Orientalmotor

αSTEP

AZ Series DC power input
Multi-Axis Driver

EtherCAT Drive Profile Compatible

USER MANUAL

Hardware Edition

Communication Specifiations Edition

Operation Edition

Object Lists

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.

3   Operation Edition

4   Object Lists

1   Hardware Edition

This part explains safety precautions, product overviews, names and functions of parts as well as installations and connections.

◆Table of contents

1 Introduction

■ Before use

Only qualified personnel of electrical and mechanical engineering should work with the product.
Use the product correctly after thoroughly reading the section "2 Safety precautions" on p.10. In addition, be sure to observe the contents described in warning, caution, and note in this manual.
The product described in this manual is designed and manufactured to be incorporated in general industrial equipment. Do not use for any other purpose. Oriental Motor Co., Ltd. is not responsible for any compensation for damage caused through failure to observe this warning.

■ Related operating manuals

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

- **AZ** Series DC power input Multi-Axis Driver EtherCAT Drive Profile Compatible 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

Note	• This manual describes contents about the drivers with software version is 2.00 and later. Note that some functions described in this manual cannot be used for the drivers older than the version 2.00. The software version of the driver can be checked using the unit information monitor of the support software **MEXE02**. (⇨ p.193) • In this manual, the specific contents of the multi-axis driver are described by partially changing the contents of the **AZ** Series OPERATING MANUAL Function Edition. Note about the operating manual referenced. Refer to the **AZ** Series OPERATING MANUAL Function Edition for the following items. • LED of the driver axis • Driver objects not described in this manual • Details about driver objects of manufacturer-specific area

■ Notation on this manual

> This product is described as "driver" in this manual.
> Also, each driver axis of the product is described as "driver axis," and EtherCAT communication axis is described as "controller axis."
> Note them in advance.

Note	The items under this heading contain important handling instructions that the user should observe to ensure the 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.

● About notation of objects

In this manual, the index number is described in parentheses ( ) after the object name.
Example: Controlword (6040h)

■ Overview of the product

The **AZ** Series DC power input multi-axis driver is the dedicated driver for the **AZ** Series DC power input types.
Since this product is compatible with the EtherCAT drive profile, it can directly be connected to the network without using a converter (gateway).
There are two types of driver shapes shown below.

● 4-axis type (**AZD2A-KED, AZD3A-KED, AZD4A-KED**)

Up to four motors and/or motorized actuators can be connected with a single driver. The model name varies with the number of driver axes.
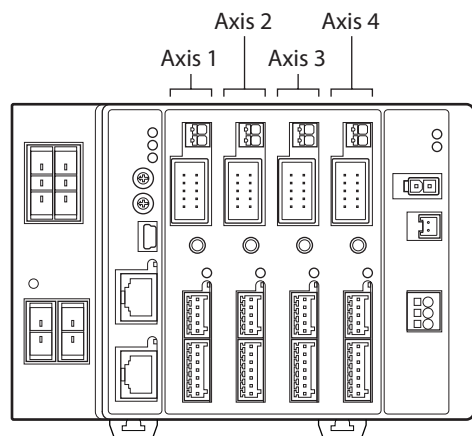
Model	Number of axes	Axes used
AZD2A-KED	2 axes	Axis 1, Axis 2
AZD3A-KED	3 axes	Axis 1 to Axis 3
AZD4A-KED	4 axes	Axis 1 to Axis 4

● 2-axis type (**AZD2B-KED**)

This is a compact driver that two motors and/or motorized actuators can be connected.
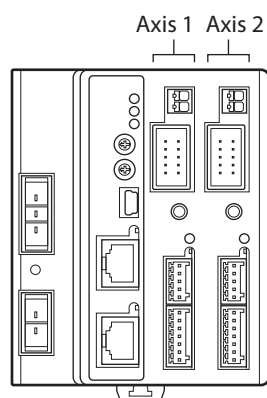
Model	Number of axes
AZD2B-KED	2 axes

1 Hardware Edition

■ System configuration

The figure shows the **AZD3A-KED** (3 axes).

> **Be sure to create the recovery data file initially when a motorized actuator is used. Refer to p.176 for how to create.**
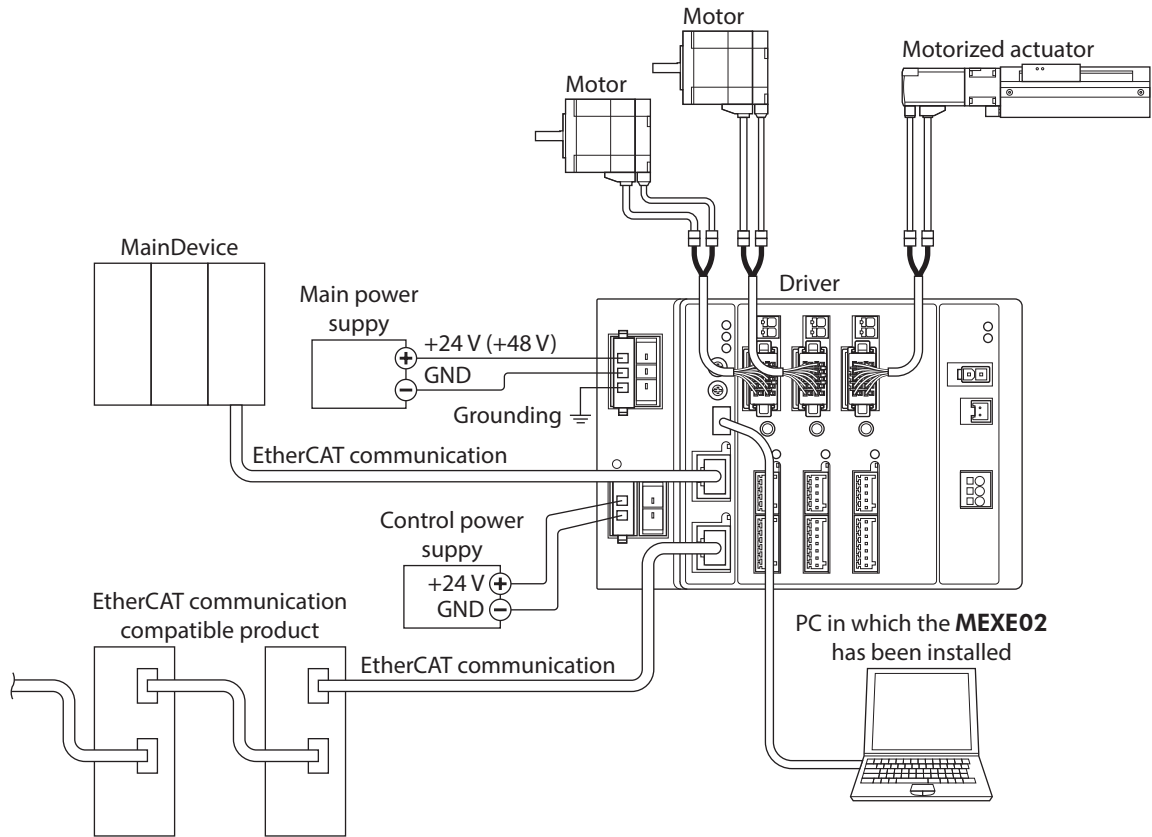
■ General specifications

Degree of protection	IP10	
Operation 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, dust, 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, dust, water or oil
Insulation resistance	100 MΩ or more when 500 VDC megger is applied between the following places: • FG terminal - Power supply terminals *	
Dielectric strength	Sufficient to withstand 1 kVAC at 50/60 Hz applied between the following places for 1 minute: • FG terminal - Power supply terminals * Leak current 10 mA or less	

* The main power supply terminals and the control power supply terminals are not electrically insulated. Bundle four lead wires of both terminals together into one piece to check.

■ Providing the ESI File

The ESI (EtherCAT SubDevice Information) file is a file that describes the specific information of the EtherCAT SubordinateDevice products in XML format. By importing the ESI file to the EtherCAT Configration Tool of the PLC (programmable controller), the settings of EtherCAT communication can be performed before you receive the driver. For details, contact your nearest Oriental Motor sales office.

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2 Safety precautions

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

Description of signs

⚠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.

Description of graphic symbols

🚫	Indicates "prohibited" actions that must not be performed.
❗	Indicates "compulsory" actions that must be performed.

⚠WARNING	
🚫	• Do not use the product in explosive or corrosive environments, in the presence of flammable gases, in places subjected to splashing water, or near combustibles. Doing so may result in fire or injury. • Do not transport, install, connect or inspect the driver 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. • Do not forcibly bend, pull or pinch the cable. Doing so may result in fire or electric shock. • Do not remove the motor excitation during operation. Doing so may cause the motor to stop and lose the holding force, resulting in injury or damage to equipment. • Do not disassemble or modify the product. Doing so may result in injury or damage to equipment.
❗	• Assign qualified personnel to the task of installing, wiring, operating/controlling, inspecting, and troubleshooting the product. Handling by unqualified personnel may result in fire, electric shock, injury, or damage to equipment. • Take measures to keep the moving part in position if the product is used in vertical operations such as elevating equipment. Failure to do so may result in injury or damage to equipment. • When an alarm is generated in the driver (any of the driver's protective functions is triggered), remove the cause before clearing the alarm (protective function). Continuing the operation without removing the cause of the problem may cause malfunction of the motor and driver, leading to injury or damage to equipment. • Install the product inside an enclosure. Failure to do so may result in electric shock or injury. • Always keep the power supply voltage of the driver within the specified range. Failure to do so may result in fire or electric shock. • Connect the cables securely according to the wiring diagram. Failure to do so may result in fire or electric shock. • Turn off the main power supply and control power supply of the driver in the event of a power failure. Failure to do so may result in injury or damage to equipment.

⚠CAUTION

🚫	• Do not use the product beyond its specifications.
	  Doing so may result in electric shock, injury or damage to equipment.
	
	• Keep your fingers and objects out of the openings in the product.
	  Failure to do so may result in fire or injury.
	
	• Do not touch the product during operation or immediately after stopping.
	  Doing so may result in a skin burn(s).
	
	• Keep the area around the product free of combustible materials.
	  Failure to do so may result in fire or a skin burn(s).
	
	• Do not forcibly bend or pull the cable that was connected to the driver.
	  Doing so may result in damage.
	
	• Do not touch the terminals while conducting the insulation resistance measurement or dielectric strength test.
	  Doing so may result in electric shock.
	
	• Leave nothing around the product that would obstruct ventilation.
	  Failure to do so may result in damage to equipment.

❗	• Use a motor and driver only in the specified combination.
	  Failure to do so may result in 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.
	
	• For the main power supply and control power supply of the driver, use a DC power supply with reinforced insulation on its primary and secondary sides.
	  Failure to do so may result in electric shock.
	
	• Before supplying main power supply and control power supply to the driver, turn all input signals to the driver to OFF.
	  Failure to do so may result in injury 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 into a non-excitation state.
	  Continuing the work while the motor is in an excitation state may result in injury.
	
	• When an abnormal condition has occurred, immediately stop operation and turn off the main power supply and control power supply of the driver.
	  Failure to do so may result in fire, electric shock or injury.
	
	• Dispose the product correctly in accordance with laws and regulations, or instructions of local governments.

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3   Precautions for use

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

● **Use this driver in combination with the AZ Series DC power input type motor (motorized actuator).**

Combining motors (motorized actuators) other than the **AZ** Series DC power input type causes an alarm of the motor combination error. For the products that can be combined, refer to p.14.

● **Be sure to use our cable to connect the motor and the driver.**

Check the model name on p.39.

● **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 dielectric strength test with the motor and driver connected may result in damage to the product.

● **Noise elimination measures**

Refer to the p.33. for measures with regard to noise.

● **Storing data in non-volatile memory**

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

● **If vertical drive (gravitational operation) such as elevating applications is performed or if sudden start-stop operation of a large inertia load is repeated frequently, connect our regeneration resistor. (AZD2A-KED, AZD3A-KED, and AZD4A-KED only)**

The overvoltage alarm may generate depending on the operating condition of the motor. When the overvoltage alarm has generated, reconsider the operating conditions or connect our regeneration resistor. Check the model name on p.41. Refer to p.32 for connection method.

> memo It is recommended to use a regeneration resistor since an alarm is likely to be generated when using the driver at 48 VDC.

● **If an alarm of the main circuit overheat is generated, use our fan. (AZD2A-KED, AZD3A-KED, and AZD4A-KED only)**

An alarm of the main circuit overheat may be generated depending on the operating condition of the motor. When the main circuit overheat alarm was generated, reconsider the operating conditions or connect our fan. Check the model name on p.41. Refer to p.32 for connection method.

● **Note on connecting a power supply whose positive terminal is grounded**

The USB communication connector is not insulated. When grounding the positive terminal of the power supply, do not connect any equipment (PC, etc.) whose negative terminal is grounded. Doing so may cause the driver and these equipment to short, damaging both. When connecting, do not ground equipment.

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4 Regulations and standards

■ 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.

■ CE Marking / UKCA Marking

This product is affixed with the marks under the following directive/regulations.

● EU EMC Directive / UK EMC Regulations

Refer to "7-10 Compliance with EMC Directive/Regulations" on p.34 for details.

● EU RoHS Directive / UK RoHS Regulations

This product does not contain the substances exceeding the restriction values.

■ Republic of Korea, Radio Waves Act

This product is affixed with the KC Mark under the Radio Waves Act, the Republic of Korea.

5   Preparation

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

5-1   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.

Included items	AZD2A-KED	AZD3A-KED	AZD4A-KED	AZD2B-KED
Driver	1 unit	1 unit	1 unit	1 unit
CN1 connector (3 pins)	2 pcs.	2 pcs.	2 pcs.	1 pc.
CN2 connector (2 pins)	2 pcs.	2 pcs.	2 pcs.	1 pc.
CN1, CN2 contact	10 pcs.	10 pcs.	10 pcs.	5 pcs.
CN9 connector (5 pins)	2 pcs.	3 pcs.	4 pcs.	2 pcs.
CN10 connector (7 pins)	2 pcs.	3 pcs.	4 pcs.	2 pcs.
Instructions and Precautions for Safe Use	1 copy	1 copy	1 copy	1 copy

5-2   Products for possible combinations

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

Power supply type	Product type	Applicable series	Model representing series name *1	Example of model
DC input	Stepping motor	AZ Series	AZM*3	AZM46AK AZM66AK-TS10
	Motorized actuator	EAS Series *2	EASM	EASM4NXD005AZAK
		EAC Series *2	EACM	EACM2E05AZAK
		EZS Series *2	EZSM	EZSM6D005AZAK
		DR Series	DR	DR28G2.5B03-AZAKU DR28T1B03-AZAKD-F
		DRS2 Series	DRSM	DRSM60-05A4AZAK
		DGII Series	DGM DGB	DGM85R-AZAK DGB85R12-AZAKR
		L Series	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. Check the model name of the equipped motor with the nameplate.

*3 Excluding connector type motors.

5-3   Names and functions of parts

■ AZD2A-KED, AZD3A-KED, AZD4A-KED

Power connection unit

Controller axis
(EtherCAT communication axis)

Driver axis (Axis 1 to Axis 4)

Regeneration resistor/
Fan connection unit

DIN lever

DIN lever

● **Power connection unit**

Main power supply
connector (CN1)

MAIN POWER LED (Green)

Control power supply
connector (CN2)

● **Controller axis (EtherCAT communication axis)**

RUN LED (Green)

ERR LED (Red)

ALARM LED (Red)

Node address setting
switches (ECAT ID ×10, ×1)

USB communication
connector

EtherCAT communication
connector (CN4 ECAT IN)

L/A LEDs (Green)

EtherCAT communication
connector (CN5 ECAT OUT)

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● **Driver axis**

Axis 1   Axis 2   Axis 3   Axis 4

Electromagnetic brake connector (MB1/MB2)

Motor connector (CN7)

Extension switch (EXT-IN)

POWER LED (Green)
ALARM LED (Red)

Input signal connector (CN9)

Output signal connector (CN10)

* The sign is common to each driver axis.

● **Regeneration resistor •**
  Fan connection unit

RG-ON LED (Green)
TH-ALM LED (Red)

Regeneration resistor connector (CN11)

Regeneration resistor thermal connector (CN12)

Fan connector (CN13)

■ **AZD2B-KED**

Power connection unit

Controller axis
(EtherCAT communication axis)

Driver axis
(Axis 1, Axis 2)

● **Power connection unit**

Main power supply
connector (CN1)

MAIN POWER LED (Green)

Control power supply
connector (CN2)

DIN lever

● **Controller axis (EtherCAT communication axis)**

RUN LED (Green)
ERR LED (Red)
ALARM LED (Red)

Node address setting
switches (ECAT ID ×10, ×1)

USB communication
connector

EtherCAT communication
connector (CN4 ECAT IN)

L/A LEDs (Green)

EtherCAT communication
connector (CN5 ECAT OUT)

● **Driver axis**

Axis 1   Axis 2

Electromagnetic brake
connector (MB1/MB2)

Motor connector (CN7)

Extension switch (EXT-IN)

POWER LED (Green)
ALARM LED (Red)

Input signal connector
(CN9)

Output signal connector
(CN10)

* The sign is common to each driver axis.

■ Functions of parts

Arrangement	Type	Name	Sign	Explanation
Power connection unit	LED	MAIN POWER LED (Green)	MAIN POWER	This LED is lit while the main power is input.
	Connector	Main power supply connector	CN1	Connects a main power supply. (24 VDC/48 VDC)
		Control power supply connector	CN2	Connects a control power supply. (24 VDC)
Controller axis (EtherCAT communication axis)	LED	RUN LED (Green)	RUN	This LED indicates the communication status of EtherCAT communication.
		ERR LED (Red)	ERR	This LED blinks when an error occurred via EtherCAT communication.
		ALARM LED (Red)	ALARM	This LED blinks or is lit when an alarm is generated in the controller axis.
		L/A LEDs (Green)	L/A	These LEDs indicate the LINK/ACT status of EtherCAT communication.
	Switch	Node address setting switches	ECAT ID ×10 ECAT ID ×1	Sets the node address of the driver. Factory setting: 0 (×10: 0, ×1: 0)
	Connector	USB communication connector	⬩⟝	Using a USB cable, connects a PC in which the **MEXE02** has been installed. (USB2.0 mini-B port)
		EtherCAT communication connector	CN4 ECAT IN	Connects with the upper EtherCAT communication compatible product.
			CN5 ECAT OUT	Connects with the EtherCAT communication compatible product of the following address number.
Driver axis	LED	POWER LED (Green)	POWER	This LED is lit while the internal control power supply is normally operated.
		ALARM LED (Red)	ALARM	This LED blinks or is lit when an alarm is generated in the driver axis.
	Switch	Extension switch	EXT-IN	This switch is used after assigning input signals. The assigned input signal can be executed just pressing the extension switch (EXT-IN).
	Connector	Electromagnetic brake connector	MB1/MB2	Connects the lead wires from the electromagnetic brake. MB1: Electromagnetic brake − (Black) MB2: Electromagnetic brake + (White)
		Motor connector	CN7 MOTOR	Connects the motor and encoder.
		Input signal connector	CN9 INPUT	Connects the input signals.
		Output signal connector	CN10 OUTPUT	Connects the output signals.
Regeneration resistor/ Fan connection unit	LED	RG-ON LED (Green)	RG-ON	This LED is lit in a regeneration state.
		TH-ALM LED (Red)	TH-ALM	This LED is lit when the regeneration resistor is in an overheat state.
	Connector	Regeneration resistor connector	CN11 RG	Connects our regeneration resistor.
		Regeneration resistor thermal connector	CN12 TH	Connects the thermal signal of our regeneration resistor.
		Fan connector	CN13 FAN	Connects our fan.
Other	–	DIN lever	–	This is used to install the driver to a DIN rail.

(memo)
- The power GND of the CN1 and that of the CN2 on the power connection unit are common internally.
- Check the model names of the regeneration resistor and fan on p.41.

■ **LED indicator of the controller axis (EtherCAT communication axis)**

LED indicator	LED status *	EtherCAT communication status
RUN (Green)	No light	Initialization state
	Blinking	Pre-Operational state
	Single flash	Safe-Operational state
	Light	Operational state (normal condition)
ERR (Red)	No light	No communication error
	Blinking	Communication setting error
	Single flash	Communication data error
	Double flash	Communication watchdog timeout
ALARM (Red)	No light	No alarm in communication axis
	Blinking	Alarm generated in communication axis
	Light	CPU error
L/A (Green)	No light	No link
	Light	Link establishment
	Flickering	Operation in progress after link establishment

* The timing to blink the LED is as follows. (unit: ms)
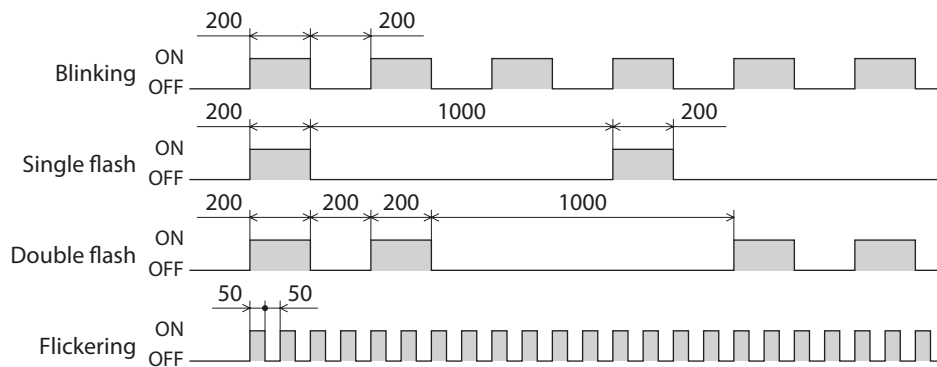
■ **LED indication of the driver axis**

POWER LED (Green)	ALARM LED (Red)	Driver status
Light	No light	Control power supply on. Under normal operation.
Light	Blinking	Alarm present.
Blinking twice at the same time		• Information present. • Remote operation is being executed with the **MEXE02**.
POWER LED Light → ALARM LED Light → Light at the same time		During simulation of the driver operation. *

* Refer to **AZ** Series OPERATING MANUAL Function Edition for details.

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6 Installation

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

6-1 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 vibrations or excessive shocks
- Area free of excessive electromagnetic noise (from welders, power machinery, etc.)
- Area free of radioactive materials, magnetic fields or vacuum
- 1,000 m (3,300 ft.) or lower above sea level

6-2 Installation method

To install the driver, there are two methods. One is installing to a DIN rail and the other is installing with screws. There must be a clearance of at least 50 mm (1.97 in.) in the horizontal and vertical directions, between the driver and enclosure or other equipment within the enclosure.
When installing side by side with our drivers, it is possible to install closely in the horizontal direction. However, it is assumed that drivers to be installed closely should be those possible to install closely. Provide a minimum clearance of 50 mm (1.97 in.) in the vertical direction.

50 mm (1.97 in.) or more

100 mm (3.94 in.)

50 mm (1.97 in.) or more

• When installing side by side with drivers possible to install closely.

Possible to install closely

50 mm (1.97 in.) or more
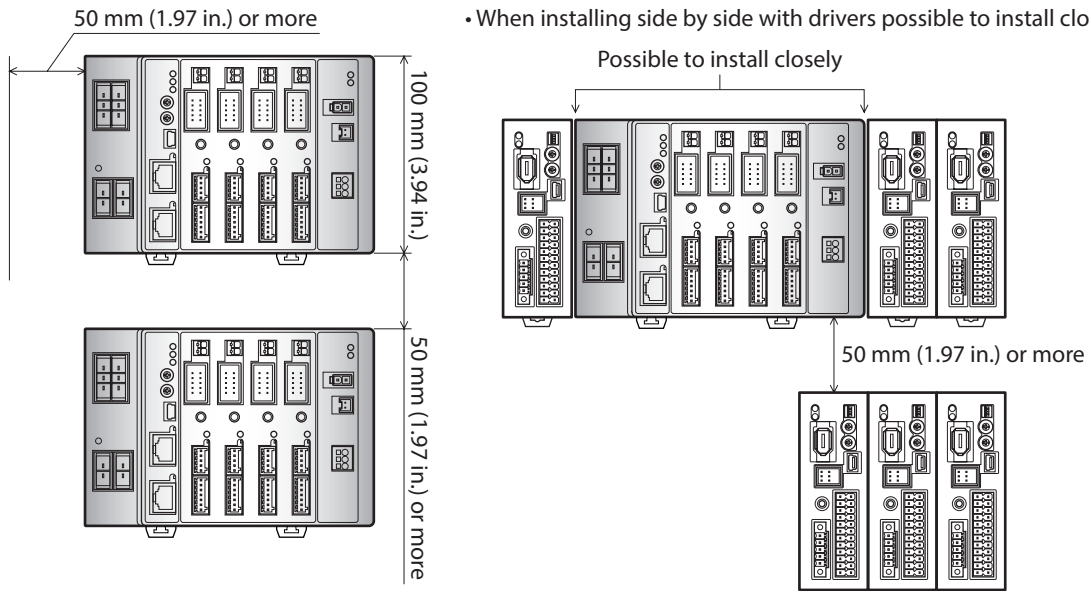
memo
- Do not install any equipment that generates a large amount of heat or noise near the driver.
- Do not install the driver underneath the controller or other equipment vulnerable to heat.
- If the ambient temperature of the driver exceeds 50 °C (122 °F), reconsider the ventilation condition such as providing forced cooling by using fans or creating spaces between the drivers.
- Install the driver vertically (in vertical position) in a condition where the motor connector (CN7) is faced up. If the driver is installed in the direction other than vertical position, its heat radiation effect will deteriorate.

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■ Installing to DIN rail

Mount the driver to a 35 mm (1.38 in.) width DIN rail.

