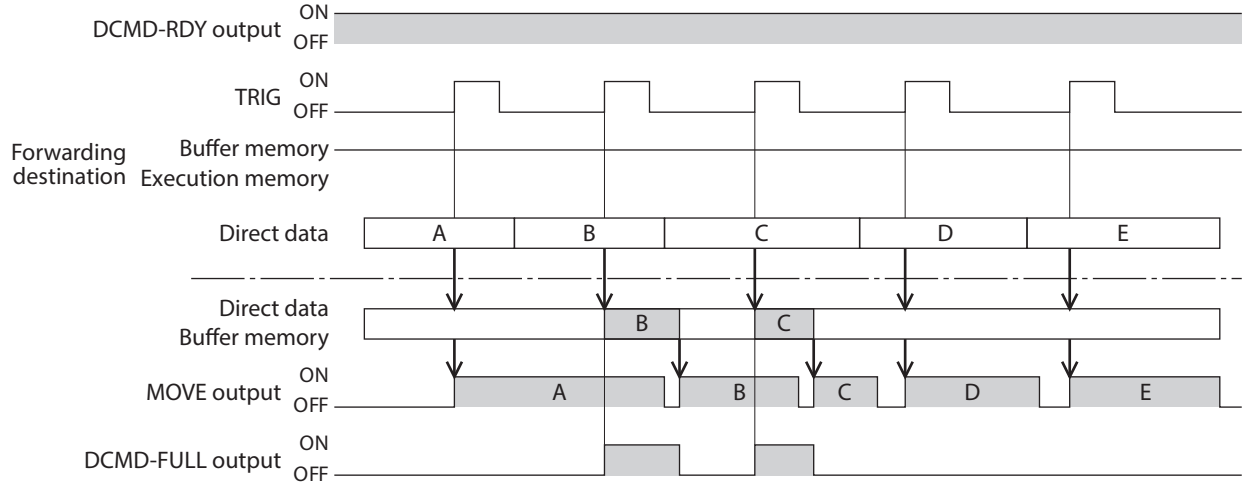
- **When the forwarding destination is set to "0: Execution memory"**

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



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

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



memo The direct data cannot be written to the buffer memory in a state where the DCMD-FULL output is ON.

6-3 Operation example

A condition to execute direct data operation can be selected from the ON edge or ON level of the TRIG of fixed I/O (IN). A condition can be selected with the TRIG-MODE of fixed I/O (IN).

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

■ When direct data operation is executed at ON edge of TRIG

As an example, this section explains how to execute the following direct data operation.

● Setting example

- Operation type: Incremental positioning (Based on command position)
- Position: 5,000 steps
- Speed: 1,000 Hz
- Starting/changing speed rate: 1,000 kHz/s
- Stopping rate: 1,000 kHz/s
- Operating current: 100 %
- Forwarding destination: Execution memory
- Other settings: Initial values

● Operation processing flow

Descriptions are given with the master station as the subject.

1. Establish communication.
2. Check that the DCMD-RDY has been turned ON.

• Remote register (Remote station → Master station)

Address	Description	Bit	Signal name	Response
RWr02	Fixed I/O (OUT)	6	DCMD-RDY	0460h*

* The SET-ERR of Bit 10 is in an ON state because the starting/changing rate and stopping rate of direct data operation are set to "0."

3. Set the following data.

• Remote register (Master station → Remote station)

Address	Description	Setting value	Note
RWw02	TRIG-MODE [bit 9 of fixed I/O (IN)]	0000h	Start at ON edge
RWw03	Direct data operation operation type	0002h	Incremental positioning (Based on command position)
RWw04	Direct data operation position (Lower)	1388h	5,000 steps
RWw05	Direct data operation position (Upper)	0000h	
RWw06	Direct data operation speed (Lower)	03E8h	1,000 Hz
RWw07	Direct data operation speed (Upper)	0000h	
RWw08	Direct data operation starting/changing rate (Lower)	4240h	1,000 kHz/s
RWw09	Direct data operation starting/changing rate (Upper)	000Fh	
RWw0A	Direct data operation stopping rate (Lower)	4240h	1,000 kHz/s
RWw0B	Direct data operation stopping rate (Upper)	000Fh	
RWw0C	Direct data operation operating current	03E8h	100.0 %
RWw0D	Direct data operation forwarding destination	0000h	Execution memory

4. Turn the TRIG ON.
Direct data operation is started.

• Remote register (Master station → Remote station)

Address	Description	Bit	Signal name	Setting value
RWw02	Fixed I/O (IN)	8	TRIG	0100h

5. Check that the TRIG_R has been turned ON.

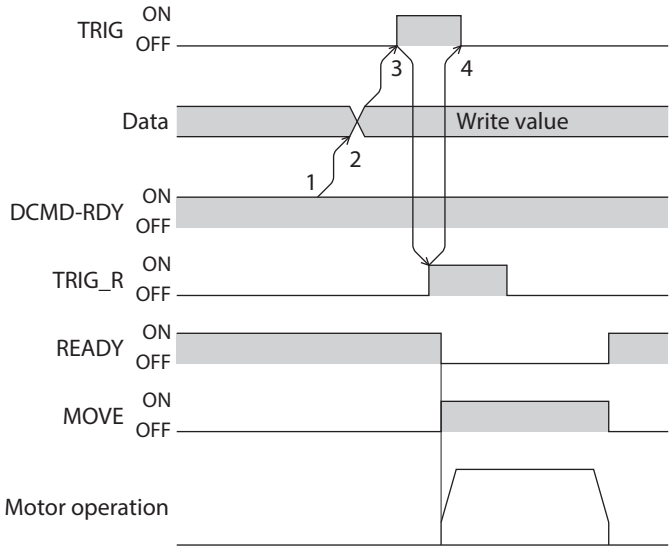
• Remote register (Remote station → Master station)

Address	Description	Bit	Signal name	Response
RWr02	Fixed I/O (OUT)	8	TRIG_R	0142h

6. Turn the TRIG OFF.

• Remote register (Master station → Remote station)

Address	Description	Bit	Signal name	Setting value
RWw02	Fixed I/O (IN)	8	TRIG	0000h



■ When direct data operation is executed at ON level of TRIG

This section explains how to execute the following direct data operation with the trigger set to "Position."
Set the trigger with the "Direct data operation trigger setting" parameter.

● Setting example

- Position of operation 1: 7,000 steps
- Position of operation 2: 3,000 steps
- Operation type: Incremental positioning (Based on command position)
- Speed: 1,000 Hz
- Starting/changing speed rate: 1,000 kHz/s
- Stopping rate: 1,000 kHz/s
- Operating current: 100 %
- Forwarding destination: Execution memory
- Other settings: Initial values

● Operation processing flow

Descriptions are given with the master station as the subject.

1. Establish communication.
2. Sets the following parameters.

• Remote register (Master station → Remote station)

Address	Description	Setting value	Note
RWw11	Write parameter ID	6114h	Parameter ID of "Direct data operation trigger setting": 24852
RWw12	Write data (Lower)	FFFBh	Position: −5
RWw13	Write data (Upper)	FFFFh	

3. Turn the WR-REQ ON.
The parameter is set in the remote station. When the setting is completed, the WR-END is turned ON.

• Remote register (Master station → Remote station)

Address	Description	Bit	Signal name	Setting value
RWw10	Write request	0	WR-REQ	0001h

• Remote register (Remote station → Master station)

Address	Description	Bit	Signal name	Response
RWr10	Read/Write status	8	WR-END	0100h
RWr11	Write parameter ID_R	–	–	6114h

4. Turn the WR-REQ OFF.
The WR-END is returned to OFF.

• Remote register (Master station → Remote station)

Address	Description	Bit	Signal name	Setting value
RWw10	Write request	0	WR-REQ	0000h

• Remote register (Remote station → Master station)

Address	Description	Bit	Signal name	Response
RWr10	Read/Write status	8	WR-END	0000h

5. Check that the DCMD-RDY has been turned ON.

• Remote register (Remote station → Master station)

Address	Description	Bit	Signal name	Response
RWr02	Fixed I/O (OUT)	6	DCMD-RDY	0060h

6. Set the following data.

• Remote register (Master station → Remote station)

Address	Description	Setting value	Note
RWw02	TRIG-MODE [bit 9 of fixed I/O (IN)]	0200h	Start at ON level
RWw03	Direct data operation operation type	0002h	Incremental positioning (Based on command position)
RWw04	Direct data operation position (Lower)	1B58h	7,000 steps
RWw05	Direct data operation position (Upper)	0000h	
RWw06	Direct data operation speed (Lower)	03E8h	1,000 Hz
RWw07	Direct data operation speed (Upper)	0000h	
RWw08	Direct data operation starting/changing rate (Lower)	4240h	1,000 kHz/s
RWw09	Direct data operation starting/changing rate (Upper)	000Fh	
RWw0A	Direct data operation stopping rate (Lower)	4240h	1,000 kHz/s
RWw0B	Direct data operation stopping rate (Upper)	000Fh	
RWw0C	Direct data operation operating current	03E8h	100.0 %
RWw0D	Direct data operation forwarding destination	0000h	Execution memory

7. Turn the TRIG ON while the TRIG-MODE is in an ON state.
Direct data operation of the operation 1 is started.

• Remote register (Master station → Remote station)

Address	Description	Bit	Signal name	Setting value
RWw02	Fixed I/O (IN)	8	TRIG	0300h

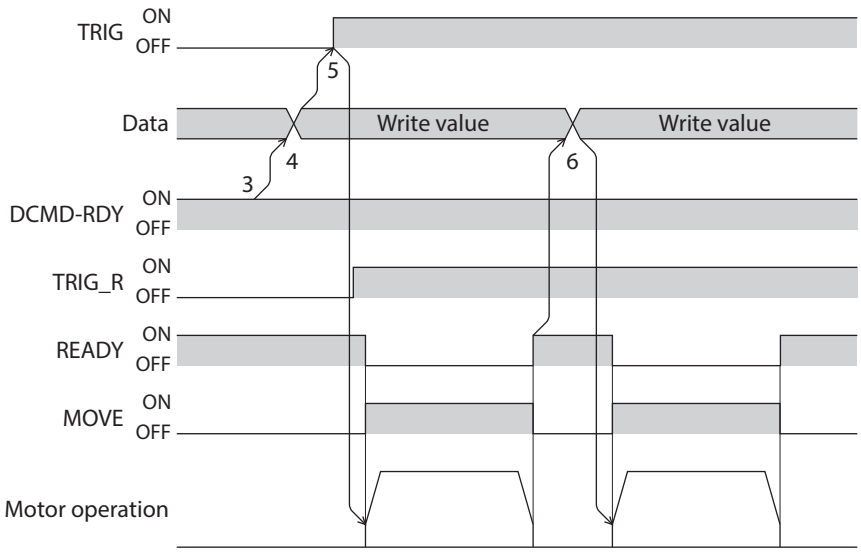
8. Check that the operation 1 is completed and set the following data.
Direct data operation of the operation 2 is started.

• Remote register (Master station → Remote station)

Address	Description	Setting value	Note
RWw04	Direct data operation position (Lower)	0BB8h	3,000 steps
RWw05	Direct data operation position (Upper)	0000h	

memo

- To execute direct data operation of the operation 2, set a value different from the operation 1 in the "Position" of the operation 2.
- If a value other than the "Position" is changed, direct data operation of the operation 2 will not be executed.



5 Parameter ID lists

This part describes the parameter ID lists to be set via Ethernet.
Data and parameters described here can also be set using the MEXE02 software.

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1 Timing for parameter update

All data used with the driver is 32 bits wide.
Parameters are saved in RAM or non-volatile memory in the driver. Parameters stored in RAM are erased when the main power supply and control power supply are turned off, but those stored in non-volatile memory are retained even when these power supplies are turned off.
When the control power supply of the driver is turned on, the parameters stored in non-volatile memory is transfered to RAM, and recalculation and setup for the parameters are executed in RAM.

Parameters having set using the parameter ID are stored in RAM. To save the parameters stored in RAM to non-volatile memory, execute the "Write batch NV memory" of the maintenance command.
When a parameter is changed, the timing for updating the new value varies depending on the parameter. Refer to "Notation rules" for details about the update timing.

Note Do not shut off the main power supply and the control power supply while writing the data to non-volatile memory, and also do not shut off for five seconds after the completion of writing the data. Doing so may abort the data write and cause an alarm of EEPROM error (alarm code 41h) to generate.

memo
- Parameters having set using the parameter ID are stored in RAM. For parameters required for turning on the main power supply or control power supply again, be sure to save them in non-volatile memory before turning off the power.
- Non-volatile memory can be rewritten approximately 100,000 times.
- Parameters having set with the **MEXE02** software are stored in non-volatile memory if "data writing" is performed.

■ Notation rules

● Timing of the update

In this manual, each update timing is represented in an alphabet.

Notation	Update timing
A	Recalculation and setup are immediately executed when the parameter is written.
B	Recalculation and setup are executed when the operation is stopped.
C	Recalculation and setup are executed after Configuration is executed or the main power supply and control power supply are turned on again.
D	Recalculation and setup are executed after the main power supply and control power supply are turned on again.

● READ and WRITE

In this manual, READ and WRITE may be represented as follows.

Notation	Update timing
R	READ
W	WRITE
R/W	READ/WRITE

2 Maintenance commands

Maintenance commands are used to execute the alarm reset, clear latch information, batch processing of non-volatile memory and others.

Note The maintenance commands include processing in which the memory is operated, such as batch processing of non-volatile memory and P-PRESET execution. Be careful not to execute them unnecessarily in succession.

Parameter ID		Name	Description	Setting range	Initial value
Hex	Dec				
00C0h	192	Alarm reset	Resets the alarm being generated. Some alarms cannot be reset.	–	–
00C2h	194	Clear alarm history	Clears the alarm history.		
00C5h	197	P-PRESET execution	Presets the command position.		
00C6h	198	Configuration	Executes recalculation and setup of the parameter. Refer to p.122 for details.		
00C7h	199	Batch data initialization (excluding communication parameters)	Restores the parameters stored in non-volatile memory to their initial values. (Excluding parameters related to communication setting)		
00C8h	200	Read batch NV memory	Reads the parameters stored in non-volatile memory to RAM. All operation data and parameters stored in RAM are overwritten.		
00C9h	201	Write batch NV memory	Writes the parameters stored in RAM to non-volatile memory. Non-volatile memory can be rewritten approximately 100,000 times.		
00CAh	202	All data batch initialization (including communication parameters)	Restores all parameters stored in non-volatile memory to their initial values.		
00CBh	203	Read from backup	Reads all the data from the backup area.		
00CCh	204	Write to backup	Writes all the data to the backup area.		
00CDh	205	Clear latch information	Clears the latch state to overwrite the operation information.		
00CEh	206	Clear sequence history	Clears the sequence history.		
00CFh	207	Clear tripmeter	Clears the tripmeter.		
00D1h	209	ZSG-PRESET	Sets the position of phase Z again.		
00D2h	210	Clear ZSG-PRESET	Clears the position data of phase Z that was set again with the "ZSG-PRESET" command.		
00D3h	211	Clear information	Clears the information.		
00D4h	212	Clear information history	Clears the information history.		
00D5h	213	Alarm history details	When writing the number of history (1 to 10) to this command and executing the "Alarm history details" of the monitor command, the detailed items of the specified alarm history can be checked.	0: Not selected 1 to 10: Alarm history number	0

■ Configuration

Configuration can be executed when all of the following conditions are satisfied.

- An alarm is not being generated.
- The motor is not operated.
- The following commands are not executed via Ethernet.
  – Batch data initialization
  – All data batch initialization
  – Read batch NV memory
  – Write batch NV memory
  – Read from backup
  – Write to backup
- The following monitors or menus are not executed with the **MEXE02** software.
  – Teaching, remote operation
  – I/O test
  – Data writing
  – Reset

The table below shows the driver status before and after Configuration is executed.

Item	Configuration is ready to execute	Configuration is being executed	After Configuration is executed
PWR/ALM LED	Green light	Blinking blue	Based on the driver condition.
Electromagnetic brake	Hold/Release	Hold	
Motor excitation	Excitation/non-excitation	Non-excitation	
Output signals	Enable	Disable	Enable
Input signal	Enable	Disable	Enable

memo Even if monitor is executed while Configuration is being executed, the correct monitor value may not return.

3 Monitor commands

Monitor commands are used to monitor the command position, the command speed, the alarm history, and the information history, etc.
All commands are used for read (READ).

Parameter ID		Name	Description
Hex	Dec		
0040h	64	Present alarm	Indicates the alarm code presently being generated.
0041h	65	Alarm history 1	Indicates the most recent item in the alarm history. When an alarm is being generated, its code is also indicated on the alarm history 1 simultaneously.
0042h	66	Alarm history 2	Indicates the item in the alarm history.
0043h	67	Alarm history 3	
0044h	68	Alarm history 4	
0045h	69	Alarm history 5	
0046h	70	Alarm history 6	
0047h	71	Alarm history 7	
0048h	72	Alarm history 8	
0049h	73	Alarm history 9	
004Ah	74	Alarm history 10	Indicates the oldest item in the alarm history.
0061h	97	Present selected data number	Indicates the operation data number presently selected. The priority is in order of the direct selection (D-SEL) and the M0 to M7 inputs.
0062h	98	Present operation data number	Indicates the operation data number presently being operated in stored data (SD) operation or continuous macro operation. In operation without using operation data, "–1" is displayed. "–1" is displayed also during stop.
0063h	99	Command position	Indicates the present command position. When the wrap function is enabled, the value on the wrap coordinates is indicated.
0064h	100	Command speed (r/min)	Indicates the present command speed.
0065h	101	Command speed (Hz)	Indicates the present command speed.
0066h	102	Feedback position	Indicates the present feedback position. When the wrap function is enabled, the value on the wrap coordinates is indicated.
0067h	103	Feedback speed (r/min)	Indicates the present feedback speed.
0068h	104	Feedback speed (Hz)	Indicates the present feedback speed.
0069h	105	Remaining dwell time (ms)	Indicates the remaining time in the drive-complete delay time or dwell time.
006Ah	106	Direct I/O	Indicates the status of direct I/O and virtual input. (Arrangement of bits ⇨ p.128)
006Bh	107	Torque monitor (1=0.1 %)	The torque presently generated is indicated as a percentage of the maximum holding torque.
006Dh	109	Cumulative Load Monitor	Indicates the integrated value of the load during operation. (Internal unit) The load is cumulated regardless of the rotation direction of the motor. Refer to the **AZ** Series OPERATING MANUAL Function Edition for details.

Parameter ID		Name	Description
Hex	Dec		
006Fh	111	Target position	• Indicates the target command position in absolute coordinates for the operations shown below. – Positioning SD operation, inching operation, high-speed return-to-home operation, return-to-home operation (during offset movement) • Indicates the operation starting position for the operations shown below. – Continuous SD operation, continuous macro operation, JOG macro operation other than inching operation, return-to-home operation (when sensors are used with push-motion)
0070h	112	Next number	Indicates the operation data number specified in "Next data number" of the operation data in operation. The value is latched even after the operation is completed. When "Link" is set to "No Link" or "Next data number" is set to "Stop," "–1" is displayed.
0071h	113	Loop origin number	Indicates the operation data number that is the starting point of the loop in loop operation (extended loop operation). When loop is not executed or stopped, "–1" is displayed.
0072h	114	Loop count	Indicates the present number of loop times in loop operation (extended loop operation). When operation other than loop is executed or loop is stopped, "0" is displayed.
0073h	115	Event monitor command position (NEXT)	Latches the position when the latch trigger in parentheses ( ) is generated. The value is overwritten if the same latch trigger is generated while latching. When the latch is cleared, "0" is displayed.
0074h	116	Event monitor feedback position (NEXT)	
0075h	117	Event monitor command position (JUMP0 – Low event)	
0076h	118	Event monitor feedback position (JUMP0 – Low event)	
0077h	119	Event monitor command position (JUMP1 – High event)	
0078h	120	Event monitor feedback position (JUMP1 – High event)	
0079h	121	Event monitor command position (STOP)	
007Ah	122	Event monitor feedback position (STOP)	
007Bh	123	Present information	Indicates the information code presently being generated. (Details of Information code ⇨p.158)
007Ch	124	Driver temperature (1=0.1 °C)	Indicates the present driver temperature.
007Dh	125	Motor temperature (1=0.1 °C)	Indicates the present motor temperature.
007Eh	126	Odometer (1=0.1 kRev)	Indicates the cumulative travel distance of the motor in revolutions. This cannot be cleared on the customer side.
007Fh	127	Tripmeter (1=0.1 kRev)	Indicates the travel distance of the motor in revolutions. This can be cleared on the customer side.
0080h	128	Sequence history 1	Indicates the most recent item in the alarm history. "–1" is displayed when stopped. During operation, the value same as the "Present operation data number" is also displayed in the sequence history 1.
0081h	129	Sequence history 2	Indicates the item in the sequence history.
0082h	130	Sequence history 3	
0083h	131	Sequence history 4	
0084h	132	Sequence history 5	
0085h	133	Sequence history 6	
0086h	134	Sequence history 7	
0087h	135	Sequence history 8	

Parameter ID		Name	Description
Hex	Dec		
0088h	136	Sequence history 9	Indicates the item in the sequence history.
0089h	137	Sequence history 10	
008Ah	138	Sequence history 11	
008Bh	139	Sequence history 12	
008Ch	140	Sequence history 13	
008Dh	141	Sequence history 14	
008Eh	142	Sequence history 15	
008Fh	143	Sequence history 16	Indicates the oldest item in the sequence history.
0090h	144	Feedback position 32-bit counter	Indicates a 32-bit counter of the feedback position. It counts independently of the wrap function. It will return to within the wrap coordinates when the power supply is turned on again.
0091h	145	Command position 32-bit counter	Indicates a 32-bit counter of the command position. It counts independently of the wrap function. It will return to within the wrap coordinates when the power supply is turned on again.
0092h	146	CST operating current (1=0.1 %)	Indicates the operating current of the α control (CST) mode.
0093h	147	Loop count buffer	Indicates the present number of loop times in loop operation (extended loop operation). The value is kept until the operation start signal is turned ON.
00A0h	160	Main power supply count	Indicates the number of times that the main power supply was turned on.
00A1h	161	Main power supply time (min)	Indicates the time elapsed since the main power supply was turned on in minutes.
00A2h	162	Control power supply count*	Indicates the number of times that the control power supply was turned on.
00A3h	163	Inverter voltage (1=0.1 V)	Indicates the inverter voltage of the driver.
00A4h	164	Main power supply voltage (1=0.1 V)	Indicates the power supply voltage of the driver.
00A7h	167	IP ADDR SW1	Indicates the input status of the IP address setting switch (×1).
00A9h	169	Elapsed time from BOOT (ms)	Indicates the time elapsed since the control power supply was turned on. For a driver that the control power supply is not connected, it indicates the time elapsed since the main power supply was turned on.
00B8h	184	I/O status 1	Indicate the ON-OFF status of the internal I/O. (Arrangement of bits ⇨ p.128)
00B9h	185	I/O status 2	
00BAh	186	I/O status 3	
00BBh	187	I/O status 4	
00BCh	188	I/O status 5	
00BDh	189	I/O status 6	
00BEh	190	I/O status 7	
00BFh	191	I/O status 8	
0500h	1280	Alarm history details (Alarm code)	Indicates the content of the alarm history specified by the "Alarm history details" of the maintenance command.
0501h	1281	Alarm history details (Sub code)	
0502h	1282	Alarm history details (Driver temperature)	
0503h	1283	Alarm history details (Motor temperature)	
0504h	1284	Alarm history details (Inverter voltage)	
0505h	1285	Alarm history details (Physical I/O input)	
0506h	1286	Alarm history details (R-I/O output)	

Parameter ID		Name	Description
Hex	Dec		
0507h	1287	Alarm history details (Operation information 0)	Indicates the content of the alarm history specified by the "Alarm history details" of the maintenance command.
0508h	1288	Alarm history details (Operation information 1)	
0509h	1289	Alarm history details (Feedback position)	
050Ah	1290	Alarm history details (Elapsed time from Boot) [ms]	
050Bh	1291	Alarm history details (Elapsed time from starting operation) [ms]	
050Ch	1292	Alarm history details (Main power supply time) [min]	
0510h	1296	Information history 1	Indicates the most recent item in the information history. When information is being generated, its code is also indicated on the information history 1 simultaneously.
0511h	1297	Information history 2	Indicates the item in the information history.
0512h	1298	Information history 3	
0513h	1299	Information history 4	
0514h	1300	Information history 5	
0515h	1301	Information history 6	
0516h	1302	Information history 7	
0517h	1303	Information history 8	
0518h	1304	Information history 9	
0519h	1305	Information history 10	
051Ah	1306	Information history 11	
051Bh	1307	Information history 12	
051Ch	1308	Information history 13	
051Dh	1309	Information history 14	
051Eh	1310	Information history 15	
051Fh	1311	Information history 16	Indicates the oldest item in the information history.
0520h	1312	Information time history 1 (ms)	Indicates the history item of the time when the most recent information was generated. When information is being generated, the time when the present information was generated is indicated.
0521h	1313	Information time history 2 (ms)	Indicates the history item of the time when the information was generated.
0522h	1314	Information time history 3 (ms)	
0523h	1315	Information time history 4 (ms)	
0524h	1316	Information time history 5 (ms)	
0525h	1317	Information time history 6 (ms)	
0526h	1318	Information time history 7 (ms)	
0527h	1319	Information time history 8 (ms)	
0528h	1320	Information time history 9 (ms)	
0529h	1321	Information time history 10 (ms)	
052Ah	1322	Information time history 11 (ms)	
052Bh	1323	Information time history 12 (ms)	
052Ch	1324	Information time history 13 (ms)	
052Dh	1325	Information time history 14 (ms)	
052Eh	1326	Information time history 15 (ms)	
052Fh	1327	Information time history 16 (ms)	Indicates the history item of the time when the oldest information was generated.