1. Pull down the DIN lever of the driver and lock it.
   Hang the hook at the rear to the DIN rail.

Hook
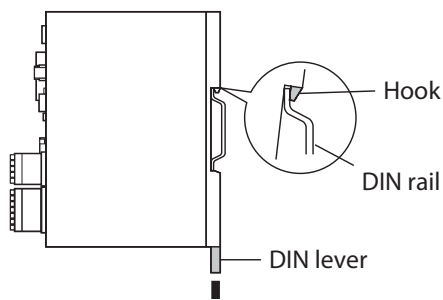
DIN rail

DIN lever

2. Hold the driver to the DIN rail, and push up the
   DIN lever to secure.
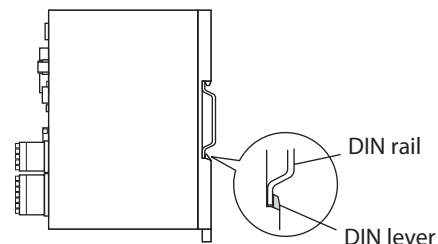
DIN rail

DIN lever

3. Secure both sides using end plates.

End plate
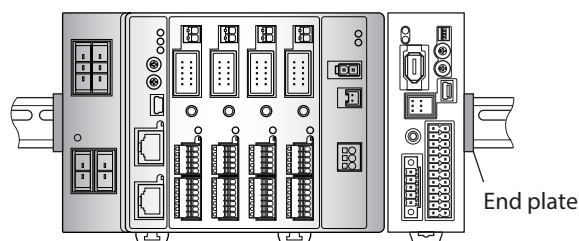
Removing from DIN rail

Pull the DIN lever down until it locks using a slotted screwdriver, and lift the bottom of
the driver to remove it from the rail. Use force of about 10 to 20 N (2.2 to 4.5 lb.) to pull
the DIN lever to lock it. Excessive force may damage the DIN lever.
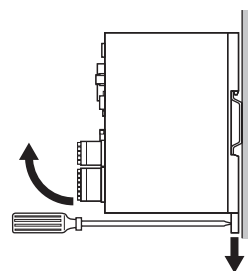
■ Installing with screws

1. Pull up and down the upper and lower levers on the rear side of the driver respectively until each lever clicks.

2. Secure four mounting holes with screws.
   Use screws and washers for mounting, which sizes are ø10 mm (ø0.39 in.) or less.
   • Screw size: M4 (not included)
   • Tightening torque: 0.7 N·m (99 oz-in)

Lever

Mounting hole

DIN lever

Mounting hole

1 Hardware Edition
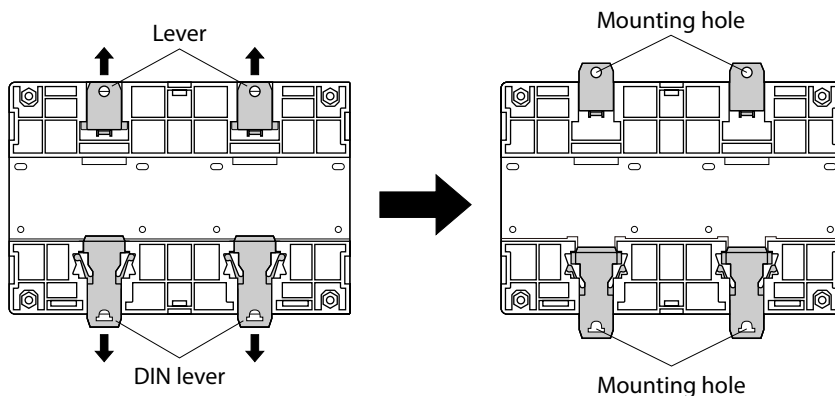
6-3 Installing the regeneration resistor (AZD2A-KED, AZD3A-KED, and AZD4A-KED only)

Secure our regeneration resistor on a mounting plate with screws. [Tightening torque: 0.5 N·m (71 oz-in)]
Use the mounting plate which heat dissipation capacity is equivalent to the level achieved with a plate. [made of aluminum, 180×150×2 mm (7.09×5.91×0.08 in.)]
Screw and washer are not included. They must be provided by the customer.

- M3 screw.............................4 pcs.
- M3 spring washer............4 pcs.
- M3 Nut.................................4 pcs. (Not necessary if mounting screw holes are provided in the mounting plate)

Plate cutout for mounting [Unit: mm (in.)]
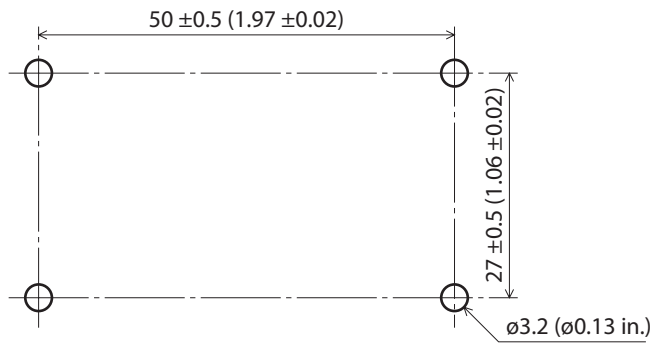
7   Connection

This chapter explains how to connect the motor, power supply and I/O signals to the driver, as well as grounding method.

7-1   Connection example

The figure shows when **AZD4A-KED** and the electromagnetic brake type motor are connected.
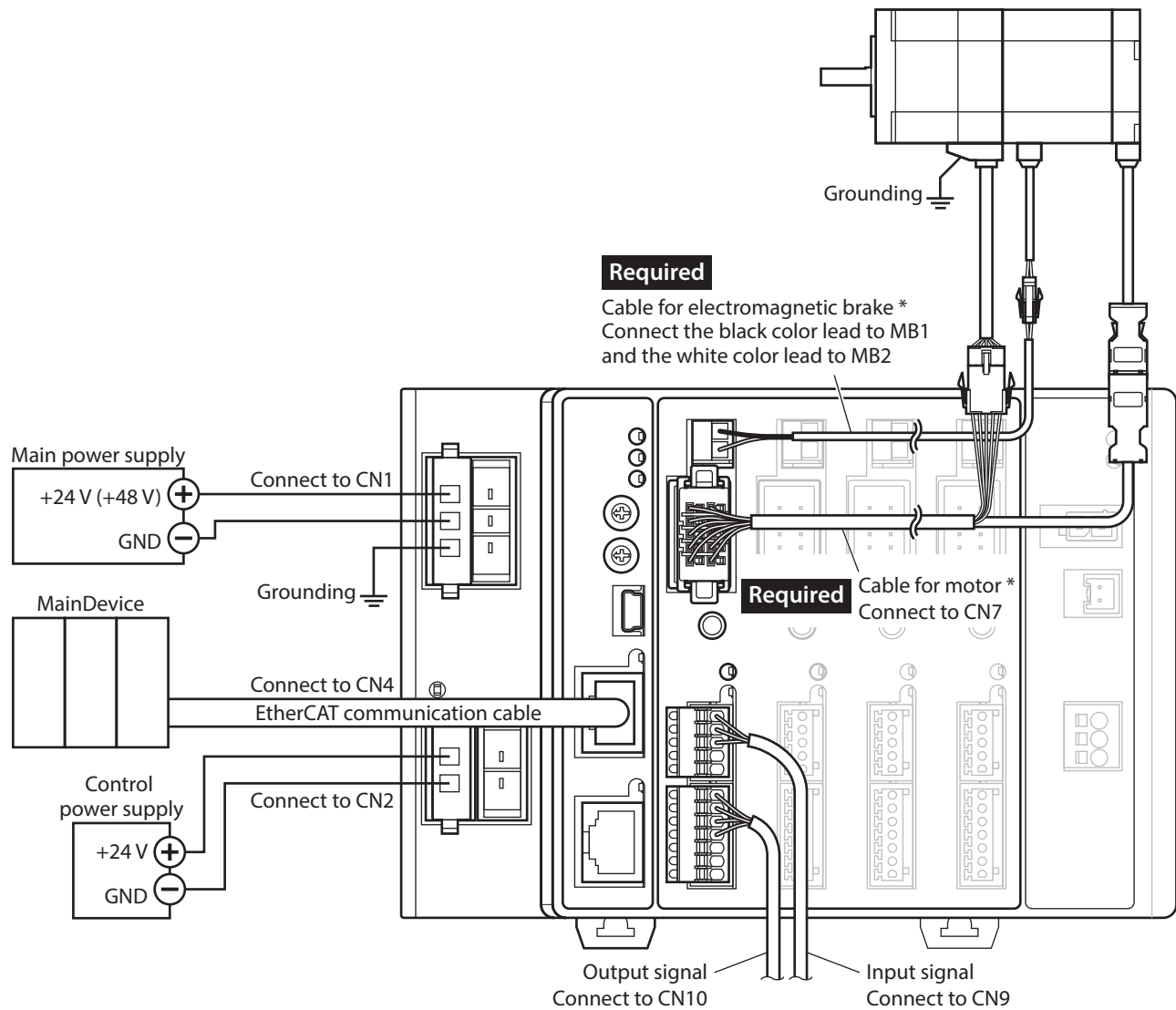
* This cable is provided as our product. Purchase it separately.

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Note
- The lead wires of the "cable for electromagnetic brake" have polarities, so connect them in the correct polarities. If the lead wires are connected with their polarities reversed, the electromagnetic brake will not operate properly.
- Do not wire the power supply cable of the driver in the same cable duct with other power lines or motor cables. Doing so may cause malfunction due to noise.
- Keep 20 m (65.6 ft.) or less for the wiring distance between the motor and driver. To extend more than 20 m (65.6 ft.) may result in the driver heat generation or increase of the electrical noise emitted from the driver.
- Before connecting or disconnecting the connector, turn off the main power supply and control power supply, and check the MAIN POWER LED has been turned off. The residual voltage may cause electric shock.
- Insecure connections may cause malfunction or damage to the motor or driver. Connect the connectors securely.
- When turning on the power supply again, turn off the power and wait for the following time before doing so. Turning on the power again immediately after turning off the power may cause damage to the driver.
  • Main power supply: 10 seconds or more
  • Control power supply: 5 seconds or more

memo
- When installing the motor on a moving part, use a flexible cable.
- When disconnecting the motor cable, pull out while pressing the latches on the connector with fingers.
- It is recommended to separate the control power supply from the main power supply. Even if the main power supply is shut off by an emergency stop or others, the motor position (travel amount) or alarm can be checked if the control power supply is being supplied.

7-2   Connecting the motor

■ Motor connector (CN7)

Pin No.	Color	Lead wire
A1	Green (FG)	AWG22 (0.3 mm²)
A2	Brown	AWG26 (0.14 mm²)
A3	Purple	
A4	Black	
A5	White	
B1	Drain wire (SG)	
B2	Orange	AWG22 (0.3 mm²)
B3	Blue	
B4	Gray	
B5	Red	
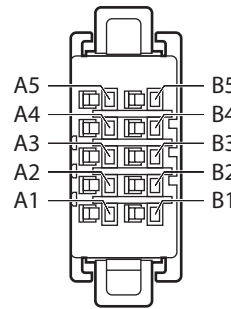
• Motor side   • Driver side
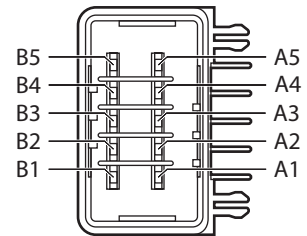
■ Electromagnetic brake connector (MB1, MB2)

Pin No.	Name	Color	Description	Lead wire
1	MB2	White	Electromagnetic brake + side	AWG20 (0.5mm²)
2	MB1	Black	Electromagnetic brake − side	
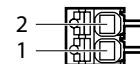
7-3   Applicable connector

Connector type	Purpose	Model
Connector housing	CN1 connector (3 pins)	F32FSS-03V-KX (J.S.T. Mfg. Co., Ltd.)
	CN2 connector (2 pins)	F32FSS-02V-KX (J.S.T. Mfg. Co., Ltd.)
	CN9 connector (5 pins)	FK-MC 0,5/ 5-ST-2,5 (PHOENIX CONTACT GmbH & Co. KG)
	CN10 connector (7 pins)	FK-MC 0,5/ 7-ST-2,5 (PHOENIX CONTACT GmbH & Co. KG)
Contact *	CN1, CN2 contact	LF3F-41GF-P2.0 (J.S.T. Mfg. Co., Ltd.) Designated crimping tool: YRF-880 (J.S.T. Mfg. Co., Ltd.)

* The included contacts are for the lead wires of AWG20 to AWG16 (0.5 to 1.25 mm2).
  When the lead wires of AWG24 to AWG20 (0.2 to 0.5 mm2) are used, provide the following contact and designated crimp tool at customer side.
  • Contact: BF3F-01GF-P2.0 (J.S.T. Mfg. Co., Ltd.)
  • Designated crimping tool: YRF-881 (J.S.T. Mfg. Co., Ltd.)

7-4   Connecting the power supply and grounding

Power supply connection terminals and a Frame Ground terminal are provided in the CN1 connector. The applicable wire size varies between lead wires for a power supply and Frame Ground. Be sure to use proper lead wires.

memo) It is recommended to separate the control power supply from the main power supply. Even if the main power supply is shut off by an emergency stop or others, the motor position (travel amount) or alarm can be checked if the control power supply is being supplied.

■ Capacitance of power supply circuit

A large-capacity capacitor is built into the main power supply circuit inside the driver, but an excessive inrush current can easily flow when the power is turned on since there is no circuit to prevent an inrush current. If an excessive inrush current flows, the protective function of the power supply may be activated to shut off the power supply. To prevent such a condition, select a power supply that matches the capacitance of the driver.

Power supply circuit	Capacitance
Main power supply circuit	**AZD2A-KED**, **AZD3A-KED**, **AZD4A-KED**: 810 µF **AZD2B-KED**: 540 µF
Control power supply circuit	220 µF

memo) An electromagnetic switch or a relay resistant to inrush current is recommended for the device that controls ON/OFF of the power supply for the driver.

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■ Power supply current capacity of main power supply

Power supply current capacity	Input power supply voltage
7.0 A	24 VDC±10 % 48 VDC±10 %

Note When a product of 24 VDC specification is connected to any of the driver axes, use 24 VDC for the main power supply of the driver. If 48 VDC is used, an alarm of the motor combination error will be generated. Check products of 24 VDC specification in the table.

Applicable Series	Model *1
AZ Series	**AZM14**, **AZM15** **AZM24**, **AZM26**
EAS Series *2 **EAC** Series *2	**AZM24**
DR Series	**DR20**, **DR28**
DGII Series	**DGM60**

*1 The motor model column in the table describes part of the entire name of models.

*2 When using the **EAS** Series and the **EAC** Series, check with the equipped motor model.

memo
- Set the input current that is an average of 4.0 A or lower.
- The maximum value of the input current per motor is approximately 3.5 A.
- When connecting to operate two or more motors, use so that the input current of the main power supply does not exceed 7.0 A. If the driver is used in a condition where the input current exceeds 7.0 A, an alarm of the "main power supply off" is generated due to overheat of the power supply of the driver.

■ Power supply current capacity of control power supply

The power supply current capacity varies depending on the motor connected. Provide a suitable power supply based on the motor connected.

● Motor without an electromagnetic brake

Power supply current capacity	Input power supply voltage
0.5 A	24 VDC±10 %

● Motor with an electromagnetic brake

Model	Power supply current capacity *1	Input power supply voltage
AZD2A-KED	1.0 A	24 VDC±5 % *2
AZD3A-KED	1.25 A	
AZD4A-KED	1.5 A	
AZD2B-KED	1.0 A	

*1 It varies depending on the motor connected. The maximum value is described in the table.
The maximum value of the input current of the electromagnetic brake are as follows.
- **AZM46**: 0.08 A
- **AZM66**, **AZM69**: 0.25 A

*2 When the wiring distance between the electromagnetic brake motor and driver is 20 m (65.6 ft.), the input power supply voltage is 24 VDC±4 %.

■ Wiring method of connectors for CN1 and CN2

- Applicable lead wire   For power supply: AWG24 to 16 (0.2 to 1.25 mm^2)
                                          For grounding: AWG18 to 16 (0.75 to 1.25 mm^2)
- Stripping length of wire insulation: 7 mm (0.28 in.)

1. Strip the insulation cover of the lead wire.

2. Crimp the lead wires and contacts using the designated crimp tool.

3. Insert the lead wires that have crimped contacts into the connector for CN1 and CN2.
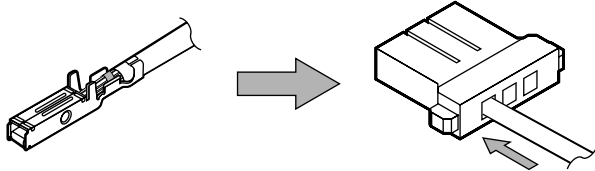
memo For **AZD2A-KED**, **AZD3A-KED**, and **AZD4A-KED**, there are two inputs (connectors) provided in the CN1 connector. If you connect the power supply of the other driver to the vacant connector on the multi-axis driver by making at transition-wiring (link wiring), the power can be supplied from the main power supply of the multi-axis driver. When you make transition-wiring (link wiring) of the power supply, use lead wires of AWG16 (1.25 mm2), and set the current that flows into the CN1 connector to 13 A or less.

■ Pin assignment

● CN1 connector (main power supply)

Pin No.	Name	Description
1	+	Main power supply input (24 VDC/48 VDC)
2	−	Power supply GND
3	⏚	Frame Ground
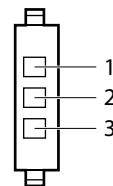
● CN2 connector (control power supply)

Pin No.	Name	Description
1	+	Control power supply input (24 VDC)
2	−	Power supply GND
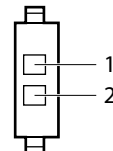
memo The power GND of the CN1 and that of the CN2 on the power connection unit are common internally.

■ Grounding

Do not share the grounding wire with a welder or any other power equipment.
When grounding the Protective Earth Terminal, use a round terminal and secure the grounding point near the driver.

7-5   Connecting the I/O signals

■ Wiring method of connectors for CN9 and CN10

- Applicable lead wire: AWG26 to 20 (0.14 to 0.5 mm^2)
- Stripping length of wire insulation: 8 mm (0.31 in.)

1. Strip the insulation cover of the lead wire.

2. Insert the lead wire while pushing the button of the orange color with a slotted screwdriver.

3. After having inserted, release the button to secure the lead wire.

Button of the orange color

Lead wire
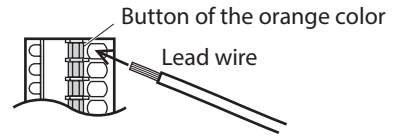
■ Pin assignment

● Input signal connector (CN9)

Pin No.	Name	Description *
1	IN0	Control input 0 (FW-LS)
2	IN1	Control input 1 (RV-LS)
3	IN2	Control input 2 (HOMES)
4	IN3	Control input 3 (FREE)
5	IN-COM	Input common
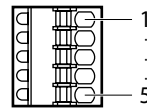
* ( ): Initial value

- Input voltage: 24 VDC±10 %
- Internal resistor: 4.4 kΩ

● Output signal connector (CN10)

Pin No.	Name	Description *
1	OUT0+	Control output 0 (ALM-B)
2	OUT0−	
3	OUT1+	Control output 1 (CRNT)
4	OUT1−	
5	OUT2+	Control output 2 (MOVE)
6	OUT2−	
7	N.C.	–
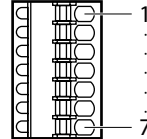
* ( ): Initial value

- Output voltage: 4.5 to 26.4 VDC
- Output current: 10 mA or less

■ Input signal

- Photocoupler inputs
- Input resistance: 4.4 KΩ
- Input voltage: 24 VDC±10 %

● **Internal circuit**
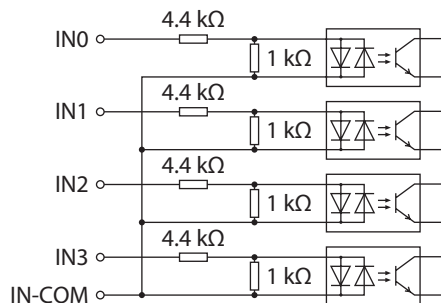
● **Sensor connection example with a current sink output circuit**
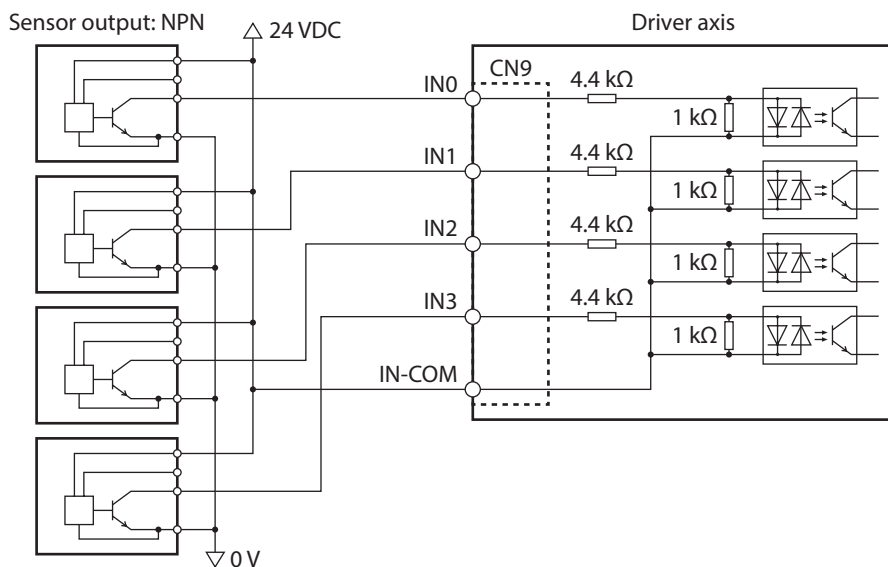
● **Sensor connection example with a current source output circuit**
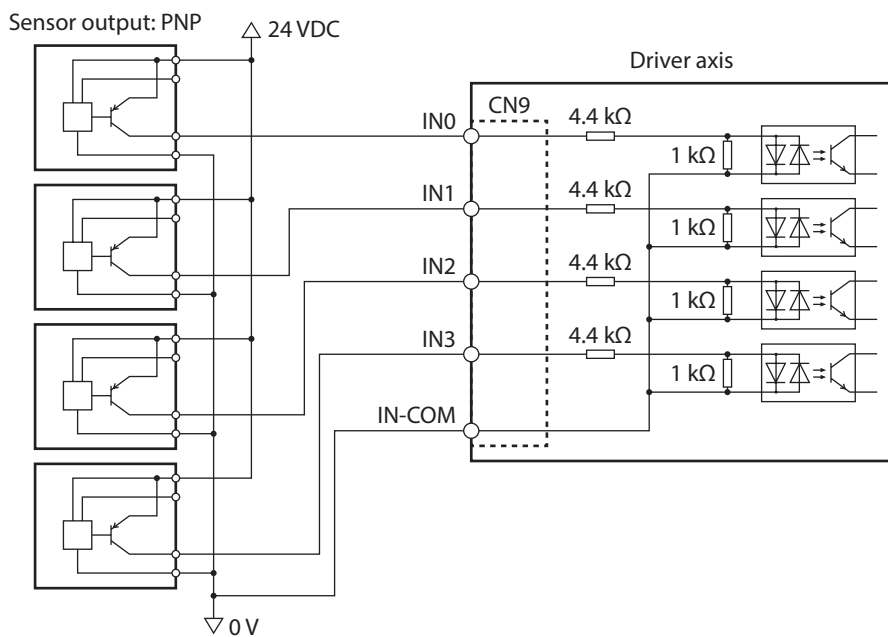
■ Output signal

- Maximum output current: 10 mA
- Applicable voltage: 4.5 to 26.4 VDC

● **Internal circuit**

OUT0+
OUT0−
OUT1+
OUT1−
OUT2+
OUT2−
N.C.
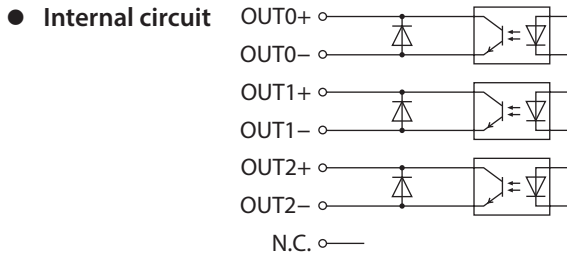
7-6   Connection diagram

(memo)
- Use input signals at 24 VDC.
- Use output signals at 4.5 to 26.4 VDC, 10 mA or less. If the current exceeds 10 mA, connect an external resistor R0 so that the current becomes 10 mA or less.