Parameter ID		Name	Description
Hex	Dec		
05C0h	1472	Latch monitor status (NEXT)	Latches the first information in which an event in parentheses ( ) is generated. The information is maintained until the latch is cleared.
05C1h	1473	Latch monitor command position (NEXT)	
05C2h	1474	Latch monitor feedback position (NEXT)	
05C3h	1475	Latch monitor target position (NEXT)	
05C4h	1476	Latch monitor operation number (NEXT)	
05C5h	1477	Latch monitor number of loop (NEXT)	
05C8h	1480	Latch monitor status (I/O event – Low event)	
05C9h	1481	Latch monitor command position (I/O event – Low event)	
05CAh	1482	Latch monitor feedback position (I/O event – Low event)	
05CBh	1483	Latch monitor target position (I/O event – Low event)	
05CCh	1484	Latch monitor operation number (I/O event – Low event)	
05CDh	1485	Latch monitor number of loop (I/O event – Low event)	
05D0h	1488	Latch monitor status (I/O event – High event)	
05D1h	1489	Latch monitor command position (I/O event – High event)	
05D2h	1490	Latch monitor feedback position (I/O event – High event)	
05D3h	1491	Latch monitor target position (I/O event – High event)	
05D4h	1492	Latch monitor operation number (I/O event – High event)	
05D5h	1493	Latch monitor number of loop (I/O event – High event)	
05D8h	1496	Latch monitor status (STOP)	
05D9h	1497	Latch monitor command position (STOP)	
05DAh	1498	Latch monitor feedback position (STOP)	
05DBh	1499	Latch monitor feedback position (STOP)	Latches the first information in which an event in parentheses ( ) is generated. The information is maintained until the latch is cleared.
05DCh	1500	Latch monitor operation number (STOP)	
05DDh	1501	Latch monitor number of loops (STOP)	

* It will be the number of times the main power supply is turned on if the control power supply is not connected.

■ Direct I/O

The arrangement of bits for direct input is indicated.

Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
–	–	–	–	–	–	–	–
Bit 23	Bit 22	Bit 21	Bit 20	Bit 19	Bit 18	Bit 17	Bit 16
–	–	–	–	–	–	–	–
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
VIR-IN3	VIR-IN2	VIR-IN1	VIR-IN0	–	–	–	–
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
–	–	–	–	–	–	IN1	IN0

■ I/O status

The arrangement of bits for internal I/O is indicated.

● **Input signal**

Parameter ID	Description							
00B8h (184)	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
	SLIT	HOMES	RV-LS	FW-LS	RV-BLK	FW-BLK	–	–
	Bit 23	Bit 22	Bit 21	Bit 20	Bit 19	Bit 18	Bit 17	Bit 16
	SPD-LMT	CRNT-LMT	T-MODE	–	–	CCM	–	HMI
	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
	–	INFO-CLR	LAT-CLR	–	–	EL-PRST	P-PRESET	ALM-RST
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	BREAK-ATSQ	PAUSE	STOP	STOP-COFF	CLR	C-ON	FREE	No function
00B9h (185)	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
	–	–	RV-PSH	FW-PSH	RV-SPD	FW-SPD	RV-POS	FW-POS
	Bit 23	Bit 22	Bit 21	Bit 20	Bit 19	Bit 18	Bit 17	Bit 16
	RV-JOG-C	FW-JOG-C	RV-JOG-P	FW-JOG-P	RV-JOG-H	FW-JOG-H	RV-JOG	FW-JOG
	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
	D-SEL7	D-SEL6	D-SEL5	D-SEL4	D-SEL3	D-SEL2	D-SEL1	D-SEL0
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	–	–	ZHOME	HOME	NEXT	–	SSTART	START
00BAh (186)	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
	R15	R14	R13	R12	R11	R10	R9	R8
	Bit 23	Bit 22	Bit 21	Bit 20	Bit 19	Bit 18	Bit 17	Bit 16
	R7	R6	R5	R4	R3	R2	R1	R0
	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
	–	–	–	–	TEACH	–	–	–
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	M7	M6	M5	M4	M3	M2	M1	M0
00BBh (187)	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
	–	–	–	–	–	–	–	–
	Bit 23	Bit 22	Bit 21	Bit 20	Bit 19	Bit 18	Bit 17	Bit 16
	–	–	–	–	–	–	–	–
	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
	–	–	–	–	–	–	–	–
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	–	–	–	–	–	–	–	–

● **Output signals**

Parameter ID	Description							
00BCh (188)	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
	MAREA	–	TIM	RND-ZERO	ZSG	RV-SLS	FW-SLS	RND-OVF
	Bit 23	Bit 22	Bit 21	Bit 20	Bit 19	Bit 18	Bit 17	Bit 16
	ORGN-STLD	PRST-STLD	PRST-DIS	–	–	ELPRST-MON	ABSPEN	HOME-END
	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
	AUTO-CD	CRNT	VA	TLC	–	IN-POS	–	SYS-BSY
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	INFO	MOVE	–	READY	SYS-RDY	ALM-B	ALM-A	CONST-OFF
00BDh (189)	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
	–	–	–	–	–	–	–	–
	Bit 23	Bit 22	Bit 21	Bit 20	Bit 19	Bit 18	Bit 17	Bit 16
	–	–	USR-OUT1	USR-OUT0	–	–	–	–
	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
	–	–	–	–	–	–	MBC	MPS
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	AREA7	AREA6	AREA5	AREA4	AREA3	AREA2	AREA1	AREA0
00BEh (190)	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
	D-END7	D-END6	D-END5	D-END4	D-END3	D-END2	D-END1	D-END0
	Bit 23	Bit 22	Bit 21	Bit 20	Bit 19	Bit 18	Bit 17	Bit 16
	M-ACT7	M-ACT6	M-ACT5	M-ACT4	M-ACT3	M-ACT2	M-ACT1	M-ACT0
	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
	M-CHG	–	DCMD-FULL	DCMD-RDY	–	NEXT-LAT	JUMP1-LAT	JUMP0-LAT
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	DELAY-BSY	SEQ-BSY	PAUSE-BSY	OPE-BSY	–	–	SPD-LMTD	CRNT-LMTD
00BFh (191)	Bit 31	Bit 30	Bit 29	Bit 28	Bit 27	Bit 26	Bit 25	Bit 24
	INFO-RBT	INFO-CFG	INFO-IOTEST	INFO-DSLMTD	–	–	–	–
	Bit 23	Bit 22	Bit 21	Bit 20	Bit 19	Bit 18	Bit 17	Bit 16
	–	–	INFO-ODO	INFO-TRIP	INFO-CULD1	INFO-CULD0	INFO-RV-OT	INFO-FW-OT
	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
	–	INFO-RND-E	INFO-EGR-E	–	INFO-PR-REQ	INFO-ZHOME	INFO-START	INFO-SPD
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	–	INFO-OLTIME	INFO-UVOLT	INFO-OVOLT	INFO-MTRTMP	INFO-DRVTMP	INFO-POSERR	INFO-USRIO

4 Operation data R/W commands

This is a method in which the parameter ID (base address) of the base operation data number is specified to input data.
Refer to "4-3 Setting example" on p.134 for how to use the base address.

4-1 Base address of each operation data number

Base address		Operation data	Base address		Operation data	Base address		Operation data	Base address		Operation data
Hex	Dec		Hex	Dec		Hex	Dec		Hex	Dec	
0C00h	3072	No. 0	10C0h	4288	No. 38	1580h	5504	No. 76	1A40h	6720	No. 114
0C20h	3104	No. 1	10E0h	4320	No. 39	15A0h	5536	No. 77	1A60h	6752	No. 115
0C40h	3136	No. 2	1100h	4352	No. 40	15C0h	5568	No. 78	1A80h	6784	No. 116
0C60h	3168	No. 3	1120h	4384	No. 41	15E0h	5600	No. 79	1AA0h	6816	No. 117
0C80h	3200	No. 4	1140h	4416	No. 42	1600h	5632	No. 80	1AC0h	6848	No. 118
0CA0h	3232	No. 5	1160h	4448	No. 43	1620h	5664	No. 81	1AE0h	6880	No. 119
0CC0h	3264	No. 6	1180h	4480	No. 44	1640h	5696	No. 82	1B00h	6912	No. 120
0CE0h	3296	No. 7	11A0h	4512	No. 45	1660h	5728	No. 83	1B20h	6944	No. 121
0D00h	3328	No. 8	11C0h	4544	No. 46	1680h	5760	No. 84	1B40h	6976	No. 122
0D20h	3360	No. 9	11E0h	4576	No. 47	16A0h	5792	No. 85	1B60h	7008	No. 123
0D40h	3392	No. 10	1200h	4608	No. 48	16C0h	5824	No. 86	1B80h	7040	No. 124
0D60h	3424	No. 11	1220h	4640	No. 49	16E0h	5856	No. 87	1BA0h	7072	No. 125
0D80h	3456	No. 12	1240h	4672	No. 50	1700h	5888	No. 88	1BC0h	7104	No. 126
0DA0h	3488	No. 13	1260h	4704	No. 51	1720h	5920	No. 89	1BE0h	7136	No. 127
0DC0h	3520	No. 14	1280h	4736	No. 52	1740h	5952	No. 90	1C00h	7168	No. 128
0DE0h	3552	No. 15	12A0h	4768	No. 53	1760h	5984	No. 91	1C20h	7200	No. 129
0E00h	3584	No. 16	12C0h	4800	No. 54	1780h	6016	No. 92	1C40h	7232	No. 130
0E20h	3616	No. 17	12E0h	4832	No. 55	17A0h	6048	No. 93	1C60h	7264	No. 131
0E40h	3648	No. 18	1300h	4864	No. 56	17C0h	6080	No. 94	1C80h	7296	No. 132
0E60h	3680	No. 19	1320h	4896	No. 57	17E0h	6112	No. 95	1CA0h	7328	No. 133
0E80h	3712	No. 20	1340h	4928	No. 58	1800h	6144	No. 96	1CC0h	7360	No. 134
0EA0h	3744	No. 21	1360h	4960	No. 59	1820h	6176	No. 97	1CE0h	7392	No. 135
0EC0h	3776	No. 22	1380h	4992	No. 60	1840h	6208	No. 98	1D00h	7424	No. 136
0EE0h	3808	No. 23	13A0h	5024	No. 61	1860h	6240	No. 99	1D20h	7456	No. 137
0F00h	3840	No. 24	13C0h	5056	No. 62	1880h	6272	No. 100	1D40h	7488	No. 138
0F20h	3872	No. 25	13E0h	5088	No. 63	18A0h	6304	No. 101	1D60h	7520	No. 139
0F40h	3904	No. 26	1400h	5120	No. 64	18C0h	6336	No. 102	1D80h	7552	No. 140
0F60h	3936	No. 27	1420h	5152	No. 65	18E0h	6368	No. 103	1DA0h	7584	No. 141
0F80h	3968	No. 28	1440h	5184	No. 66	1900h	6400	No. 104	1DC0h	7616	No. 142
0FA0h	4000	No. 29	1460h	5216	No. 67	1920h	6432	No. 105	1DE0h	7648	No. 143
0FC0h	4032	No. 30	1480h	5248	No. 68	1940h	6464	No. 106	1E00h	7680	No. 144
0FE0h	4064	No. 31	14A0h	5280	No. 69	1960h	6496	No. 107	1E20h	7712	No. 145
1000h	4096	No. 32	14C0h	5312	No. 70	1980h	6528	No. 108	1E40h	7744	No. 146
1020h	4128	No. 33	14E0h	5344	No. 71	19A0h	6560	No. 109	1E60h	7776	No. 147
1040h	4160	No. 34	1500h	5376	No. 72	19C0h	6592	No. 110	1E80h	7808	No. 148
1060h	4192	No. 35	1520h	5408	No. 73	19E0h	6624	No. 111	1EA0h	7840	No. 149
1080h	4224	No. 36	1540h	5440	No. 74	1A00h	6656	No. 112	1EC0h	7872	No. 150
10A0h	4256	No. 37	1560h	5472	No. 75	1A20h	6688	No. 113	1EE0h	7904	No. 151

Base address		Operation data
Hex	Dec	
1F00h	7936	No. 152
1F20h	7968	No. 153
1F40h	8000	No. 154
1F60h	8032	No. 155
1F80h	8064	No. 156
1FA0h	8096	No. 157
1FC0h	8128	No. 158
1FE0h	8160	No. 159
2000h	8192	No. 160
2020h	8224	No. 161
2040h	8256	No. 162
2060h	8288	No. 163
2080h	8320	No. 164
20A0h	8352	No. 165
20C0h	8384	No. 166
20E0h	8416	No. 167
2100h	8448	No. 168
2120h	8480	No. 169
2140h	8512	No. 170
2160h	8544	No. 171
2180h	8576	No. 172
21A0h	8608	No. 173
21C0h	8640	No. 174
21E0h	8672	No. 175
2200h	8704	No. 176
2220h	8736	No. 177

Base address		Operation data
Hex	Dec	
2240h	8768	No. 178
2260h	8800	No. 179
2280h	8832	No. 180
22A0h	8864	No. 181
22C0h	8896	No. 182
22E0h	8928	No. 183
2300h	8960	No. 184
2320h	8992	No. 185
2340h	9024	No. 186
2360h	9056	No. 187
2380h	9088	No. 188
23A0h	9120	No. 189
23C0h	9152	No. 190
23E0h	9184	No. 191
2400h	9216	No. 192
2420h	9248	No. 193
2440h	9280	No. 194
2460h	9312	No. 195
2480h	9344	No. 196
24A0h	9376	No. 197
24C0h	9408	No. 198
24E0h	9440	No. 199
2500h	9472	No. 200
2520h	9504	No. 201
2540h	9536	No. 202
2560h	9568	No. 203

Base address		Operation data
Hex	Dec	
2580h	9600	No. 204
25A0h	9632	No. 205
25C0h	9664	No. 206
25E0h	9696	No. 207
2600h	9728	No. 208
2620h	9760	No. 209
2640h	9792	No. 210
2660h	9824	No. 211
2680h	9856	No. 212
26A0h	9888	No. 213
26C0h	9920	No. 214
26E0h	9952	No. 215
2700h	9984	No. 216
2720h	10016	No. 217
2740h	10048	No. 218
2760h	10080	No. 219
2780h	10112	No. 220
27A0h	10144	No. 221
27C0h	10176	No. 222
27E0h	10208	No. 223
2800h	10240	No. 224
2820h	10272	No. 225
2840h	10304	No. 226
2860h	10336	No. 227
2880h	10368	No. 228
28A0h	10400	No. 229

Base address		Operation data
Hex	Dec	
28C0h	10432	No. 230
28E0h	10464	No. 231
2900h	10496	No. 232
2920h	10528	No. 233
2940h	10560	No. 234
2960h	10592	No. 235
2980h	10624	No. 236
29A0h	10656	No. 237
29C0h	10688	No. 238
29E0h	10720	No. 239
2A00h	10752	No. 240
2A20h	10784	No. 241
2A40h	10816	No. 242
2A60h	10848	No. 243
2A80h	10880	No. 244
2AA0h	10912	No. 245
2AC0h	10944	No. 246
2AE0h	10976	No. 247
2B00h	11008	No. 248
2B20h	11040	No. 249
2B40h	11072	No. 250
2B60h	11104	No. 251
2B80h	11136	No. 252
2BA0h	11168	No. 253
2BC0h	11200	No. 254
2BE0h	11232	No. 255

4-2 Parameter IDs

The setting items of operation data are set with the operation data R/W command.
The parameter IDs for the setting items are arranged based on the base address of the operation data number. (Base address ⇨p.130)
For example, in the case of the setting item "Position," 1 is added to the base address.

Parameter ID	Name	Description	Setting range*1	Initial value	Update
Base address +0	Operation type	Selects the operation type.	1: Absolute positioning 2: Incremental positioning (based on command position) 3: Incremental positioning (based on feedback position) 7: Continuous operation (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 positioning push-motion 21: Incremental positioning push-motion (based on command position) 22: Incremental positioning push-motion (based on feedback position)	2	B
Base address +1	Position	Sets the target position (travel amount). It is not used for continuous SD operation.	–2,147,483,648 to 2,147,483,647 steps	0	B
Base address +2	Speed	Sets the operating speed. Positioning operation and push-motion operation are performed at the absolute operating speed. For continuous operation, setting a positive value rotates the motor in the forward direction, and setting a negative value rotates it in the reverse direction.	–4,000,000 to 4,000,000 Hz	1,000	B
Base address +3	Starting/ changing rate	Sets the acceleration/ deceleration rate or the acceleration/deceleration time when staring or changing the speed.	1 to 1,000,000,000 (1=0.001)*2	1,000,000	B
Base address +4	Stop	Sets the deceleration rate or the deceleration time when stopping.		1,000,000	B

Parameter ID	Name	Description	Setting range*1	Initial value	Update
Base address +5	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.	0 to 1,000 (1=0.1 %)	1,000	B
Base address +6	Drive-complete delay time	Sets the waiting time generated after operation is completed.	0 to 65,535 (1=0.001 s)	0	B
Base address +7	Link	Sets the mode for link operation.	0: No link 1: Manual sequential 2: Automatic sequential 3: Continuous sequential operation	0	B
Base address +8	Next data number	Sets the next data number.	−256: No link [Stop] −2: Operation data number after next one [↓↓(+2)] −1: Next operation data number [↓(+1)] 0 to 255: Operation data number	−1	B
Base address +9	Area offset	Sets the distance from the center position of the range in which the MAREA output is turned ON to the target position of positioning operation. Sets the distance to the operation starting position in the case of continuous operation.	−2,147,483,648 to 2,147,483,647 steps	0	B
Base address +10	Area width	Sets the range in which the MAREA output is turned ON.	−1: Disable 0 to 4,194,303: Set in 1-step increments	−1	B
Base address +11	Loop count	Sets the number of loop times.	0: No loop [–] 2 to 255: Number of loop times [loop 2{ to loop 255{]	0	B
Base address +12	Loop offset	Offsets the position (travel amount) every time loop is executed.	−4,194,304 to 4,194,303 steps	0	B
Base address +13	Loop end point	Sets to the operation data number in which loop is completed.	0: Not the loop end point [–] 1: Loop end point [}L-End]	0	B
Base address +14	(Low) I/O event number	Sets the number of the operation I/O event to generate a low event. The condition to generate the event is set with the operation I/O event.	−1: Disable [–] 0 to 31: Operation I/O event number	−1	B
Base address +15	(High) I/O event number	Sets the number of the operation I/O event to generate a high event. If a low event and a high event are generated at the same time, the high event is prioritized. The condition to generate the event is set with the operation I/O event.		−1	B

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

4-3 Setting example

As an example, this section explains how to set the following operation data to the operation data No. 0 to No. 2.

Setting item	Operation data No. 0	Operation data No. 1	Operation data No. 2
Operation type	Absolute positioning	Incremental positioning (based on command position)	Incremental positioning (based on feedback position)
Position [step]	1,000	1,000	1,000
Operating speed [Hz]	1,000	1,000	1,000
Operating current [%]	50.0	70.0	100.0

■ Setting of operation data No. 0

Seeing the table on p.130, we can find that the base address of the operation data No. 0 is "3072 (0C00h)."
Based on this base address, the parameter ID for the setting item is calculated from the table on p.132.

Base address
3072 (0C00h)

Setting item	Parameter ID			Setting value
	Calculation method	Dec	Hex	
Operation type	Base address +0	3072 + 0 = 3072	0C00h	1
Position	Base address +1	3072 + 1 = 3073	0C01h	1,000
Speed	Base address +2	3072 + 2 = 3074	0C02h	1,000
Operating current	Base address +5	3072 + 5 = 3077	0C05h	500

■ Setting of operation data No. 1

From the table on p.130, we can find that the base address of the operation data No. 1 is "3104 (0C20h)."
Based on this base address, the parameter ID for the setting item is calculated from the table on p.132.

Base address
3104 (0C20h)

Setting item	Parameter ID			Setting value
	Calculation method	Dec	Hex	
Operation type	Base address +0	3104 + 0 = 3104	0C20h	2
Position	Base address +1	3104 + 1 = 3105	0C21h	1,000
Speed	Base address +2	3104 + 2 = 3106	0C22h	1,000
Operating current	Base address +5	3104 + 5 = 3109	0C25h	700

■ Setting of operation data No. 2

From the table on p.130, we can find that the base address of the operation data No. 2 is "3136 (0C40h)."
Based on this base address, the parameter ID for the setting item is calculated from the table on p.132.