■ Connecting to a current sink output circuit

Host controller

24 VDC

Driver

CN9

IN-COM   5
IN0 (FW-LS)   1   4.4 kΩ   1 kΩ
IN1 (RV-LS)   2   4.4 kΩ   1 kΩ
IN2 (HOMES)   3   4.4 kΩ   1 kΩ
IN3 (FREE)   4   4.4 kΩ   1 kΩ

0 V

4.5 to 26.4 VDC

CN10

R0   10 mA or less →   OUT0+ (ALM-B+)   1
                       OUT0− (ALM-B−)   2
R0   OUT1+ (CRNT+)   3
                       OUT1− (CRNT−)   4
R0   OUT2+ (MOVE+)   5
                       OUT2− (MOVE−)   6
0 V   Twisted pair cable   N.C.   7
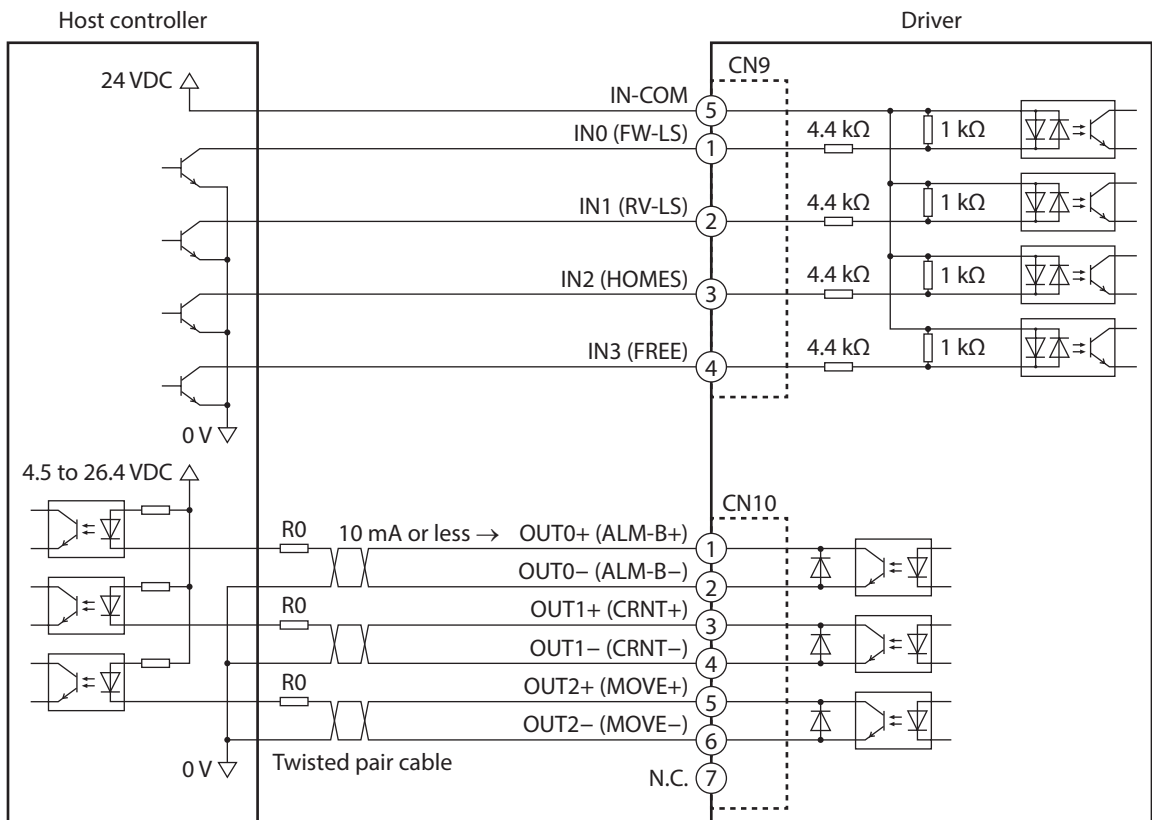
* ( ): Initial value

■ **Connecting to a current source output circuit**

Host controller | Driver
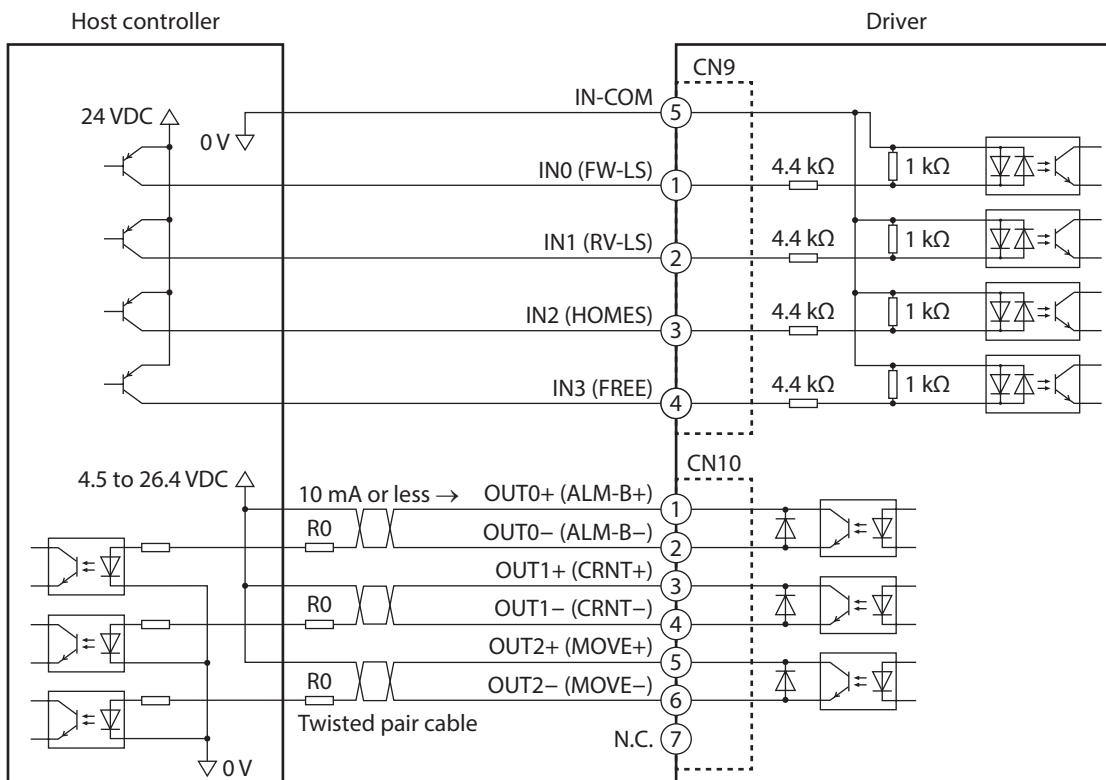
* ( ): Initial value

7-7 Connecting the regeneration resistor and fan (AZD2A-KED, AZD3A-KED, and AZD4A-KED only)

When our regeneration resistor and fan are used, connect as shown in the figure below.

■ **Installation example**

Regeneration resistor: Connect to CN11

Regeneration resistor thermal: Connect to CN12

Fan: Connect to CN13
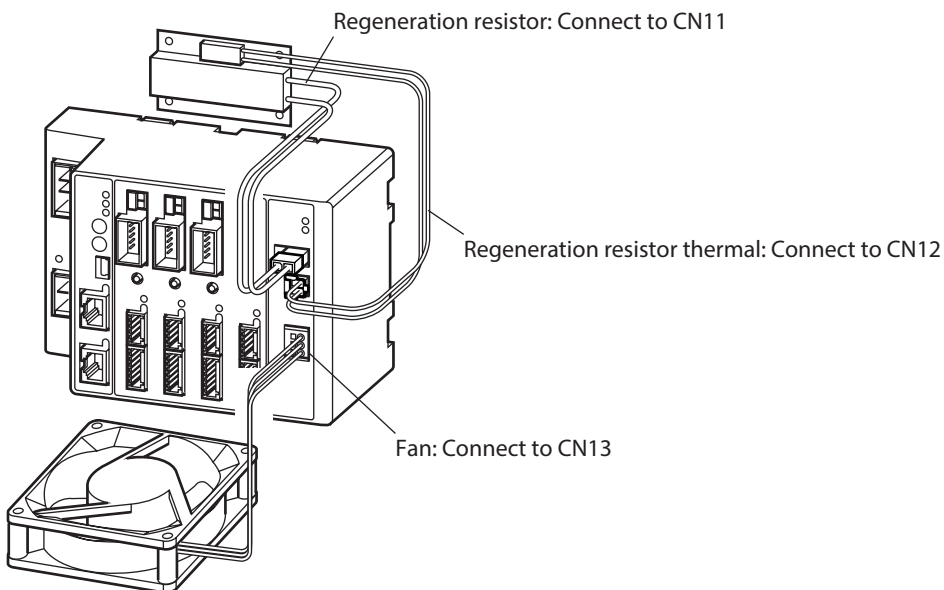
(memo) Install the fan on the lower side of the driver so that the wind can blow through in an upward direction.

■ Connecting the regeneration resistor

When the regeneration resistor is used, enable the "RG overheat alarm (4185h)."

● Connecting method

- Regenerative current flows through the two thick lead wires (AWG20: 0.5 mm^2) of the regeneration resistor. Connect to the CN11.
- The two thin lead wires (AWG24: 0.2 mm^2) of the regeneration resistor are the thermostat outputs. Connect to the CN12.

● Pin assignment

Regeneration resistor connector (CN11)

Pin No.	Name	Description
1	RG+	Regeneration resistor + side
2	RG−	Regeneration resistor − side

● Regeneration resistor side   ● Driver side
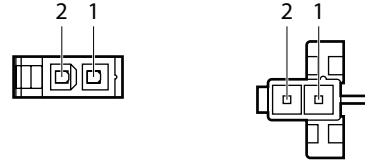
Regeneration resistor thermal connector (CN12)

Pin No.	Name	Description
1	TH+	Thermal input + side
2	TH−	Thermal input − side

● Regeneration resistor side   ● Driver side

● Regeneration resistor specification

Model	**RGC40**
Allowable current consumption	Continuous regenerative power: 40 W * Instantaneous regenerative power: 400 W
Resistance value	15 Ω
Thermostat operating temperature	Operation: Opens at 95±5 °C (203±9 °F) Reset: Closes at 65±15 °C (149±27 °F) [normally closed]
Thermostat electrical rating	250 VAC, 0.5 A (minimum current: 1.5 VDC, 1 mA)

* Install the regeneration resistor in a location where heat dissipation capacity equivalent to a level achieved with a heat sink [made of aluminum, 180×150×2 mm (7.09×5.91×0.08 in.)] is ensured.

> **memo** If the allowable power consumption of the regeneration resistor exceeds the allowable level, the thermostat will be triggered to generate an alarm of the regeneration resistor overheat. If an alarm of the regeneration resistor overheat is generated, turn off the main power supply and the control power supply to check the content of the error.

■ Connecting the fan

If the driver temperature information is generated in any of the driver axes when a fan is connected, the fan automatically starts operating. If the temperature inside the driver falls about 5 °C (9 °F) below the setting value of the "Driver temperature information (41A0h)," the "Driver temperature information" is canceled and the fan stops.

● Connecting method

Connect the lead wires of the fan to CN13.

Fan connector (CN13)

Pin No.	Name	Lead wire color	Description
1	ALM	Orange	Stall alarm input of fan
2	FAN−	Black	Fan output − side
3	FAN+	Red	Fan output + side
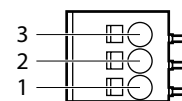
● Output voltage: 24 VDC±5 %
● Output current: 0.2 A or less

7-8 Connecting the USB cable

Using a USB cable of the following specification, connect a PC in which the **MEXE02** has been installed to the USB communication connector.

Specification	USB2.0 (Full Speed)
Cable	Length: 3 m (9.8 ft.) or less Type: A to mini B

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

7-9 Noise elimination measures

There are two types of electrical noises: One is a noise to invade into the driver from the outside and cause the driver malfunction, and the other is a noise to emit from the driver and cause peripheral equipment malfunction.
For the noise that is invaded from the outside, take measures to prevent the driver malfunction. It is needed to take adequate measures because signal lines are very likely to be affected by the noise.
For the noise that is emitted from the driver, take measures to suppress it.

■ Measures against electrical noise

There are the following three methods mainly to take measures against the electrical noise.

● **Noise suppression**
- When relays or electromagnetic switches are used together with the system, use noise filters and CR circuits to suppress surges generated by them.
- Use our motor connection cable when extending a wiring distance between the motor and driver. This is effective in suppressing the electrical noise emitted from the motor. Check the model name on p.39.
- Cover the driver by a metal plate such as aluminum. This is effective in shielding the electrical noise emitted from the driver.

● **Prevention of noise propagation**
- Connect a noise filter on the input side of the DC power supply.
- Place the power lines, such as the motor and power supply cables, keeping a distance of 200 mm (7.87 in.) or more from the signal lines, and also do not bundle them or wire them in parallel. If the power cables and signal cables have to cross, cross them at a right angle.
- Use shielded cables for power lines and signal lines.
- Keep cables as short as possible without coiling and bundling extra lengths.
- Grounding multiple points will increase effect to block electrical noise because impedance on the grounding points is decreased. However, ground them so that a potential difference does not occur among the grounding points.
- To ground a shielded cable, use a metal cable clamp that will maintain contact with the entire circumference of the cable. Ground the cable clamp near the product.

Shielded cable

Cable clamp
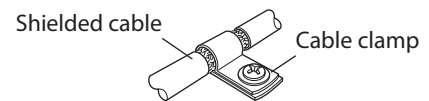
● **Suppression of effect by noise propagation**

Loop the noise propagated cable around a ferrite core. Doing so will prevent the propagated noise invades into the driver or emits from the driver. The frequency band in which an effect by the ferrite core can be seen is generally 1 MHz or more. Check the frequency characteristics of the ferrite core used. When increasing the effect of noise attenuation by the ferrite core, loop the cable a lot.

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■ **Noise suppression product**

● **Noise filter**

- Connect a noise filter (or equivalent) in the table on the input side of the DC power supply. When a power supply transformer is used, be sure to connect a noise filter on the AC input side of the power supply transformer. Doing so will prevent the propagated noise through the power line. Install the noise filter as close to the input terminals of DC power supply as possible.

Manufacture	Model
SOSHIN ELECTRIC CO., LTD.	HF2010A-UPF
Schaffner EMC	FN2070-10-06

- Use the AWG18 (0.75 mm^2) or thicker wire for the input and output cables of the noise filter, and secure firmly using a cable clamp or others so that the cable does not come off the enclosure.
- Place the input cable as far apart as possible from the output cable, and do not wire the cables in parallel. If the input and output cable are placed at a close distance or if they are wired in parallel, the noise in the enclosure affects the power cable through stray capacitance, and the noise suppressing effect will reduce.
- Connect the ground terminal of the noise filter to the grounding point, using as thick and short a wire as possible.
- When connecting a noise filter inside an enclosure, wire the input cable of the noise filter as short as possible. Wiring in long distance may reduce the noise suppressing effect.

■ **Our noise suppression product**

Check the model name on p.41.

● **Surge suppressor**

This product is effective to suppress the surge which occurs in a relay contact part. Connect it when using a relay or electromagnetic switch. CR circuit for surge suppression and CR circuit module are provided.

7-10   Compliance with EMC Directive/Regulations

Effective measures must be taken against the EMI that the motor and driver may give to adjacent control-system equipment, as well as the EMS of the motor and driver itself, in order to prevent a serious functional impediment in the machinery. Use of the following installation and wiring methods will enable the motor and driver to comply with the EMC Directive/Regulations.
Oriental Motor conducts EMC testing on its motors and drivers in accordance with "Example of motor and driver installation and wiring" on p.35. The user is responsible for ensuring the machine's compliance with the EMC Directive, based on the installation and wiring explained below.

⚠**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.

● **Connecting the noise filter**

In large electrically noisy environments, connect a noise filter. Refer to "Noise filter" on p.34.

● **Connecting the power supply**

Use a DC power supply that complies with the EMC Directive/Regulations for the power supply.
Use a shielded cable for the wiring , and keep it as short as possible.
Refer to "Prevention of noise propagation" on p.33 for grounding the shielded cable.

● **Ferrite core**

Use the following ferrite core (or equivalent) and install to the places shown in "Example of motor and driver installation and wiring" on p.35.
Model: ZCAT3035-1330 (TDK Corporation)

● **Connecting the motor cable**

Use our motor connection cable when extending the wiring distance between the motor and driver. Check the model name on p.39.

● **Connecting the signal cable**

Refer to "Prevention of noise propagation" on p.33.

● **How to ground**

- The cable used to ground the motor, driver and noise filter must be as thick and short as possible so that no potential difference is generated.
- Choose a large, thick and uniformly conductive surface for the grounding point.
- Be sure to ground the Protective Earth Terminal of the motor.

● **Example of motor and driver installation and wiring**

▢ is a ferrite core.

⏚ symbol indicate the grounding.

- - - is a shield box.
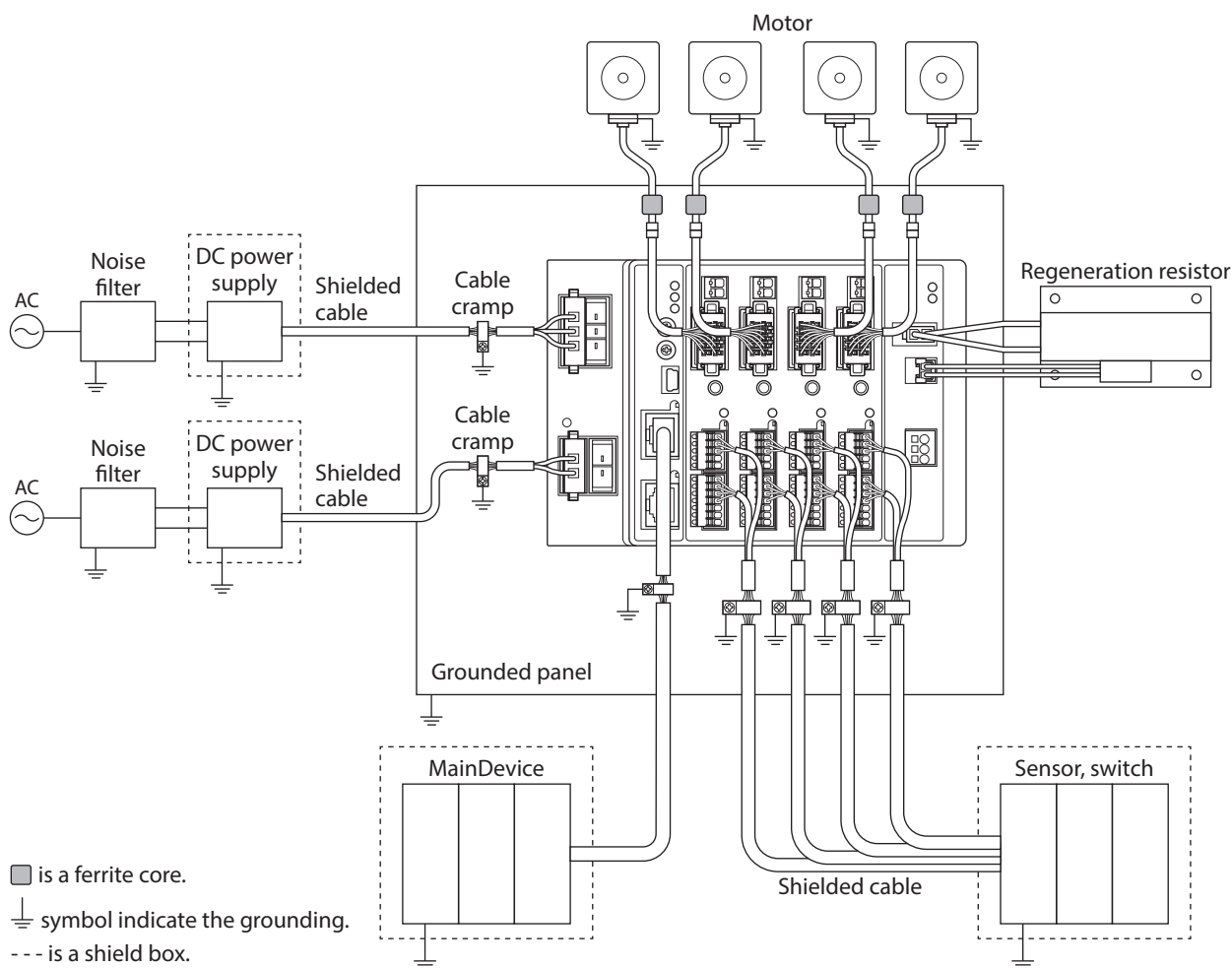
Note
- The driver uses components that are sensitive to electrostatic charge. Take measures against static electricity since static electricity may cause the driver to malfunction or suffer damage.
- When connecting the following products, cover the motor cable with a shielded braided sleeving. Use the cable clamps to ground both ends of the shielded braided sleeving.
  AZ Series: **AZM14**, **AZM15**
  DR Series: **DR20**

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8 Setting

This chapter explains how to set the driver functions.

8-1 Node address

Set the node address of the driver using the two node address setting switches (ECAT ID ×10 and ×1).
The node address setting switches are hexadecimal number. Convert the node address from decimal to hexadecimal to set.
When connecting two or more EtherCAT compatible products, do not set duplicate node address.

Factory setting   0 (×10: 0, ×1: 0)

Setting range	Description
0 (00h)	The setting of the MainDevice is enabled.
1 to 255 (1h to FFh)	The setting of the multi-axis driver is enabled.

> (memo) Be sure to turn off the control power supply of the driver before setting the switches. If the switches are set while the power is still on, the new switch settings will not become effective until the control power supply is turned on again.

8-2 Extension input signals

Input signals can be assigned to the extension switch (EXT-IN).

Factory setting   P-PRESET

Related parameters

Name	Description	Initial value
Extended input (EXT-IN) function	Selects the input signal to be assigned to the extension switch (EXT-IN). **Setting range** Input signal list ⇨p.100	9: P-PRESET
Extended input (EXT-IN) inverting mode	ON/OFF of the input signal assigned to the extension switch (EXT-IN) is inverted. **Setting range** 0: Not inverted 1: Inverted	0
Extended input (EXT-IN) interlock releasing time	Normally, the extension switch (EXT-IN) is interlocked. By holding down the switch for a certain time, interlock is released and the assigned function is enabled. With this parameter, the time to hold down the switch to release interlock is set. **Setting range** 0: Interlock disabled 1 to 50 (1=0.1 s)	10
Extended input (EXT-IN) interlock releasing duration	Sets the time to retain the status in which the interlock is released. **Setting range** 0 to 50 (1=0.1 s)	30
Extended input (EXT-IN) ON monitor time	When the signal assigned to the extension switch (EXT-IN) is input, the POWER LED and ALARM LED of each driver axis are lit. With this parameter, the time to light the LED is set. **Setting range** 0 to 50 (1=0.1 s)	10

For the index number of parameters, check "4 Driver objects of the manufacturer-specific area" on p.220.

■ How to operate the extension switch (EXT-IN)

Normally, the extension switch(EXT-IN) is interlocked. If the following operation is performed, the interlock of the extension switch (EXT-IN) is released, and the assigned input signal is executed.

1. Keep pressing the extension switch (EXT-IN) until the POWER LED (green) and the ALARM LED (red) blink (*1). While the POWER LED (green) and the ALARM LED (red) are blinking, the state releasing the interlock (*2) is continued.

Extension switch — EXT-IN

Blink (Green) — POWER

Blink (Red) — ALARM
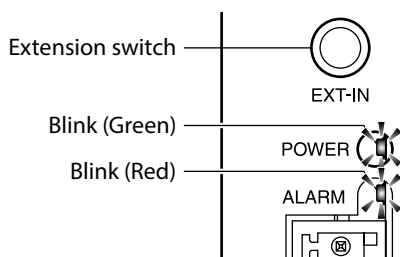
2. While the POWER LED (green) and the ALARM LED (red) are blinking, release the hand from the extension switch (EXT-IN), and press it again.
   When the input signal assigned to the extension switch (EXT-IN) is executed, both the POWER LED (green) and the ALARM LED (red) are lit (*3). After that, only the POWER LED (green) will be lit.

Extension switch — EXT-IN

Light (Green) — POWER

Light (Red) — ALARM

➡

EXT-IN

POWER — Light (Green)

ALARM
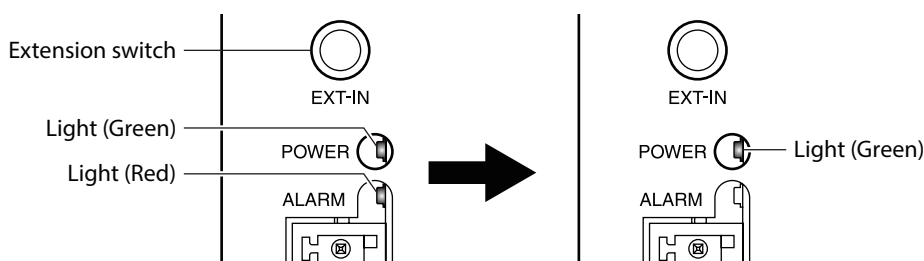
*1 The time period during which the extension switch (EXT-IN) is kept pressing can be set in the "Extended input (EXT-IN) interlock releasing time" parameter.

*2 The time period during which the interlock is being released can be set in the "Extended input (EXT-IN) interlock releasing duration" parameter.

*3 The time period during which the POWER LED (green) and the ALARM LED (red) are lit can be set in the "Extended input (EXT-IN) ON monitor time" parameter.

memo Be sure to perform the operation of the step 2 while the POWER LED (green) and the ALARM LED (red) are blinking. If the POWER LED (green) and the ALARM LED (red) returned to lighting, perform from the step 1 again.

1 Hardware Edition

9   Inspection

It is recommended that periodic inspections be conducted for the items listed below after each operation of the motor. If an abnormal condition is noted, discontinue any use and contact your nearest Oriental Motor sales office.

■ Inspection item

- Check if the openings in the driver blocked.
- Check if the installation place of the driver is loose.
- Check if any of the connection parts of the driver is loose.
- Check if dust and others attach on the driver.
- Check if the driver has unusual smells or appearance defects.

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

1 Hardware Edition

10   Cables

Note
- Cables are provided for exclusive use for the **AZ** Series DC power input multi-axis driver. Be sure to purchase it.
- Keep 20 m (65.6 ft.) or less for the wiring distance between the motor and driver. To extend more than 20 m (65.6 ft.) may result in the driver heat generation or increase of the electrical noise emitted from the driver.

■ Motor connection cable

This cable is used to connect the driver and **AZ** Series motor.
When installing the motor on a moving part, use a flexible connection cable

Motor frame size [mm (in.)]	Length [m (ft.)]	Model	
		Connection cable	Flexible connection cable
20 (0.79) 28 (1.10)	0.5 (1.6)	**CC005VZ2FA**	**CC005VZ2RA**
	1 (3.3)	**CC010VZ2FA**	**CC010VZ2RA**
	1.5 (4.9)	**CC015VZ2FA**	**CC015VZ2RA**
	2 (6.6)	**CC020VZ2FA**	**CC020VZ2RA**
	2.5 (8.2)	**CC025VZ2FA**	**CC025VZ2RA**
	3 (9.8)	**CC030VZ2FA**	**CC030VZ2RA**
	4 (13.1)	**CC040VZ2FA**	**CC040VZ2RA**
	5 (16.4)	**CC050VZ2FA**	**CC050VZ2RA**
	7 (23.0)	**CC070VZ2FA**	**CC070VZ2RA**
	10 (32.8)	**CC100VZ2FA**	**CC100VZ2RA**
	15 (49.2)	**CC150VZ2FA**	**CC150VZ2RA**
	20 (65.6)	**CC200VZ2FA**	**CC200VZ2RA**

Motor frame size [mm (in.)]	Length [m (ft.)]	Model	
		Connection cable	Flexible connection cable
42 (1.65) 60 (2.36)	0.5 (1.6)	**CC005VZFA**	**CC005VZRA**
	1 (3.3)	**CC010VZFA**	**CC010VZRA**
	1.5 (4.9)	**CC015VZFA**	**CC015VZRA**
	2 (6.6)	**CC020VZFA**	**CC020VZRA**
	2.5 (8.2)	**CC025VZFA**	**CC025VZRA**
	3 (9.8)	**CC030VZFA**	**CC030VZRA**
	4 (13.1)	**CC040VZFA**	**CC040VZRA**
	5 (16.4)	**CC050VZFA**	**CC050VZRA**
	7 (23.0)	**CC070VZFA**	**CC070VZRA**
	10 (32.8)	**CC100VZFA**	**CC100VZRA**
	15 (49.2)	**CC150VZFA**	**CC150VZRA**
	20 (65.6)	**CC200VZFA**	**CC200VZRA**

■ Connection cable set for electromagnetic brake motor

This cable is used to connect the driver and **AZ** Series electromagnetic brake motor.
It consists of two cables; one is a connection cable for motor and the other is a connection cable for electromagnetic brake.
When installing the motor on a moving part, use a flexible connection cable.