Base address
3136 (0C40h)

Setting item	Parameter ID			Setting value
	Calculation method	Dec	Hex	
Operation type	Base address +0	3136 + 0 = 3136	0C40h	3
Position	Base address +1	3136 + 1 = 3137	0C41h	1,000
Speed	Base address +2	3136 + 2 = 3138	0C42h	1,000
Operating current	Base address +5	3136 + 5 = 3141	0C45h	1,000

5 Operation I/O event R/W commands

If a specified event (ON-OFF of I/O) is generated during operation of the motor, another operation can be started. This is called operation I/O event. This chapter explains the address to execute the operation I/O event.

5-1 Base address of operation I/O event

Base address		Operation I/O event number
Hex	Dec	
0A00h	2560	0
0A08h	2568	1
0A10h	2576	2
0A18h	2584	3
0A20h	2592	4
0A28h	2600	5
0A30h	2608	6
0A38h	2616	7
0A40h	2624	8
0A48h	2632	9
0A50h	2640	10

Base address		Operation I/O event number
Hex	Dec	
0A58h	2648	11
0A60h	2656	12
0A68h	2664	13
0A70h	2672	14
0A78h	2680	15
0A80h	2688	16
0A88h	2696	17
0A90h	2704	18
0A98h	2712	19
0AA0h	2720	20
0AA8h	2728	21

Base address		Operation I/O event number
Hex	Dec	
0AB0h	2736	22
0AB8h	2744	23
0AC0h	2752	24
0AC8h	2760	25
0AD0h	2768	26
0AD8h	2776	27
0AE0h	2784	28
0AE8h	2792	29
0AF0h	2800	30
0AF8h	2808	31

5-2 Parameter IDs for 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 command.
The parameter IDs for the setting items are arranged based on the base address of the operation I/O event.
For example, in the case of the setting item "Dwell," 2 is added to the base address.

Parameter ID	Name	Description	Setting range*	Initial value	Update
Base address +0	Link	Sets the mode for link operation after detecting the event trigger.	0: No link 1: Manual sequential 2: Automatic sequential 3: Continuous sequential operation	0	B
Base address +1	Next data number	Sets the next data number.	−256: No link [Stop] −2: Operation data number after next one [↓↓(+2)] −1: Next operation data number [↓(+1)] 0 to 255: Operation data number	−256	B
Base address +2	Dwell	Sets the waiting time generated after detecting the event trigger.	0 to 65,535 (1=0.001 s)	0	B
Base address +3	Event trigger I/O	Sets the I/O to be used as an event trigger.	Input signal list ⇨p.159 Output signal list⇨p.160	0: No function	B

Parameter ID	Name	Description	Setting range*	Initial value	Update
Base address +4	Event trigger type	Sets the timing to detect the event trigger.	0: No setting 1: ON (calculated cumulative msec) 2: ON (msec) 3: OFF (calculated cumulative msec) 4: OFF (msec) 5: ON edge 6: OFF edge 7: ON (cumulative msec) 8: OFF (cumulative msec)	0	B
Base address +5	Event trigger count	Sets the judgment time to detect the event trigger or the number of times of detection.	0 to 65,535 (1=1 ms or 1=once)	0	B

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

6 Protect release commands

The key codes to read/write the data from/to the backup area and those to release the function limitation by the HMI input are set.

Parameter ID		Name	Description	Setting range	Initial value
Hex	Dec				
0020h	32	Backup DATA access key	Inputs the key code to access the backup area.	Refer to the next table.	0
0021h	33	Backup DATA write key	Inputs the key code to write the data to the backup area.		
0022h	34	HMI release key	Inputs the key code to release the limitation by the HMI input.		

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)

7 Extended operation data setting R/W commands

Parameters for extended operation data setting can be set.

Parameter ID		Name	Description	Setting range	Initial value	Update
Hex	Dec					
0140h	320	Common acceleration rate or time	Sets the starting/changing rate or the starting/changing time in common setting.	1 to 1,000,000,000 (1=0.001)*	1,000,000	A
0141h	321	Common stopping rate	Sets the stopping rate or the stop time in common setting.	1 to 1,000,000,000 (1=0.001)*	1,000,000	A
0146h	326	Rate selection	Sets whether to use the common acceleration/ deceleration or the acceleration/deceleration specified in the operation data.	0: The common rate is used (common setting) 1: The rate of each operation data is used (separate setting)	1	A
0800h	2048	Repeat start operation data number	Sets to the operation data number in which extended loop operation is started.	−1: Disable 0 to 255: Operation data number	−1	A
0801h	2049	Repeat end operation data number	Sets the operation data number in which extended loop operation is completed.	−1: Disable 0 to 255: Operation data number	−1	A
0802h	2050	Repeat time	Sets the number of repeat times of extended loop operation.	−1: Disable 0 to 100,000,000	−1	A

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

Note Rewrite the parameters of the extended operation data setting R/W command while operation is stopped.

8 Parameter R/W commands

These commands are used to write or read parameters.

8-1 (p4) Base setting parameters

Use the **MEXE02** software to set parameters that have "–" in the parameter ID. They cannot be read or written via Ethernet.

Parameter ID		Name	Description	Setting range	Initial value	Update
Hex	Dec					
0110h	272	Direct data operation zero speed command action	Sets the command when "0" is written to the "Speed" for direct data operation.	0: Deceleration stop command 1: Speed zero command	0	B
0126h	294	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	A
0128h	296	Stop current	Sets the current at motor standstill as a percentage of the base current, based on the base current being 100 %.		500	A
0129h	297	Command filter setting	Sets the filter function to adjust the motor response.	1: LPF (Speed filter) 2: Moving average filter	1	B
012Ah	298	Command filter time constant	Adjusts the motor response.	0 to 200 ms	1	B
012Ch	300	Smooth drive function	Enables the smooth drive function.	0: Disable 1: Enable	1	C
012Dh	301	Current control mode	Sets the current control method.	0: The setting of the CCM input is followed 1: α control mode (CST) 2: Servo emulation mode (SVE)	0	A
012Eh	302	Servo emulation (SVE) ratio	Sets the ratio (percentage) of the the operating current value to be controlled by the servo emulation mode. Setting it to "0" automatically switches to the α control mode.	0 to 1,000 (1=0.1 %)	1,000	A
012Fh	303	SVE position loop gain	Adjusts the motor response in reaction to the position deviation. Increasing this value will make the deviation between the command position and the actual position smaller.	1 to 50	10	A
0130h	304	SVE speed loop gain	Adjusts the motor response in reaction to the speed deviation. Increasing this value will make the deviation between the command speed and the actual speed smaller.	10 to 200	180	A

Parameter ID		Name	Description	Setting range	Initial value	Update
Hex	Dec					
0131h	305	SVE speed loop integral time constant	Adjusts the deviation that cannot be adjusted with the speed loop gain. If this value is too high, the motor will move slowly.	100 to 2,000 (1=0.1 ms)	1,000	A
0132h	306	Automatic current cutback function	Enables the automatic current cutback function.	0: Disable 1: Enable	1	A
0133h	307	Automatic current cutback switching time	Sets a period of time from when the motor stops to when the automatic current cutback function is activated.	0 to 1,000 ms	100	A
0134h	308	Operating current ramp up rate	Sets the increasing rate when the operating current increases.	0 to 100 ms/100 %	0	A
0135h	309	Operating current ramp down rate	Sets the decreasing rate when the operating current decreases.	0 to 100 ms/100 %	0	A
0137h	311	Resonance suppression control frequency	Sets the frequency of vibration to be suppressed.	100 to 2,000 Hz	1,000	A
0138h	312	Resonance suppression control gain	Sets the gain to suppress the vibration. Increasing the value causes the motor response to the deviation to lower.	–500 to 500	0	A
0139h	313	Deviation acceleration suppressing gain	Prevents the occurrence of sudden acceleration and overspeed. Increasing the value causes the motor response to the deviation to lower.	0 to 500	45	A
0142h	322	Starting speed	Sets the starting speed for stored data (SD) operation or continuous macro operation.	0 to 4,000,000 Hz	500	B
0147h	327	Acceleration/ deceleration unit	Sets the acceleration/ deceleration unit.	0: kHz/s 1: s 2: ms/kHz	0	C
0148h	328	Permission of absolute positioning without setting absolute coordinates	Permits absolute positioning operation in a state where coordinates are not set.	0: Disable 1: Enable	0	B
01C3h	451	Software overtravel	Sets the action when the software overtravel is detected.	–1: Disable 0: Immediate stop 1: Deceleration stop 2: Immediate stop with alarm 3: Deceleration stop with alarm	3	A
01C4h	452	Positive software limit	Sets the value of software limit in the forward direction.	–2,147,483,648 to 2,147,483,647 steps	2,147,483,647	A
01C5h	453	Negative software limit	Sets the value of software limit in the reverse direction.		–2,147,483,648	A
01C6h	454	Preset position	Sets the preset position.	–2,147,483,648 to 2,147,483,647 steps	0	A

Parameter ID		Name	Description	Setting range	Initial value	Update
Hex	Dec					
01FAh	506	Main power mode	Sets the voltage mode of the main power supply. The voltage mode of the main power supply is discriminated in 50 ms after the main power supply is turned on. Set the Main power mode (41FAh) to "0: 24 VDC" or "1: 48 VDC" when the main power supply starts up slowly or the voltage of the main power supply is unstable.	–1: Automatic discrimination (discriminates the input power supply voltage automatically) 0: 24 VDC 1: 48 VDC	–1	D
01FFh	511	Driver simulation mode	Situation for coordinates or I/O can be simulated using a virtual motor without connecting a motor.	0: Use real motor 1: Virtual motor (when ABZO not connected= no ABZO information) 2: Virtual motor (when ABZO not connected= 1,800 rev wrap enable) 3: Virtual motor (when ABZO not connected= 900 rev wrap enable)	0	D
6114h	24852	Direct data operation trigger setting	Sets the trigger to execute direct data operation. The trigger setting is enabled only when the TRIG-MODE is set to "1: Start at ON level."	–6: Operation type –5: Position –4: Speed –3: Starting/changing rate –2: Stopping deceleration –1: Operating current 0: Disable 1: Apply all data	1	A
–	–	Motor user name	The desired name can be given to the motor used.	–	–	A
–	–	Driver user name	The desired name can be given to the driver used.	–	–	A

8-2 (p5) Motor & Mechanism (Coordinates/JOG/Home operation) setting parameters

Parameter ID		Name	Description	Setting range	Initial value	Update
Hex	Dec					
0150h	336	(JOG) Travel amount	Sets the travel amount for inching operation.	1 to 8,388,607 steps	1	B
0151h	337	(JOG) Operating speed	Sets the operating speed for JOG operation and inching operation.	1 to 4,000,000 Hz	1,000	B
0152h	338	(JOG) Acceleration/ deceleration	Sets the acceleration/ deceleration rate or the acceleration/deceleration time for JOG macro operation.	1 to 1,000,000,000 (1=0.001)*1	1,000,000	B
0153h	339	(JOG) Starting speed	Sets the starting speed for JOG macro operation.	0 to 4,000,000 Hz	500	B
0154h	340	(JOG) Operating speed (high)	Sets the operating speed for high-speed JOG operation.	1 to 4,000,000 Hz	5,000	B
0158h	344	(ZHOME) Operating speed	Sets the operating speed for high-speed return-to-home operation.	1 to 4,000,000 Hz	5,000	B

Parameter ID		Name	Description	Setting range	Initial value	Update
Hex	Dec					
0159h	345	(ZHOME) acceleration/ deceleration rate	Sets the acceleration/ deceleration rate or the acceleration/deceleration time for high-speed return-to-home operation.	1 to 1,000,000,000 (1=0.001)*1	1,000,000	B
015Ah	346	(ZHOME) Starting speed	Sets the starting speed for high-speed return-to-home operation.	0 to 4,000,000 Hz	500	B
015Eh	350	JOG/HOME/ZHOME command filter time constant	Sets the time constant for the command filter.	1 to 200 ms	1	B
015Fh	351	JOG/HOME/ZHOME operating current	Sets the operating current.	0 to 1,000 (1=0.1 %)	1,000	B
0160h	352	(HOME) Return-to-home mode	Sets the return-to-home method.	0: 2 sensors 1: 3 sensors*2 2: One-way rotation 3: Push-motion	2	B
0161h	353	(HOME) Return-to-home starting direction	Sets the starting direction for detecting the home.	0: Negative side 1: Positive side	1	B
0162h	354	(HOME) Acceleration/ deceleration	Sets the acceleration/ deceleration rate or the acceleration/deceleration time for return-to-home operation.	1 to 1,000,000,000 (1=0.001)*1	1,000,000	B
0163h	355	(HOME) Return-to-home starting speed	Sets the starting speed for return-to-home operation.	1 to 4,000,000 Hz	500	B
0164h	356	(HOME) Return-to-home operating speed	Sets the operating speed for return-to-home operation.		1,000	B
0165h	357	(HOME) Return-to-home last speed	Sets the operating speed when finally positioning with the home.	1 to 10,000 Hz	500	B
0166h	358	(HOME) Return-to-home SLIT detection	Sets whether to use the SLIT input together when returning to the home.	0: Disable 1: Enable	0	B
0167h	359	(HOME) Return-to-home TIM/ZSG signal detection	Sets whether to use the TIM output or the ZSG output together when returning to the home.	0: Disable 1: TIM 2: ZSG	0	B
0168h	360	(HOME) Return-to-home position offset	Sets the amount of offset from the home.	−2,147,483,648 to 2,147,483,647 steps	0	B
0169h	361	(HOME) Backward steps in 2 sensor return-to-home	Sets the amount of backward steps after return-to-home operation in 2-sensor mode.	0 to 8,388,607 steps	500	B
016Ah	362	(HOME) Operating amount in uni-directional return-to-home	Sets the operating amount after return-to-home operation in the one-way rotation mode.		500	B
016Bh	363	(HOME) Operating current for push-motion return-to-home	Sets the operating current rate of push-motion return-to-home based on the base current being 100 %.	0 to 1,000 (1=0.1 %)	1,000	B
016Ch	364	(HOME) Backward steps after first entry in push-motion return-to-home	Sets the amount of backward steps after first detecting the mechanical end in push-motion return-to-home operation.	0 to 8,388,607 steps	0	B
016Dh	365	(HOME) Pushing time in push-motion return-to-home	Sets the generation time of the TLC output that judges the completion of push motion.	1 to 65,535 ms	200	B

Parameter ID		Name	Description	Setting range	Initial value	Update
Hex	Dec					
016Eh	366	(HOME) Backward steps in push-motion return-to-home	Sets the amount of backward steps after fixing the mechanical end position in push-motion return-to-home operation.	0 to 8,388,607 steps	500	B
01C0h	448	Electronic gear A	Sets the denominator of the electronic gear.	1 to 65,535	1	C
01C1h	449	Electronic gear B	Sets the numerator of the electronic gear.		1	C
01C2h	450	Motor rotation direction	Sets the rotation direction of the motor output shaft.	0: Positive side= Counterclockwise 1: Positive side= Clockwise 2: Positive side= Counterclockwise (the driver parameter is applied) 3: Positive side= Clockwise (the driver parameter is applied)	1	C
01C7h	455	Wrap (RND) setting	Sets the wrap function.	0: Disable 1: Enable	1	C
01C9h	457	Initial coordinate generation & wrap setting range	Sets the wrap range.	Refer to the next table. (1=0.1 rev)	10	C
01CBh	459	Initial coordinate generation & wrap range offset ratio	Sets the offset ratio of the wrap range.	0 to 10,000 (1=0.01 %)	5,000	C
01CCh	460	Initial coordinate generation & wrap range offset value	Sets the offset amount of the wrap range.	−536,870,912 to 536,870,911 steps	0	C
01CDh	461	The number of the RND-ZERO output in wrap range	Sets the number of times to turn the RND-ZERO output ON in the wrap range.	1 to 536,870,911 divisions	1	C
07E1h	2017	Mechanism lead	Sets the lead of the ball screw.	1 to 32,767	1	C
07F0h	2032	Mechanism settings	To change the mechanism settings parameter, select "1: Manual setting."	0: Prioritize ABZO setting 1: Manual setting	0	D
07F1h	2033	Gear ratio setting	Sets the gear ratio for geared motor.	0: Gear ratio setting disable 1 to 32,767: Gear ratio (1=0.01)	0	C
07F2h	2034	Initial coordinate generation & wrap coordinate setting	To change the initial coordinate generation & wrap coordinate parameter, select "1: Manual setting."	0: Prioritize ABZO setting 1: Manual setting	0	D
07F3h	2035	Mechanism limit parameter setting	Disables the ABZO setting of the mechanism limit parameter.	0: Follow ABZO setting 1: Disable	0	D
07F4h	2036	Mechanism protection parameter setting	Disables the ABZO setting of the mechanism protection parameter.	0: Follow ABZO setting 1: Disable	0	D
07F5h	2037	JOG/HOME/ZHOME operation setting	To change the operation parameter, select "1: Manual setting."	0: Prioritize ABZO setting 1: Manual setting	0	D

Parameter ID		Name	Description	Setting range	Initial value	Update
Hex	Dec					
09F9h	2553	Mechanism lead decimal digit setting	Sets the number of decimal places when the lead of the ball screw contains a decimal point.	0: ×1 [mm] 1: ×0.1 [mm] 2: ×0.01 [mm] 3: ×0.001 [mm]	0	C

*1 The setting unit is followed the "Acceleration/deceleration unit" parameter.
*2 Two input signals are provided for the mini Driver. Return-to-home operation of the 3-sensor mode requires three inputs: HOMES input, FW-LS input, and RV-LS input. Therefore, return-to-home operation of the 3-sensor mode is not recommended for the mini Driver.

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

  Since the internal coordinate of the ABZO sensor is 1,800 revolutions (or 900 revolutions), select a value from the table to set in the "Initial coordinate generation & wrap setting range" parameter.
  In the table, the values which are surrounded with thick box border cannot be set for the ABZO sensor of 900 revolutions.

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

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

8-3 (p6) Alarm & Information setting parameters

Parameter ID		Name	Description	Setting range	Initial value	Update
Hex	Dec					
0180h	384	Overload alarm	Sets the condition under which the overload alarm is generated.	1 to 300 (1=0.1 s)	50	A
0181h	385	Excessive position deviation alarm	Sets the condition under which the excessive position deviation alarm is generated.	1 to 30,000 (1=0.01 rev)	300	A
01A0h	416	Driver temperature information (INFO-DRVTMP)	Sets the condition under which the information is generated.	40 to 85 °C	85	A
01A1h	417	Overload time information (INFO-OLTIME)		1 to 300 (1=0.1 s)	50	A
01A2h	418	Speed information (INFO-SPD)		0: Disable 1 to 12,000 r/min	0	A
01A5h	421	Position deviation information (INFO-POSERR)		1 to 30,000 (1=0.01 rev)	300	A
01A8h	424	Motor temperature information (INFO-MTRTMP)		40 to 120 °C	85	A

Parameter ID		Name	Description	Setting range	Initial value	Update
Hex	Dec					
01ABh	427	Overvoltage information (INFO-OVOLT)	Sets the condition under which the information is generated.	140 to 630 (1=0.1 V)	630	A
01ACh	428	Undervoltage information (INFO-UVOLT)			140	A
01AFh	431	Tripmeter information (INFO-TRIP)		0: Disable 1 to 2,147,483,647 (1=0.1 kRev)	0	A
01B0h	432	Odometer information (INFO-ODO)			0	A
01B1h	433	Cumulative load 0 information (INFO-CULD0)		0 to 2,147,483,647	0	A
01B2h	434	Cumulative load 1 information (INFO-CULD1)			0	A
01B3h	435	Cumulative load value auto clear	Clears the cumulative load when operation is started (at the ON edge of the MOVE output).	0: Disable 1: Enable	1	A
01B4h	436	Cumulative load value count divisor	Sets the divisor of the cumulative load.	1 to 32,767	1	A
01BCh	444	INFO-USRIO output selection	Selects the I/O status to be checked by the INFO-USRIO output.	Output signals list ⇨p.160	128: CONST-OFF	A
01BDh	445	INFO-USRIO output inversion	Sets the ON-OFF status of the INFO-USRIO output.	0: Non invert 1: Invert	0	A
01BEh	446	Information LED condition	Sets the LED status when information is generated.	0: Disable (LED does not blink) 1: Enable (LED blinks)	1	A
01BFh	447	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	A
07A0h	1952	INFO action (Assigned I/O status information (INFO-USRIO))	Sets the bit output, the INFO output, and the LED status when information is generated.	0: No info reflect (Only the bit output is ON.)* 1: Info reflect (The bit output and the INFO output are ON and the LED blinks.)	1	A
07A1h	1953	INFO action (Position deviation information (INFO-POSERR))			1	A
07A2h	1954	INFO action (Driver temperature information (INFO-DRVTMP))			1	A
07A3h	1955	INFO action (Motor temperature information (INFO-MTRTMP))			1	A
07A4h	1956	INFO action (Overvoltage information (INFO-OVOLT))			1	A
07A5h	1957	INFO action (Undervoltage information (INFO-UVOLT))			1	A
07A6h	1958	INFO action (Overload time information (INFO-OLTIME))			1	A

Parameter ID		Name	Description	Setting range	Initial value	Update
Hex	Dec					
07A8h	1960	INFO action (Speed information (INFO-SPD))	Sets the bit output, the INFO output, and the LED status when information is generated.	0: No info reflect (Only the bit output is ON.)* 1: Info reflect (The bit output and the INFO output are ON and the LED blinks.)	1	A
07A9h	1961	INFO action (Start operation error information (INFO-START))			1	A
07AAh	1962	INFO action (Start ZHOME error information (INFO-ZHOME))			1	A
07ABh	1963	INFO action (PRESET request information (INFO-PR-REQ))			1	A
07ADh	1965	INFO action (Electronic gear setting error information (INFO-EGR-E))			1	A
07AEh	1966	INFO action (Wrap setting error information (INFO-RND-E))			1	A
07B0h	1968	INFO action (Forward operation prohibition information (INFO-FW-OT))			1	A
07B1h	1969	INFO action (Reverse operation prohibition information (INFO-RV-OT))			1	A
07B2h	1970	INFO action (Cumulative load 0 information (INFO-CULD0))			1	A
07B3h	1971	INFO action (Cumulative load 1 information (INFO-CULD1))			1	A
07B4h	1972	INFO action (Tripmeter information (INFO-TRIP))			1	A
07B5h	1973	INFO action (Odometer information (INFO-ODO))			1	A
07BCh	1980	INFO action (Start operation restricted mode information (INFO-DSLMTD))			1	A
07BDh	1981	INFO action (I/O test mode information (INFO-IOTEST))			1	A
07BEh	1982	INFO action (Configuration request information (INFO-CFG))			1	A
07BFh	1983	INFO action (Reboot request information (INFO-RBT))			1	A
6188h	24968	Network bus error alarm (CC-Link IE Field Network Basic)	Sets the function of the network bus error alarm.	0: Disable 1: Enable	1	A

* Even if the "INFO action" parameter is set to "0," it will remain in the information history of the **MEXE02** software.