Length [m (ft.)]	Model	
	Connection cable	Flexible connection cable
0.5 (1.6)	**CC005VZFBA**	**CC005VZRBA**
1 (3.3)	**CC010VZFBA**	**CC010VZRBA**
1.5 (4.9)	**CC015VZFBA**	**CC015VZRBA**
2 (6.6)	**CC020VZFBA**	**CC020VZRBA**
2.5 (8.2)	**CC025VZFBA**	**CC025VZRBA**
3 (9.8)	**CC030VZFBA**	**CC030VZRBA**
4 (13.1)	**CC040VZFBA**	**CC040VZRBA**
5 (16.4)	**CC050VZFBA**	**CC050VZRBA**
7 (23.0)	**CC070VZFBA**	**CC070VZRBA**
10 (32.8)	**CC100VZFBA**	**CC100VZRBA**
15 (49.2)	**CC150VZFBA**	**CC150VZRBA**
20 (65.6)	**CC200VZFBA**	**CC200VZRBA**

■ Power supply cable

This is a cable with connector to connect a driver and a power supply.

Model	Type
LC03D06A	Main power supply
LC02D06A	Control power supply

11 Accessories

■ Regeneration resistor

If vertical drive (gravitational operation) such as elevating applications is performed or if sudden start-stop operation of a large inertia is repeated frequently, connect the regeneration resistor. Always connect the regeneration resistor if an alarm of the overvoltage was generated. (**AZD2A-KED**, **AZD3A-KED**, and **AZD4A-KED** only)
It is recommended to use the regeneration resistor since an alarm is likely to be generated when using the driver at 48 VDC.

Model: **RGC40**

■ Fans

These are DC axial flow fans to stir the air inside of the control box or to cool locally. Be sure to connect if an alarm of the main circuit overheat was generated. (**AZD2A-KED**, **AZD3A-KED**, and **AZD4A-KED** only)

Model: **V-MD825B24L** (Fan with DIN rail mounting bracket)
MD825B-24L (Fan only)

■ CR circuit for surge suppression

This product is effective to suppress the surge which occurs in a relay contact part. Use this product to protect the contacts of the relay or switch.

Model: **EPCR1201-2**

■ CR circuit module

This product is effective to suppress the surge which occurs in a relay contact part. Use this product to protect the contacts of the relay or switch.
Four pieces of CR circuit for surge suppression are mounted on the compact circuit, and this product can be installed to the DIN rail. This product can make the wiring easily and securely since it also supports terminal block connection.

Model: **VCS02**

2 Communication Specifiations Edition

This part explains the communication specifications and supported objects.

◆ Table of contents

■ Setting of data and parameters

Data and parameters described in this "Communication Specifications Edition" can be set using the **MEXE02** in addition to EtherCAT communication.

■ Notation rules

● Timing to update

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

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

1   Communication specifications

1-1   EtherCAT communication interface

Item	Description
Communications standards	IEC 61158 Type12
Physical layer/Protocol	100 BASE-TX (IEEE 802.3)
Transmission rate	100 Mbps
Communication cycle	• Free run mode: 1 ms or more • SM2 event synchronization mode: 1 ms or more • DC mode: 0.5 ms, 1 ms, 2 ms, 3 ms, 4 ms, 5 ms, 6 ms, 7 ms, 8 ms
Communication port/Connector	RJ45×2 (shielded) ECAT IN: EtherCAT input ECAT OUT: EtherCAT output
Topology	Daisy chain (Up to 65,535 nodes)
Process data	Variable PDO mapping
Sync manager	• SM0: Mailbox output • SM1: Mailbox input • SM2: Process data output • SM3: Process data input
Mailbox (CoE)	• Emergency message • SDO request • SDO response • SDO information
Synchronization mode	• Free run mode (asynchronous) • SM2 event synchronization mode • DC mode (SYNC0 event synchronization)
Device profile	IEC 61800-7 CiA402 drive profile

1-2   CiA402 Drive Profile

Item	Description
Operation mode	• Profile position mode (PP) • Profile velocity mode (PV) • Homing mode (HM) • Cyclic synchronous position mode (CSP) • Cyclic synchronous velocity mode (CSV)
Function	Touch probe (position latch) function 2 inputs (EXT1, EXT2)

2 Communication Specifications Edition

1-3　　EtherCAT State Machine (ESM)

The "EtherCAT state machine (ESM)" is controlled by the MainDevice.
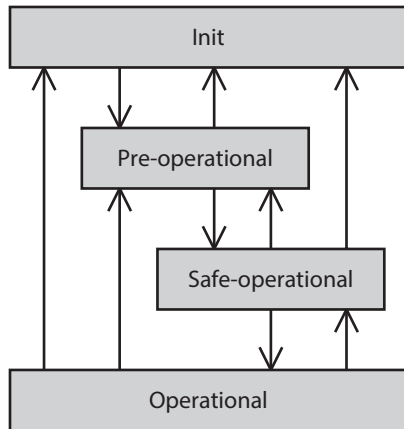
ESM State	SDO communication	Transmit PDO (TxPDO)	Receive PDO (RxPDO)	Status
Init	Not possible	Not possible	Not possible	During initialization. Communication is not possible.
Pre-operational	Possible	Not possible	Not possible	The mailbox communication (SDO) is possible. The process data communication (PDO) is not possible.
Safe-operational	Possible	Possible	Not possible	The mailbox communication and transmit PDO are possible. The status of the driver can be sent to the MainDevice by the transmit PDO.
Operational	Possible	Possible	Possible	The mailbox communication, transmit PDO, and receive PDO are possible. Commands can be sent from the MainDevice to the driver by the PDO communication.

1-4　　Process data object (PDO)

The process data object (PDO) is used in real-time data communication of EtherCAT communication.
There are two types of PDO; transmit PDO (TxPDO) and receive PDO (RxPDO).
The transmit PDO (TxPDO) is to send data to the MainDevice from the driver.
The receive PDO (RxPDO) is to receive data from the MainDevice to the driver.

Contents, which are sent and received using the PDO, are set by the PDO mapping object and sync manager 2/sync manager 3 PDO assignment object.
The PDO mapping is to set the PDO mapping object in each driver axis and controller axis.
Sync manager 2/sync manager 3 PDO assignment is to set the PDO mapping object that performs communication actually.

The PDO mapping object is consisted of 4 bytes that are indexes of assigned object (Index), sub-index (Sub-index), and data length (Length). Only data of 08h (1 byte), 10h (2 bytes), and 20h (4 bytes) can be set in the data length.

Index	Sub-index	Data length
(2 bytes)	(1 byte)	(1 byte)

■ PDO mapping object of driver axis

In the driver axis, there is a different PDO mapping object per axis. Check in the table.
Up to eight objects can be mapped in a single PDO.

Axis	Receive PDO mapping object		Transmit PDO mapping object	
	Receive PDO	Index	Transmit PDO	Index
Driver axis 1	RxPDO1	1600h	TxPDO1	1A00h
	RxPDO2	1601h	TxPDO2	1A01h
	RxPDO3	1602h	TxPDO3	1A02h
	RxPDO4	1603h	TxPDO4	1A03h
Driver axis 2	RxPDO1	1610h	TxPDO1	1A10h
	RxPDO2	1611h	TxPDO2	1A11h
	RxPDO3	1612h	TxPDO3	1A12h
	RxPDO4	1613h	TxPDO4	1A13h
Driver axis 3	RxPDO1	1620h	TxPDO1	1A20h
	RxPDO2	1621h	TxPDO2	1A21h
	RxPDO3	1622h	TxPDO3	1A22h
	RxPDO4	1623h	TxPDO4	1A23h
Driver axis 4	RxPDO1	1630h	TxPDO1	1A30h
	RxPDO2	1631h	TxPDO2	1A31h
	RxPDO3	1632h	TxPDO3	1A32h
	RxPDO4	1633h	TxPDO4	1A33h

For the objects to be mapped in the PDO of each driver axis, check in the table.

Axis	Objects of profile area	Objects of manufacturer-specific area
Driver axis 1	6000h to 67FFh	Sub-index 1 of 4000h to 4FFFh
Driver axis 2	6800h to 6FFFh	Sub-index 2 of 4000h to 4FFFh
Driver axis 3	7000h to 77FFh	Sub-index 3 of 4000h to 4FFFh
Driver axis 4	7800h to 7FFFh	Sub-index 4 of 4000h to 4FFFh

memo This document describes indexes of the driver axis 1 for the objects of the profile area (*). Objects of the driver axis 2 to driver axis 4 are indexes to offset each 800h from the previous axis.
* The configuration of objects is as follows.

Index (Hex)	Object	Overview
1000h to 1FFFh	CoE communication area	CoE communication area
2000h to 2FFFh	Manufacturer specific area	Controller object (for communication board)
3000h to 3FFFh		Not used
4000h to 4FFFh		Sets the axis number (1 to 4) to the Sub-index of the driver object.
5000h to 5FFFh		Not used
6000h to 67FFh	Profile area	Profile area of axis 1
6800h to 6FFFh		Profile area of axis 2
7000h to 77FFh		Profile area of axis 3
7800h to 7FFFh		Profile area of axis 4

■ PDO mapping object of controller axis

There is a PDO mapping object in the controller axis.

Axis	Receive PDO mapping object		Transmit PDO mapping object	
	Receive PDO	Index	Transmit PDO	Index
Controller axis	RxPDO	1700h	TxPDO	1B00h

Map the object dedicated to EtherCAT communication in the PDO of the controller axis.

Axis	Objects of profile area	Objects of manufacturer-specific area
Controller axis	– (Not possible to assign)	2000h to 2FFFh

■ SM2/SM3 PDO assignment object

The SM (sync manager channel) PDO assignment object sets the relationship between the PDO and sync manager.
The "Sync manager 2 PDO assignment (1C12h)" is the assignment object dedicated to the receive PDO.
The "Sync manager 3 PDO assignment (1C13h)" is the assignment object dedicated to the transmit PDO.
Objects of up to 32 bytes can be assigned in each driver axis.

■ Setting of PDO mapping object

The PDO mapping can be changed when the ESM is pre-operational. Change the PDO mapping in the following steps.

1. Set the number of entries of the sync manager 2/sync manager 3 PDO assignment object to 0.

2. Set the number of entries of the PDO mapping object to 0.

3. Change the PDO mapping object.

4. Change the number of entries of the PDO mapping object to the number of objects mapped in the step 3.

5. Change the sync manager 2/sync manager 3 PDO assignment object.

6. Change the number of entries of the sync manager 2/sync manager 3 PDO assignment object to the number assigned in the step 5.

■ Example of PDO mapping

This section introduces an example of RxPDO mapping. Data of 2 bytes and 4 bytes are little-endian.
Data of all axes are sent and received at one time via EtherCAT communication with the MainDevice.

EtherCAT communication frame

Object | A | B | C | D | E | J | K | M | N | P | Q | R

PDO frame of driver

SM2 PDO assignment object

Index	Sub	Setting value
1C12h	00h	5
	01h	1600h
	02h	1610h
	03h	1621h
	04h	1632h
	05h	1700h

Driver axis 1 RxPDO mapping object

PDO	Index	Sub	Mapping	Data length
Axis 1-RxPDO1	1600h	00h	3	–
		01h	Object A	4 bytes
		02h	Object B	1 byte
		03h	Object C	2 bytes
Axis 1-RxPDO2	1601h	00h	0	–
Axis 1-RxPDO3	1602h	00h	0	–
Axis 1-RxPDO4	1603h	00h	0	–

Driver axis 2 RxPDO mapping object

PDO	Index	Sub	Mapping	Data length
Axis 2-RxPDO1	1610h	00h	2	–
		01h	Object D	4 bytes
		02h	Object E	2 bytes
Axis 2-RxPDO2	1611h	00h	2	–
		01h	Object F	4 bytes
		02h	Object G	4 bytes
Axis 2-RxPDO3	1612h	00h	0	–
Axis 2-RxPDO4	1613h	00h	0	–

Driver axis 3 RxPDO mapping object

PDO	Index	Sub	Mapping	Data length
Axis 3-RxPDO1	1620h	00h	2	–
		01h	Object H	4 bytes
		02h	Object I	2 bytes
Axis 3-RxPDO2	1621h	00h	2	–
		01h	Object J	4 bytes
		02h	Object K	4 bytes
Axis 3-RxPDO3	1622h	00h	0	–
Axis 3-RxPDO4	1623h	00h	0	–

Driver axis 4 RxPDO mapping object

PDO	Index	Sub	Mapping	Data length
Axis 4-RxPDO1	1630h	00h	0	–
Axis 4-RxPDO2	1631h	00h	1	–
		01h	Object L	2 bytes
Axis 4-RxPDO3	1632h	00h	2	–
		01h	Object M	2 bytes
		02h	Object N	2 bytes
Axis 4-RxPDO4	1633h	00h	1	–
		01h	Object O	2 bytes

Controller axis RxPDO mapping object

PDO	Index	Sub	Mapping	Data length
Contoroller axis -RxPDO	1700h	00h	3	–
		01h	Object P	1 byte
		02h	Object Q	1 byte
		03h	Object R	1 byte

1-5   Service data object (SDO)

When read and write of the parameter object is performed, or monitor is executed via EtherCAT communication, the "Service data object (SDO)" is used. The SDO is not synchronized to EtherCAT communication cycles, but it is sent and received in an arbitrary timing. The setting of PDO mapping is also performed using the SDO.

■ SDO abort code

If an error occurs while the SDO is sent and received, an abort code is sent back. Abort code lists are shown in the table.

Abort code	Description
0503 0000h	Toggle bit did not inverted.
0504 0000h	SDO protocol timeout
0504 0001h	Client/server command specifier is not enabled or unknown
0504 0005h	Out of range of memory
0601 0000h	Unsupported access to an object
0601 0001h	Read access was performed to a write only object.
0601 0002h	Write access was performed to a read only object.
0602 0000h	The object does not exist.
0604 0041h	The object can not be mapped in the PDO.
0604 0042h	The number of the PDO mappings or the data length exceeded the limitation.
0604 0043h	General parameter incompatibility
0604 0047h	General internal incompatibility in the device
0606 0000h	Access failed due to a hardware error
0607 0010h	Data type does not match, length of service parameter does not match
0607 0012h	Data type does not match, length of service parameter is too long.
0607 0013h	Data type does not match, length of service parameter is too short.
0609 0011h	Sub-index does not exist.
0609 0030h	The setting range of the parameter was exceeded. (For write access)
0609 0031h	The value of the write parameter is too large.
0609 0032h	The value of the write parameter is too small.
0609 0036h	The maximum value is less than the minimum value.
0800 0000h	General error
0800 0020h	Data cannot be transferred or stored to the application.
0800 0021h	Data cannot be transferred or stored to the application because of local control.
0800 0022h	Data cannot be transferred or stored to the application in the present device status.
0800 0023h	Object dictionary cannot be generated or object dictionary does not exist.

1-6   Synchronous mode of EtherCAT communication

This product is compatible with three modes of EtherCAT communication.

● Free run mode

The driver operates in asynchronous to EtherCAT communication.
The communication cycle of the Free run mode is 1 ms or more.

● SM2 event synchronization mode

The driver operates in synchronization with EtherCAT communication. An application is synchronized with the SM2 event. Whenever the driver receives the process data output (RxPDO), the SM2 event is generated.
The communication cycle of the SM2 event synchronization mode is 1 ms or more.

● DC mode (SYNC0 event synchronization)

The driver operates in synchronization with EtherCAT communication. An application is synchronized with the SYNC0 event.
The communication cycle of the DC mode is 0.5 ms or 1 to 8 ms (in 1 ms unit).

1-7 Distributed clocks

The "Distributed clocks (DC)" is a method to synchronize an operation by sharing the same clock between the MainDevice and driver.

The interruption signal (Sync0) is output at a precise interval based on the DC. In the DC mode, an application is executed in synchronization with SYNC0.

1-8 Emergency message

If an error occurs in the driver, an emergency message is sent to the MainDevice using the mailbox communication. The emergency message is sent only once per error.

The emergency message consists of the following 8 bytes.

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7
Emergency error code		Error register object (1001h)	Manufacturer-specific error definition field				

■ Emergency message when an alarm is generated

If an alarm is generated in the driver, an emergency message is sent to the MainDevice using the mailbox communication.

The emergency message when the alarm is generated consists of the following 8 bytes.

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7
Emergency error code (FF00h)		Error register object (1001h)	Manufacturer-specific error definition field				
			Alarm axis number	Alarm code	0		

The emergency error code is FF00h regardless of the alarm contents.

The byte 2 is the same value as the error register object.

The byte 3 is the driver axis number that the alarm was generated.

The byte 4 is the alarm code. See p.155 for alarm code.

■ Emergency code when the ESM transition error is generated

If the transition from pre-operational to safe-operational was failed in the ESM, the following emergency code is sent.

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7
Emergency error code (A000h)		Channel (02h)	Diagnosis data				
			0Ah	0			

If the transition from pre-operational to safe-operational was requested during the following status, this emergency code is generated. Check the contents, and reconsider the setting and other conditions.

- The unsupported communication cycle in the DC mode is set.
- The object that mapping is not possible is mapped in the PDO mapping.
- The object for TxPDO is mapped in RxPDO. Or the object for RxPDO is mapped in TxPDO.
- The object of the different driver axis is mapped.

2 Communication Specifications Edition

2 Drive profile

memo This document describes indexes of the driver axis 1 for the objects of the profile area. Objects of the driver axis 2 to driver axis 4 are indexes to offset each 800h from the previous axis. Refer to examples in the following table.

Example for the beginning indexes of the driver axis 1 to driver axis 4

Axis	Index	Sub	Name	Type	R/W	PDO	Save	Range	Update
Axis 1	603Fh	00h							
Axis 2	683Fh	00h	Error code	U16	RO	TxPDO	–	−2,147,483,648 to 2,147,483,647 (Initial value: 0)	–
Axis 3	703Fh	00h							
Axis 4	783Fh	00h							

2-1 Drive State Machine

The drive state machine is controlled by the "Controlword object (6040h)." The status of each state can be checked by the "Statusword object (6041h)."

	Control power	Main power	ESM	Motor
(A): Lower-level power (B): High-level power (C): Current on	ON	ON or OFF	–	Non-excitation
(B)	ON	ON	Operational	Non-excitation
(C)	ON	ON	Operational	Excitation
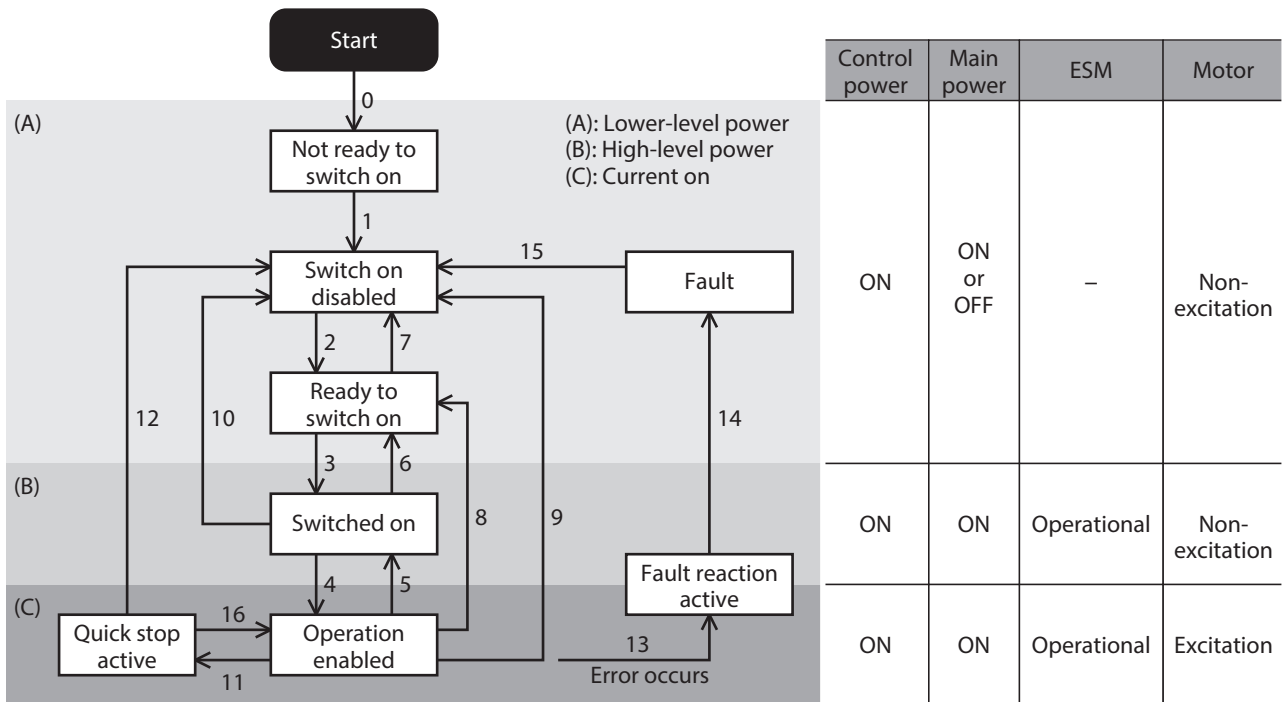
State	Status	Motor status	Parameter setting
Not ready to switch on	The control power supply was turned on, and the initialization processing is executing	Non-excitation	Not possible to set
Switch on disabled	The initialization was complete	Non-excitation	Possible to set
Ready to switch on	A state that the main power supply is possible to turn on	Non-excitation	Possible to set
Switched on	A state that the main power supply was turned on	Non-excitation	Possible to set
Operation enabled	The motor is in an excitation state, and the operation function is enabled	Excitation	Possible to set
Quick stop active	The Quick stop command was received, and the operation stop is processing	Excitation	Possible to set

2 Communication Specifications Edition

State	Status	Motor status	Parameter setting
Fault reaction active	An alarm was generated in the driver, and the operation stop is processing	Excitation	Possible to set
Fault	An alarm is present in the driver	Non-excitation	Possible to set

■ State transition of the drive state machine

The drive state machine is controlled by the "Controlword object (6040h)."

● Controlword object (6040h)

Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
Manufacturer specific (ms)					Reserved	oms	Halt

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Fault reset	Operation mode specific (oms)			Enable operation	Quick stop	Enable voltage	Switch on

● State transition commands by the controlword

State control command	Bit7	Bit3	Bit2	Bit1	Bit0	Transition number in the figure
Shutdown	–	–	1	1	0	2, 6, 8
Switch on	–	0	1	1	1	3 *
Switch on + enable operation	–	1	1	1	1	3+4 *
Disable voltage	–	–	–	0	–	7, 9, 10, 12
Quick stop	–	–	0	1	–	7, 10, 11
Disable operation	–	0	1	1	1	5
Enable operation	–	1	1	1	1	4, 16
Fault reset	0 to 1	–	–	–	–	15

* When the following conditions are not satisfied, the state will not transition from "Ready to switch on" to "Switched on" even if the command is received.
· The status of the ESM is operational.
· The main power is turned on.
· The FREE input is being OFF.
· Test operation (remote operation) is not being executed using the **MEXE02**.

Note After transitioning to "Operation enabled," 250 ms is required until the motor is excited and the preparation for operation is completed. The motor does not start running even if the operation command is input before the preparation for operation is completed. Input the operation command after a period of at least 250 ms has elapsed from having transitioned to "Operation enabled" or after the DCMD-RDY output is turned ON.

● State transition other than the above

Transition number in the figure	Transition event
0	Transitions automatically when the control power supply is turned on.
1	Transitions automatically when the initialization of the driver is complete.
12	Transitions to "Switch on disabled" after the motor stops if the Quick stop command is sent when the Quick stop option code (605Ah) is 1 to 3.
13, 14	Transitions if an alarm is generated.

If the drive state machine is in a state of any of "Switched on," "Operation enabled," or "Quick stop active," the state changes when an event in the table is generated.

State	Motor operation	Event	Action
Switched on	During stop	• The ESM transitions to other than OP. • The main power was cut off. • The FREE input is ON.	Transitions to "Ready to switch on." (Transition number 6)
Operation enabled	During stop	• The ESM transitions to other than OP. • The main power was cut off. • The FREE input is ON.	Transitions to "Ready to switch on." (Transition number 8) The motor becomes in a non-excitation state.
	During operation	The ESM transitions to other than OP.	The network bus error alarm is generated (alarm code 81h). After transitioning from "Fault reaction active" to "Fault," the motor becomes in a non-excitation state. (Transition number 13, 14)
		The main power was cut off.	The main power off alarm is generated (alarm code 23h). After transitioning from "Fault reaction active" to "Fault," the motor becomes in a non-excitation state. (Transition number 13, 14)
		The FREE input is ON.	Transitions to "Ready to switch on." (Transition number 8) The motor becomes in a non-excitation state.
Quick stop active	During stop	• The ESM transitions to other than OP. • The main power was cut off. • The FREE input is ON.	Transitions to "Switch on disabled." (Transition number 12) The motor becomes in a non-excitation state.
	During operation	The ESM transitions to other than OP.	The network bus error alarm is generated (alarm code 81h). After transitioning from "Fault reaction active" to "Fault," the motor becomes in a non-excitation state. (Transition number 13, 14)
		The main power was cut off.	The main power off alarm is generated (alarm code 23h). After transitioning from "Fault reaction active" to "Fault," the motor becomes in a non-excitation state. (Transition number 13, 14)
		The FREE input is ON.	Transitions to "Switch on disabled." (Transition number 12) The motor becomes in a non-excitation state.

■ Status output of the drive state machine

The status of the drive state machine is output by the "Statusword object (6041h)."

● Statusword object (6041h)

Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
Manufacturer specific (ms)		Operation mode specific (oms)		Internal limit active	Target reached	Remote	ms

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Warning	Switch on disabled	Quick stop	Voltage enabled	Fault	Operation enabled	Switched on	Ready to switch on

● **Status output of the Statusword**

State	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Start	0	0	0	0	0	0	0
Not ready to switch on	0	0	0	0	0	0	0
Fault	0	1	– *	1	0	0	0
Fault reaction active	0	1	– *	1	1	1	1
Switch on disabled	1	1	– *	0	0	0	0
Ready to switch on	0	1	– *	0	0	0	1
Switched on	0	1	– *	0	0	1	1
Operation enabled	0	1	– *	0	1	1	1
Quick stop active	0	0	– *	0	1	1	1

* Voltage enabled is 1 while the main power is input.

2-2 Operation mode

The driver supports the operation modes listed below.
- Cyclic synchronous position mode (CSP)
- Profile position mode (PP)
- Cyclic synchronous velocity mode (CSV)
- Profile velocity mode (PV)
- Homing mode (HM)

■ Switching of operation modes

The operation mode can be switched by the "Modes of operation (6060h)."

Setting value of the operation mode	Operation mode
0 (Initial value)	Operation function disable
1	Profile position mode (PP)
3	Profile velocity mode (PV)
6	Homing mode (HM)
8	Cyclic synchronous position mode (CSP)
9	Cyclic synchronous velocity mode (CSV)

Switch the operation mode while an operation is stopped. When it was switched during operation, the new operation mode will be enabled after the operation is stopped.
The operation mode which is enabled can be checked in the "Modes of operation display (6061h)."

2 Communication Specifications Edition

2-3　Cyclic synchronous position mode (CSP)

In the cyclic synchronous position mode, a path generation (profile generation) is performed by the MainDevice. By cyclic synchronous communication, when the "Target position (607Ah)" is sent from the MainDevice to the driver, the driver performs position controls. Use the cyclic synchronous position mode when EtherCAT communication is performed in the DC mode. If the cyclic synchronous position mode is used in the free run mode or SM2 event synchronization mode, the speed fluctuation or vibration may increase.

Note
- Since the position is controlled by the MainDevice in the cyclic synchronous position mode, if the operation is stopped by I/O signals without the MainDevice, the position deviation may cause. When the stop signal such as the STOP input or FREE input was input, be sure to remove the position deviation by performing the following processing. Turning the stop signal OFF with remaining the position deviation may cause the motor to start running suddenly.
  · Execute the operation stop from the MainDevice.
  · Clear the position deviation between the MainDevice and driver.
- Since the position is controlled by the MainDevice in the cyclic synchronous position mode, executing the position preset (P-PRESET) in the driver during the motor excitation state will cause the motor to start suddenly or an alarm of the command pulse error to generate. Stop the motor execution before executing the position preset (P-PRESET) in the driver.

Related objects

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
6040h	00h	Controlword	U16	RW	RxPDO	–	0000h to FFFFh (Initial value: 0000h)	A
6041h	00h	Statusword	U16	RO	TxPDO	–	–	–
6060h	00h	Modes of operation	INT8	RW	RxPDO	○	0, 1, 3, 6, 8, 9 (⇨ p.55) (Initial value: 0)	B
6061h	00h	Modes of operation display	INT8	RO	TxPDO	–	–	–
6062h	00h	Position demand value [step]	INT32	RO	TxPDO	–	–	–
6064h	00h	Position actual value [step]	INT32	RO	TxPDO	–	–	–
607Ah	00h	Target position [step]	INT32	RW	RxPDO	–	−2,147,483,648 to 2,147,483,647 (Initial value: 0)	A
607Dh	01h	Min. position limit [step]	INT32	RW	No	○	−2,147,483,648 to 2,147,483,647 (Initial value: −2,147,483,648)	A
	02h	Max. position limit [step]	INT32	RW	No	○	−2,147,483,648 to 2,147,483,647 (Initial value: 2,147,483,647)	A

■ Controlword of the cyclic synchronous position mode

Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
Manufacturer specific (ms)					Reserved	oms	Halt
–	–	–	–	–		–	

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Fault reset	Operation mode specific (oms)			Enable operation	Quick stop	Enable voltage	Switch on
	–	–	–				

Details of controlword

Bit	Name	Value	Description
8	Halt	0	Operation allowed
		1	Stop operation. The stopping method is "Immediate stop."

For the Bit7 and Bit3 to Bit0, refer to "State transition of the drive state machine" on p.53.

■ Statusword of the cyclic synchronous position mode

Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
Manufacturer specific		Operation mode specific		Internal limit active	–	Remote	ms
TLC	–	Following error	Target position ignored				–
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Warning	Switch on disabled	Quick stop	Voltage enabled	Fault	Operation enabled	Switched on	Ready to switch on

Details of statusword

Bit	Name	Value	Description
15	TLC	0	A load does not reach the upper limit of the motor output torque.
		1	A load reached the upper limit of the motor output torque.
13	Following error	0	Position deviation error not present
		1	Position deviation error present The position deviation exceeded the value set in the "Following error window (6065h)." The value changes to 0 when the "Excessive position deviation alarm (alarm code 10h)" or "Overload alarm (alarm code 30h)" is cleared.
12	Target position ignored	0	Target position command disable When the state is any of the followings, the value is 0, and the target position is disabled. • The drive state machine is other than "Operation enabled." • The motor is in a non-excitation state. • "Halt (6040h: Bit8)" has been 1. • The STOP input is being ON. • The internal limit is in an active state.
		1	Target position command enable
11	Internal limit active	0	The function limitation by the internal limit is not in an active state.
		1	The function limitation by the internal limit became an active state. The value is 1 when any of the following internal limit function is activated. • Limit sensor (FW-LS/RV-LS) • Operation prohibition input (FW-BLK/RV-BLK) • Software limit • Mechanical limit
9	Remote	1	The value becomes 1 when the initialization is complete.
7	Warning	0	Information not present When the causes of information are cleared, the warning is automatically cleared to 0.
		1	Information present.

For the Bit6 to Bit0, refer to "Status output of the drive state machine" on p.54.

2 Communication Specifications Edition

2-4　　Profile position mode (PP)

The profile position mode operates in the internal profile of the driver. A path generation (profile generation) is performed in the driver. The target position, speed, acceleration rate and others are set in the MainDevice.

Related objects

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
6040h	00h	Controlword	U16	RW	RxPDO	–	0000h to FFFFh (Initial value: 0000h)	A
6041h	00h	Statusword	U16	RO	TxPDO	–	–	–
6060h	00h	Modes of operation	INT8	RW	RxPDO	○	0, 1, 3, 6, 8, 9 (⇨ p.55) (Initial value: 0)	B
6061h	00h	Modes of operation display	INT8	RO	TxPDO	–		–
6062h	00h	Position demand value [step]	INT32	RO	TxPDO	–	–	–
6064h	00h	Position actual value [step]	INT32	RO	TxPDO	–	–	–
607Ah	00h	Target position [step]	INT32	RW	RxPDO	–	−2,147,483,648 to 2,147,483,647 (Initial value: 0)	A
607Dh	01h	Min. position limit [step]	INT32	RW	No	○	−2,147,483,648 to 2,147,483,647 (Initial value: −2,147,483,648)	A
	02h	Max. position limit [step]	INT32	RW	No	○	−2,147,483,648 to 2,147,483,647 (Initial value: 2,147,483,647)	A
6081h	00h	Profile velocity [Hz]	U32	RW	RxPDO	○	0 to 4,000,000 (Initial value: 10,000)	B
6083h	00h	Profile acceleration [step/s²]	U32	RW	RxPDO	○	1 to 1,000,000,000 (Initial value: 300,000)	B
6084h	00h	Profile deceleration [step/s²]	U32	RW	RxPDO	○	1 to 1,000,000,000 (Initial value: 300,000)	B
4142h	*	Starting speed [Hz]	INT32	RW	No	○	0 to 4,000,000 (Initial value: 5,000)	B
414Fh	*	Wrap positioning mode	U8	RW	RxPDO	○	0: Wrap absolute positioning 1: Wrap proximity 2: Wrap forward direction 3: Wrap reverse direction (Initial value: 0)	B

* Set the axis number (1 to 4) in the sub-index because of the driver object in the manufacturer-specific area.

■ Controlword of the profile position mode

Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
Manufacturer specific (ms)					Reserved	oms	Halt
–	Wrap	Push	Base position of Rel	–		Change on set point	

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Fault reset	Operation mode specific (oms)			Enable operation	Quick stop	Enable voltage	Switch on
	Abs/Rel	Change set immediately	New set point				

2 Communication Specifications Edition

Details of controlword

Bit	Name	Value	Description
14	Wrap	1	Wrap absolute positioning operation After the "Wrap" is set to 1, when an operation is started by setting the "New set point (6040h: Bit4)" to 1, wrap absolute positioning operation is performed. The operating method is in accordance with the setting of the "Wrap positioning mode (414Fh)."
13	Push	1	Push-motion positioning operation After the "Push" is set to 1, when an operation is started by setting the "New set point (6040h: Bit4)" to 1, push-motion positioning operation is performed. The "Push current (4121h)" is applied to the motor current. When the "Halt (6040h: Bit8)" is set to 1, or when the STOP input is turned ON, the operation is stopped. The "Stop current (4128h)" is applied to the motor current at standstill.
12	Base position of Rel	0	Incremental positioning operation (based on command position) Positioning operation of the set travel amount is performed from the present command position. The travel amount is set with the "Target position (607Ah)."
		1	Incremental positioning operation (based on feedback position) Positioning operation of the set travel amount is performed from the present actual position. The travel amount is set with the "Target position (607Ah)."
10	Reserved	–	Reserved
9	Change on set point	–	Not supported.
8	Halt	0	Operation allowed
		1	Stop operation. The stopping method is in accordance with the setting of the "Halt option code (605Dh)."
6	Abs/Rel	0	Absolute positioning operation The "Target position (607Ah)" is the target position of absolute positioning operation.
		1	Incremental positioning operation The "Target position (607Ah)" is the target position of incremental positioning operation.
5	Change set immidiately	0	When the "New set point (6040h: Bit4)" is changed from 0 to 1 during operation, the new operation command is stored. When the present operation is complete, the stored new operation command is started.
		1	When the "New set point (6040h: Bit4)" is changed from 0 to 1 during operation, the new operation command is immediately updated. During push-motion positioning operation, when the New set point (6040h: Bit4) is set from 0 to 1 to start new operation, set the Change set immediately to 1.
4	New set point	0 to 1	Starting of positioning operation Before starting the operation, select the "Wrap(6040h: Bit14)", "Push (6040h: Bit13)", "Base position of Rel(6040h: Bit12)" and "Abs/Rel (6040h: Bit6)." If positioning operation is executed in a state where the operation is stopped by changing the "Halt (6040h: Bit8)" to 1, change the "Halt (6040h: Bit8)" from 1 to 0 first, and then leave an interval at more than double of the communication cycle before changing the "New set point (6040h: Bit4)" from 0 to 1. The operation may not be started unless the interval at more than double of the communication cycle is left. The command cannot be received in the following status, and the operation is not started. ● "Halt (6040h: Bit8)" has been 1. ● The STOP input is being ON. ● The drive state machine is other than "Operation enabled." ● The motor is in a non-excitation state.

For the Bit7 and Bit3 to Bit0, refer to "State transition of the drive state machine" on p.53.

■ Statusword of the profile position mode

Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
Manufacturer specific		Operation mode specific		Internal limit active	Target reached	Remote	ms
TLC	–	Following error	Set point acknowledge				–
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Warning	Switch on disabled	Quick stop	Voltage enabled	Fault	Operation enabled	Switched on	Ready to switch on

Details of statusword

Bit	Name	Value	Description
15	TLC	0	A load does not reach the upper limit of the motor output torque.
		1	A load reached the upper limit of the motor output torque. When push-motion operation is performed, use this signal as the completion signal of push-motion operation.
13	Following error	0	Position deviation error not present
		1	Position deviation error present The position deviation exceeded the value set in the "Following error window (6065h)." The value changes to 0 when the "Excessive position deviation alarm (alarm code 10h)" or "Overload alarm (alarm code 30h)" is cleared.
12	Set point acknowledge	0	The operation start by the "New set point (6040h: Bit4)" has not been received.
		1	The operation start by the "New set point (6040h: Bit4)" was received. When the "New set point (6040h: Bit4)" is set to 1 and the operation start is received, the "Set point acknowledge" changes to 1. When the "New set point (6040h: Bit4)" is set to 0, the "Set point acknowledge" also changes to 0.
11	Internal limit active	0	The function limitation by the internal limit is not in an active state.
		1	The function limitation by the internal limit became an active state. The value is 1 when any of the following internal limit function is activated. • Limit sensor (FW-LS/RV-LS) • Operation prohibition input (FW-BLK/RV-BLK) • Software limit • Mechanical limit
10	Target reached	0	• When the "Halt (6040h: Bit8)" is 0: The positioning operation is not complete. • When the "Halt (6040h: Bit8)" is 1: During deceleration stop.
		1	• When the "Halt (6040h: Bit8)" is 0: After positioning operation is properly completed, the "Target Reached" changes 1 when the feedback position has converged in a range of the Position window (6067h) with respect to the command position. It does not change to 1 when the positioning operation was interrupted on the way. It changes to 0 if the operation is started from a state where the positioning was complete. • When the "Halt (6040h: Bit8)" is 1: The value changes to 1 when the operation command speed becomes 0.
9	Remote	1	The value becomes 1 when the initialization is complete.
7	Warning	0	Information not present When the causes of information are cleared, the warning is automatically cleared to 0.
		1	Information present.

For the Bit6 to Bit0, refer to "Status output of the drive state machine" on p.54

■ Operation in the profile position mode

● Positioning operation

Positioning operation is started when the "Target position (607Ah)" is set and the "New set point (6040h: Bit4)" is set to 1.
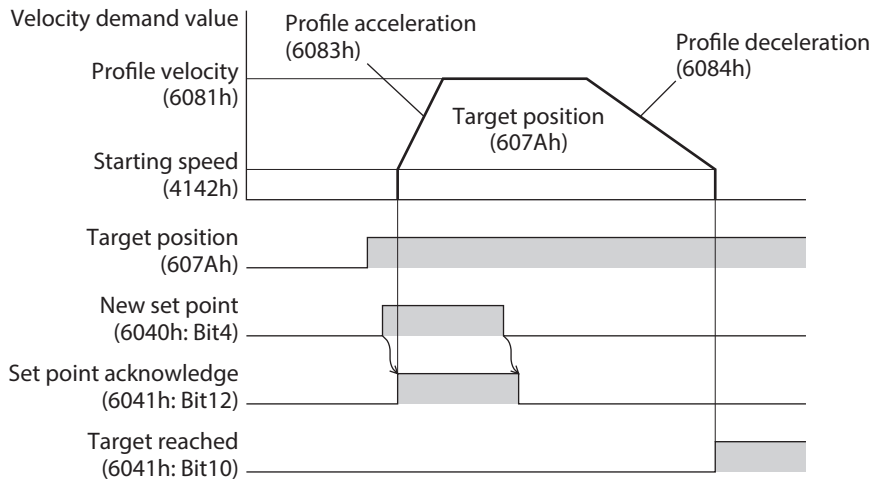
Single set-point [When the "Change set immidiately (6040h: Bit5)" is 1]

If the "New set point (6040h: Bit4)" is set during operation, the new operation command is updated immediately.
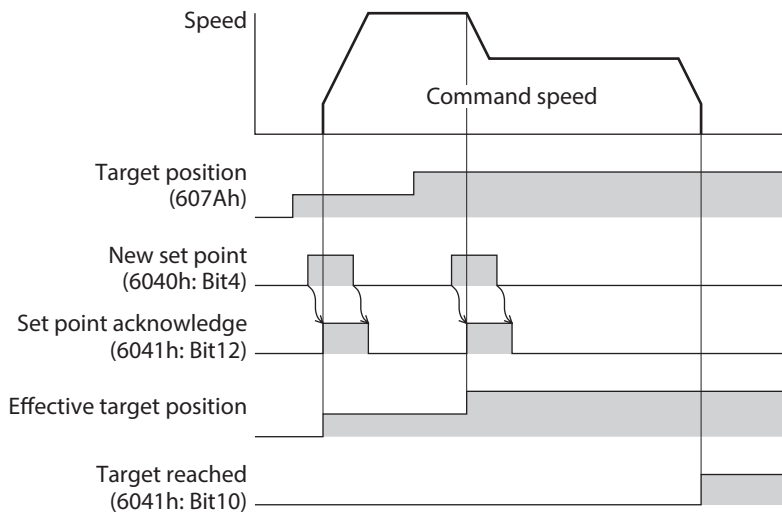
Set of set-points [When the "Change set immidiately (6040h: Bit5)" is 0]

If the "New set point (6040h: Bit4)" is set during operation, the new operation command is stored. When the present operation is complete, the stored new operation command is started.
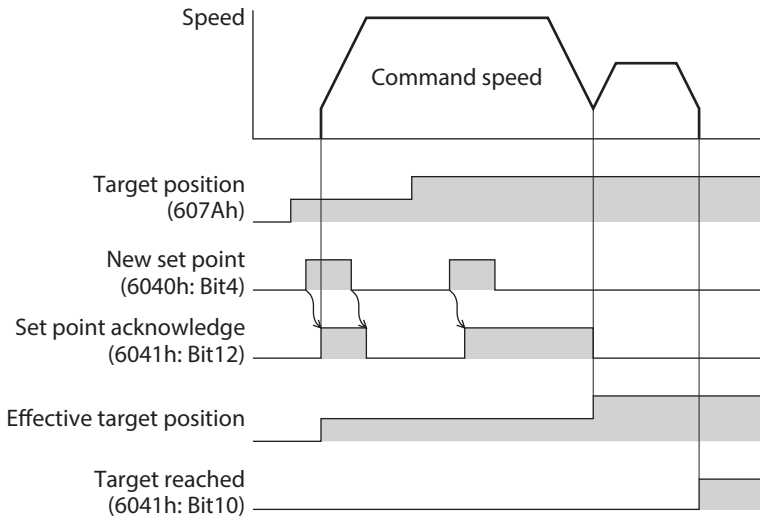
● **Push-motion positioning operation**

After the "Push (6040h: Bit13)" is set to 1, when the "New set point (6040h: Bit4)" is set to 1, push-motion positioning operation is started. If push-motion positioning operation is started, self-start operation (rectangular operation) is performed at the operating speed set in the "Profile velocity (6081h)."
During push-motion positioning operation, when the New set point (6040h: Bit4) is set from 0 to 1 to start new operation, set the Change set immediately (6040h: Bit5) to 1.

Note
- When a mechanism installed to the motor pressed against a load, push-motion operation is performed while a position deviation of 2.7° generates. An overload alarm may be generated if the operation is stopped in this state, so perform operation to return the detection position by 3.6° beofore push-motion operation is stopped.
- Do not perform push-motion operation with geared motor and the **DGII** Series. Doing so may cause damage to the motor or gear part.
- When push-motion operation is stopped in a state where a load is pressed, set the Operating current (4120h) of the next operation to be executed, to a value in the Push current (4121h) or less. If a higher current value than the Push current (4121h) is set, the push current may increase when an operation is transited, causing an unexpected push force to apply.

When a mechanism installed to the motor had presses against a load

When a load is pressed, the "TLC (6041h: Bit15)" of the statusword changes to 1.
If the "Halt (6040h: Bit8)" of the controlword is set to 1 or the STOP input is turned ON, the operation is stopped and the push-motion status is canceled.
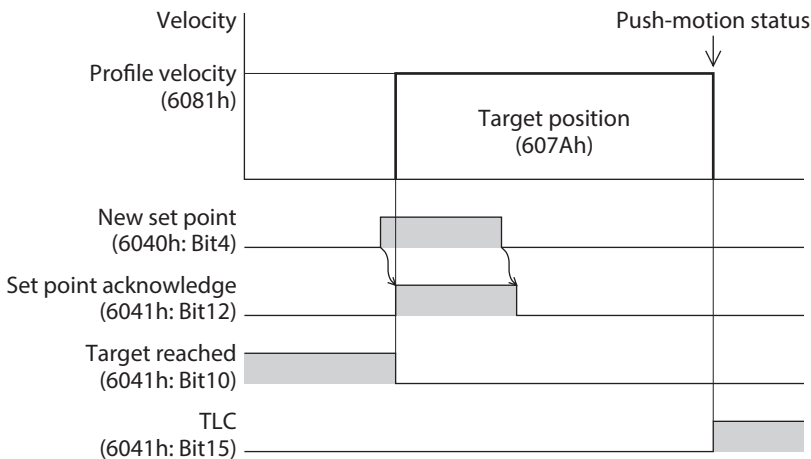
When a mechanism installed to the motor had not presses against a load

If the motor reaches the target position without pressing a load, the operation is complete. The "TLC (6041h: Bit15)" does not change to 1.
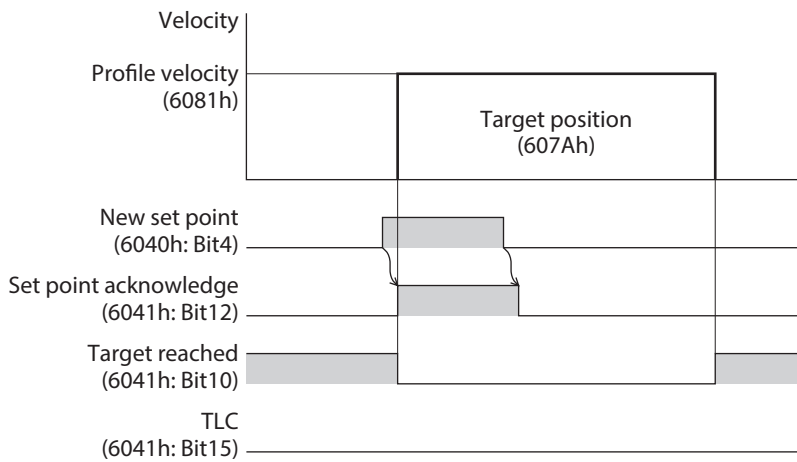
- **Wrap absolute positioning operation**

If the "New set point (6040h: Bit4)" is changed to 1 after the "Target position (607Ah)" was set and the "Wrap (6040h: Bit14)" was changed to 1, wrap absolute positioning operation is started. With wrap absolute positioning operation, absolute positioning operation is performed regardless of the value of the "Abs/Rel (6040h: Bit6)."

> (memo) When wrap absolute positioning operation is performed, set the "Wrap setting (41C7h)" to "1: Enable."
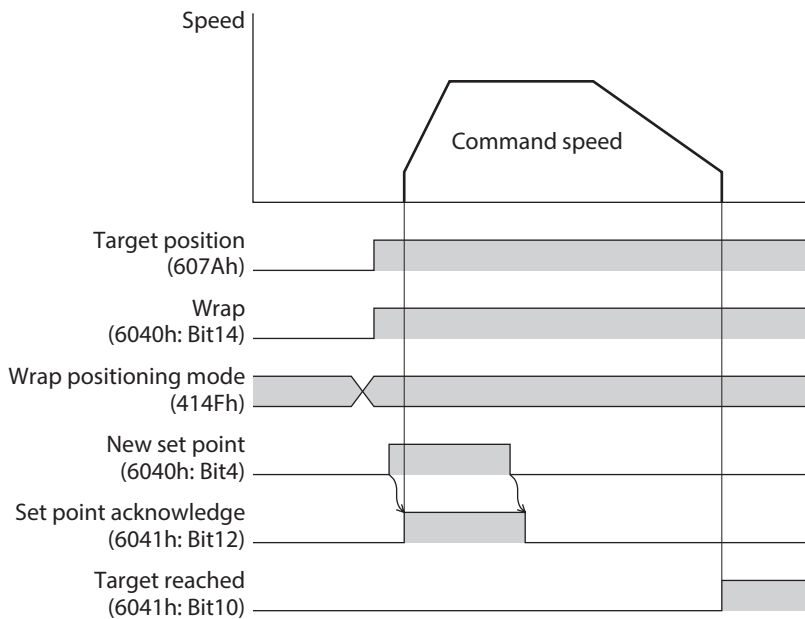
■ Operation mode of the profile position mode

The operation mode of the profile position mode is set with the "Controlword (6040h)" and the "Wrap positioning mode (414Fh)." The operation modes are listed in the table.

Operation mode	Wrap positioning mode (414Fh)	Controlword (6040h)			
		Wrap (Bit14)	Push (Bit13)	Base position of Rel (Bit12)	Abs/Rel (Bit6)
Absolute positioning	–	0	0	–	0
Incremental positioning (based on command position)	–	0	0	0	1
Incremental positioning (based on feedback position)	–	0	0	1	1
Absolute positioning push-motion	–	0	1	–	0
Incremental positioning push-motion (based on command position)	–	0	1	0	1
Incremental positioning push-motion (based on feedback position)	–	0	1	1	1
Wrap absolute positioning	0	1	0	–	–
Wrap proximity positioning	1	1	0	–	–
Wrap forward direction absolute positioning	2	1	0	–	–
Wrap reverse direction absolute positioning	3	1	0	–	–
Wrap absolute push-motion	0	1	1	–	–
Wrap proximity push-motion	1	1	1	–	–
Wrap forward direction push-motion	2	1	1	–	–
Wrap reverse direction push-motion	3	1	1	–	–

● Absolute positioning

Positioning operation is performed from the present position to the set target position. In the "Target position (607Ah)," set the target position on the coordinates with the home as a reference.

Example: When moving from the command position "1,000" to the target position "4,000"

Set 4,000 steps in the "Target position (607Ah)" to start absolute positioning operation.
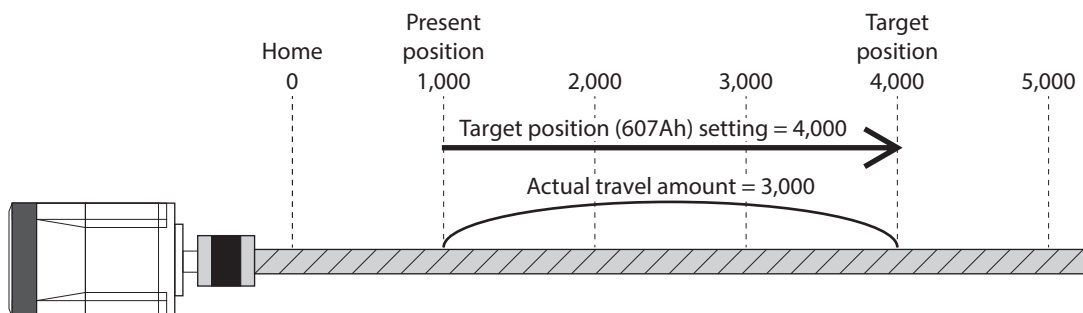
● **Incremental positioning (based on command position)**

Positioning operation of the set travel amount is performed from the present command position. In the "Target position (607Ah)," set the travel amount from the present command position to the target position.