8-4 (p7) I/O action and function parameters

Parameter ID		Name	Description	Setting range	Initial value	Update
Hex	Dec					
0700h	1792	STOP/STOP-COFF input action	Sets how to stop the motor when the STOP input or the STOP-COFF input is turned ON.	0: Immediate stop for both STOP and STOP-COFF inputs 1: Deceleration stop for STOP input, immediate stop for STOP-COFF input 2: Immediate stop for STOP input, deceleration stop for STOP-COFF input 3: Deceleration stop for both STOP and STOP-COFF inputs	3	A
0701h	1793	FW-LS/RV-LS input action	Sets how to stop the motor when the FW-LS input or the RV-LS input is turned ON.	−1: 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
0702h	1794	FW-BLK/RV-BLK input action	Sets how to stop the motor when the FW-BLK input or the RV-BLK input is turned ON.	0: Immediate stop 1: Deceleration stop	1	A
0703h	1795	IN-POS positioning completion signal range	Sets the output range of the IN-POS output (angle range in which the motor is converged) with the target position as a center.	0 to 180 (1=0.1°)	18	A
0704h	1796	IN-POS positioning completion signal offset	Sets the amount of offset from the target position.	−18 to 18 (1=0.1°)	0	A
0705h	1797	D-SEL drive start function	Sets how to start operation when the D-SEL input is turned ON.	0: Only operation data number selection 1: Operation data number selection with START function	1	A
0706h	1798	TEACH operation type setting	Selects the operation type when "Position" is set by the teaching function.	−1: Not set 1: Absolute positioning 8: Wrap absolute positioning	1	A
0707h	1799	ZSG signal width	Sets the output width of the ZSG output.	1 to 1,800 (1=0.1°)	18	A
0708h	1800	RND-ZERO signal width	Sets the output width of the RND-ZERO output.	1 to 10,000 steps	10	A
0709h	1801	RND-ZERO output data selection	Sets the criterion of the RND-ZERO output.	0: Based on feedback position 1: Based on command position	0	A
070Ah	1802	MOVE minimum ON time	Sets the minimum time during which the MOVE output remains ON.	0 to 255 ms	0	A
070Bh	1803	PAUSE standby condition selection	Selects a standby state when the PAUSE input is turned ON.	0: Standstill mode (current cutback) 1: Operation mode (operating current is retained)	0	A
070Dh	1805	CRNT-LMT operating current limit value	Sets the operating current that is limited by the CRNT-LMT input. Sets the ratio of the operating current based on the base current being 100 %.	0 to 1,000 (1=0.1 %)	500	A
070Eh	1806	SPD-LMT speed limit type selection	Selects the setting method of the speed limit value.	0: Ratio 1: Value	0	A

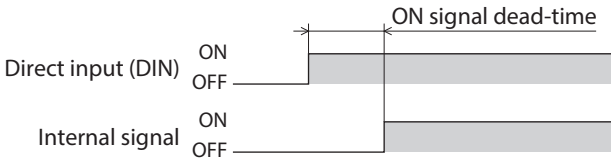
Parameter ID		Name	Description	Setting range	Initial value	Update
Hex	Dec					
070Fh	1807	SPD-LMT speed limit ratio	Sets the percentage of the speed limit based on "Speed" of the operation data being 100 %. This is enabled when the "SPD-LMT speed limit type selection" parameter is set to "0: Ratio."	1 to 100 %	50	A
0710h	1808	SPD-LMT speed limit value	Sets the speed limit value as "Value." This is enabled when the "SPD-LMT speed limit type selection" parameter is set to "1: Value."	1 to 4,000,000 Hz	1,000	A
0711h	1809	JOG-C time from JOG-P to JOG	Sets the timing to transit from inching operation to JOG operation in combined JOG operation.	1 to 5,000 (1=0.001 s)	500	B
0712h	1810	JOG-C time from JOG to JOG-H	Sets the timing to transit from JOG operation to high-speed JOG operation in combined JOG operation.		1,000	B
0718h	1816	VA mode selection	Selects the judgment criterion of the VA output.	0: Feedback speed attainment (speed at feedback position) 1: Speed at command position (only internal profile) 2: Speed at feedback position & command position (only internal profile)	0	B
0719h	1817	VA detection speed range	Sets the allowable range of the judgment criterion for the feedback speed when the "VA mode selection" parameter is set to "0: Feedback speed attainment (speed at feedback position)" or "2: Speed at feedback position & command position (only internal profile)."	1 to 200 r/min	30	B
071Ah	1818	MAREA output source	Sets the criterion to turn the MAREA output ON and the status of the MAREA output after operation.	0: Feedback position (ON after operation) 1: Command position (ON after operation) 2: Feedback position (MAREA output OFF at completion) 3: Command position (MAREA output OFF at completion)	0	A
0740h	1856	AREA0 positive direction position/ offset	• AREA positive direction position/offset Sets the positive direction position or offset from the target position for the AREA output. • AREA negative direction position/offset Sets the negative direction position or distance from the offset position for the AREA output.	–2,147,483,648 to 2,147,483,647 steps	0	A
0741h	1857	AREA0 negative direction position/ detection range			0	A
0742h	1858	AREA1 positive direction position/ offset			0	A
0743h	1859	AREA1 negative direction position/ detection range			0	A
0744h	1860	AREA2 positive direction position/ offset			0	A

Parameter ID		Name	Description	Setting range	Initial value	Update
Hex	Dec					
0745h	1861	AREA2 negative direction position/ detection range	• AREA positive direction position/offset Sets the positive direction position or offset from the target position for the AREA output. • AREA negative direction position/offset Sets the negative direction position or distance from the offset position for the AREA output.	−2,147,483,648 to 2,147,483,647 steps	0	A
0746h	1862	AREA3 positive direction position/ offset			0	A
0747h	1863	AREA3 negative direction position/ detection range			0	A
0748h	1864	AREA4 positive direction position/ offset			0	A
0749h	1865	AREA4 negative direction position/ detection range			0	A
074Ah	1866	AREA5 positive direction position/ offset			0	A
074Bh	1867	AREA5 negative direction position/ detection range			0	A
074Ch	1868	AREA6 positive direction position/ offset			0	A
074Dh	1869	AREA6 negative direction position/ detection range			0	A
074Eh	1870	AREA7 positive direction position/ offset			0	A
074Fh	1871	AREA7 negative direction position/ detection range			0	A
0750h	1872	AREA0 range setting mode	Sets the range setting method for the AREA output.	0: Range setting with absolute value 1: Offset/width setting from the target position	0	A
0751h	1873	AREA1 range setting mode			0	A
0752h	1874	AREA2 range setting mode			0	A
0753h	1875	AREA3 range setting mode			0	A
0754h	1876	AREA4 range setting mode			0	A
0755h	1877	AREA5 range setting mode			0	A
0756h	1878	AREA6 range setting mode			0	A
0757h	1879	AREA7 range setting mode			0	A
0758h	1880	AREA0 positioning standard	Sets the judgment criterion of the position for the AREA output.	0: Based on feedback position 1: Based on command position	0	A
0759h	1881	AREA1 positioning standard			0	A
075Ah	1882	AREA2 positioning standard			0	A

Parameter ID		Name	Description	Setting range	Initial value	Update
Hex	Dec					
075Bh	1883	AREA3 positioning standard	Sets the judgment criterion of the position for the AREA output.	0: Based on feedback position 1: Based on command position	0	A
075Ch	1884	AREA4 positioning standard			0	A
075Dh	1885	AREA5 positioning standard			0	A
075Eh	1886	AREA6 positioning standard			0	A
075Fh	1887	AREA7 positioning standard			0	A
0760h	1888	D-SEL0 operation number selection	Sets the operation data number corresponding to the D-SEL input.	0 to 255: Operation data number	0	A
0761h	1889	D-SEL1 operation number selection			1	A
0762h	1890	D-SEL2 operation number selection			2	A
0763h	1891	D-SEL3 operation number selection			3	A
0764h	1892	D-SEL4 operation number selection			4	A
0765h	1893	D-SEL5 operation number selection			5	A
0766h	1894	D-SEL6 operation number selection			6	A
0767h	1895	D-SEL7 operation number selection			7	A
0768h	1896	D-END0 operation number selection	Sets the operation data number corresponding to the D-END output.	0 to 255: Operation data number	0	A
0769h	1897	D-END1 operation number selection			1	A
076Ah	1898	D-END2 operation number selection			2	A
076Bh	1899	D-END3 operation number selection			3	A
076Ch	1900	D-END4 operation number selection			4	A
076Dh	1901	D-END5 operation number selection			5	A
076Eh	1902	D-END6 operation number selection			6	A
076Fh	1903	D-END7 operation number selection			7	A
09FAh	2554	Current setting during motor standstill at T-MODE	Selects the command current when the motor is stopped in a state where the T-MODE input is ON.	0: Stop current 1: Operating current	0	A

8-5 (p8) Direct-IN function selection (DIN) parameters

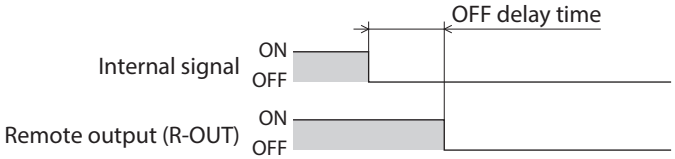
Parameter ID		Name	Description	Setting range	Initial value	Update
Hex	Dec					
0840h	2112	DIN0 input function	Selects an input signal to be assigned to DIN.	Input signals list ⇨p.159	5: STOP	C
0841h	2113	DIN1 input function			1: FREE	C
0850h	2128	DIN0 inverting mode	Changes the ON-OFF status of DIN.	0: Non invert 1: Invert	0	C
0851h	2129	DIN1 inverting mode			0	C
0880h	2176	DIN0 composite input function	Selects an input signal to be assigned to DIN as the composite input function.	Input signals list ⇨p.159	0: No function	C
0881h	2177	DIN1 composite input function			0: No function	C
08C0h	2240	DIN0 ON signal dead-time	Sets the ON signal dead-time of DIN. (Refer to the figure)	0 to 250 ms	0	C
08C1h	2241	DIN1 ON signal dead-time			0	C
08D0h	2256	DIN0 1 shot signal	Sets the 1-shot signal function of DIN.	0: 1-shot signal function is disabled 1: 1-shot signal function is enabled	0	C
08D1h	2257	DIN1 1 shot signal			0	C



8-6 (p9) Remote-I/O function selection (R-I/O) parameters

Parameter ID		Name	Description	Setting range	Initial value	Update
Hex	Dec					
0900h	2304	R-IN0 input function	Selects an input signal to be assigned to R-IN.	Input signals list ⇨p.159	0: No function	C
0901h	2305	R-IN1 input function			0: No function	C
0902h	2306	R-IN2 input function			0: No function	C
0903h	2307	R-IN3 input function			0: No function	C
0904h	2308	R-IN4 input function			0: No function	C
0905h	2309	R-IN5 input function			0: No function	C
0906h	2310	R-IN6 input function			0: No function	C
0907h	2311	R-IN7 input function			0: No function	C
0908h	2312	R-IN8 input function			0: No function	C
0909h	2313	R-IN9 input function	Selects an input signal to be assigned to R-IN.	Input signals list ⇨p.159	0: No function	C
090Ah	2314	R-IN10 input function			0: No function	C
090Bh	2315	R-IN11 input function			0: No function	C
090Ch	2316	R-IN12 input function			0: No function	C
090Dh	2317	R-IN13 input function			0: No function	C
090Eh	2318	R-IN14 input function			0: No function	C
090Fh	2319	R-IN15 input function			0: No function	C

Parameter ID		Name	Description	Setting range	Initial value	Update
Hex	Dec					
0910h	2320	R-OUT0 output function	Selects an output signal to be assigned to R-OUT.	Output signals list ⇨p.160	64: M0_R	C
0911h	2321	R-OUT1 output function			65: M1_R	C
0912h	2322	R-OUT2 output function			66: M2_R	C
0913h	2323	R-OUT3 output function			32: START_R	C
0914h	2324	R-OUT4 output function			144: HOME-END	C
0915h	2325	R-OUT5 output function			132: READY	C
0916h	2326	R-OUT6 output function			135: INFO	C
0917h	2327	R-OUT7 output function			129: ALM-A	C
0918h	2328	R-OUT8 output function			136: SYS-BSY	C
0919h	2329	R-OUT9 output function			160: AREA0	C
091Ah	2330	R-OUT10 output function			161: AREA1	C
091Bh	2331	R-OUT11 output function			162: AREA2	C
091Ch	2332	R-OUT12 output function			157: TIM	C
091Dh	2333	R-OUT13 output function			134: MOVE	C
091Eh	2334	R-OUT14 output function			138: IN-POS	C
091Fh	2335	R-OUT15 output function			140: TLC	C
0930h	2352	R-OUT0 OFF delay time	Sets the OFF delay time of R-OUT. (Refer to the figure)	0 to 250 ms	0	C
0931h	2353	R-OUT1 OFF delay time			0	C
0932h	2354	R-OUT2 OFF delay time			0	C
0933h	2355	R-OUT3 OFF delay time			0	C
0934h	2356	R-OUT4 OFF delay time			0	C
0935h	2357	R-OUT5 OFF delay time			0	C
0936h	2358	R-OUT6 OFF delay time			0	C
0937h	2359	R-OUT7 OFF delay time			0	C
0938h	2360	R-OUT8 OFF delay time			0	C
0939h	2361	R-OUT9 OFF delay time			0	C
093Ah	2362	R-OUT10 OFF delay time			0	C
093Bh	2363	R-OUT11 OFF delay time			0	C
093Ch	2364	R-OUT12 OFF delay time			0	C
093Dh	2365	R-OUT13 OFF delay time			0	C
093Eh	2366	R-OUT14 OFF delay time			0	C
093Fh	2367	R-OUT15 OFF delay time			0	C



8-7 (p10) VIR-IN & USR-OUT function selection (Extended) parameters

Parameter ID		Name	Description	Setting range	Initial value	Update
Hex	Dec					
0940h	2368	Virtual input (VIR-IN0) function	Selects an input signal to be assigned to VIR-IN.	Input signals list ⇨p.159	0: No function	C
0941h	2369	Virtual input (VIR-IN1) function			0: No function	C
0942h	2370	Virtual input (VIR-IN2) function			0: No function	C
0943h	2371	Virtual input (VIR-IN3) function			0: No function	C
0944h	2372	Virtual input (VIR-IN0) source selection	Selects an output signal to be the trigger of VIR-IN.	Output signals list ⇨p.160	128: CONST-OFF	C
0945h	2373	Virtual input (VIR-IN1) source selection			128: CONST-OFF	C
0946h	2374	Virtual input (VIR-IN2) source selection			128: CONST-OFF	C
0947h	2375	Virtual input (VIR-IN3) source selection			128: CONST-OFF	C
0948h	2376	Virtual input (VIR-IN0) inverting mode	Changes the ON-OFF status of VIR-IN.	0: Non invert 1: Invert	0	C
0949h	2377	Virtual input (VIR-IN1) inverting mode			0	C
094Ah	2378	Virtual input (VIR-IN2) inverting mode			0	C
094Bh	2379	Virtual input (VIR-IN3) inverting mode			0	C
094Ch	2380	Virtual input (VIR-IN0) ON signal dead-time	Sets the ON signal dead-time of VIR-IN.	0 to 250 ms	0	C
094Dh	2381	Virtual input (VIR-IN1) ON signal dead-time			0	C
094Eh	2382	Virtual input (VIR-IN2) ON signal dead-time			0	C
094Fh	2383	Virtual input (VIR-IN3) ON signal dead-time			0	C
0950h	2384	Virtual input (VIR-IN0) 1 shot signal mode	Enables the 1-shot signal function of VIR-IN.	0: 1-shot signal function is disabled 1: 1-shot signal function is enabled	0	C
0951h	2385	Virtual input (VIR-IN1) 1 shot signal mode			0	C
0952h	2386	Virtual input (VIR-IN2) 1 shot signal mode			0	C
0953h	2387	Virtual input (VIR-IN3) 1 shot signal mode			0	C
0960h	2400	User output (USR-OUT0) source A function	Sets the output source A of USR-OUT.	Output signals list ⇨p.160	128: CONST-OFF	C
0961h	2401	User output (USR-OUT1) source A function			128: CONST-OFF	C
0962h	2402	User output (USR-OUT0) source A inverting mode	Changes the ON-OFF status of the output source A of USR-OUT.	0: Non invert 1: Invert	0	C
0963h	2403	User output (USR-OUT1) source A inverting mode			0	C

Parameter ID		Name	Description	Setting range	Initial value	Update
Hex	Dec					
0964h	2404	User output (USR-OUT0) source B function	Sets the output source B of USR-OUT.	Output signals list ⇨p.160	128: CONST-OFF	C
0965h	2405	User output (USR-OUT1) source B function			128: CONST-OFF	C
0966h	2406	User output (USR-OUT0) source B inverting mode	Changes the ON-OFF status of the output source B of USR-OUT.	0: Non invert 1: Invert	0	C
0967h	2407	User output (USR-OUT1) source B inverting mode			0	C
0968h	2408	User output (USR-OUT0) logical operation	Sets the logical combination of the user output sources A and B of USR-OUT.	0: AND 1: OR	1	C
0969h	2409	User output (USR-OUT1) logical operation			1	C

8-8 (p11) Communication & I/O function parameters

Use the **MEXE02** software to set parameters that have "–" in the parameter ID. They cannot be read or written via Ethernet.

Parameter ID		Name	Description	Setting range	Initial value	Update
Hex	Dec					
01F2h	498	USB-ID enable	The COM port can be fixed. (⇨p.157)	0: Disable 1: Enable	1	D
01F3h	499	USB-ID	This can be set when the "USB-ID enable" parameter is set to "1: Enable." Sets the ID to the COM port.	0 to 999,999,999	0	D
09FBh	2555	USB-PID	Sets the product ID to be displayed in the COM port. (⇨p.158)	0 to 31	0	D
63D4h	25556	IP Address 1	Sets the IP address.	0 to 255	192	D
63D5h	25557	IP Address 2			168	D
63D6h	25558	IP Address 3			1	D
63D7h	25559	IP Address 4			1	D
63D8h	25560	Network Mask 1	Sets the subnet mask.	0 to 255	255	D
63D9h	25561	Network Mask 2			255	D
63DAh	25562	Network Mask 3			255	D
63DBh	25563	Network Mask 4			0	D
63DCh	25564	Gateway Address 1	Sets the default gateway.	0 to 255	0	D
63DDh	25565	Gateway Address 2			0	D
63DEh	25566	Gateway Address 3			0	D
63DFh	25567	Gateway Address 4			0	D
63E5h	25573	Protocol (Network I/O)	Selects the protocol for network I/O.	1: Modbus TCP 2: Modbus UDP 3: CC-Link IE Field Network Basic	1	D
63E7h	25575	Port number (Modbus TCP/UDP)	Sets the port number. Do not set port numbers 60930, 61450, and 61451, as these are fixed in the driver.	1 to 65,535	502	D

Parameter ID		Name	Description	Setting range	Initial value	Update
Hex	Dec					
63F0h	25584	IP address blocking (Modbus TCP/UDP)	Restricts the IP address of the host controller that can be connected. Sets the IP address (representative value) of the host controller in hexadecimal. Refer to p.158 for details.	00:00:00:00 to FF:FF:FF:FF	00:00:00:00	D
63F1h	25585	IP address blocking number of bits (Modbus TCP/UDP)	Restricts the IP address of the host controller that can be connected. Sets the IP address (range) of the host controller. Refer to p.158 for details.	0: Not restricted 1 to 32 bits	0	D
63F5h	25589	Insufficient number of connections (Modbus TCP)	Sets the action to take when the number of connections is insufficient.	0: No action 1: Disconnect all connections	0	A
63FAh	25594	Communication timeout (Modbus TCP/UDP)	Sets the condition under which a communication timeout is detected. If the frame is not properly received after the set time has elapsed, it is judged as a communication timeout and an alarm of Network bus error is generated.	−1: Set by Modbus 0: Not monitored 1 to 65,535 ms	−1	D
63FBh	25595	Connection interruption during operation (Modbus TCP)	If the connection is lost during operation, the Network bus error alarm is generated.	0: Disabled 1: Enabled (one connection is disconnected) 2: Enabled (all connection is disconnected)	2	A
63FCh	25596	Communication timeout during operation (Modbus TCP/UDP)	Sets the condition under which a communication timeout during operation is detected. If the frame is not properly received after the set time has elapsed during motor operation, it is judged as a communication timeout during operation and an alarm of Network bus error is generated.	0: Not monitored 1 to 65,535 ms	0	D
63FDh	25597	32-bit data word order (Modbus TCP/UDP)	Sets the order of Word (2 bytes) in 32-bit data (4 bytes). Set when the arrangement of communication data is different from the host controller.	0: Order from upper to lower 1: Order from lower to upper	1	D
6400h	25600	Assignable monitor address 0	Sets the parameter ID to be displayed on the assignable monitor.	Set from items of "3 Monitor commands" on p.123.	124: Driver temperature	A
6401h	25601	Assignable monitor address 1			125: Motor temperature	A
6402h	25602	Assignable monitor address 2			109: Cumulative load monitor	A
6403h	25603	Assignable monitor address 3			127: Tripmeter	A

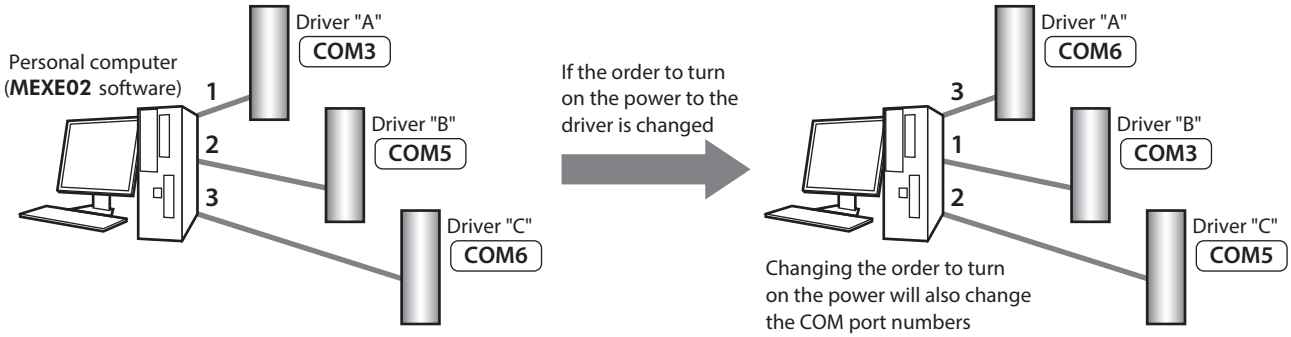
Parameter ID		Name	Description	Setting range	Initial value	Update
Hex	Dec					
643Dh	25661	Keep-alive starting time (TCP)	Sets the time from the end of communication with the host controller to the start of the keep-alive function.	10 to 3,600 s	60	D
643Eh	25662	Keep-alive notification interval (TCP)	Sets the notification interval of the keep-alive function.	1 to 60 s	10	D
6444h	25668	Frame timeout (Modbus TCP)	Sets the conditions under which the received frame timeout occurs. If the frame has not reached the message length after the set time has elapsed, the driver discards the reception frame(s) having been received.	1 to 30,000 ms	2,000	D
–	–	Support software connection (**MEXE02**)	Uses when connecting the **MEXE02** software via Ethernet. It is used to set the connection to be disabled or enabled and set the connection key. (⇨p.190)	–1: Disable 0: Enable –2,147,483,648 to –2 or 1 to 2,147,483,647: Connection key (⇨p.192)	–1	D
–	–	IP address blocking (**MEXE02**)	Uses when connecting the **MEXE02** software via Ethernet. It is used to restrict a PC(s) that can connect to the driver when used with the "IP address blocking number of bits" parameter. Refer to p.196 for details.	0000 0000 h to FFFF FFFF h	0000 0000 h	D
–	–	IP address blocking number of bits (**MEXE02**)	Uses when connecting the **MEXE02** software via Ethernet. It is used to restrict a PC(s) that can connect to the driver when used with the "IP address blocking" parameter. Refer to p.196 for details.	0: Not restricted 1 to 32 bits	0	D

■ 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** software.
If multiple drivers are connected to a PC, the PC allocates empty COM ports to the drivers 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 be changed because the order of connection recognized by the PC is changed.