Example: When moving from the command position "1,000" to the target position "4,000"

Set 3,000 steps in the "Target position (607Ah)" to start incremental positioning (based on command position) operation.
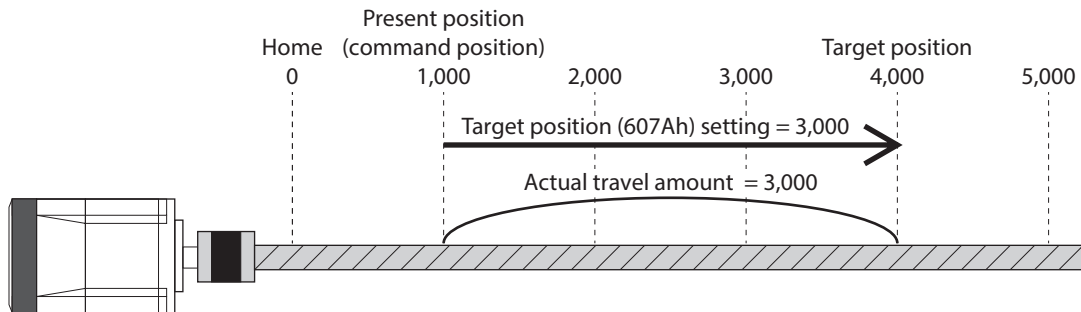
● **Incremental positioning (based on feedback position)**

Positioning operation of the set travel amount is performed from the present actual position. In the "Target position (607Ah)," set the travel amount from the actual position.

Example: When moving 3000 steps from the command position "1,000" and the actual position "900"

Set 3,000 steps in the "Target position (607Ah)" to start incremental positioning (based on feedback position) operation. The command position and the actual position after completing the operation will be "3,900."
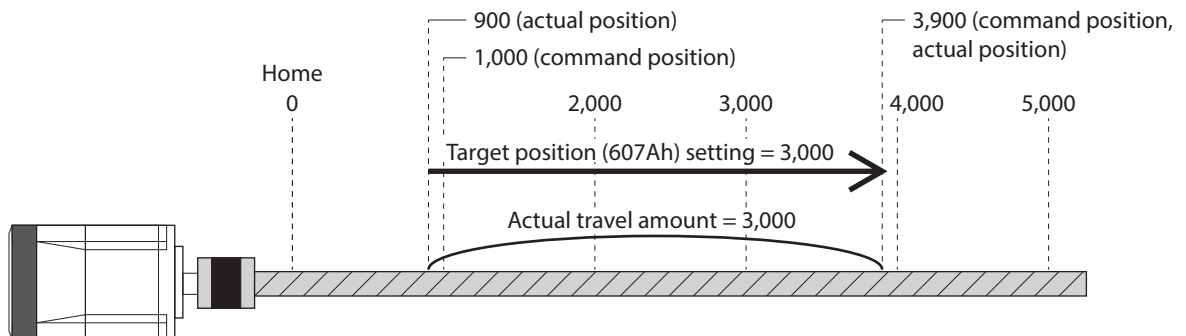
memo
- The reference position of the operation based on the feedback position varies depending on the load.
- If the command position and the actual position are different such as push-motion operation, the next operation can be started based on the actual position of the push position or others.

● **Wrap absolute positioning**

Positioning operation is performed to the target position within the wrap range. In the "Target position (607Ah)," set the target position within the wrap range. Refer to p.93 for the wrap function.

**Example: When moving from the command position "1,000" to the target position "4,000"
            (Wrap setting range 1.0 rev, wrap offset ratio 50.00 %)**

Set the items in the table to start wrap absolute positioning operation.

Index	Name	Setting value
41C7h	Wrap setting	1: Enable
41C9h	Initial coordinate generation & wrap setting range [1=0.1rev]	10
41CBh	Initial coordinate generation & wrap range offset ratio [1=0.01 %]	5,000
414Fh	Wrap positioning mode	0: Wrap absolute positioning
607Ah	Target position [step]	4,000

Home
0
Present position
1,000

• Target position (607Ah) setting = 4,000
• Actual travel amount = 3,000

−2,500   2,500

4,000
Target position

−5,000
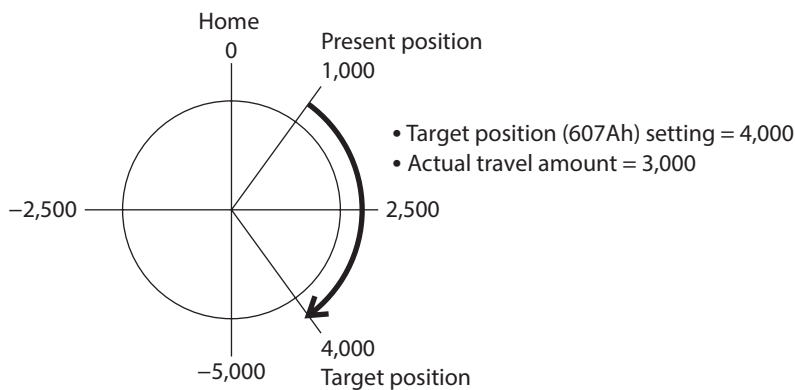
● **Wrap proximity positioning**

Positioning operation in the shortest distance is performed to the target position within the wrap range. In the "Target position (607Ah)," set the target position within the wrap range. Refer to p.93 for the wrap function.

**Example: When moving from the command position "−4,000" to the target position "4,000"
            (Wrap setting range 1.0 rev, wrap offset ratio 50.00 %)**

Set the items in the table to start wrap proximity positioning operation.

Index	Name	Setting value
41C7h	Wrap setting	1: Enable
41C9h	Initial coordinate generation & wrap setting range [1=0.1rev]	10
41CBh	Initial coordinate generation & wrap range offset ratio [1=0.01 %]	5,000
414Fh	Wrap positioning mode	1: Wrap proximity
607Ah	Target position [step]	4,000

Home
0

• Target position (607Ah) setting = 4,000
• Actual travel amount = −2,000

−2,500   2,500

−4000   4,000
Present position   −5,000   Target position
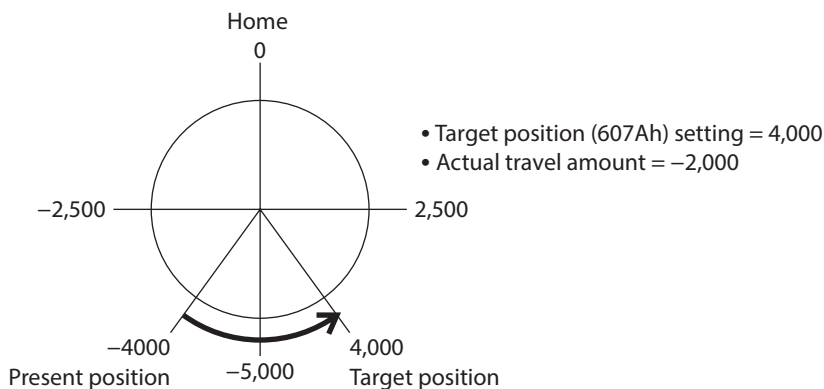
● **Wrap forward direction absolute positioning**

Positioning operation in the forward direction is performed to the target position within the wrap range. In the "Target position (607Ah)," set the target position within the wrap range. Refer to p.93 for the wrap function.

Example: When moving from the command position "1,000" to the target position "−4,000"
(Wrap setting range 1.0 rev, wrap offset ratio 50.00 %)

Set the items in the table to start wrap forward direction absolute positioning operation.

Index	Name	Setting value
41C7h	Wrap setting	1: Enable
41C9h	Initial coordinate generation & wrap setting range [1=0.1rev]	10
41CBh	Initial coordinate generation & wrap range offset ratio [1=0.01 %]	5,000
414Fh	Wrap positioning mode	2: Wrap forward direction
607Ah	Target position [step]	−4,000

Home
0
Present position
1,000

• Target position (607Ah) setting = −4,000
• Actual travel amount = 5,000

−2,500   2,500

−4,000
Target position   −5,000
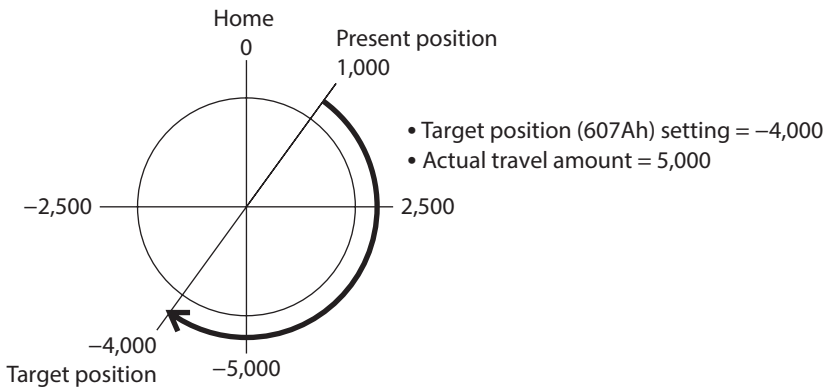
● **Wrap reverse direction absolute positioning**

Positioning operation in the reverse direction is performed to the target position within the wrap range. In the "Target position (607Ah)," set the target position within the wrap range. Refer to p.93 for the wrap function.

Example: When moving from the command position "1,000" to the target position "4,000"
(Wrap setting range 1.0 rev, wrap offset ratio 50.00 %)

Set the items in the table to start wrap reverse direction absolute positioning operation.

Index	Name	Setting value
41C7h	Wrap setting	1: Enable
41C9h	Initial coordinate generation & wrap setting range [1=0.1rev]	10
41CBh	Initial coordinate generation & wrap range offset ratio [1=0.01 %]	5,000
414Fh	Wrap positioning mode	3: Wrap reverse direction
607Ah	Target position [step]	4,000

Home
0
Present position
1,000

• Target position (607Ah) setting = 4,000
• Actual travel amount = −7,000

−2,500   2,500

−5,000
4,000
Target position
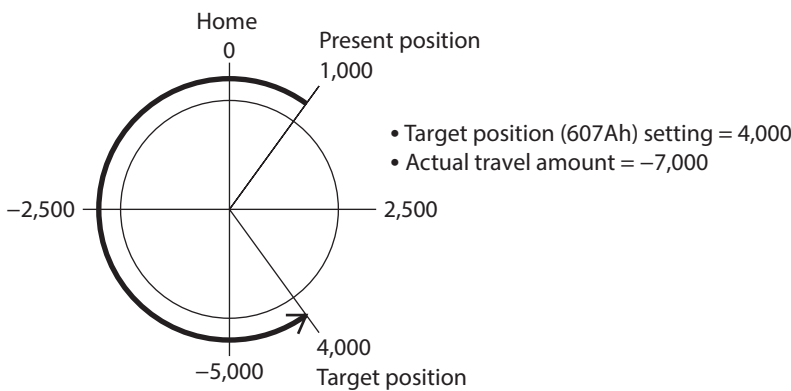
■ Orbit comparison of positioning operation

These are examples when the wrap setting range is set to 1 rev and the wrap range offset ratio is set to 50 %.

Operation mode	Initial value → The value set in the "Target position (607Ah)"	
	2,500 → 9,000	2,500 → −14,000
• Absolute positioning * Sets the coordinate of the target position from the home.	−1,000 / 0 / −2,500 / 2,500 / −5,000	0 / −2,500 / 2,500 / −4,000 / −5,000
• Incremental positioning (based on command position) • Incremental positioning (based on feedback position) * Sets the travel amount from the command position or the actual position to the target position.	0 / 1,500 / −2,500 / 2,500 / −5,000	0 / −1,500 / −2,500 / 2,500 / −5,000
• Wrap absolute positioning * Sets the target position on coordinates with the home as a reference. Operation is performed within the wrap range.	−1,000 / 0 / −2,500 / 2,500 / −5,000	0 / −2,500 / 2,500 / −4,000 / −5,000
• Wrap proximity positioning * Sets the target position on coordinates with the home as a reference. Operation in the shortest distance is performed to the target position within the wrap range.	−1,000 / 0 / −2,500 / 2,500 / −5,000	0 / −2,500 / 2,500 / −4,000 / −5,000
• Wrap forward direction absolute positioning * Sets the target position on coordinates with the home as a reference. Operation in the forward direction is performed to the target position within the wrap range.	−1,000 / 0 / −2,500 / 2,500 / −5,000	0 / −2,500 / 2,500 / −4,000 / −5,000
• Wrap reverse direction absolute positioning * Sets the target position on coordinates with the home as a reference. Operation in the reverse direction is performed to the target position within the wrap range.	−1,000 / 0 / −2,500 / 2,500 / −5,000	0 / −2,500 / 2,500 / −4,000 / −5,000

* The value □ represents the coordinate of the position where the motor stopped.

2-5 Cyclic synchronous velocity mode (CSV)

In the cyclic synchronous velocity mode, a path generation (profile generation) is performed by the MainDevice. By cyclic synchronous communication, when the "Target velocity (60FFh)" is sent from the MainDevice to the driver, the driver performs speed controls.

Related objects

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
6040h	00h	Controlword	U16	RW	RxPDO	–	0000h to FFFFh (Initial value: 0000h)	A
6041h	00h	Statusword	U16	RO	TxPDO	–	–	–
6060h	00h	Modes of operation	INT8	RW	RxPDO	O	0, 1, 3, 6, 8, 9 (⇨ p.55) (Initial value: 0)	B
6061h	00h	Modes of operation display	INT8	RO	TxPDO	–	–	–
606Bh	00h	Velocity demand value [Hz]	INT32	RO	TxPDO	–	–	–
606Ch	00h	Velocity actual value [Hz]	INT32	RO	TxPDO	–	–	–
60FFh	00h	Target velocity [Hz]	INT32	RW	RxPDO	–	−4,000,000 to 4,000,000 (Initial value: 0)	A

■ Controlword of the cyclic synchronous velocity mode

Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
Manufacturer specific (ms)					Reserved	oms	Halt
–	–	Type		–		–	

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Fault reset	Operation mode specific (oms)			Enable operation	Quick stop	Enable voltage	Switch on
	–	–	–				

Details of Controlword

Bit	Name	Value	Description
13	Type	–	The operation mode of the cyclic synchronous velocity mode is selected. The operation mode changed is updated immediately. For details, refer to "Operation mode of the cyclic synchronous velocity mode."
12		–	
8	Halt	0	Operation allowed
		1	Stop operation. The stopping method is "Immediate stop."

For the Bit7 and Bit3 to Bit0, refer to "State transition of the drive state machine" on p.53.

■ Operation mode of the cyclic synchronous velocity mode

The operation mode of the cyclic synchronous velocity mode is set with the "Type (6040h: Bit13, Bit12)." The operation modes are as shown in the table.

Bit13	Bit12	Operation mode	Explanation
0	0	Continuous operation (Position control)	Continuous operation is executed at the "Target velocity (60FFh)." Operation is executed while the position deviation is monitored, so when a load exceeding the torque of the motor is applied, an alarm of overload or excessive position deviation is generated. If sudden position deviation occurs, for example, when a large load is removed, the motor accelerates suddenly or has overspeed to remove deviation.
0	1	Continuous operation (Speed control)	Continuous operation is executed at the "Target velocity (60FFh)." When a load exceeding the torque of the motor is applied, an alarm of overload is generated.
1	0	Continuous operation (Push-motion) *	Continuous operation is executed at the "Target velocity (60FFh)." When a mechanism installed to the motor presses against a load, pressure is continuously applied to the load.
1	1	Continuous operation (Torque control) *	In the cyclic synchronous velocity mode, it is the same movement as continuous operation (push-motion) and continuous operation (torque control).

Note * When continuous operation (Push-motion) or continuous operation (Torque control) is performed, note the following.
- When a mechanism installed to the motor pressed against a load, push-motion operation is performed while a position deviation of 2.7° generates. An overload alarm may be generated if the operation is stopped in this state, so perform operation to return the detection position by 3.6° beofore push-motion operation is stopped.
- Do not perform push-motion operation with geared motor and the **DGII** Series. Doing so may cause damage to the motor or gear part.
- When push-motion operation is stopped in a state where a load is pressed, set the Operating current (4120h) of the next operation to be executed, to a value in the Push current (4121h) or less. If a higher current value than the Push current (4121h) is set, the push current may increase when an operation is transited, causing an unexpected push force to apply.

■ Statusword of the cyclic synchronous velocity mode

Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
Manufacturer specific		Operation mode specific		Internal limit active	Reserved	Remote	ms
TLC	–	Reserved	Target velocity ignored				–
Bit7	**Bit6**	**Bit5**	**Bit4**	**Bit3**	**Bit2**	**Bit1**	**Bit0**
Warning	Switch on disabled	Quick stop	Voltage enabled	Fault	Operation enabled	Switched on	Ready to switch on

Details of statusword

Bit	Name	Value	Description
15	TLC	0	A load does not reach the upper limit of the motor output torque.
		1	A load reached the upper limit of the motor output torque.
13	Reserved	0	Reserved
12	Target velocity ignored	0	Target speed command disable When the state is any of the followings, the value is 0, and the target speed is disabled. ● The drive state machine is other than "Operation enabled." ● The motor is in a non-excitation state. ● "Halt (6040h: Bit8)" has been 1. ● The STOP input is being ON. ● The internal limit is in an active state.
		1	Target speed command enable
11	Internal limit active	0	The function limitation by the internal limit is not in an active state.
		1	The function limitation by the internal limit became an active state. The value is 1 when any of the following internal limit function is activated. ● Limit sensor (FW-LS/RV-LS) ● Operation prohibition input (FW-BLK/RV-BLK) ● Software limit ● Mechanical limit
10	Reserved	0	Reserved
9	Remote	1	The value becomes 1 when the initialization is complete.
7	Warning	0	Information not present When the causes of information are cleared, the warning is automatically cleared to 0.
		1	Information present.

For the Bit6 to Bit0, refer to "Status output of the drive state machine" on p.54

■ Operation in the cyclic synchronous velocity mode

2 Communication Specifications Edition
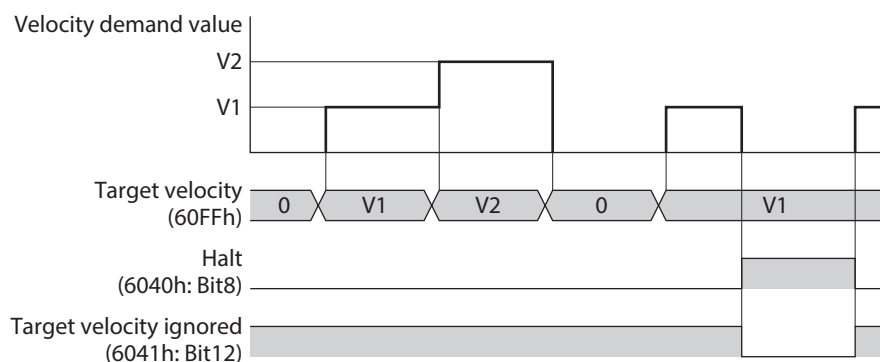
2-6   Profile velocity mode (PV)

The profile velocity mode operates in the internal profile of the driver. A path generation (profile generation) is performed in the driver. The speed, acceleration rate and others are set in the MainDevice.

Related objects

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
6040h	00h	Controlword	U16	RW	RxPDO	–	0000h to FFFFh (Initial value: 0000h)	A
6041h	00h	Statusword	U16	RO	TxPDO	–	–	–
6060h	00h	Modes of operation	INT8	RW	RxPDO	○	0, 1, 3, 6, 8, 9 (⇨ p.55) (Initial value: 0)	B
6061h	00h	Modes of operation display	INT8	RO	TxPDO	–	–	–
606Bh	00h	Velocity demand value [Hz]	INT32	RO	TxPDO	–	–	–
606Ch	00h	Velocity actual value [Hz]	INT32	RO	TxPDO	–	–	–
6083h	00h	Profile acceleration [step/s²]	U32	RW	RxPDO	○	1 to 1,000,000,000 (Initial value: 300,000)	B
6084h	00h	Profile deceleration [step/s²]	U32	RW	RxPDO	○	1 to 1,000,000,000 (Initial value: 300,000)	B
60FFh	00h	Target velocity [Hz]	INT32	RW	RxPDO	–	−4,000,000 to 4,000,000 (Initial value: 0)	B
4142h	*	Starting speed [Hz]	INT32	RW	No	○	0 to 4,000,000 (Initial value: 5,000)	B

* Set the axis number (1 to 4) in the Sub-index because of the driver object in the manufacturer-specific area.

■ Controlword of the profile velocity mode

Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
Manufacturer specific (ms)					Reserved	oms	Halt
–	–	Type		–		–	

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Fault reset	Operation mode specific (oms)			Enable operation	Quick stop	Enable voltage	Switch on
	–	–	–				

Details of controlword

Bit	Name	Value	Description
13	Type	–	The operation mode of the profile velocity mode is selected. The operation mode changed is updated immediately. For details, refer to "Operation mode of the profile velocity mode."
12		–	
8	Halt	0	Operation allowed
		1	Stop operation. The stopping method is in accordance with the setting of the "Halt option code (605Dh)."

For the Bit7 and Bit3 to Bit0, refer to "State transition of the drive state machine" on p.53.

■ Operation mode of the profile velocity mode

The operation mode of the profile velocity mode is set with the "Type (6040h: Bit13, Bit12)." The operation modes are as shown in the table.

Bit13	Bit12	Operation mode	Explanation
0	0	Continuous operation (Position control)	The motor is started running at the Starting speed (4142h) and accelerates until the Target velocity (60FFh) is reached. When the Target velocity (60FFh) is reached, operation is continued with the speed maintained. Operation is executed while the position deviation is monitored, so when a load exceeding the torque of the motor is applied, an alarm of overload or excessive position deviation is generated. If sudden position deviation occurs, for example, when a large load is removed, the motor accelerates suddenly or has overspeed to remove deviation.
0	1	Continuous operation (Speed control)	The motor is started running at the Starting speed (4142h) and accelerates until the Target velocity (60FFh) is reached. When the Target velocity (60FFh) is reached, operation is continued with the speed maintained. When a load exceeding the torque of the motor is applied, an alarm of overload is generated.
1	0	Continuous operation (Push-motion) *	The motor is started running at the Starting speed (4142h) and accelerates until the Target velocity (60FFh) is reached. When the Target velocity (60FFh) is reached, operation is continued with the speed maintained. When a mechanism installed to the motor presses against a load, pressure is continuously applied to the load.
1	1	Continuous operation (Torque control) *	Rectangular operation (drive without acceleration/deceleration time) of the motor is executed at the Target velocity (60FFh), and operation is continued with the speed maintained. When a mechanism installed to the motor presses against a load, pressure is continuously applied to the load.

Note * When continuous operation (Push-motion) or continuous operation (Torque control) is performed, note the following.

- When a mechanism installed to the motor pressed against a load, push-motion operation is performed while a position deviation of 2.7° generates. An overload alarm may be generated if the operation is stopped in this state, so perform operation to return the detection position by 3.6° beofore push-motion operation is stopped.
- Do not perform push-motion operation with geared motor and the **DGII** Series. Doing so may cause damage to the motor or gear part.
- When push-motion operation is stopped in a state where a load is pressed, set the Operating current (4120h) of the next operation to be executed, to a value in the Push current (4121h) or less. If a higher current value than the Push current (4121h) is set, the push current may increase when an operation is transited, causing an unexpected push force to apply.

■ **Statusword of the profile velocity mode**

Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
Manufacturer specific		Operation mode specific		Internal limit active	Target reached	Remote	ms
TLC	–	–	Speed				–
Bit7	**Bit6**	**Bit5**	**Bit4**	**Bit3**	**Bit2**	**Bit1**	**Bit0**
Warning	Switch on disabled	Quick stop	Voltage enabled	Fault	Operation enabled	Switched on	Ready to switch on

Details of statusword

Bit	Name	Value	Description
15	TLC	0	A load does not reach the upper limit of the motor output torque.
		1	A load reached the upper limit of the motor output torque.
12	Speed	0	Internal speed command is other than 0.
		1	Internal speed command is 0.
11	Internal limit active	0	The function limitation by the internal limit is not in an active state.
		1	The function limitation by the internal limit became an active state. The value is 1 when any of the following internal limit function is activated. • Limit sensor (FW-LS/RV-LS) • Operation prohibition input (FW-BLK/RV-BLK) • Software limit • Mechanical limit
10	Target reached	0	• When the "Halt (6040h: Bit8)" is 0: The internal command speed does not reach the "Target velocity (60FFh)." • When the "Halt (6040h: Bit8)" is 1: During deceleration stop. (Internal speed command is other than 0.)
		1	• When the "Halt (6040h: Bit8)" is 0: The internal command speed reached the "Target velocity (60FFh)." When the Halt is 0, the status of the VA output signal is output. The judgment level of the target speed reached can be set in the "VA mode selection (4718h)" and "VA detection speed range (4719h)." • When the "Halt (6040h: Bit8)" is 1: Internal speed command is 0.
9	Remote	1	The value becomes 1 when the initialization is complete.
7	Warning	0	Information not present When the causes of information are cleared, the warning is automatically cleared to 0.
		1	Information present.

For the Bit6 to Bit0, refer to

■ Operation in the profile velocity mode

V1, V2: velocity

> **memo** When the "Type (6040h: Bit12, Bit13)" is set to continuous operation (torque control), self-start operation (rectangular operation) at the "Target velocity (60FFh)" is performed.

2-7 Homing mode (HM)

The home is set in the homing mode. A path generation (profile generation) is performed in the driver.
If return-to-home operation is performed, the position preset (P-PRESET) is executed when the operation is complete, and the home will be the value set in the "Home offset (607Ch)."

● **Related object**

Refer to "Selection of return-to-home method" on p.77.

■ Before starting operation; When the motorized actuator is used

For parameters of the **AZ** Series, the different values are stored in the ABZO sensor and driver. The values based on the product specifications are saved in the ABZO sensor, and they cannot be changed. Meantime, the values for the standard type (motor only) are stored in the driver parameters. In a state of the factory shipment, parameters stored in the ABZO sensor are used preferentially.
Since parameters stored in the driver are prioritized in the homing mode, change the setting according to the following steps.