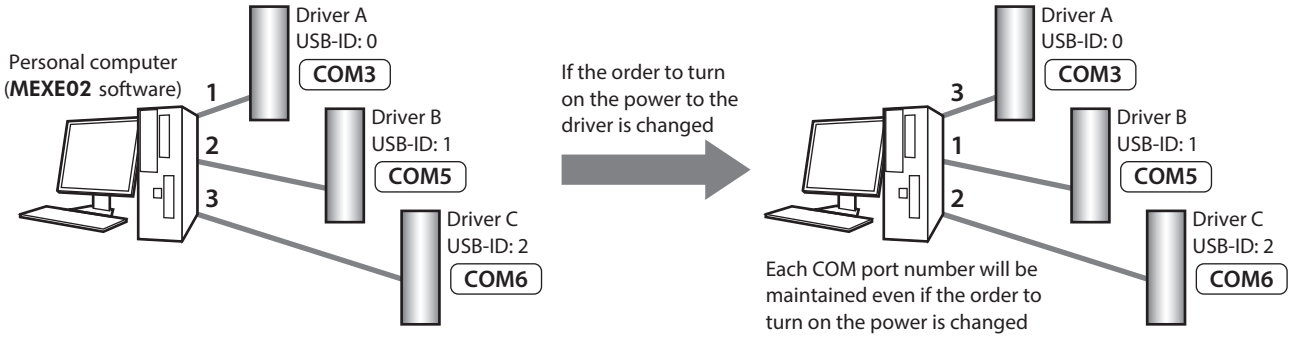
● When the USB-ID is not set

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



● When the USB-ID is set

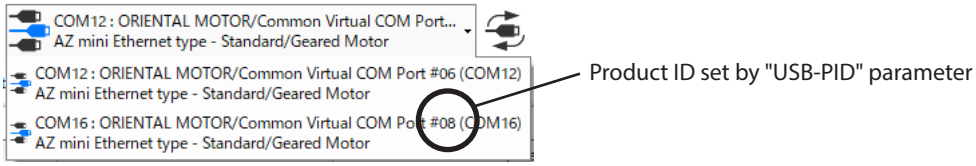
If the "USB-ID" parameter is set, the same COM port numbers are always displayed regardless of the order of connection because the COM port number is fixed to each driver. (The USB-ID and the COM port number may not match because a PC associates with empty COM port numbers in descending order.)



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** software because the ID number of the driver is not changed.



memo If USB-PID with the same number is set to multiple drivers, COM port numbers are allocated in the connected order.

■ Restriction of IP address

Using the "IP address blocking (Modbus TCP/UDP)" parameter and the "IP address blocking number of bits (Modbus TCP/UDP)" parameter together can restrict the host controller that can connect to the driver via Modbus TCP or Modbus UDP.

memo The function to restrict the IP address cannot completely prevent unauthorized access from outside.

● Setting example

This section explains how to set the parameter. The representative value of the IP address is "192.168.1.10" this time.

Example 1: When connecting a host controller whose IP address is "192.168.*.*"

If the parameter is set as follows, the range of IP addresses that can be connected is from "192.168.0.0" to "192.168.255.255."

Setting of parameters

MEXE02 code	Name	Setting value	Note
p11	IP address blocking (Modbus TCP/UDP)	C0:A8:01:0A	Representative value of IP address: 192.168.1.10
	IP address blocking number of bits (Modbus TCP/UDP)	16	Range of IP address: Matches the upper 16 bits

Example 2: When connecting a host controller whose IP address is "192.168.1.*"

If the parameter is set as follows, the range of IP addresses that can be connected is from "192.168.1.0" to "192.168.1.255."

Setting of parameters

MEXE02 code	Name	Setting value	Note
p11	IP address blocking (Modbus TCP/UDP)	C0:A8:01:0A	Representative value of IP address: 192.168.1.10
	IP address blocking number of bits (Modbus TCP/UDP)	24	Range of IP address: Matches the upper 24 bits

Example 3: When connecting a host controller whose IP address is "192.168.1.10"

If the parameter is set as follows, the IP address that can be connected is "192.168.1.10" only.

Setting of parameters

MEXE02 code	Name	Setting value	Note
p11	IP address blocking (Modbus TCP/UDP)	C0:A8:01:0A	Representative value of IP address: 192.168.1.10
	IP address blocking number of bits (Modbus TCP/UDP)	32	Range of IP address: Matches the upper 32 bits

9 I/O signals assignment list

To assign signals via Ethernet, use the "Assignment number" in the table instead of the signal name.

9-1 Input signals

Assignment number	Signal name
0	No function
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
13	LAT-CLR
14	INFO-CLR
16	HMI
18	CCM
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

Assignment number	Signal name
35	NEXT
36	HOME
37	ZHOME
40	D-SEL0
41	D-SEL1
42	D-SEL2
43	D-SEL3
44	D-SEL4
45	D-SEL5
46	D-SEL6
47	D-SEL7
48	FW-JOG
49	RV-JOG
50	FW-JOG-H
51	RV-JOG-H
52	FW-JOG-P
53	RV-JOG-P
54	FW-JOG-C
55	RV-JOG-C
56	FW-POS
57	RV-POS
58	FW-SPD
59	RV-SPD
60	FW-PSH
61	RV-PSH
64	M0

Assignment number	Signal name
65	M1
66	M2
67	M3
68	M4
69	M5
70	M6
71	M7
75	TEACH
80	R0
81	R1
82	R2
83	R3
84	R4
85	R5
86	R6
87	R7
88	R8
89	R9
90	R10
91	R11
92	R12
93	R13
94	R14
95	R15

9-2 Output signals

Assignment number	Signal name
0	No function
1	FREE_R
2	C-ON_R
3	CLR_R
4	STOP-COFF_R
5	STOP_R
6	PAUSE_R
7	BREAK-ATSQ_R
8	ALM-RST_R
9	P-PRESET_R
10	EL-PRST_R
13	LAT-CLR_R
14	INFO-CLR_R
16	HMI_R
18	CCM_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
46	D-SEL6_R
47	D-SEL7_R
48	FW-JOG_R
49	RV-JOG_R
50	FW-JOG-H_R
51	RV-JOG-H_R
52	FW-JOG-P_R
53	RV-JOG-P_R
54	FW-JOG-C_R
55	RV-JOG-C_R

Assignment number	Signal name
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
80	R0_R
81	R1_R
82	R2_R
83	R3_R
84	R4_R
85	R5_R
86	R6_R
87	R7_R
88	R8_R
89	R9_R
90	R10_R
91	R11_R
92	R12_R
93	R13_R
94	R14_R
95	R15_R
128	CONST-OFF
129	ALM-A
130	ALM-B
131	SYS-RDY
132	READY
134	MOVE
135	INFO
136	SYS-BSY
138	IN-POS
140	TLC
141	VA
142	CRNT
143	AUTO-CD
144	HOME-END

Assignment number	Signal name
145	ABSPEN
146	ELPRST-MON
149	PRST-DIS
150	PRST-STLD
151	ORGN-STLD
152	RND-OVF
153	FW-SLS
154	RV-SLS
155	ZSG
156	RND-ZERO
157	TIM
159	MAREA
160	AREA0
161	AREA1
162	AREA2
163	AREA3
164	AREA4
165	AREA5
166	AREA6
167	AREA7
168	MPS
169	MBC
180	USR-OUT0
181	USR-OUT1
192	CRNT-LMTD
193	SPD-LMTD
196	OPE-BSY
197	PAUSE-BSY
198	SEQ-BSY
199	DELAY-BSY
200	JUMP0-LAT
201	JUMP1-LAT
202	NEXT-LAT
204	DCMD-RDY
205	DCMD-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

Assignment number	Signal name
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
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

6 Troubleshooting

This part explains the alarm and information functions.

◆Table of contents

1 Detection of communication errors

1-1 Communication error list

■ When communicating via Modbus TCP or Modbus UDP

If a communication error occurs in the driver, the NS LED is lit in red.
Communication errors can be checked using the Ethernet error history monitor of the **MEXE02** software.

Error code	Cause	Remedial action	Driver status
0100h	Reception error due to IP address restriction (Modbus UDP only)	Check the IP address of the host controller and the following parameters. • IP address blocking (Modbus TCP/UDP) • IP address blocking number of bits (Modbus TCP/UDP)	No response (Discard)
0101h 0102h 0103h	Connection establishment error due to IP address restriction (Modbus TCP only)		Connection establishment disable
0111h 0112h 0113h	Connection establishment error due to connection busy (Modbus TCP only)	Check the number of connections being used simultaneously.	
0121h 0122h 0123h	Connection establishment error due to connection busy and request to close other connection (Modbus TCP only)		
0131h 0132h	Reception error due to frame timeout (Modbus TCP only)	Check the transmission time of a frame and the format of the frame.	No response (Discard)
0140h	Reception error due to processing (Modbus UDP only)	Check to see if a frame is sent before responding.	
0141h 0142h 0143h	Reception error due to processing (Modbus TCP only)		
0151h 0152h	Reception error due to invalid protocol ID (Other than 0)	Check the protocol ID.	
0161h 0162h	Reception error due to invalid unit ID (Other than 0x00, 0xFF)	Check the unit ID.	
0170h	Reception error due to insufficient number of receptions (Modbus UDP only)	Check the frame format.	
0171h 0172h	Reception error due to invalid message length (Small)		
0181h 0182h	Reception error due to invalid message length (Large)		
0190h	Transmission error due to ARP (Address Resolution Protocol) timeout (Modbus UDP only)	Check the response time and communication load between the host controller and the driver.	
0191h	Transmission error due to insufficient buffers (Modbus UDP only)	Check to see if a frame is sent while responding.	
0200h	Execution error due to function code error (Not supported)	Check the function code.	Exception response
0201h	Execution error due to invalid PDU data length of function code 03h	Check the number of registers.	
0202h	Execution error due to invalid read number of registers of function code 03h		

Error code	Cause	Remedial action	Driver status
0203h	Execution error due to invalid PDU data length of function code 10h	Check the number of registers.	Exception response
0204h	Execution error due to invalid write number of registers of function code 10h		
0205h	Execution error due to invalid PDU data length of function code 17h		
0206h	Execution error due to invalid read number of registers of function code 17h		
0207h	Execution error due to invalid write number of registers of function code 17h		
0210h	Execution error due to out of address range of function code 03h	Check the register address.	
0211h	Execution error due to out of address range of function code 10h		
0212h	Execution error due to out of write address range of function code 17h		
0213h	Execution error due to out of read address range of function code 17h		

■ When communicating via CC-Link IE Field Network Basic

When a communication error occurs, use the CC-Link IE Field Network Basic diagnostics of the host controller to check the error.
This section describes the communication errors that the driver can detect.
The communication errors in the table can be checked with the Ethernet error history monitor of the **MEXE02** software.

Error code	Cause	Remedial action
0274h	The master station has been duplicated.	Check to see if the master station has been duplicated.
0275h	The number of occupied stations is set incorrectly.	Check to see if the number of occupied stations set in the master station is correct.
0277h	The remote station has been duplicated.	Check to see if the remote station has been duplicated.
0281h	The master station sent an unsupported command.	Check to see if the master station has sent a command that the remote station does not support.

■ When connecting the MEXE02 software via Ethernet

If the communication error in the table occurs, the **MEXE02** software will not be able to connect via Ethernet.
The communication error can be checked with the Ethernet error history monitor of the **MEXE02** software.

Error code	Cause	Remedial action
02A1h 02A2h 02A3h	Initialization failed due to a duplicate port number.	Check the setting of the port number.

1-2 Functions related to communication errors

For Modbus TCP, it is necessary for the user to decide the condition under which a communication error occurs. This section describes the functions available for use with Modbus TCP.

■ Frame timeout

If the frame has not reached the message length after the time set in the "Frame timeout (Modbus TCP)" parameter has elapsed since the last reception, the driver discards the reception frame(s) having been received. If the reception frame is discarded, the history is recorded as a communication error.
Set the "Frame timeout (Modbus TCP)" parameter to a value that satisfies both of the following conditions.

- A value longer than the time it takes the host controller to transmit a frame.
- A value shorter than the interval at which the host controller retransmits a frame, if the host controller has a retransmission function

Related parameter

MEXE02 code	Name	Description	Setting range	Initial value
p11	Frame timeout (Modbus TCP)	Sets the conditions under which the received frame timeout occurs. If the frame has not reached the message length after the set time has elapsed, the driver discards the reception frame(s) having been received.	1 to 30,000 ms	2,000

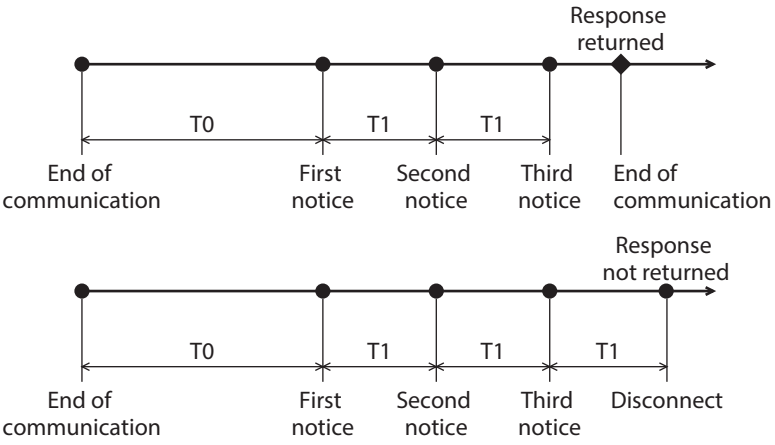
■ Detection of connection error

This is a function that detects an error in the connection to the host controller.

● Keep-alive function

For Modbus TCP, it is necessary to establish a connection before sending or receiving a frame.
The keep-alive function periodically checks whether the connection established by Modbus TCP is ready for communication. The starting time and notification interval are set for the keep-alive function. The number of notifications is three (fixed). If there is no response after three notifications, the connection will be lost.

- T0: Keep-alive starting time (TCP)
- T1: Keep-alive notification interval (TCP)



Related parameters

MEXE02 code	Name	Description	Setting range	Initial value
p11	Keep-alive starting time (TCP)	Sets the time (T0) from the end of communication with the host controller to the start of the keep-alive function.	10 to 3,600 s	60
	Keep-alive notification interval (TCP)	Sets the notification interval (T1) of the keep-alive function.	1 to 60 s	10

memo If the "Connection interruption during operation (Modbus TCP)" parameter is set to "1: Enable (one connection is disconnected)" or "2: Enable (all connections are disconnected)," an alarm can be generated to stop the motor when the connection is lost.

- **Insufficient number of connections**

This is a function that forcibly disconnects all connections when an attempt is made to establish a connection beyond the number of connections allowed for the driver. Use this function when existing connections cannot be disconnected, such as when a half-open occurs.
The number of connections that can be made to the driver is two.

Related parameter

MEXE02 code	Name	Description	Setting range	Initial value
p11	Insufficient number of connections (Modbus TCP)	Sets the action to take when the number of connections is insufficient.	0: No action 1: Disconnect all connections	0

memo If the "Connection interruption during operation (Modbus TCP)" parameter is set to "1: Enable (one connection is disconnected)" or "2: Enable (all connections are disconnected)," an alarm can be generated to stop the motor when the connection is lost.

1-3 Monitor function

This section introduces the monitor function of **MEXE02** software about communications.
Use this function when a communication error occurs or when the communication status is to be checked.

Related monitors

MEXE02 code	Name	Description
m8	Ethernet I/O Monitor	The status of I/O data can be checked.
m9	Ethernet status monitor	The communication status of the driver, such as the frame reception cycle and number of received frames addressed to its own station, can be checked. Refer to the next section for the frame reception cycle.
m10	Ethernet I/O input history monitor	The history of I/O data can be checked.
m11	Ethernet frame history monitor	The reception and transmission frames of Modbus TCP or Modbus UDP can be checked.
m12	Ethernet error history monitor	The communication error history and communication event history can be checked.
m13	Ethernet port information monitor	The number of frames received and transmitted on the Ethernet connectors (CN3, CN4) can be checked. Frames not addressed to its own station are also included.

- **Frame reception cycle**

This function is available for use with Modbus TCP and Modbus UDP.
The frame reception cycle can be checked using the Ethernet status monitor of the **MEXE02** software.
The frame reception cycle can be used to verify that the communication cycle of the host controller is within the cycle designed by the customer.
The interval between queries received by the driver is monitored, and the latest, minimum, and maximum values of the frame reception cycle are recorded.

2 Alarms

This driver is equipped with the alarm function to protect against temperature rise, poor connection, operation error, and the like.
If an alarm is generated, the ALM-A output is turned ON and the ALM-B output is turned OFF to stop the motor. At the same time, the PWR/ALM LED blinks in red.
The type of alarm being generated can be checked by counting the number of times the PWR/ALM LED blinks, or using Ethernet or the **MEXE02** software.

2-1 Alarm reset

Before resetting an alarm, always correct the cause of the alarm and ensure safety, and perform one of the reset operations specified below.

- Turn the ALM-RST input ON. (It is enabled at the ON edge.)
- Execute the alarm reset by the maintenance command.
- Execute the alarm reset using the **MEXE02** software.
- Turn off and then turn on the main power supply and the control power supply.

memo

- Some alarms cannot be reset by other methods than turning on the main power supply and control power supply again. Refer to "2-4 Alarm list" on p.169 .
- An alarm of Absolute position error can be reset if position preset or return-to-home operation is performed. If it cannot be reset by these methods, the ABZO sensor may be damaged.

2-2 Alarm history

Up to 10 generated alarm items are stored in non-volatile memory in order from most recent to oldest. The stored alarm history can be read or cleared when one of the following operations is performed.

- Read the alarm history with the monitor command.
- Clear the alarm history with the maintenance command.
- Read and clear the alarm history using the **MEXE02** software.

2-3 Generation condition of alarms

Alarms shown in the table will be generated if the generation condition is exceeded.

Alarm code	Alarm name	Motor model	Generation condition
21h	Main circuit overheat	–	85 °C (185 °F)
22h	Overvoltage	–	36 V*1 63 V*2
26h	Motor overheat	–	85 °C (185 °F)
31h	Overspeed	**AZM14**, **AZM15**, **AZM24**, **AZM26**	8,000 r/min
		AZM46, **AZM48**, **AZM66**	4,500 r/min
		AZM69	2,500 r/min
34h	Command pulse error	–	38,400 r/min

*1 When the "Main power mode" parameter is 24 VDC.
*2 When the "Main power mode" parameter is 48 VDC.

2-4 Alarm list

Alarm code	Number of times LED blinks	Alarm type	Cause	Remedial action	How to reset	Motor excitation*
10h	4	Excessive position deviation	• When the motor was in a state of current ON, the deviation between the command position and the feedback position exceeded the value set in the "Excessive position deviation alarm" parameter in the motor shaft. • A load is large, or the acceleration/deceleration time is too short or the acceleration/deceleration rate is too fast against the load. • The operating range of positioning push-motion SD operation was exceeded.	• Reduce the load. • Increase the acceleration/deceleration time or slow the acceleration/deceleration rate. • increase the operating current. • Reconsider the operation data.	Any of reset operations	Non-excitation
20h	5	Overcurrent	The motor, the cable, and the driver output circuit were short-circuited.	Turn off the main power supply and the control power supply, and check that the motor, the cable, and the driver are not damaged. After that, turn on the main power supply and the control power supply again. If the alarm is still not reset, the motor, the cable, or the driver may be damaged. Contact your nearest Oriental Motor sales office.	Turn on the main power supply and control power supply again	Non-excitation
21h	2	Main circuit overheat	The internal temperature of the driver reached the upper limit of the specification value.	Reconsider the ventilation condition.	Any of reset operations	Non-excitation
22h	3	Overvoltage	• The main power supply voltage exceeded the permissible value. • A large load inertia was suddenly stopped. • Vertical operation (elevating operation) was performed.	• Check the input voltage of the main power supply. • Reduce the load. • Increase the acceleration/deceleration time or slow the acceleration/deceleration rate.	Any of reset operations	Non-excitation
23h	3	Main power supply OFF	The main power supply was shut off during operation.	Check to see if the main power supply is properly supplied.	Any of reset operations	Non-excitation
25h	3	Undervoltage	The main power supply was momentarily shut off or the voltage was insufficient.	Check the input voltage of the main power supply.	Any of reset operations	Non-excitation
26h	8	Motor overheat	The detection temperature of the ABZO sensor reached the upper limit of the specification value.	• Check the heat radiation condition of the motor. • Reconsider the ventilation condition.	Any of reset operations	Non-excitation

Alarm code	Number of times LED blinks	Alarm type	Cause	Remedial action	How to reset	Motor excitation*
28h	8	Sensor error	An error of the ABZO sensor was detected during operation.	Turn off the main power supply and the control power supply, and check the connection of the motor. After that, turn on the main power supply and the control power supply again.	Turn on the main power supply and control power supply again	Non-excitation
29h	9	CPU peripheral circuit error	• A temperature significantly higher or lower than the specifications was detected. • The driver internal circuit was damaged.	• Reconsider the ambient temperature and ventilation condition. • Turn off the main power supply and the control power supply, and check to see if the driver is damaged. After that, turn on the main power supply and the control power supply again. If the alarm has still not reset, the driver may be damaged. Contact your nearest Oriental Motor sales office.	Turn on the main power supply and control power supply again	Non-excitation
2Ah	8	ABZO sensor communication error	An error occurred in communication between the driver and the ABZO sensor.	Turn off the main power supply and the control power supply, and check the connection of the ABZO sensor. After that, turn on the main power supply and the control power supply again.	Turn on the main power supply and control power supply again	Non-excitation
30h	2	Overload	A load exceeding the maximum torque was applied for the time exceeded the value set in the "Overload alarm" parameter.	• Reduce the load. • Increase the acceleration/deceleration time or slow the acceleration/deceleration rate. • Increase the operating current.	Any of reset operations	Non-excitation
31h	2	Overspeed	The feedback speed of the motor output shaft exceeded the specification value.	• Reconsider the "Electronic gear A" parameter and the "Electronic gear B" parameter, and set the speed of the motor output shaft to a value less than the specification value. • If an overshoot is occurred at the time of accelerating, increase the acceleration time or slow the acceleration rate.	Any of reset operations	Non-excitation
33h	7	Absolute position error	The home information of the ABZO sensor was damaged.	Perform the position preset or return-to-home operation to set the home again.	Turn on the main power supply and control power supply again	Non-excitation
34h	2	Command pulse error	The command pulse frequency exceeded the specification value.	Reduce the frequency of the command pulse.	Any of reset operations	Non-excitation