1. Copy the fixed value (parameters) of the ABZO sensor to the driver. (⇨ p.174)

2. Change the "JOG/HOME/ZHOME operation setting (47F5h)" to "1: Manual setting."

3. Change the "Homing method (6098h)" to "−1: Return-to-home of our specifications."

4. Execute the "Write batch NV memory (40C9h)."

5. Turn on the control power supply of the driver again.
   With these steps, the driver parameters will be prioritized.

■ Controlword of the homing mode

Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
Manufacturer specific (ms)					Reserved	oms	Halt
–	–	–	–	–		–	
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Fault reset	Operation mode specific (oms)			Enable operation	Quick stop	Enable voltage	Switch on
	–	–	Homing operation start				

Details of controlword

Bit	Name	Value	Description
8	Halt	0	Operation allowed
		1	Stop operation. The stopping method is in accordance with the setting of the "Halt option code (605Dh)."
4	Homing operation start	0 to 1	Start of return-to-home operation If the Homing operation start is set to 0 during return-to-home operation, the motor decelerates to a stop. When the state is any of the followings, the command is not received, and an operation does not start. • During operation • "Halt (6040h: Bit8)" has been 1. • The STOP input is being ON. • The drive state machine is other than "Operation enabled." • The motor is in a non-excitation state.

For the Bit7 and Bit3 to Bit0, refer to "State transition of the drive state machine" on p.53.

■ Statusword of the homing mode

Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
Manufacturer specific		Operation mode specific		Internal limit active	Target reached	Remote	ms
TLC	–	Homing error	Homing attained				–
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Warning	Switch on disabled	Quick stop	Voltage enabled	Fault	Operation enabled	Switched on	Ready to switch on

● Details of statusword

Bit	Name	Value	Description
15	TLC	0	A load does not reach the upper limit of the motor output torque.
		1	A load reached the upper limit of the motor output torque.
13	Homing error	0/1	The status of the motor is output by combining the values in the "Homing error (6041h: Bit13)," "Homing attained (6041h: Bit12)" and "Target reached (6041h: Bit10)." For details, refer to table below.
12	Homing attained	0/1	The status of the motor is output by combining the values in the "Homing error (6041h: Bit13)," "Homing attained (6041h: Bit12)" and "Target reached (6041h: Bit10)." For details, refer to table below.
11	Internal limit active	0	The function limitation by the internal limit is not in an active state.
		1	The function limitation by the internal limit became an active state. The value is 1 when any of the following internal limit function is activated. • Limit sensor (FW-LS/RV-LS) • Operation prohibition input (FW-BLK/RV-BLK) • Software limit • Mechanical limit

Bit	Name	Value	Description
10	Target reached	0/1	The status of the motor is output by combining the values in the "Homing error (6041h: Bit13)," "Homing attained (6041h: Bit12)" and "Target reached (6041h: Bit10)." For details, refer to table below.
9	Remote	1	The value becomes 1 when the initialization is complete.
7	Warning	0	Information not present When the causes of information are cleared, the warning is automatically cleared to 0.
		1	Information present.

For the Bit6 to Bit0, refer to "Status output of the drive state machine" on p.54

● **Status output of motor**

The status of the motor is output by combining the values in the "Homing error (Bit13)," "Homing attained (Bit12)" and "Target reached (Bit10)."

Homing error (Bit13)	Homing attained (Bit12)	Target reached (Bit10)	Status
0	0	0	During operation of return-to-home operation
0	0	1	Return-to-home operation is interrupted, or it is not started.
0	1	0	– (Not generated)
0	1	1	Return-to-home operation was properly complete.
1	0	0	– (Not generated)
1	0	1	Interrupted since an alarm was generated during return-to-home operation.
1	1	0	Reserved
1	1	1	Reserved

■ Selection of return-to-home method

The return-to-home method is selected in the "Homing method (6098h)." The driver supports the following return-to-home methods.

Homing method	Description
17	Return-to-home by the limit sensor (FW-LS/RV-LS), Starts in the negative direction
18	Return-to-home by the limit sensor (FW-LS/RV-LS), Starts in the positive direction
24	Return-to-home by the home sensor (HOMES), Starts in the positive direction
28	Return-to-home by the home sensor (HOMES), Starts in the negative direction
35, 37 *	Home preset
−1	Return-to-home of our specifications

* 35 and 37 perform the same action.

● **Related objects**

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
607Ch	00h	Home offset [step]	INT32	RW	No	○	−2,147,483,648 to 2,147,483,647 (Initial value: 0)	A
6098h	00h	Homing method	INT8	RW	No	○	17, 18, 24, 28, 35, 37, −1 (Initial value: 24) (⇨ Selection of return-to-home method)	B
6099h	01h	Speed during search for switch [Hz]	U32	RW	No	○	1 to 4,000,000 (Initial value: 10,000)	B
	02h	Speed during search for zero [Hz]	U32	RW	No	○	1 to 10,000 (Initial value: 5,000)	B

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
609Ah	00h	Homing acceleration [step/sec^2]	U32	RW	No	○	1 to 1,000,000,000 (Initial value: 300,000)	B
415Fh	*	JOG/HOME/ZHOME operating current [1=0.1 %]	INT16	RW	No	○	0 to 1,000 (Initial value: 1,000)	B
4163h	*	(HOME) Starting speed [Hz]	INT32	RW	No	○	1 to 4,000,000 (Initial value: 5,000)	B
4169h	*	(HOME) Backward steps in 2 sensor home-seeking [step]	INT32	RW	No	○	0 to 8,388,607 (Initial value: 5,000)	B
41C6h	*	Preset position [step]	INT32	RW	No	○	−2,147,483,648 to 2,147,483,647 (Initial value: 0)	A

* Set the axis number (1 to 4) in the sub-index because of the driver object in the manufacturer-specific area.

● **Return-to-home operation of our specifications**

Return-to-home mode of our specifications is applied when setting the "Homing method (6098h)" to −1.

Related objects (our specifications)

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
607Ch	00h	Home offset [step]	INT32	RW	No	○	−2,147,483,648 to 2,147,483,647 (Initial value: 0)	A
6099h	01h	Speed during search for switch [Hz]	U32	RW	No	○	1 to 4,000,000 (Initial value: 10,000)	B
	02h	Speed during search for zero [Hz]	U32	RW	No	○	1 to 10,000 (Initial value: 5,000)	B
609Ah	00h	Homing acceleration [step/sec^2]	U32	RW	No	○	1 to 1,000,000,000 (Initial value: 300,000)	B
415Fh	*	JOG/HOME/ZHOME operating current [1=0.1 %]	INT16	RW	No	○	0 to 1,000 (Initial value: 1,000)	B
4160h	*	(HOME) Home-seeking mode	U8	RW	No	○	0: 2-sensor mode 1: 3-sensor mode 2: One-way rotation mode 3: Push mode (Initial value: 1)	B
4161h	*	(HOME) Starting direction	U8	RW	No	○	0: Negative direction 1: Positive direction (Initial value: 1)	B
4163h	*	(HOME) Starting speed [Hz]	INT32	RW	No	○	1 to 4,000,000 (Initial value: 5,000)	B
4166h	*	(HOME) SLIT detection	U8	RW	No	○	0: Disable 1: Enable (Initial value: 0)	B
4167h	*	(HOME) TIM/ZSG signal detection	U8	RW	No	○	0: Disable 1: TIM output 2: ZSG output (Initial value: 0)	B
4168h	*	(HOME) Position offset [Hz]	INT32	RW	No	○	−2,147,483,647 to 2,147,483,647 (Initial value: 0)	B
4169h	*	(HOME) Backward steps in 2 sensor home-seeking [step]	INT32	RW	No	○	0 to 8,388,607 (Initial value: 5,000)	B
416Ah	*	(HOME) Operating amount in uni-directional home-seeking [step]	INT32	RW	No	○	0 to 8,388,607 (Initial value: 5,000)	B

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
416Bh	*	(HOME) Operating current for push-home-seeking [1=0.1 %]	INT16	RW	No	○	0 to 1,000 (Initial value: 1,000)	B
416Ch	*	(HOME) Backward steps after first entry in push-home-seeking [step]	INT32	RW	No	○	0 to 8,388,607 (Initial value: 0)	B
416Dh	*	(HOME) Pushing-time in push-home-seeking [ms]	U16	RW	No	○	0 to 65,535 (Initial value: 200)	B
416Eh	*	HOME) Backward steps in push-home-seeking [step]	INT32	RW	No	○	0 to 8,388,607 (Initial value: 5,000)	B
41C6h	*	Preset position [step]	INT32	RW	No	○	−2,147,483,648 to 2,147,483,647 (Initial value: 0)	A

* Set the axis number (1 to 4) in the sub-index because of the driver object in the manufacturer-specific area.

■ Operation of return-to-home mode of CiA402 drive profile

How to read the figure

Starting position of operation

Moving direction ← (28) — Reverses when the motor passed through the limit signal

HOMES (limit signal)

Selection number of the "Homing method (6098h)" and stop position
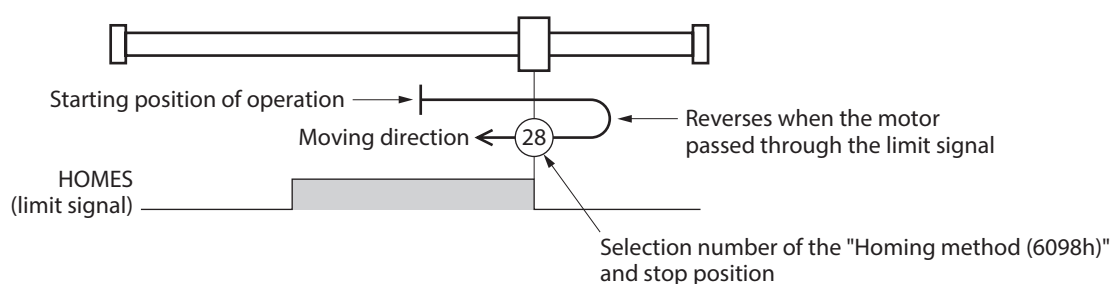
● Homing method: 24 [Return-to-home by the home sensor (HOMES), starts in the positive direction]

When the HOME sensor is detected, the motor rotates in the reverse direction and pulls out of the HOME sensor at the "(HOME) Starting speed (4163h)." After pulling out of the HOME sensor, the motor reverses once again, and continue to operate at the "Speed during search for zero (6099h-02h)." The motor stops when the ON edge of the HOME sensor is detected, and the position at which the motor stopped becomes the home.

HOME switch (HOMES)

Positive limit switch (FW-LS)

In the case of return-to-home operation of our specifications, the same operation is performed if the following data is set.
- (HOME) Home-seeking mode (4160h): 1 [3-sensor]
- (HOME) Starting direction (4161h): 1 [positive direction]
- (HOME) SLIT detection (4166h): 0 [disable]
- (HOME) TIM/ZSG signal detection (4167h): 0 [disable]

● **Homing method: 28 [Return-to-home by the home sensor (HOMES), starts in the negative direction]**

When the HOME sensor is detected, the motor rotates in the reverse direction and pulls out of the HOME sensor at the "(HOME) Starting speed (4163h)." After pulling out of the HOME sensor, the motor reverses once again, and continue to operate at the "Speed during search for zero (6099h-02h)." The motor stops when the ON edge of the HOME sensor is detected, and the position at which the motor stopped becomes the home.

In the case of return-to-home operation of our specifications, the same operation is performed if the following data is set.
- (HOME) Home-seeking mode (4160h): 1 [3-sensor]
- (HOME) Starting direction (4161h): 0 [negative direction]
- (HOME) SLIT detection (4166h): 0 [disable]
- (HOME) TIM/ZSG signal detection (4167h): 0 [disable]

● **Homing method: 17 [Return-to-home by the limit sensor (FW-LS/RV-LS), starts in the negative direction]**

After pulling out of the limit sensor, the motor rotates to stop according to the value set in the "(HOME) Backward steps in 2 sensor home-seeking (4169h)." The stop position will be the home.
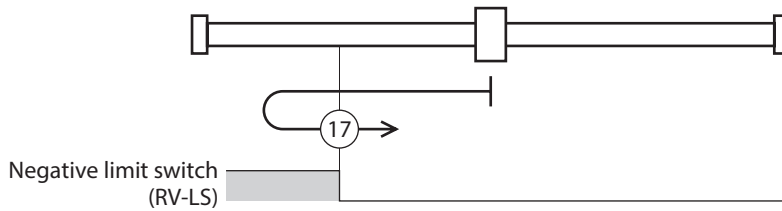
In the case of return-to-home operation of our specifications, the same operation is performed if the following data is set.
- (HOME) Home-seeking mode (4160h): 0 [2-sensor]
- (HOME) Starting direction (4161h): 0 [negative direction]
- (HOME) SLIT detection (4166h): 0 [disable]
- (HOME) TIM/ZSG signal detection (4167h): 0 [disable]

● **Homing method: 18 [Return-to-home by the limit sensor (FW-LS/RV-LS), starts in the positive direction]**

After pulling out of the limit sensor, the motor rotates to stop according to the value set in the "(HOME) Backward steps in 2 sensor home-seeking (4169h)." The stop position will be the home.
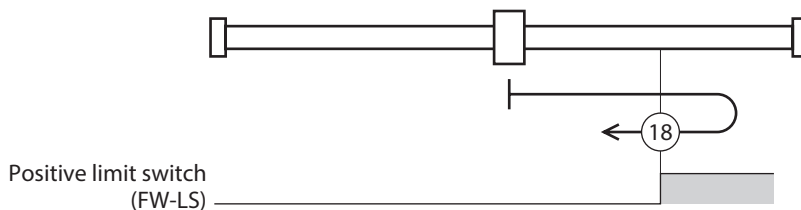
In the case of return-to-home operation of our specifications, the same operation is performed if the following data is set.
- (HOME) Home-seeking mode (4160h): 0 [2-sensor]
- (HOME) Starting direction (4161h): 1 [positive direction]
- (HOME) SLIT detection (4166h): 0 [disable]
- (HOME) TIM/ZSG signal detection (4167h): 0 [disable]

● **Homing method: 35, Homing method: 37 (home preset)**

The present position will be the home. The home preset can be executed except when the drive state machine is in a state of the "Operation enabled." It can also be executed even when the motor is in a non-excitation state.

■ Operation of the return-to-home mode of our specifications

● Return-to-home operation sequence of the 3-sensor mode

The motor operates at the "Speed during search for switch (6099h-01h)." When the limit sensor is detected during operation, the motor rotates in the reverse direction and pulls out of the limit sensor. When the ON edge of the HOME sensor is detected, operation is stopped. The position at which the motor stopped becomes the home.

Explanation of labels	• VR: Speed during search for switch (6099h-01h)
	• VS: (HOME) Starting speed (4163h)
	• VL: Speed during search for zero (6099h-02h)
	• - - -: Orbit when a home offset is set

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

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

Even after return-to-home operation is complete, operation is continued until an external signal is detected. The return-to-home operation will be completed when the external signal is detected while the HOME sensor is being ON.

Explanation of labels	• VR: Speed during search for switch (6099h-01h)
	• VS: (HOME) Starting speed (4163h)
	• VL: Speed during search for zero (6099h-02h)
	• - - -: Orbit when a home offset is set

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

● **Return-to-home operation sequence of the 2-sensor mode**

The motor is operated in the "(HOME) Starting speed (4163h)." When the limit sensor is detected, the motor rotates in the reverse direction and pulls out of the limit sensor. After pulling out, the motor is operated according to the value of the "(HOME) Backward steps in 2 sensor home-seeking (4169h)" and stops. The position at which the motor stopped becomes the home.

Explanation of labels	• VR: Speed during search for switch (6099h-01h)
	• VS: (HOME) Starting speed (4163h)
	• VL: Speed during search for zero (6099h-02h)
	• - - -: Orbit when a home offset is set

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

* After pulling out of the limit sensor, the motor rotates to stop according to the value set in the "(HOME) Backward steps in 2 sensor home-seeking (4169h)."

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

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

Explanation of labels	• VR: Speed during search for switch (6099h-01h)
	• VS: (HOME) Starting speed (4163h)
	• VL: Speed during search for zero (6099h-02h)
	• - - -: Orbit when a home offset is set

Home detection signal	Starting direction of return-to-home operation: Positive side	Starting direction of return-to-home operation: Negative side
SLIT input	RV-LS FW-LS +VR +VS +VL −VL −VS −VR * SLIT input ON OFF	RV-LS FW-LS +VR +VS +VL −VL −VS −VR * SLIT input ON OFF
TIM signal or ZSG signal	RV-LS FW-LS +VR +VS +VL −VL −VS −VR * TIM output (ZSG output) ON OFF	RV-LS FW-LS +VR +VS +VL −VL −VS −VR * TIM output (ZSG output) ON OFF
SLIT input and TIM signal or SLIT input and ZSG signal	RV-LS FW-LS +VR +VS +VL −VL −VS −VR * SLIT input ON OFF TIM output (ZSG output) ON OFF	RV-LS FW-LS +VR +VS +VL −VL −VS −VR * SLIT input ON OFF TIM output (ZSG output) ON OFF

* After pulling out of the limit sensor, the motor rotates to stop according to the value set in the "(HOME) Backward steps in 2 sensor home-seeking (4169h)."

● **One-way rotation mode**

The motor is operated in the "Speed during search for switch (6099h-01h)." When the HOME sensor is detected, the motor decelerates to a stop and pulls out of the range of the HOME sensor at the "Speed during search for zero (6099h-02h)."

After pulling out, motor operates according to the value of "(HOME) Operating amount in uni-directional home-seeking (416Ah)," and stops. The position at which the motor stopped becomes the home.

Explanation of labels	• VR: Speed during search for switch (6099h-01h) • VS: (HOME) Starting speed (4163h) • VL: Speed during search for zero (6099h-02h) • - - -: Orbit when a home offset is set

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

* After pulling out of the HOME sensor, the motor rotates to stop according to the value set in the "(HOME) Operating amount in uni-directional home-seeking (416Ah)."

(memo) When the motor pulls out of the HOME sensor during deceleration stop after detection of the HOME sensor, an alarm of return-to-home error (alarm code 62h) is generated. Set the "Homing acceleration (609Ah)" so that the motor can stop in the range of the HOME sensor.

2 Communication Specifications Edition

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

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

Explanation of labels	• VR: Speed during search for switch (6099h-01h)
	• VS: (HOME) Starting speed (4163h)
	• VL: Speed during search for zero (6099h-02h)
	• - - -: Orbit when a home offset is set

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

* After pulling out of the HOME sensor, the motor rotates to stop according to the value set in the "(HOME) Operating amount in uni-directional home-seeking (416Ah)."

● **Push-motion mode**

The motor is operated in the "Speed during search for switch (6099h-01h)." When the motor presses the stopper or others installed in the mechanical end, it rotates in the reverse direction and stops after moving the value set in the "(HOME) Backward steps after first entry in push-home-seeking (416Ch)." Once again, the motor starts the operation toward the stopper, and it rotates in the reverse direction when pressing the stopper, and stops after moving the value set in the "(HOME) Backward steps in push-home-seeking (416Eh)."

Note Do not perform push-motion operation with geared motor and the **DGII** Series. Doing so may cause damage to the motor or gear part.

Explanation of labels	• VR: Speed during search for switch (6099h-01h)
	• VS: (HOME) Starting speed (4163h)
	• VL: Speed during search for zero (6099h-02h)
	• - - -: Orbit when a home offset is set

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

*1 The motor moves from the mechanical end according to the value set in the "(HOME) Backward steps after first entry in push-home-seeking (416Ch)" and stop.

*2 The motor moves from the mechanical end according to the value set in the "(HOME) Backward steps in push-home-seeking (416Eh)" and stop.

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

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

Explanation of labels	• VR: Speed during search for switch (6099h-01h) • VS: (HOME) Starting speed (4163h) • VL: Speed during search for zero (6099h-02h) • - - -: Orbit when a home offset is set

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

* The motor moves from the mechanical end according to the value set in the "(HOME) Backward steps in push-home-seeking (416Eh)" and stop.

3 Function

3-1 Touch probe

The Touch probe is a function to set the external latch input signal (EXT1 input, EXT2input) or output signal (ZSG output, TIM output) as a trigger, and to latch the position when the trigger is input. For the position to latch, either of the internal command position or feedback position can be selected.
The Touch probe has the Touch probe 1 and Touch probe 2.

● **Related objects**

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
60B8h	00h	Touch probe function	U16	RW	RxPDO	–	0000h to FFFFh (Initial value: 0000h)	A
60B9h	00h	Touch probe status	U16	RO	TxPDO	–	–	–
60BAh	00h	Touch probe position 1 positive value [step]	INT32	RO	TxPDO	–	–	–
60BBh	00h	Touch probe position 1 negative value [step]	INT32	RO	TxPDO	–	–	–
60BCh	00h	Touch probe position 2 positive value [step]	INT32	RO	TxPDO	–	–	–
60BDh	00h	Touch probe position 2 negative value [step]	INT32	RO	TxPDO	–	–	–
44B0h	*	Touch probe 1 latch position	U8	RW	No	–	0: Latches the feedback position 1: Latches the command position (Initial value: 0)	A
44B1h	*	Touch probe 2 latch position	U8	RW	No	–	0: Latches the feedback position 1: Latches the command position (Initial value: 0)	A
44B2h	*	Touch probe 1 TIM/ZSG signal select	U8	RW	No	–	0: Latch on the ZSG output 1: Latch on the TIM output (Initial value: 0)	A
44B3h	*	Touch probe 2 TIM/ZSG signal select	U8	RW	No	–	0: Latch on the ZSG output 1: Latch on the TIM output (Initial value: 0)	A

* Set the axis number (1 to 4) in the sub-index because of the driver object in the manufacturer-specific area.

● **Related signals**

Name	Description
EXT1 input	This is an external latch input signal for the touch probe 1.
EXT2 input	This is an external latch input signal for the touch probe 2.
ZSG output	This signal can be used in the touch probe 1 and touch probe 2.
TIM output	This signal is output once per 7.2° rotation of the motor output shaft. It can be used in the touch probe 1 and touch probe 2.

2 Communication Specifations Edition

■ Details of touch probe function

The action of the touch probe is set in the "Touch probe function (60B8h)."
The action of the touch probe 1 is set in the lower 8 bits, and that of the touch probe 2 is set in the upper 8 bits.

Set the trigger condition using the Touch probe 1 trigger action/Touch probe 2 trigger action (Bit1/Bit9) and the Touch probe 1 trigger selection/Touch probe 2 trigger selection (Bit2/Bit10). After that, changing the Touch probe 1 permission/Touch probe 2 permission (Bit0/Bit8) from 0 to 1 latches according to the set trigger condition.
Be sure to change the Touch probe 1 permission/Touch probe 2 permission (Bit0/Bit8) back to 0 before changing the trigger condition. Changing the trigger condition while the Touch probe 1 permission/Touch probe 2 permission (Bit0/Bit8) remains 1 will not be enabled.

Bit	Name	Value	Definition
0	Touch probe 1 permission	0	Disables touch probe 1.
		1	Enables touch probe 1.
1	Touch probe 1 trigger action	0	First trigger action Latches only once on the first trigger.
		1	Continuous operation Latches every time a trigger is input.
2	Touch probe 1 trigger selection	0	Sets the external latch input EXT1 as a trigger.
		1	Sets the ZSG output or TIM output as a trigger.
3	Reserved	0	Reserved
4	Touch probe 1 up-edge action	0	Disables the latch function at the up-edge of a trigger.
		1	Enables the latch function at the up-edge of a trigger.
5	Touch probe 1 down-edge action	0	Disables the latch function at the down-edge of a trigger.
		1	Enables the latch function at the down-edge of a trigger.
6	Reserved	0	Reserved
7	Reserved	0	Reserved
8	Touch probe 2 permission	0	Disables touch probe 2.
		1	Enables touch probe 2.
9	Touch probe 2 trigger action	0	First trigger action Latches only once on the first trigger.
		1	Continuous operation Latches every time a trigger is input.
10	Touch probe 2 trigger selection	0	Sets the external latch input EXT2 as a trigger.
		1	Sets the ZSG output or TIM output as a trigger.
11	Reserved	0	Reserved
12	Touch probe 2 up-edge action	0	Disables the latch function at the up-edge of a trigger.
		1	Enables the latch function at the up-edge of a trigger.
13	Touch probe 2 down-edge action	0	Disables the latch function at the down-edge of a trigger.
		1	Enables the latch function at the down-edge of a trigger.
14	Reserved	0	Reserved
15	Reserved	0	Reserved

■ Details of touch probe status

The status of the touch probe is output by the "Touch probe status (60B9h)."
The status of the touch probe 1 is output by the lower 8 bits, and that of the touch probe 2 is output by the upper 8 bits.

Bit	Name	Value	Definition
0	Touch probe 1 permission status	0	Touch probe 1 is disabled.
		1	Touch probe 1 is enabled.
1	Touch probe 1 up-edge latch	0	Has not latch on the up-edge of the touch probe 1.
		1	Latched on the up-edge of the touch probe 1.
2	Touch probe 1 down-edge latch	0	Has not latch on the down-edge of the touch probe 1.
		1	Latched on the down-edge of the touch probe 1.
3 to 7	Reserved	0	Reserved
8	Touch probe 2 permission status	0	Touch probe 2 is disabled.
		1	Touch probe 2 is enabled.
9	Touch probe 2 up-edge latch	0	Has not latch on the up-edge of the touch probe 2.
		1	Latched on the up-edge of the touch probe 2.
10	Touch probe 2 down-edge latch	0	Has not latch on the down-edge of the touch probe 2.
		1	Latched on the down-edge of the touch probe 2.
11 to 15	Reserved	0	Reserved

■ Trigger and latch position

A signal that is set as a trigger is selected by the trigger selection (Bit2/Bit10) of the "Touch probe function (60B8h)."
The ZSG output and TIM output can be selected by the "Touch probe TIM/ZSG signal select (44B2h/44B3h)."
The latch position varies depending on the signal that was set as the trigger. When the external latch input (EXT1 input, EXT2 input) is set as the trigger, the latch position can be set to ether of the feedback position (actual position) or internal command position.

Name	Latch position
External latch input	Feedback position (actual position) or internal command position. Select by the "Touch probe latch position (44B0h/44B1h)"
ZSG output	Feedback position
TIM output	Internal command position

Related objects

Index	Sub	Object name	Initial value	Description
44B0h	*	Touch probe 1 latch position	0	0: Latches the feedback position (actual position)
44B1h	*	Touch probe 2 latch position	0	1: Latches the command position
44B2h	*	Touch probe 1 TIM/ZSG signal select	0	0: Latch on the ZSG output
44B3h	*	Touch probe 2 TIM/ZSG signal select	0	1: Latch on the TIM output.