Alarm code	Number of times LED blinks	Alarm type	Cause	Remedial action	How to reset	Motor excitation*
41h	9	EEPROM error	The data stored in the driver was damaged.	Initialize all parameters.	Turn on the main power supply and control power supply again	Non-excitation
42h	8	Sensor error at power-on	An error of the ABZO sensor was detected when the control power supply was turned on.	Turn off the main power supply and the control power supply, and check the connection of the ABZO sensor. After that, turn on the main power supply and the control power supply again.	Turn on the main power supply and control power supply again	Non-excitation
43h	8	Rotation error at power on	The motor was being rotated when the control power supply was turned on.	Reconsider the load conditions so that the output shaft is not rotated by an external force when the control power supply is turned on.	Turn on the main power supply and control power supply again	Non-excitation
44h	8	Encoder EEPROM error	The data stored in the ABZO sensor was damaged.	Execute one of the following operations. If the same alarm is still generated, the ABZO sensor has been damaged. Contact your nearest Oriental Motor sales office. • Set phase Z again with the "ZSG-PRESET" of the maintenance command. • Execute the "Clear tripmeter" of the maintenance command.	Turn on the main power supply and control power supply again	Non-excitation
45h	8	Motor combination error	A motor that is not compatible with the driver was connected. (⇨ Refer to p.174 for details.)	Check the motor model name and the driver model name, and connect them in the correct combination.	Turn on the main power supply and control power supply again	Non-excitation
4Ah	7	Return-to-home incomplete	Absolute positioning operation was started in a state where the coordinates were not set.	Execute the position preset or return-to-home operation.	Any of reset operations	Excitation
60h	7	±LS both sides active	• When the "FW-LS/RV-LS input action" parameter is set to "2: Immediate stop with alarm" or "3: Deceleration stop with alarm," both the FW-LS input and the RV-LS input were detected. • Return-to-home operation was executed in a state where both the FW-LS input and the RV-LS input were detected.	Check the sensor logic installed and the "Inverting mode" parameter.	Any of reset operations	Excitation

Alarm code	Number of times LED blinks	Alarm type	Cause	Remedial action	How to reset	Motor excitation*
61h	7	Reverse ±LS connection	The LS input opposite to the operating direction was detected while return-to-home operation in the 2-sensor mode or the 3-sensor mode was performed.	Check the wiring of the sensor.	Any of reset operations	Excitation
62h	7	Return-to-home operation error	• An unanticipated load was applied while return-to-home operation was performed. • The installation positions of the FW-LS and RV-LS sensors and the HOME sensor are close to each other. • Position preset processing upon completion of return-to-home operation was failed. • During return-to-home operation in the one-way rotation mode, the motor position exceeded the HOME sensor while the motor was decelerating to a stop.	• Check the load. • Reconsider the sensor installation positions and the starting direction of motor operation. • Upon completion of return-to-home operation, ensure that no load exceeding the maximum torque is applied. • Reconsider the specifications of the HOME sensor and the "(HOME) Return-to-home acceleration/deceleration" parameter.	Any of reset operations	Excitation
63h	7	No HOMES	The HOMES input was not detected at a position between the FW-LS input and the RV-LS input while return-to-home operation in the 3-sensor mode was performed.	Install the HOME sensor at a position between the FW-LS and RV-LS sensors.	Any of reset operations	Excitation
64h	7	TIM, ZSG, SLIT signal error	None of the TIM output, the ZSG output, or the SLIT input could be detected during return-to-home operation.	• Reconsider the connection status of the load and the position of the HOME sensor so that these signals should be ON while the HOMES input is ON. • When a signal is not used, set the "(HOME) TIM/ZSG signal detection" parameter and the "(HOME) SLIT detection" parameter to "0: Disable."	Any of reset operations	Excitation
66h	7	Hardware overtravel	When the "FW-LS/RV-LS input action" parameter is set to "2: Immediate stop with alarm" or "3: Deceleration stop with alarm," the FW-LS input or the RV-LS input was detected.	Reset the alarm and then escape from the sensor by operating the motor or manually.	Any of reset operations	Excitation

Alarm code	Number of times LED blinks	Alarm type	Cause	Remedial action	How to reset	Motor excitation*
67h	7	Software overtravel	When the "Software overtravel" parameter is set to "2: Immediate stop with alarm" or "3: Deceleration stop with alarm," the motor position reached the set value of the software limit.	• Reconsider the operation data. • Reset the alarm and then escape from the sensor by operating the motor or manually.	Any of reset operations	Excitation
6Ah	7	Return-to-home operation offset error	When offset movement as part of return-to-home operation was performed, the FW-LS input or the RV-LS input was detected.	Check the offset value.	Any of reset operations	Excitation
6Dh	7	Mechanical overtravel	The product having set the home reached the mechanism limit stored in the ABZO sensor.	• Check the travel amount (position). • Reset the alarm and then escape from the sensor by operating the motor or manually.	Any of reset operations	Excitation
70h	7	Abnormal operation data	• Stored data (SD) operation was performed with data whose operating speed was 0. • Operation was performed at the operating speed or operating current exceeding the value set in the "Mechanism protection parameter." • Wrap operation was executed when wrap setting was disabled. • Push-motion operation or push-motion return-to-home operation was performed with the **DGII** Series.	• Check the operation data. • Check the value set in the "Mechanism protection parameter" using the unit information monitor of the **MEXE02** software. • Check the wrap setting. • Push-motion operation as well as push-motion return-to-home operation cannot be performed with the **DGII** Series.	Any of reset operations	Excitation
71h	7	Electronic gear setting error	The resolution set with the "Electronic gear A" parameter and the "Electronic gear B" parameter was out of the specifications.	Reconsider the "Electronic gear A" parameter and the "Electronic gear B" parameter, and set the resolution in a range of the specifications.	Turn on the main power supply and control power supply again	Non-excitation
72h	7	Wrap setting error	The control power supply was turned on in a state where a value of the resolution and that of the "Initial coordinate generation & wrap setting range" parameter were inconsistent.	Set the "Initial coordinate generation & wrap setting range" parameter properly, and turn on the main power supply and the control power supply again.	Turn on the main power supply and control power supply again	Non-excitation

Alarm code	Number of times LED blinks	Alarm type	Cause	Remedial action	How to reset	Motor excitation*
81h	7	Network bus error	• Modbus TCP: If the "Connection interruption during operation (Modbus TCP)" parameter was set to "1: Enable (one connection is disconnected)" or "2: Enable (all connections are disconnected)," the connection was lost. • Modbus TCP and Modbus UDP: A communication timeout was detected. Refer to p.175 for details. • CC-Link IE Field Network Basic: Communication with the host controller was disconnected during operation.	Check the connection with the host controller and the condition of the power supply of the host controller.	Any of reset operations	Excitation
82h	7	Network module error	An error was detected in the network module.	Check the wiring of the network. After that, turn on the main power supply and the control power supply again.	Turn on the main power supply and control power supply again	Non-excitation
F0h	Light	CPU error	CPU malfunctioned.	Turn off and then turn on the main power supply and the control power supply.	Turn on the main power supply and control power supply again	Non-excitation

* An excitation state of the motor when an alarm is generated is as follows.
Non-excitation: If an alarm is generated, the current to the motor is cut off and the holding force of the motor is lost. When an electromagnetic brake motor is used, the electromagnetic brake is in a state of holding the motor shaft.
Excitation: Even if an alarm is generated, the current to the motor is not cut off and the motor position is maintained.

Related parameters

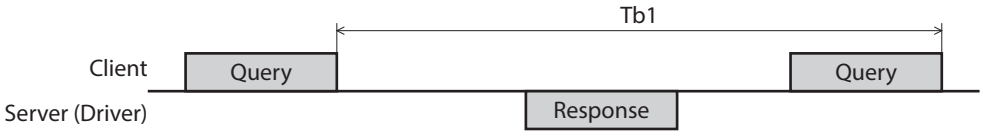
MEXE02 code	Parameter name	Description	Setting range	Initial value
p6	Overload alarm	Sets the condition under which the alarm is generated.	1 to 300 (1=0.1 s)	50
	Excessive position deviation alarm	Sets the condition under which the excessive position deviation alarm is generated.	1 to 30,000 (1=0.01 rev)	300
	Network bus error alarm (CC-Link IE Field Network Basic)	Sets the function of the network bus error alarm.	0: Disable 1: Enable	1

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

An alarm of the motor combination error is generated in the following conditions.
- When a motor for the AC power supply was connected to the driver.
- When a motor of frame size 20 mm (0.79 in.) or 28 mm (1.10 in.) was connected to the driver and a voltage of 48 VDC was applied.

■ About detecting communication timeout

The driver monitors the interval between queries (Tb1) and detects a communication timeout if a Modbus TCP frame or a Modbus UDP frame addressed to its own station has not been received for a certain period of time. When a communication timeout is detected, an alarm of Network bus error is generated to stop the motor.
The condition for detecting a communication timeout can be set with the parameter or register. The setting method varies depending on the type of host controller.



Note When detecting a communication timeout, be sure to set the related parameter or register. If both the parameter and the register are initial values, the driver will not detect a communication timeout because it does not monitor the interval between received queries (Tb1). Therefore, even if a state where it is not possible to receive a Modbus TCP frame or a Modbus UDP frame persists, the motor will continue to operate.

● For a host controller that periodically sends queries, regardless of whether the motor is operating or stopped

There are two ways to set the condition to detect a communication timeout.

- When the detection time is set to a constant value:
  Set with the "Communication timeout (Modbus TCP/UDP)" parameter.
- When the detection time is changed each time:
  Set with the "Communication timeout (For setting)" register. When setting with the register, set the "Communication timeout (Modbus TCP/UDP)" parameter to "−1: Set via Modbus communication."

Related parameter

MEXE02 code	Name	Description	Setting range	Initial value
p11	Communication timeout (Modbus TCP/UDP)	Sets the condition under which a communication timeout is detected. If the frame is not properly received after the set time has elapsed, it is judged as a communication timeout and an alarm of Network bus error is generated.	−1: Set by Modbus 0: Not monitored 1 to 65,535 ms	−1

Related register

Direction	Bit	Name	Description	Setting range	Initial value
Output	0 to 15	Communication timeout (For setting)	This is enabled when the "Communication timeout (Modbus TCP/UDP)" parameter is set to "−1: Set by Modbus." Sets the condition under which a communication timeout is detected. It is updated immediately when the value is changed.	0: Not monitored 1 to 65,535 ms	0

- **For a host controller that periodically sends queries while the motor is operating**

  Set the condition for detecting a communication timeout with the "Communication timeout during operation (Modbus TCP/UDP)" parameter.

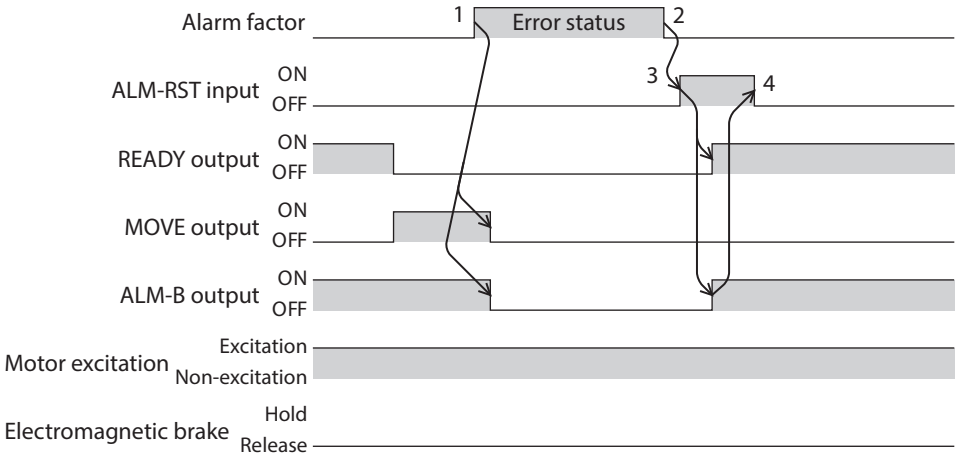
  Related parameter

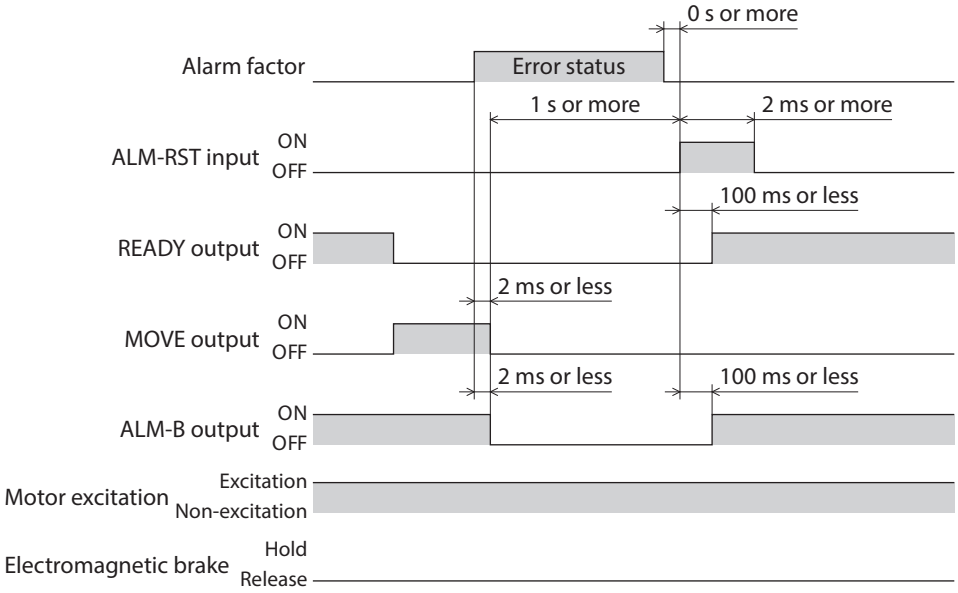
MEXE02 code	Name	Description	Setting range	Initial value
p11	Communication timeout during operation (Modbus TCP/UDP)	Sets the condition under which a communication timeout during operation is detected. If the frame is not properly received after the set time has elapsed during motor operation, it is judged as a communication timeout during operation and an alarm of Network bus error is generated.	0: Not monitored 1 to 65,535 ms	0

2-5 Timing chart

■ When the motor remains in an excitation state even if an alarm is generated

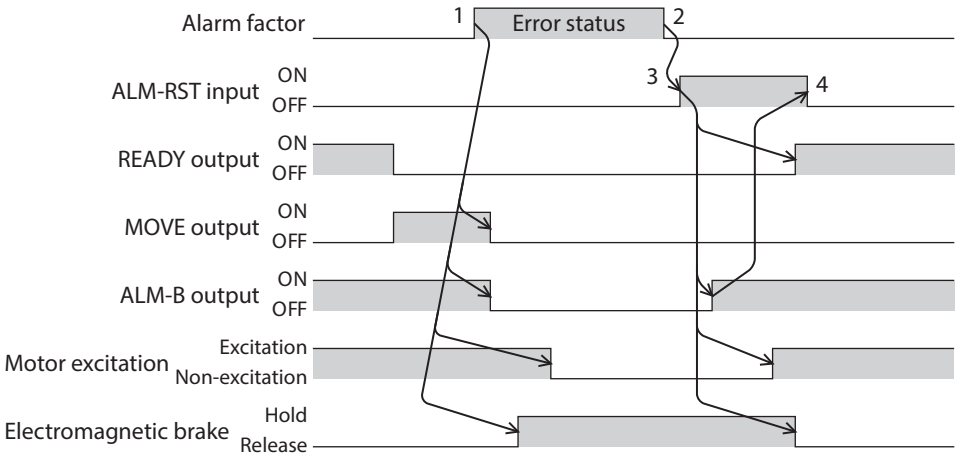
1. If an error occurs, the ALM-B output and the MOVE output are turned OFF.
   At the same time, the motor stops immediately.
2. When resetting the alarm, turn the operation command OFF, If the alarm is reset while the operation command is in an ON state, the motor may start suddenly, causing injury or damage to equipment.
3. Remove the cause of the alarm before turning the ALM-RST input ON.
   The alarm is reset, and the ALM-B output and the READY output are turned ON.
4. Check that the ALM-B output has been turned ON, and then turn the ALM-RST input OFF.

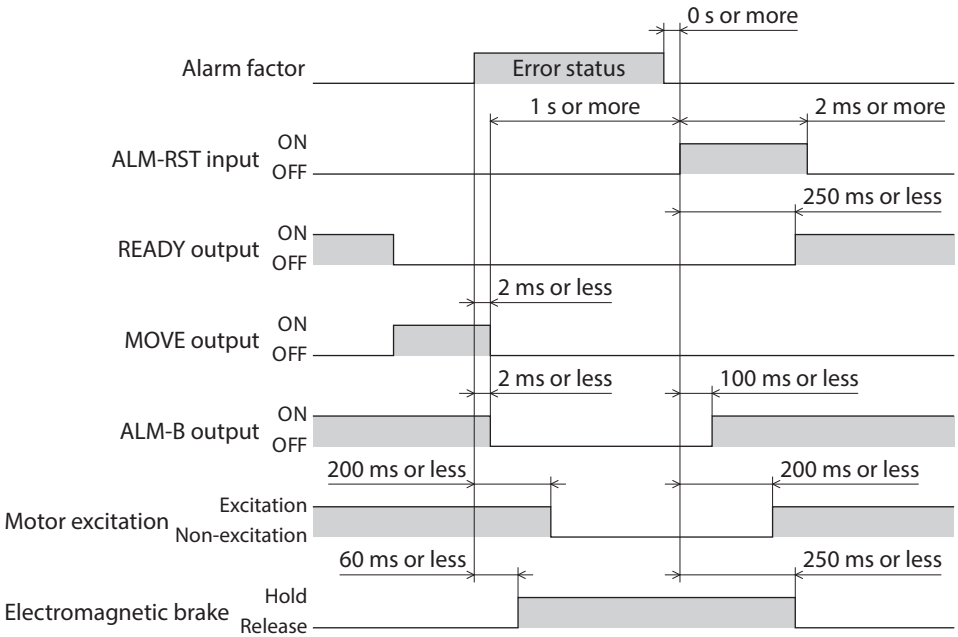




■ When the motor goes into a non-excitation state if an alarm is generated

1. If an error occurs, the ALM-B output and the MOVE output are turned OFF.
   At the same time, the motor stops immediately.
2. When resetting the alarm, turn the operation command OFF, If the alarm is reset while the operation command is in an ON state, the motor may start suddenly, causing injury or damage to equipment.
3. Remove the cause of the alarm before turning the ALM-RST input ON.
   The alarm is reset, and the ALM-B output and the READY output are turned ON.
4. Check that the ALM-B output has been turned ON, and then turn the ALM-RST input OFF.





3 Information

The driver is equipped with a function to generate information output before an alarm is generated.
This function can be utilized for periodic maintenance of equipment by setting a suitable value in the parameter of each information.
For example, utilizing the "Motor temperature information" parameter can prevent equipment malfunction or production stoppage due to motor overheat. In addition, the "Tripmeter information" parameter can be utilized as a reference to do maintenances every time a certain travel distance is reached.

■ Status when information is generated

- **Information bit output**

  If information is generated, a bit output (INFO-∗∗ output) of the corresponding information is turned ON.
  A desired output signal can be assigned to the INFO-USRIO output among bit outputs and used. If the assigned output signal is turned ON, the INFO-USRIO output is also turned ON. (Details of bit output ⇨p.181)

- **INFO output**

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

- **LED indicator**

  If information is generated, the PWR/ALM LED blinks in blue.

- **Operation of motor**

  The motor continues to operate during information unlike in the case of an alarm.

- **Parameters**

  Each information has a corresponding "INFO action" parameter. If the parameter is set to "0: No Info reflect," only the bit output of information is turned ON, and the INFO output and LED are not changed.

Related parameters

MEXE02 code	Parameter name	Description	Setting range	Initial value
p6	Driver temperature information (INFO-DRVTMP)	Sets the condition under which the information is generated.	40 to 85 °C	85
	Overload time information (INFO-OLTIME)		1 to 300 (1=0.1 s)	50
	Speed information (INFO-SPD)		0: Disable 1 to 12,000 r/min	0
	Position deviation information (INFO-POSERR)		1 to 30,000(1=0.01 rev)	300
	Motor temperature information (INFO-MTRTMP)		40 to 120 °C	85
	Overvoltage information (INFO-OVOLT)		140 to 630 (1=0.1 V)	630
	Undervoltage information (INFO-UVOLT)			140
	Tripmeter information (INFO-TRIP)		0: Disable 1 to 2,147,483,647 (1=0.1 kRev)	0
	Odometer information (INFO-ODO)			0
	Cumulative load 0 information (INFO-CULD0)		0 to 2,147,483,647	0
	Cumulative load 1 information (INFO-CULD1)			0
	Cumulative load value auto clear	Clears the cumulative load when operation is started (at the ON edge of the MOVE output).	0: Disable 1: Enable	1

MEXE02 code	Parameter name	Description	Setting range	Initial value
p6	Cumulative load value count divisor	Sets the divisor of the cumulative load.	1 to 32,767	1
	INFO-USRIO output selection	Selects the output signal to be checked by the INFO-USRIO output.	Output signals⇨p.160	128: CONST-OFF
	INFO-USRIO output inversion	Sets the ON-OFF status of the INFO-USRIO output.	0: Non invert 1: Invert	0
	Information LED condition	Sets the LED status when information is generated.	0: Disable (LED does not blink) 1: Enable (LED blinks)	1
	Information auto clear	When the cause of information is eliminated, the INFO output and the bit output of the corresponding information are turned OFF automatically.	0: Disabled (Not turned OFF automatically) 1: Enabled (Turned OFF automatically)	1
	INFO action (Assigned I/O status information (INFO-USRIO))	Sets the bit output, the INFO output, and the LED status when information is generated.	0: No info reflect (Only the bit output is ON.)* 1: Info reflect (The bit output and the INFO output are ON and the LED blinks.)	1
	INFO action (Position deviation information (INFO-POSERR))			1
	INFO action (Driver temperature information (INFO-DRVTMP))			1
	INFO action (Motor temperature information (INFO-MTRTMP))			1
	INFO action (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 (Forward operation prohibition information (INFO-FW-OT))			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

MEXE02 code	Parameter name	Description	Setting range	Initial value
p6	INFO action (Odometer information (INFO-ODO))	Sets the bit output, the INFO output, and the LED status when information is generated.	0: No info reflect (Only the bit output is ON.)* 1: Info reflect (The bit output and the INFO output are ON and the LED blinks.)	1
	INFO action (Start operation restricted mode information (INFO-DSLMTD))			1
	INFO action (I/O test mode information (INFO-IOTEST))			1
	INFO action (Configuration request information (INFO-CFG))			1
	INFO action (Reboot request information (INFO-RBT))			1

* It remains in the information history of the **MEXE02** software even if the "INFO action" parameter is set to "0."

3-1 Information history

Up to 16 generated information items are stored in RAM in order from most recent to oldest. Information items stored as the information history are the information code, generation time, and contents of information.
The stored information history can be read or cleared if one of the following operations is performed.

- Read the information history with the monitor command.
- Clear the information history with the maintenance command.
- Read or clear the information history using the **MEXE02** software.

memo Information history is cleared when the main power supply and control power supply of the driver are turned off because it is stored in RAM.

3-2 Information list

Information item	Information bit output signal	Cause	Condition to clear
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 the feedback position exceeded the value set in the "Position deviation information" parameter in the motor output shaft.	The deviation between the command position and the feedback position fell below the value set in the "Position deviation information" parameter in the motor output shaft.
Driver temperature	INFO-DRVTMP	The internal temperature of the driver exceeded the value set in the "Driver temperature information" parameter.	The internal temperature of the driver fell below the value set in the "Driver temperature information" parameter.
Motor temperature	INFO-MTRTMP	The detection temperature of the encoder exceeded the value set in the "Motor temperature information" parameter.	The detection temperature of the encoder fell below the value set in the "Motor temperature information" parameter.
Overvoltage	INFO-OVOLT	• The voltage of the main power supply exceeded the value set in the "Overvoltage information" parameter. • A large load inertia was suddenly stopped. • Vertical operation (elevating operation) was performed.	The voltage of the main power supply fell below the value set in the "Overvoltage information" parameter.

Information item	Information bit output signal	Cause	Condition to clear
Undervoltage	INFO-UVOLT	• The voltage of the main power supply fell below the value set in the "Undervoltage information" parameter. • The main power supply was momentarily shut off or the voltage was insufficient.	The voltage of the main power supply exceeded the value set in the "Undervoltage information" parameter.
Overload time	INFO-OLTIME	A load exceeding the maximum torque was applied for a period of time exceeding the value set in the "Overload time information" parameter.	The overload counter fell below the value set in the "Overload time information" parameter.
Speed	INFO-SPD	The feedback speed of the motor exceeded the value set in the "Speed information" parameter.	The feedback speed of the motor fell below the value set in the "Speed information" parameter.
Start operation error	INFO-START	• The operation start signal in the direction that was stopped by the FW-BLK input or RV-BLK input has been turned ON. • The operation start signal in the direction that was stopped by the FW-LS input or RV-LS input has been turned ON. • The operation start signal in the direction that was stopped by the software limit has been turned ON. • When operation could not be executed (example: the READY output was OFF), the operation start signal was turned ON.	Operation was started properly.
Start ZHOME error	INFO-ZHOME	• When the coordinates were not set (the ABSPEN output was OFF), the ZHOME input was turned ON. • When the motor was used with the electrical home coordinate system (the EL-PRST input was ON), return-to-home operation was performed.	Operation was started properly.
Preset request	INFO-PR-REQ	Preset was executed by the position preset or return-to-home operation.	Preset was completed.
Electronic gear setting error	INFO-EGR-E	The resolution set in the "Electronic gear A" parameter and the "Electronic gear B" parameter was out of the specification.	The resolution was set within the specifications.
Wrap setting error	INFO-RND-E	The resolution and the "Initial coordinate generation & wrap setting range" parameter were inconsistent.	The "Initial coordinate generation & wrap setting range" parameter was set in the range of the specifications.
Forward operation prohibition	INFO-FW-OT	• The positive software limit was exceeded. • Either the FW-LS input or the FW-BLK input was turned ON.	The position of the motor fell into the range of the positive software limit, and additionally, both the FW-LS input and the FW-BLK input were turned OFF.
Reverse operation prohibition	INFO-RV-OT	• The negative software limit was exceeded. • Either the RV-LS input or the RV-BLK input was turned ON.	The position of the motor fell into the range of the negative software limit, and additionally, both the RV-LS input and the RV-BLK input were turned OFF.
Cumulative load 0	INFO-CULD0	The cumulative load exceeded the value set in the "Cumulative load 0 information" parameter.	The cumulative load fell below the value set in the "Cumulative load 0 information" parameter.
Cumulative load 1	INFO-CULD1	The cumulative load exceeded the value set in the "Cumulative load 1 information" parameter.	The cumulative load fell below the value set in the "Cumulative load 1 information" parameter.

Information item	Information bit output signal	Cause	Condition to clear
Tripmeter	INFO-TRIP	The travel distance of the motor exceeded the value set in the "Tripmeter information" parameter.	After one of the following operations was performed, the travel distance (Tripmeter) of the motor fell below the value set in the "Tripmeter information" parameter. • The "Tripmeter information" parameter was set again. • The "Clear tripmeter" of the maintenance command was executed.
Odometer	INFO-ODO	The cumulative travel distance of the motor exceeded the value set in the "Odometer information" parameter.	After the following operation was performed, the cumulative travel distance (Odometer) of the motor fell below the value set in the "Odometer information" parameter. • The "Odometer information" parameter was set again.
Start operation restricted mode	INFO-DSLMTD	• "Teaching, remote operation" was executed using the **MEXE02** software. • Configuration was executed. • Data was written to the driver from the **MEXE02** software. • "Restored to the factory setting" was executed using the **MEXE02** software.	• Teaching, remote operation was canceled. • Configuration was completed. • Writing data was completed. • Data was restored to the factory setting.
I/O test mode	INFO-IOTEST	• "I/O test" was executed with the **MEXE02**software. • Configuration was executed.	• The I/O test mode was canceled. • Configuration was completed.
Configuration request	INFO-CFG	The parameter that required executing Configuration was changed.	Configuration was executed.
Reboot request	INFO-RBT	The parameter that required rebooting was changed.	Reboot was executed.

memo If information of Preset request was generated for 100 ms or more in a state where the "Information auto clear" parameter was set to "0: Disable," the preset may have been failed. There are the following two possible reasons the preset was failed.
- The ABZO sensor is not connected to the driver.
- Preset was executed in a state where the position deviation between the command position and the feedback position was 1.8 degrees or more.

4 Troubleshooting and remedial actions

In motor operation, the motor or the driver may not operate properly due to an improper setting or incorrect connection.
When the motor cannot be operated properly, refer to the contents provided in this chapter and take an appropriate remedial action.
If the problem persists, contact your nearest Oriental Motor sales office.

Phenomenon	Possible cause	Remedial action
• The motor is not excited. • The output shaft can be rotated by hand.	Connection error of the motor cable.	Check the motor connection.
	The FREE input is being ON.	Turn the FREE input OFF.
The motor has a holding torque even if it is in a non-excitation state.	Effect of dynamic brake.	If the motor is in a non-excitation state, the motor windings are brought into a state of being short-circuited inside the driver, generating a larger holding torque than when no current is supplied (dynamic brake). To release the dynamic brake, turn off the main power supply and control power supply or turn the FREE input ON.
The motor does not rotate.	When an electromagnetic brake motor is used, the electromagnetic brake is in a state of holding the motor shaft.	• Check the connection of the electromagnetic brake. • Check the input voltage of the control power supply.
	The position (travel amount) is not set in the operation data when positioning operation is performed.	Check the operation data.
	When JOG operation, high-speed JOG operation, or continuous macro operation is performed, the input signal in the forward direction and that in the reverse direction are simultaneously ON.	Turn both input signals in the forward direction and the reverse direction OFF, and then turn either one ON.
	The STOP input is being ON.	Turn the STOP input OFF.
The motor rotates in the direction opposite to the specified direction.	The "Motor rotation direction" parameter is set wrongly.	Check the setting of the "Motor rotation direction" parameter.
The output shaft of the geared motor (gearhead output shaft) rotates in the opposite direction to the motor output shaft.	The gearhead whose output shaft rotates in the opposite direction to the motor output shaft is used.	• The output shaft of the **TS** geared type with a gear ratio of 20 or 30 rotates in the opposite direction to the motor output shaft. • The output shaft of the Harmonic geared type rotates in the opposite direction to the motor output shaft.
Motor operation is unstable.	Connection error of the motor cable or the power supply cable.	Check the connections between the driver, motor and power supply.
	A value set in the "Base current" parameter is too low.	Check the setting of the "Base current" parameter. If the motor current is low relative to the load, the torque will also be low and operation will be unstable.
	The "Main power mode" parameter is set wrongly.	Check the setting of the "Main power mode" parameter.
	The main power supply starts up slowly or the voltage of the main power supply is unstable.	Set the "Main power mode" parameter to "0: 24 VDC" or "1: 48 VDC" according to the rated voltage of the main power supply.

Phenomenon	Possible cause	Remedial action
Motor vibration is too large.	The load is small.	Lower the current with the "Base current" parameter. If the motor output torque is too high relative to the load, vibration will increase.
	The "Main power mode" parameter is set wrongly.	Check the setting of the "Main power mode" parameter.
	The main power supply starts up slowly or the voltage of the main power supply is unstable.	Set the "Main power mode" parameter to "0: 24 VDC" or "1: 48 VDC" according to the rated voltage of the main power supply.
The electromagnetic brake is not put in a state of releasing the motor shaft.	The power is not supplied to the electromagnetic brake.	Check the connection of the electromagnetic brake.
	A voltage for the electromagnetic brake is insufficient.	Check the input voltage of the control power supply.

memo If an alarm is generated, check the type of alarm via Ethernet or using the **MEXE02** software.

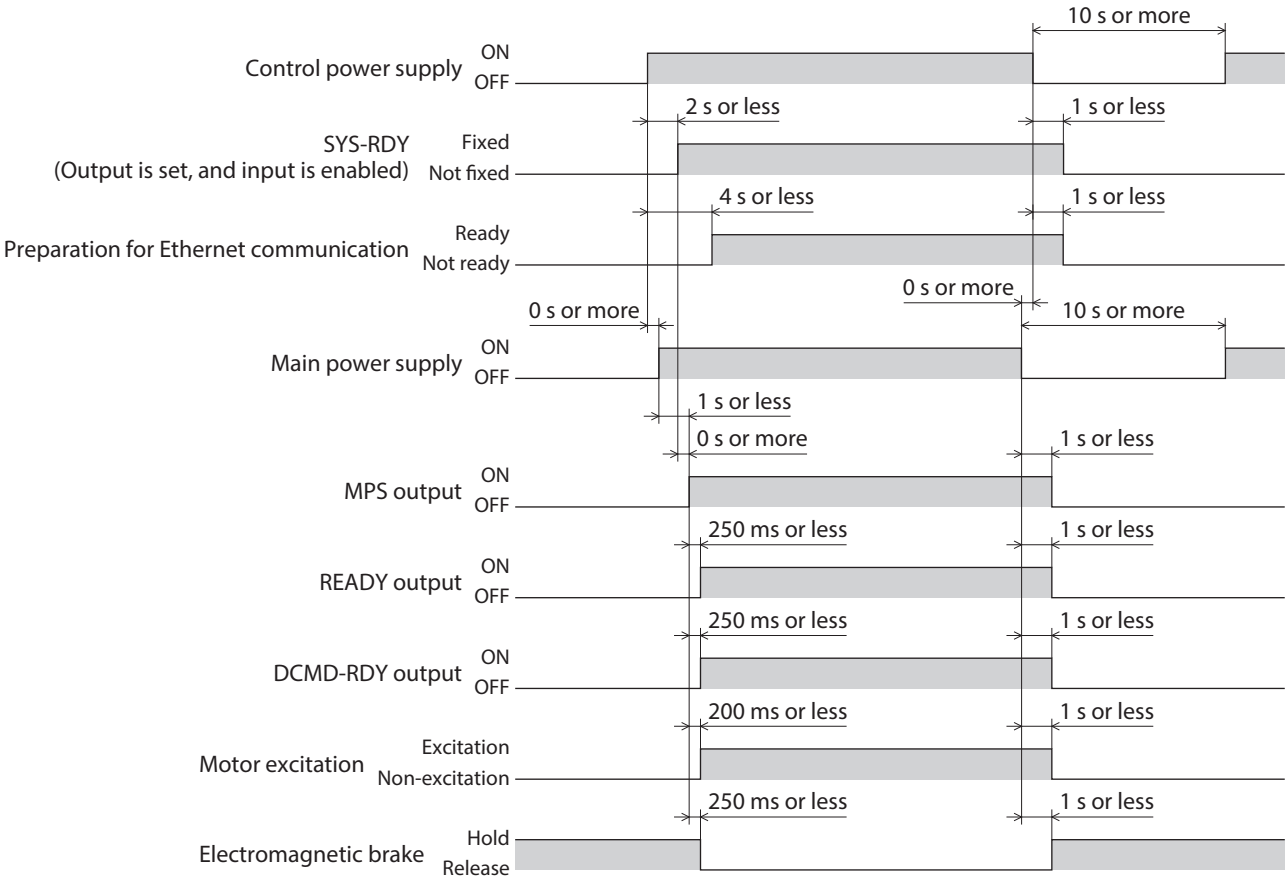
7 Reference materials

◆Table of contents

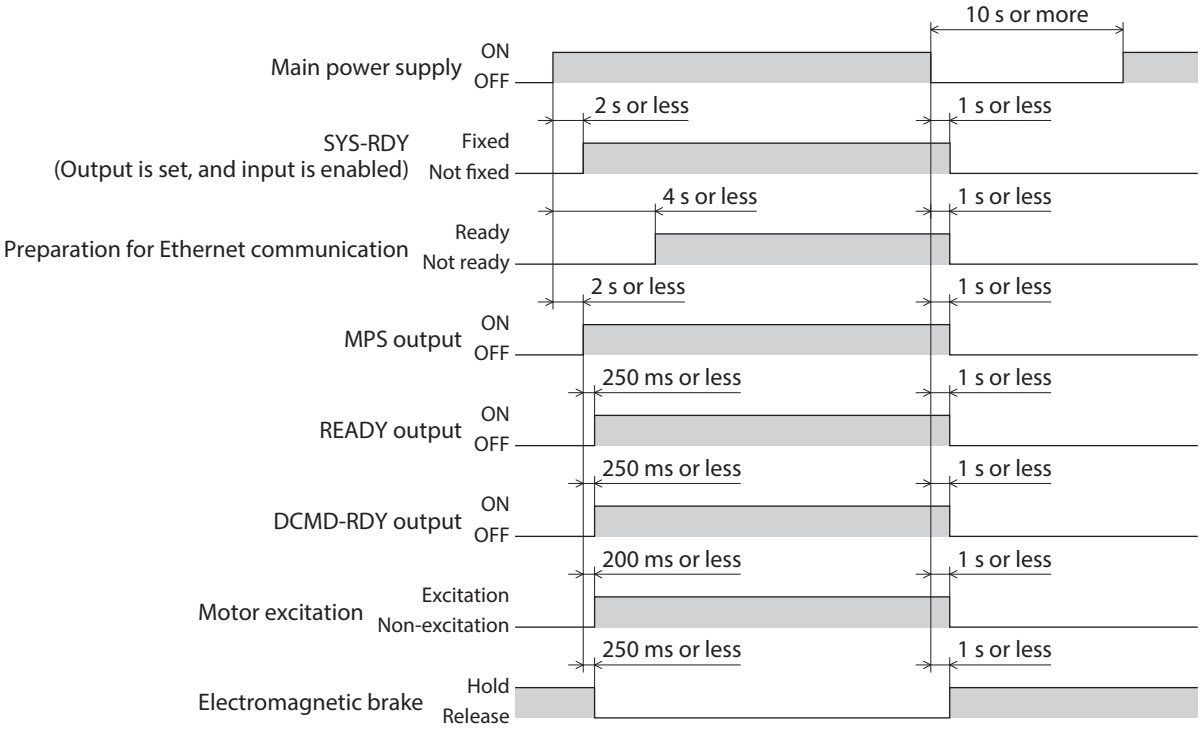
1 Timing chart

■ Power activation

● When a control power supply is used



- **When a control power supply is not used**



2 Operation example using the MEXE02 software

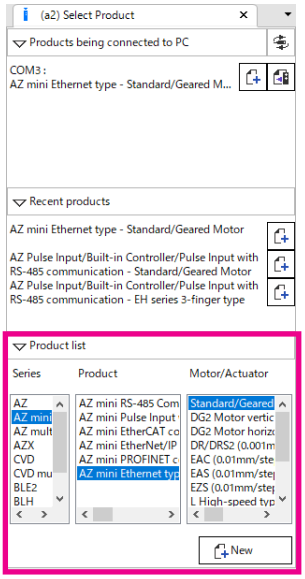
2-1 Connecting the MEXE02 software via Ethernet

To connect the **MEXE02** software via Ethernet, it is necessary to connect the PC and driver using a USB cable, and set the driver parameters in advance.

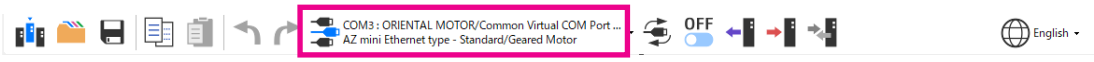
Note The **MEXE02** software with Ver. 4.18.0.0 or a later version is required to connect via Ethernet. If an older version of the **MEXE02** software than Ver. 4.18.0.0 is used, download and install the latest version from the Oriental Motor website.

■ Setting of the MEXE02 software

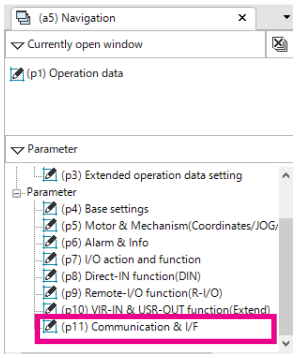
1. Connect the driver to a PC on which the **MEXE02** software has been installed using a USB cable.
2. Select a product from "Product list" of the **MEXE02** software and click [New].



3. Select the communication port from the toolbar.



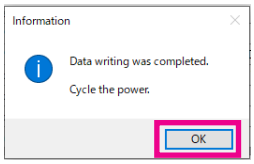
4. Click [(p11) Communication & I/F] under "Parameter" in the window list.



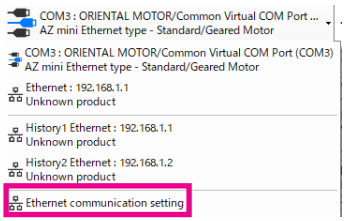
5. Set the "Support software connection (**MEXE02**)" parameter to "0: Enable."

16	[Parameter ID: 25661 (643Dh)]	Keep-alive starting time (TCP)	60 s
17	[Parameter ID: 25662 (643Eh)]	Keep-alive notification interval (TCP)	10 s
18	[Parameter ID: 25584 (63F0h)]	IP address blocking (Modbus TCP/UDP)	00000000 h
19	[Parameter ID: 25585 (63F1h)]	IP address blocking number of bits (Modbus TCP/UDP)	0 : Not restricted
20	[Parameter ID: 25595 (63FBh)]	Connection interruption during operation (Modbus TCP)	Enable (All connections are disconnected)
21	[Parameter ID: 25596 (63FCh)]	Communication timeout during operation (Modbus TCP/UDP)	0 : Do not monitor
22	[Parameter ID: 25594 (63FAh)]	Communication timeout (Modbus TCP/UDP)	-1 : Setting with Modbus communication
23	[Parameter ID: 25589 (63F5h)]	Insufficient number of connections (Modbus TCP)	None
24	[Parameter ID: - (-)]	Support software connection (MEXE02)	0 : Enable
25	[Parameter ID: - (-)]	IP address blocking (MEXE02)	00000000 h
26	[Parameter ID: - (-)]	IP address blocking number of bits (MEXE02)	0

6. Click on the toolbar to write the parameter to the driver.
7. Click [OK], and then turn off and on again the main and control power supplies of the driver.

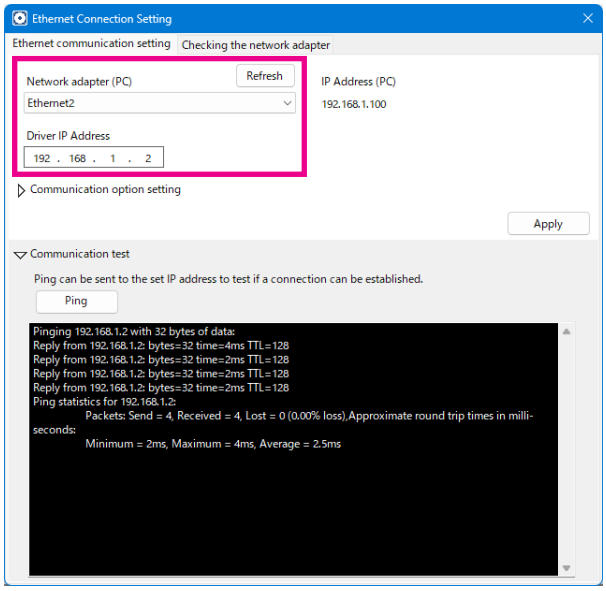


8. Click on the toolbar, and then click [Ethernet communication setting].



9. Set [Network adapter (PC)] and [Driver IP Address].

Item	Description
Network adapter (PC)	Sets the network adapter used by the connected PC.
Driver IP Address	Sets the IP address of the driver to connect to.

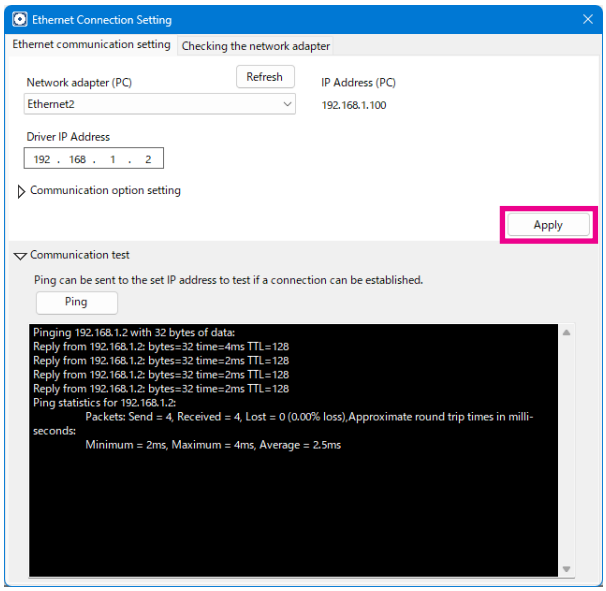


memo

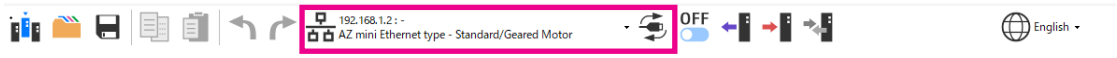
[Ethernet communication setting] can also be used to set communication options and perform a communication test.

- Setting the communication options ⇨p.192
- Communication test ⇨p.195

10. Click [Apply].
The Ethernet port is selected.



11. Click to detect the communication port.
When the **MEXE02** software successfully communicates with the driver via Ethernet, the product name is displayed.



memo

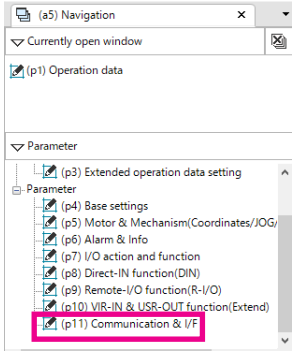
- A communication error occurs if the port number is duplicated (error codes: 02A1h, 02A2h, or 02A3h). Check the setting of the port number.
- To communicate with multiple Ethernet-type drivers, set the parameters and others to each driver according to the "Setting of the **MEXE02** software" on p.190.
- If the IP address of the driver to connect to is set with [Ethernet communication setting], the set history is saved in the **MEXE02** software. Up to five history items can be saved, and the item in order from the oldest one is overwritten. Since the history is saved even when the **MEXE02** software is closed, the Ethernet communication port can be selected from of the toolbar when the **MEXE02** software is started again.

The setting is complete. Remove the USB cable.

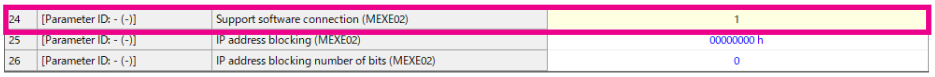
■ Setting the connection key

The connection key is the identification information set in the **MEXE02** software and driver.
If the connection key is set, it must be entered when connecting the **MEXE02** software to the driver via Ethernet. This prevents unintended connections to the driver. However, setting the connection key does not completely prevent unauthorized access from outside.

1. Set the connection key to the driver.
   1) Click [(p11) Communication & I/F] under "Parameter" in the window list.

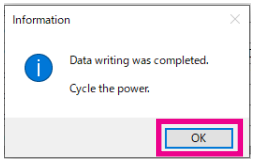


2) Set the connection key to the "Support software connection (**MEXE02**)" parameter.
Set the connection key with a value ranging from 1 to 2,147,483,647, or from −2 to −2,147,483,648 for . Any other value is disabled.

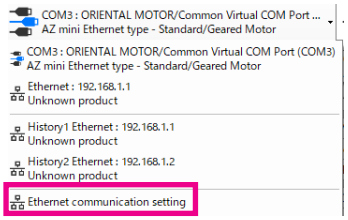


24	[Parameter ID: - (-)]	Support software connection (MEXE02)	1
25	[Parameter ID: - (-)]	IP address blocking (MEXE02)	00000000 h
26	[Parameter ID: - (-)]	IP address blocking number of bits (MEXE02)	0

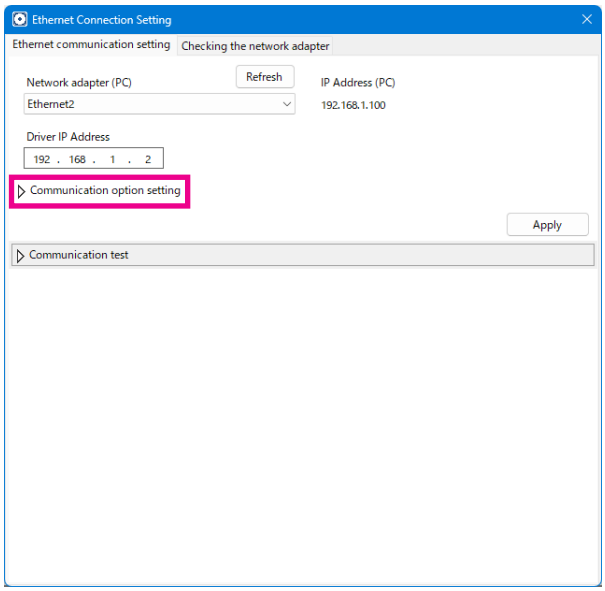
3) Click on the toolbar to write the parameter to the driver.
4) Click [OK], and then turn off and on again the main and control power supplies of the driver.



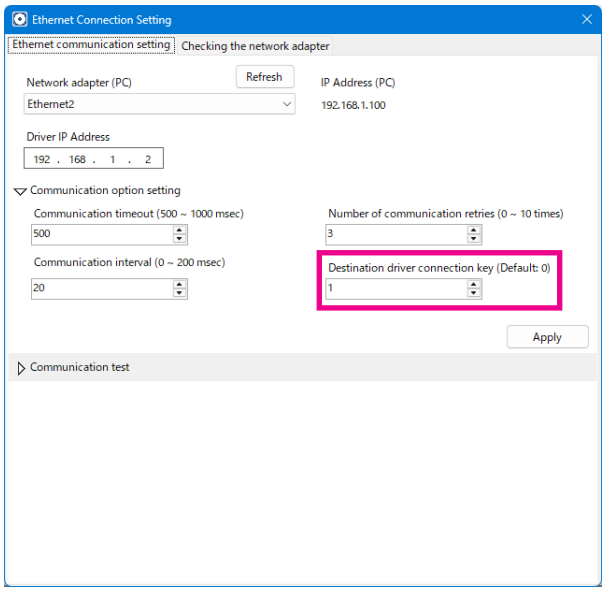
2. Set the connection key to the **MEXE02** software.
1) Click on the toolbar, and then click [Ethernet communication setting].



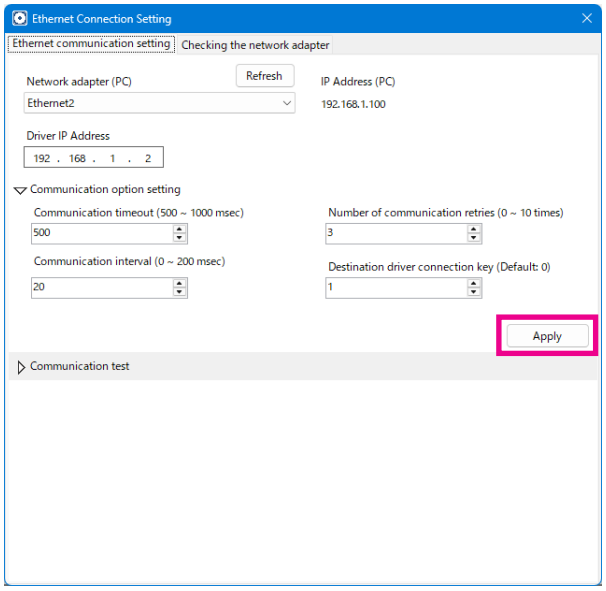
2) Click [Communication option setting].



3) Set the same value as the "Support software connection (**MEXE02**)" parameter to "Destination driver connection key."



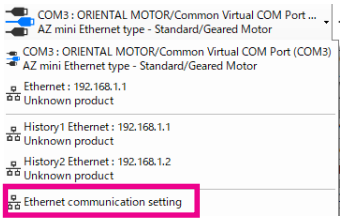
4) Click [Apply].



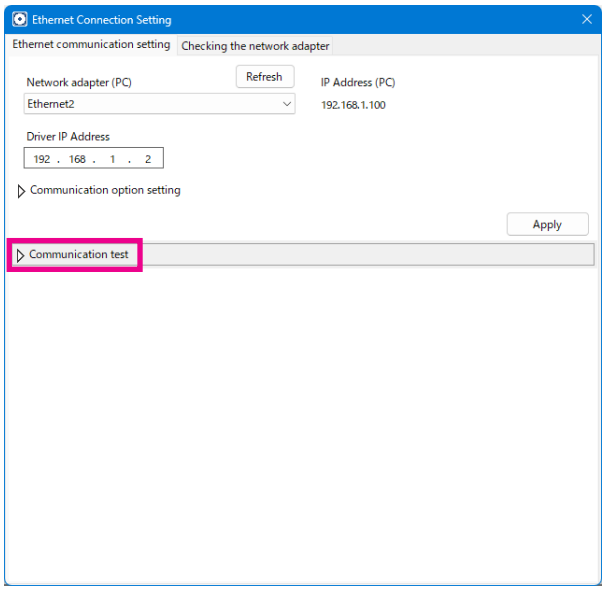
■ Communication test

Sending the Ping to the set IP address from the PC can test the connection with the driver. Set the IP address of the driver before performing the communication test.

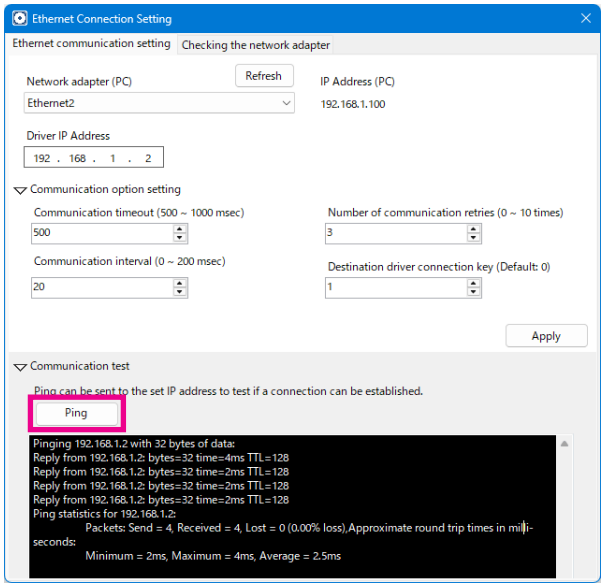
1) Click on the toolbar, and then click [Ethernet communication setting].



2) Click [Communication test].



3) Click [Ping].



■ Restriction of IP address

When using the "IP address blocking (**MEXE02**)" and "IP address blocking number of bits (**MEXE02**)" parameters in combination, a PC(s), which can connect to the driver, can be restricted using the **MEXE02** software via Ethernet.

memo The function to restrict the IP address cannot completely prevent unauthorized access from outside.

● Setting example

This section explains how to set the parameter. The representative value of the IP address is "192.168.1.10" this time.

Example 1: When connecting a PC whose IP address is "192.168.*.*"

If the parameter is set as follows, the range of IP addresses that can be connected is from "192.168.0.0" to "192.168.255.255."

Setting of parameters

MEXE02 code	Name	Setting value	Note
p11	IP address blocking (**MEXE02**)	C0:A8:01:0A	Representative value of IP address: 192.168.1.10
	IP address blocking number of bits (**MEXE02**)	16	Range of IP address: Matches the upper 16 bits

Example 2: When connecting a PC whose IP address is "192.168.1.*"

If the parameter is set as follows, the range of IP addresses that can be connected is from "192.168.1.0" to "192.168.1.255."

Setting of parameters

MEXE02 code	Name	Setting value	Note
p11	IP address blocking (**MEXE02**)	C0:A8:01:0A	Representative value of IP address: 192.168.1.10
	IP address blocking number of bits (**MEXE02**)	24	Range of IP address: Matches the upper 24 bits

Example 3: When connecting a PC whose IP address is "192.168.1.10"

If the parameter is set as follows, the IP address that can be connected is "192.168.1.10" only.

Setting of parameters

MEXE02 code	Name	Setting value	Note
p11	IP address blocking (**MEXE02**)	C0:A8:01:0A	Representative value of IP address: 192.168.1.10
	IP address blocking number of bits (**MEXE02**)	32	Range of IP address: Matches the upper 32 bits

2-2 Restoring the driver to its factory settings using the MEXE02 software via Ethernet

There are the following two methods to restore the parameter to the factory settings.

- When restoring all parameters to the factory settings.
  Select [Restore to factory settings (including communication settings)] under the [Communication] menu.
- When restoring the settings other than the parameters related to communication settings to the factory settings
  Select [Restore to factory settings (excluding communication settings)] under the [Communication] menu.

memo If [Restore to factory settings (including communication settings)] is selected, all parameters that include the parameters related to communication settings will be restored to the factory settings, and the **MEXE02** software and the driver will not be able to connect via Ethernet. Refer to "Setting of the **MEXE02** software" on p.190 and set the parameters and others in the **MEXE02** software to the driver again.

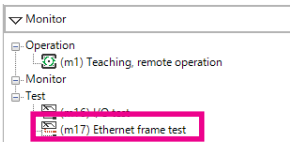
2-3 Communication program creation support function for the host controller

This section describes the functions available for use with Modbus TCP and Modbus UDP.

■ Ethernet frame test function

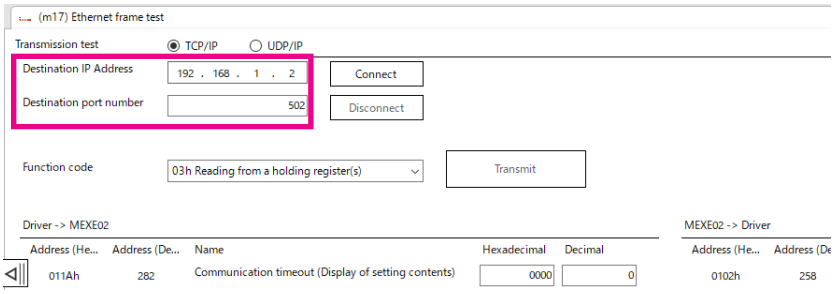
Modbus TCP and Modbus UDP frames can be sent to the driver for testing using the **MEXE02** software as the host controller.
This function can be used to check the configuration of the communication frames when starting up the equipment, or to perform a communication test.

1. Click [(m17) Ethernet frame test] under "Monitor" in the **MEXE02** software window list.



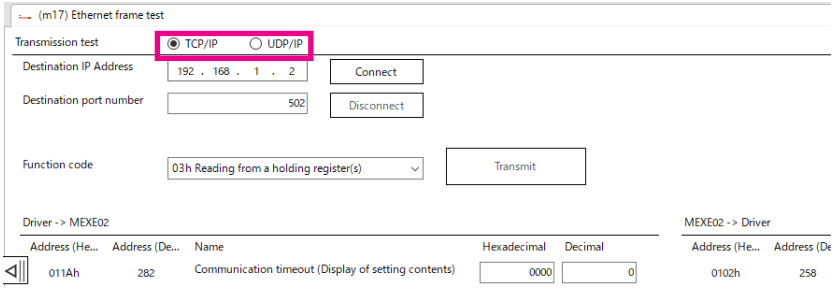
2. Set "Destination IP Address" and "Destination port number."

Item	Description
Destination IP Address	Sets the IP address of the driver.
Destination port number	Sets the port number of the driver.



memo It is recommended that the default port number (502) be used for the driver. If the port number needs to be changed due to security measures or the host controller's requirements, set it within the range of the private port number (49152 to 65535). However, do not use the port numbers that are fixed in the driver (60930, 61450, and 61451).

3. Select the protocol to be used for transmitting frames.
When selecting "TCP/IP": Go to Step 4.
When selecting "UDP/IP": Go to Step 5.



4. Click [Connect].

5. Click [Transmit].
When "TCP/IP" is selected in Step 3: Go to Step 6.
When "UDP/IP" is selected in Step 3: The test transmission is completed.

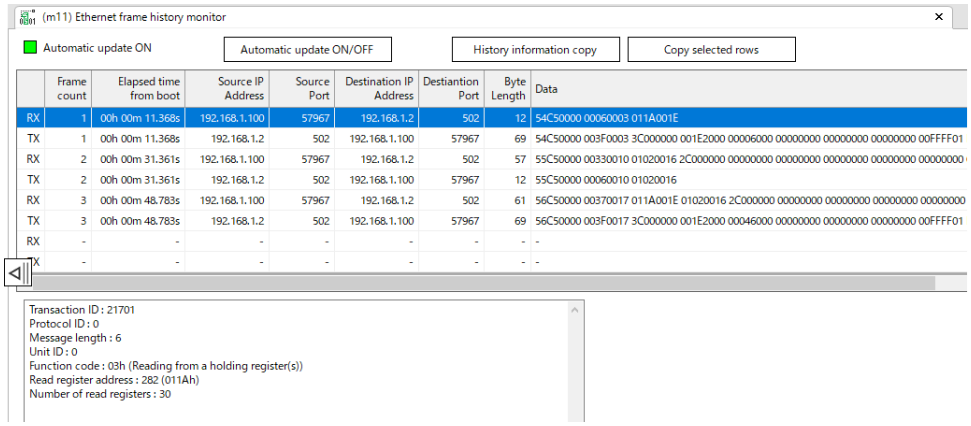
6. When the test transmission is finished, click [Disconnect].
   To send frames successively, wait until all the transmission frames have finished before clicking [Disconnect].

memo Be sure to disconnect the connection once the test transmission is finished.

■ Ethernet frame history monitor

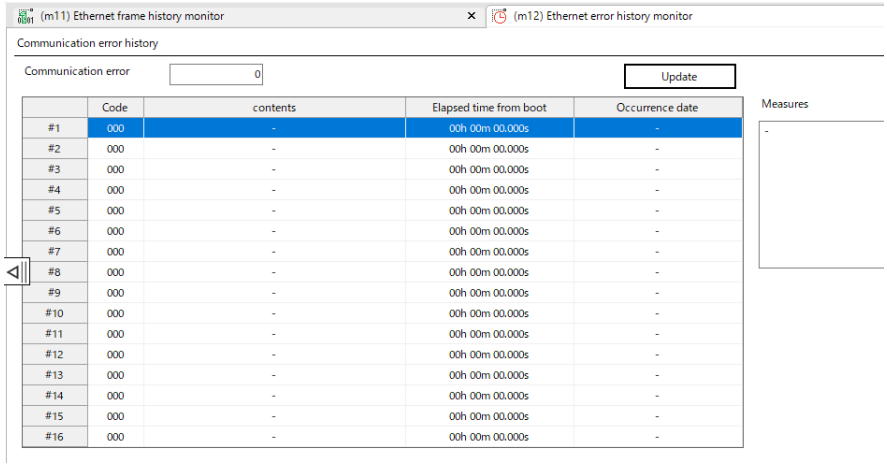
The following frames can be checked using the Ethernet frame history monitor of the **MEXE02** software.

- Modbus TCP and Modbus UDP frames that are transmitted and received by the driver
- Frames transmitted by "(m17) Ethernet frame test"



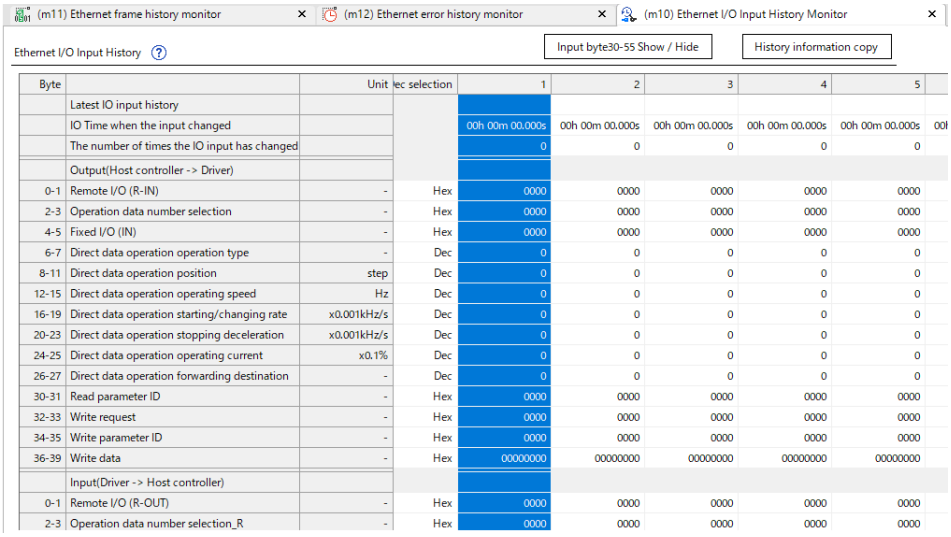
■ Ethernet error history monitor

Using the Ethernet error history monitor of the **MEXE02** software can check a communication error that is detected by the driver.



■ Ethernet I/O input history monitor

Using the Ethernet I/O input history monitor of the **MEXE02** software can check the history of I/O data (Input) sent from the host controller to the driver. Due to the history that I/O data (Input) changes, the handshaking of I/O data between the host controller and the driver can be checked.



Byte		Unit	ec selection	1	2	3	4	5	
	Latest IO input history								
	IO Time when the input changed			00h 00m 00.000s	00h 00m 00.000s	00h 00m 00.000s	00h 00m 00.000s	00h 00m 00.000s	00h
	The number of times the IO input has changed			0	0	0	0	0	
	Output(Host controller -> Driver)								
0-1	Remote I/O (R-IN)	-	Hex	0000	0000	0000	0000	0000	
2-3	Operation data number selection	-	Hex	0000	0000	0000	0000	0000	
4-5	Fixed I/O (IN)	-	Hex	0000	0000	0000	0000	0000	
6-7	Direct data operation operation type	-	Dec	0	0	0	0	0	
8-11	Direct data operation position	step	Dec	0	0	0	0	0	
12-15	Direct data operation operating speed	Hz	Dec	0	0	0	0	0	
16-19	Direct data operation starting/changing rate	x0.001kHz/s	Dec	0	0	0	0	0	
20-23	Direct data operation stopping deceleration	x0.001kHz/s	Dec	0	0	0	0	0	
24-25	Direct data operation operating current	x0.1%	Dec	0	0	0	0	0	
26-27	Direct data operation forwarding destination	-	Dec	0	0	0	0	0	
30-31	Read parameter ID	-	Hex	0000	0000	0000	0000	0000	
32-33	Write request	-	Hex	0000	0000	0000	0000	0000	
34-35	Write parameter ID	-	Hex	0000	0000	0000	0000	0000	
36-39	Write data	-	Hex	00000000	00000000	00000000	00000000	00000000	
	Input(Driver -> Host controller)								
0-1	Remote I/O (R-OUT)	-	Hex	0000	0000	0000	0000	0000	
2-3	Operation data number selection_R	-	Hex	0000	0000	0000	0000	0000	

3 Specifications

3-1 Product specifications

Main power supply	Rated voltage	24 VDC±5 % 48 VDC±5 %
	Input current	0.4 to 3.7 A*1
	Allowable operating voltage	24 VDC input: 20 to 32 VDC (22.8 to 32 VDC)*2 48 VDC input: 40 to 55 VDC
Control power supply	Rated voltage	24 VDC±5 % 48 VDC±5 %
	Input current	0.15 A (0.4 A)*3
	Allowable operating voltage	24 VDC input: 20 to 32 VDC (22.8 to 32 VDC)*2 48 VDC input: 40 to 55 VDC
Interface	Control input	20 to 32 VDC Number of input points: 2, photocoupler
	Field network	• Modbus TCP • Modbus UDP • CC-Link IE Field Network Basic

*1 The input current varies depending on the motor combined. Refer to p.27.
*2 The value in parentheses ( ) is the value when the electromagnetic brake motor is connected.
*3 The value in parentheses ( ) is the value when the electromagnetic brake motor is connected. The **AZM46** type is 0.23 A.

3-2 General specifications

Degree of protection		IP20
Operating environment	Ambient temperature	0 to +50 °C [+32 to +122 °F] (non-freezing)
	Humidity	85 % or less (non-condensing)
	Altitude	Up to 1,000 m (3,300 ft.) above sea level
	Surrounding atmosphere	No corrosive gas or dust. No exposure to water or oil.
Storage environment Shipping environment	Ambient temperature	−25 to +70 °C [−13 to +158 °F] (non-freezing)
	Humidity	85 % or less (non-condensing)
	Altitude	Up to 3,000 m (10,000 ft.) above sea level
	Surrounding atmosphere	No corrosive gas or dust. No exposure to water or oil.

4 Regulations and standards

4-1 UL Standards, CSA Standards

This product is recognized by UL under UL and CSA Standards.
The driver is not provided with the electronic motor overload protection and the motor overtemperature protection specified in UL and CSA Standards.

4-2 CE Marking / UKCA Marking

This product is affixed with the marks under the following directive/regulations.

■ EU EMC Directive / UK EMC Regulations

Refer to "4-7 Compliance with the EMC Directive/Regulations" on p.30 for details about conformity.

■ EU RoHS Directive / UK RoHS Regulations

This product does not contain the substances exceeding the restriction values.

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