* Set the axis number (1 to 4) in the sub-index because of the driver object in the manufacturer-specific area.

■ **Operation sequence of the touch probe**

The operation examples of touch probe 1 are shown below.

● **If the trigger action is "First trigger action (60B8h: Bit1 is 0)"**

Touch probe 1 permission (60B8h: Bit0)	
Touch probe 1 up-edge action (60B8h: Bit4)	
Touch probe 1 permission status (60B9h: Bit0)	
Touch probe 1 up-edge latch (60B9h: Bit1)	
Trigger input	
Touch probe position 1 positive value (60BAh)	P0 / P1 / P2

P0 to P2: Latch position
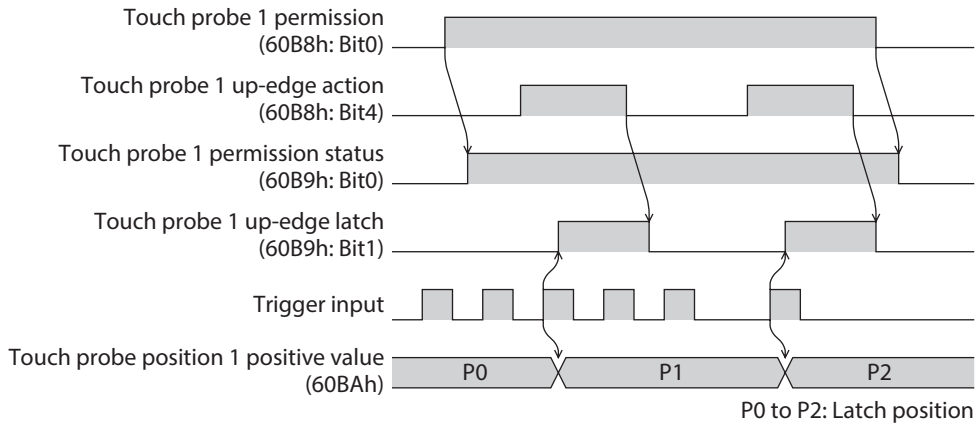
● **If the trigger action is "Continuous operation (60B8h: Bit1 is 1)"**

Touch probe 1 permission (60B8h: Bit0)	
Touch probe 1 up-edge action (60B8h: Bit4)	
Touch probe 1 permission status (60B9h: Bit0)	
Touch probe 1 up-edge latch (60B9h: Bit1)	
Trigger input	
Touch probe position 1 positive value (60BAh)	P0 / P1 / P2 / P3

P0 to P3: Latch position

3-2   Resolution

When the "Gear ratio (6091h)" is set, the resolution per one rotation of the motor output shaft can be set.
● Resolution of the motor output shaft = 10,000 × "Electronic gear B (6091h-02h)"/"Electronic gear A (6091h-01h)"
● Factory setting: 10,000 P/R
● Setting range: 100 to 10,000 P/R

Related object

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
6091h	00h	Number of entries	U8	RO	No	–	2	–
	01h	Electronic gear A	U32	RW	No	○	1 to 65,535 (Initial value: 1)	C
	02h	Electronic gear B	U32	RW	No	○	1 to 65,535 (Initial value: 1)	C

(memo)
● If the value out of the setting range is set, the information of electronic gear setting error is generated (information code 2000h). If the control power supply is turned on again or configuration is executed while the information of electronic gear setting error is present, an alarm of electronic gear setting error is generated (alarm code 71h).
● If the resolution was changed after executing position preset (P-PRESET) with the "Home offset (607Ch)" other than "0," execute position preset (P-PRESET) again. When the "Home offset (607Ch)" is "0," it is no need to execute position preset (P-PRESET) again even if the resolution is changed. (The present position is calculated automatically.)
● When the TIM output is used in return-to-home operation or others, set the resolution to be an integral multiple of 50.

3-3　Wrap function

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

Related objects

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
41C7h	*	Wrap setting	U8	RW	No	○	0: Disable 1: Enable (Initial value: 1)	C
41C9h	*	Initial coordinate generation & wrap setting range [1=0.1 rev]	INT32	RW	No	○	5 to 655,360 (Initial value: 10)	C
41CBh	*	Initial coordinate generation & wrap range offset ratio [1=0.01 %]	U16	RW	No	○	0 to 10,000 (Initial value: 5,000)	C
41CCh	*	Initial coordinate generation & wrap range offset value [step]	INT32	RW	No	○	−536,870,912 to 536,870,911 (Initial value: 0)	C

* Set the axis number (1 to 4) in the Sub-index because of the driver object in the manufacturer-specific area.

3-4　Operating current and standstill current

Set the base current rate (%) for the operating current and standstill current by the "Base current (4126h)."
- Operating current = Maximum output current × "Base current (4126h)" × "Operating current (4120h)"
- Standstill current = Maximum output current × "Base current (4126h)" × "Stop current (4128h)"
- Push current = Maximum output current × "Base current (4126h)" × "Push current (4121h)"

> memo　If the base current is set, the maximum output current of the driver can be changed. If the load is small and there is an ample allowance for torque, the motor temperature rise can be suppressed by setting a lower base current. However, excessively low base current may cause a problem in starting the motor or holding the load in position. Do not reduce the base current any more than is necessary.

Related objects

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
4120h	*1	Operating current [1=0.1 %]	INT16	RW	RxPDO	○	0 to 1,000 (Initial value: 1,000)	A *2
4121h	*1	Push current [1=0.1 %]	INT16	RW	RxPDO	○	0 to 1,000 (Initial value: 200)	A *2
4126h	*1	Base current [1=0.1 %]	INT16	RW	RxPDO	○	0 to 1,000 (Initial value: 1,000)	A
4128h	*1	Stop current [1=0.1 %]	INT16	RW	RxPDO	○	0 to 1,000 (Initial value: 500)	A
415Fh	*1	JOG/HOME/ZHOME operating current [1=0.1 %]	INT16	RW	No	○	0 to 1,000 (Initial value: 1,000)	B
416Bh	*1	(HOME) Operating current for push-home-seeking [1=0.1 %]	INT16	RW	No	○	0 to 1,000 (Initial value: 1,000)	B

*1 Set the axis number (1 to 4) in the sub-index because of the driver object in the manufacturer-specific area.
*2 With the profile position mode, it will be updated at start of operation.

3-5　　Maintenance commands

Resetting an alarm, executing the position preset (P-PRESET), batch processing for the non-volatile memory, and others are performed.

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

Related objects

Index	Sub	Name	Description
40C0h	*	Alarm reset	Resets the alarm that is present. Some alarms cannot be reset.
40C2h	*	Clear alarm history	Clears alarm history.
40C5h	*	P-PRESET execution	Presets the command position.
40C6h	*	Configuration	Executes the parameter recalculation and the setup.
40C8h	*	Read batch NV memory	Reads the parameters saved in the non-volatile memory to the RAM. All parameters saved in the RAM are overwritten.
40C9h	*	Write batch NV memory	Writes the parameters saved in the RAM to the non-volatile memory. The non-volatile memory can be rewritten approximately 100,000 times.
40CAh	*	All data initialization	Resets the parameters saved in the non-volatile memory to their initial values.
40CBh	*	Read from backup	Reads all the data from the backup area.
40CCh	*	Write to backup	Writes all the data to the backup area.
40CDh	*	Clear latch information	Clears the cumulative load. This can be used when the "Cumulative load value auto clear (41B3h)" is set to "0: Does not clear."
40CFh	*	Clear tripmeter	Clears the tripmeter.
40D1h	*	ZSG-PRESET	Resets the position of the Z-phase.
40D2h	*	Clear ZSG-PRESET	Clears the position data of the Z-phase reset by the "ZSG-PRESET (40D1h)" command.
40D3h	*	Clear information	Clears information.
40D4h	*	Clear information history	Clears information history.

* Set the axis number (1 to 4) in the Sub-index because of the driver object in the manufacturer-specific area.

■ How to execute maintenance commands

The following two methods are available to execute maintenance commands. Use them selectively in accordance with the intended use.

● Writing 1 to data (recommended)

When data is changed from 0 to 1 after 1 is written to it, the command is executed.
To execute the same command again, restore the data to 0 and then write 1. It is safe, because the command is not executed in succession even if 1 is written from the MainDevice continuously.

● Writing 2 to data

When 2 is written to data, the command is executed. After execution, the data is restored to 1 automatically.
Data does not need to restore to 1, and it can be written consecutively.
If commands which take time to write to the non-volatile memory such as "Write batch NV memory (40C9h)" are executed consecutively, increase the length of the intervals between commands.

■ Configuration

Configuration can be executed when all of the following conditions are satisfied:
- An alarm is not present.
- The motor is not operating.
- I/O test, remote operation and downloading are not executed with the **MEXE02**.

The table shows the driver status before and after executing the configuration.

Item	Configuration is ready to execute	Configuration is being executed	After execution of configuration
POWER LED/ALARM LED of the driver axis	POWER LED: Green light ALARM LED: No light	POWER LED: Green blinking ALARM LED: Red blinking	Depends on the driver condition.
Electromagnetic brake	Hold/release	Hold	
Motor excitation	Excitation/non-excitation	Non-excitation	
Output signal	Enable	Disable	Enable
Input signal	Enable	Disable	Enable

memo The correct monitor value may not be returned even if monitoring is executed during configuration.

3-6 Assignment of I/O function

This section explains the assignment of I/O functions and internal I/O status.

■ Assignment to input terminals

Input signals can be assigned to the input terminals IN0 to IN3 of the driver axis. For input signals that can be assigned, refer to p.100.

Related objects

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
4840h	*	DIN0 input function	U8	RW	No	○	0 to 127 (Initial value: 28 [FW-LS])	C
4841h	*	DIN1 input function	U8	RW	No	○	0 to 127 (Initial value: 29 [RV-LS])	C
4842h	*	DIN2 input function	U8	RW	No	○	0 to 127 (Initial value: 30 [HOMES])	C
4843h	*	DIN3 input function	U8	RW	No	○	0 to 127 (Initial value: 1 [FREE])	C

* Set the axis number (1 to 4) in the sub-index because of the driver object in the manufacturer-specific area.

■ Assignment to the output terminals

Output signals can be assigned to the output terminals OUT0 to OUT2 of the driver axis. For output signals that can be assigned, refer to p.101.

Related objects

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
4860h	*	DOUT0 (Normal) output function	U8	RW	No	○	0 to 255 (Initial value: 130 [ALM-B])	C
4861h	*	DOUT1 (Normal) output function	U8	RW	No	○	0 to 255 (Initial value: 142 [CRNT])	C
4862h	*	DOUT2 (Normal) output function	U8	RW	No	○	0 to 255 (Initial value: 134 [MOVE])	C

* Set the axis number (1 to 4) in the sub-index because of the driver object in the manufacturer-specific area.

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■ Direct I/O

The status of the direct I/O can be checked using the "Direct I/O (406Ah)." Bit arrangements are as follows.

Bit31	Bit30	Bit29	Bit28	Bit27	Bit26	Bit25	Bit24
–	–	–	–	–	–	–	–
Bit23	Bit22	Bit21	Bit20	Bit19	Bit18	Bit17	Bit16
–	–	–	–	–	OUT2	OUT1	OUT0
Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
VR-IN3	VR-IN2	VR-IN1	VR-IN0	–	EXT-IN	–	–
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
–	–	–	–	IN3	IN2	IN1	IN0

Related object

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
406Ah	*	Direct I/O	U32	RO	TxPDO	–	–	–

* Set the axis number (1 to 4) in the sub-index because of the driver object in the manufacturer-specific area.

■ I/O status

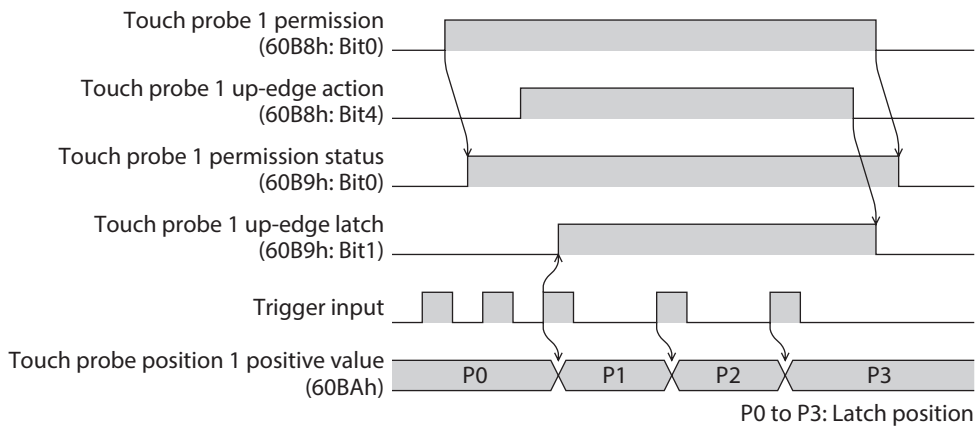The status of the I/O inside the driver can be monitored using the I/O status. Bit arrangements of the internal I/O are as follows.

Driver object	Description							
	Bit31	Bit30	Bit29	Bit28	Bit27	Bit26	Bit25	Bit24
I/O status 1 (40B8h)	SLIT	HOMES	RV-LS	FW-LS	RV-BLK	FW-BLK	–	–
	Bit23	Bit22	Bit21	Bit20	Bit19	Bit18	Bit17	Bit16
	SPD-LMT	CRNT-LMT	T-MODE	–	–	CCM	–	HMI
	Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
	–	INFO-CLR	LAT-CLR	–	–	–	P-PRESET	ALM-RST
	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
	–	–	STOP	–	CLR	–	FREE	Not used
I/O status 2 (40B9h)	Bit31	Bit30	Bit29	Bit28	Bit27	Bit26	Bit25	Bit24
	–	–	–	–	–	–	–	–
	Bit23	Bit22	Bit21	Bit20	Bit19	Bit18	Bit17	Bit16
	–	–	–	–	–	–	–	–
	Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
	–	–	–	–	–	–	–	–
	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
	–	–	–	–	–	–	–	–
I/O status 3 (40BAh)	Bit31	Bit30	Bit29	Bit28	Bit27	Bit26	Bit25	Bit24
	R15	R14	R13	R12	R11	R10	R9	R8
	Bit23	Bit22	Bit21	Bit20	Bit19	Bit18	Bit17	Bit16
	R7	R6	R5	R4	R3	R2	R1	R0
	Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
	–	–	–	–	–	–	–	–
	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
	–	–	–	–	–	–	–	–

Driver object	Description							
	Bit31	Bit30	Bit29	Bit28	Bit27	Bit26	Bit25	Bit24
	–	–	–	–	–	–	–	–
	Bit23	Bit22	Bit21	Bit20	Bit19	Bit18	Bit17	Bit16
I/O status 4	–	–	–	–	–	–	–	–
(40BBh)	Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
	–	–	–	–	–	–	EXT2	EXT1
	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
	–	–	–	–	–	–	–	–
	Bit31	Bit30	Bit29	Bit28	Bit27	Bit26	Bit25	Bit24
	–	–	TIM	RND-ZERO	ZSG	RV-SLS	FW-SLS	RND-OVF
	Bit23	Bit22	Bit21	Bit20	Bit19	Bit18	Bit17	Bit16
I/O status 5	ORGN-STLD	PRST-STLD	PRST-DIS	–	–	–	ABSPEN	HOME-END
(40BCh)	Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
	AUTO-CD	CRNT	VA	TLC	–	IN-POS	–	SYS-BSY
	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
	INFO	MOVE	–	READY	SYS-RDY	ALM-B	ALM-A	CONST-OFF
	Bit31	Bit30	Bit29	Bit28	Bit27	Bit26	Bit25	Bit24
	–	–	–	–	–	–	–	–
	Bit23	Bit22	Bit21	Bit20	Bit19	Bit18	Bit17	Bit16
I/O status 6	–	–	USR-OUT1	USR-OUT0	–	–	–	–
(40BDh)	Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
	–	–	–	–	–	–	MBC	MPS
	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
	AREA7	AREA6	AREA5	AREA4	AREA3	AREA2	AREA1	AREA0
	Bit31	Bit30	Bit29	Bit28	Bit27	Bit26	Bit25	Bit24
	–	–	–	–	–	–	–	–
	Bit23	Bit22	Bit21	Bit20	Bit19	Bit18	Bit17	Bit16
I/O status 7	–	–	–	–	–	–	–	–
(40BEh)	Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
	–	–	DCMD-FULL	DCMD-RDY	–	–	–	–
	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
	–	–	–	OPE-BSY	–	–	SPD-LMTD	CRNT-LMTD
	Bit31	Bit30	Bit29	Bit28	Bit27	Bit26	Bit25	Bit24
	INFO-RBT	INFO-CFG	INFO-IOTEST	INFO-DSLMTD	–	–	–	–
	Bit23	Bit22	Bit21	Bit20	Bit19	Bit18	Bit17	Bit16
	–	–	INFO-ODO	INFO-TRIP	INFO-CULD1	INFO-CULD0	INFO-RV-OT	INFO-FW-OT
I/O status 8	Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
(40BFh)	–	INFO-RND-E	INFO-EGR-E	–	INFO-PR-REQ	INFO-ZHOME	INFO-START	INFO-SPD
	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
	–	INFO-OLTIME	INFO-UVOLT	INFO-OVOLT	INFO-MTRTMP	INFO-DRVTMP	INFO-POSERR	INFO-USRIO

Related objects

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
40B8h	*	I/O status 1	U32	RO	TxPDO	–	–	–
40B9h	*	I/O status 2	U32	RO	TxPDO	–	–	–
40BAh	*	I/O status 3	U32	RO	TxPDO	–	–	–
40BBh	*	I/O status 4	U32	RO	TxPDO	–	–	–
40BCh	*	I/O status 5	U32	RO	TxPDO	–	–	–
40BDh	*	I/O status 6	U32	RO	TxPDO	–	–	–
40BEh	*	I/O status 7	U32	RO	TxPDO	–	–	–
40BFh	*	I/O status 8	U32	RO	TxPDO	–	–	–

* Set the axis number (1 to 4) in the sub-index because of the driver object in the manufacturer-specific area.

■ Driver input command

The "Driver input command (403Eh)" is an input command from the MainDevice to the driver. Bit arrangements are as follows. Bit0 to Bit7 are assigned to the R-IN0 to R-IN7. Bit8 to Bit16 are not used.
( ): Initial value

Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
–	–	–	–	–	–	–	–
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
R-IN7 (not used)	R-IN6 (not used)	R-IN5 (not used)	R-IN4 (not used)	R-IN3 (not used)	R-IN2 (not used)	R-IN1 (not used)	R-IN0 (not used)

Related objects

For input signals that can be assigned, refer to p.100.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
4900h	*	R-IN0 input function	U8	RW	No	○	0 to 127 (Initial value: 0 [not used])	C
4901h	*	R-IN1 input function	U8	RW	No	○	0 to 127 (Initial value: 0 [not used])	C
4902h	*	R-IN2 input function	U8	RW	No	○	0 to 127 (Initial value: 0 [not used])	C
4903h	*	R-IN3 input function	U8	RW	No	○	0 to 127 (Initial value: 0 [not used])	C
4904h	*	R-IN4 input function	U8	RW	No	○	0 to 127 (Initial value: 0 [not used])	C
4905h	*	R-IN5 input function	U8	RW	No	○	0 to 127 (Initial value: 0 [not used])	C
4906h	*	R-IN6 input function	U8	RW	No	○	0 to 127 (Initial value: 0 [not used])	C
4907h	*	R-IN7 input function	U8	RW	No	○	0 to 127 (Initial value: 0 [not used])	C

* Set the axis number (1 to 4) in the sub-index because of the driver object in the manufacturer-specific area.

■ Driver status

The status of the R-OUT0 to R-OUT15 can be checked using the "Driver output status (403Fh)." Bit arrangements are as follows.
( ): Initial value

Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
R-OUT15 (TLC)	R-OUT14 (IN-POS)	R-OUT13 (MOVE)	R-OUT12 (TIM)	R-OUT11 (AREA2)	R-OUT10 (AREA1)	R-OUT9 (AREA0)	R-OUT8 (SYS-BSY)
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
R-OUT7 (ALM-A)	R-OUT6 (INFO)	R-OUT5 (DCMD-RDY)	R-OUT4 (HOME-END)	R-OUT3 (not used)	R-OUT2 (ZSG)	R-OUT1 (RV-LS_R)	R-OUT0 (FW-LS_R)

Related objects

For output signals that can be assigned, refer to p.101.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
4910h	*	R-OUT0 output function	U8	RW	No	○	0 to 255 (Initial value: 28 [FW-LS_R])	C
4911h	*	R-OUT1 output function	U8	RW	No	○	0 to 255 (Initial value: 29 [RV-LS_R])	C
4912h	*	R-OUT2 output function	U8	RW	No	○	0 to 255 (Initial value: 155 [ZSG])	C
4913h	*	R-OUT3 output function	U8	RW	No	○	0 to 255 (Initial value: 0 [not used])	C
4914h	*	R-OUT4 output function	U8	RW	No	○	0 to 255 (Initial value: 144 [HOME-END])	C
4915h	*	R-OUT5 output function	U8	RW	No	○	0 to 255 (Initial value: 204 [DCMD-RDY]	C
4916h	*	R-OUT6 output function	U8	RW	No	○	0 to 255 (Initial value: 135 [INFO])	C
4917h	*	R-OUT7 output function	U8	RW	No	○	0 to 255 (Initial value: 129 [ALM-A])	C
4918h	*	R-OUT8 output function	U8	RW	No	○	0 to 255 (Initial value: 136 [SYS-BSY])	C
4919h	*	R-OUT9 output function	U8	RW	No	○	0 to 255 (Initial value: 160 [AREA0])	C
491Ah	*	R-OUT10 output function	U8	RW	No	○	0 to 255 (Initial value: 161 [AREA1])	C
491Bh	*	R-OUT11 output function	U8	RW	No	○	0 to 255 (Initial value: 162 [AREA2])	C
491Ch	*	R-OUT12 output function	U8	RW	No	○	0 to 255 (Initial value: 157 [TIM])	C
491Dh	*	R-OUT13 output function	U8	RW	No	○	0 to 255 (Initial value: 134 [MOVE])	C
491Eh	*	R-OUT14 output function	U8	RW	No	○	0 to 255 (Initial value: 138 [IN-POS])	C
491Fh	*	R-OUT15 output function	U8	RW	No	○	0 to 255 (Initial value: 140 [TLC])	C

* Set the axis number (1 to 4) in the sub-index because of the driver object in the manufacturer-specific area.

■ **Input signals list**

To assign signals via EtherCAT communication, use the "Assignment No." in the table instead of the signal names.

Assignment No.	Name	Function	Status
0	Not used	Set when the input terminal is not used.	–
1	FREE	Shut off the motor current to put the motor into a non-excitation state. When an electromagnetic brake motor is used, the electromagnetic brake is in a state of releasing the motor output shaft.	0: No motion 1: Electromagnetic brake is in a state of releasing + motor non-excitation
3	CLR	Clear the deviation (position deviation) between the command position and actual position to zero.	0: No motion 1: Clear deviation
5	STOP	Stop the motor.	0: No motion 1: Stop operation
8	ALM-RST	Release the alarm that is present.	0: No motion 1: Reset alarm
9	P-PRESET	Rewrite the mechanical home to the current position.	0: No motion 1: Execute preset
13	LAT-CLR	Clear the cumulative load. This can be used when the "Cumulative load value auto clear (41B3h)" is set to "0: Does not clear."	0: No motion 1: Cumulative load clear
14	INFO-CLR	Release the information status.	0: No motion 1: Release information status
16	HMI	Release the function limitation of the **MEXE02**.	0: Function limitation 1: Release the function limitation
18	CCM	Change the control mode from the normal mode to the current control mode.	0: Normal mode 1: Current control mode
21	T-MODE	Disable the overload alarm.	0: No motion 1: Disable the overload alarm
22	CRNT-LMT	Execute current limiting.	0: Release the current limitation 1: Current limitation
23	SPD-LMT	Execute speed limiting. This signal cannot be used in the cyclic synchronous position mode (CSP).	0: Release the speed limiting. 1: Speed limiting
26	FW-BLK	Stop operation in the forward direction.	0: No motion 1: Stop the forward direction operation
27	RV-BLK	Stop operation in the reverse direction.	0: No motion 1: Stop the reverse direction operation
28	FW-LS	A signal input from the limit sensor in the forward direction.	0: OFF 1: ON
29	RV-LS	A signal input from the limit sensor in the reverse direction.	0: OFF 1: ON
30	HOMES	A signal input from the HOME sensor.	0: OFF 1: ON
31	SLIT	A signal input from the SLIT sensor.	0: OFF 1: ON
80	R0	General signals.	0: OFF 1: ON
81	R1		
82	R2		
83	R3		
84	R4		
85	R5		
86	R6		
87	R7		
88	R8		

Assignment No.	Name	Function	Status
89	R9	General signals.	0: OFF 1: ON
90	R10		
91	R11		
92	R12		
93	R13		
94	R14		
95	R15		
104	EXT1	This is an external latch signal of the touch probe 1.	0: OFF 1: ON
105	EXT2	This is an external latch signal of the touch probe 2.	

Note
- When the same input signal is assigned to multiple input terminals, the function is executed if any of the terminals has input.
- When the HMI input is not assigned to the input terminals, these inputs are always turned 1. Also, when these inputs are assigned to both direct I/O (DIN0 to DIN3) and remote I/O (R-IN0 to R-IN7), the function is executed only when both of them are turned 1.

■ **Output signals list**

To assign signals via EtherCAT communication, use the "Assignment No." in the table instead of the signal names.

Assignment No.	Name	Function	Status
0	Not used	Set when the output terminal is not used.	–
1 to 127	Response signals (input signal_R)	Output in response to the corresponding input signal.	0: Input signal is OFF 1: Input signal is ON
128	CONST-OFF	Output an OFF state all the time.	0: OFF
129	ALM-A	Output the alarm status of the driver (normally open).	0: Alarm not present 1: Alarm present
130	ALM-B	Output the alarm status of the driver (normally closed).	0: Alarm present 1: Alarm not present
131	SYS-RDY	Output when the control power supply of the driver is turned on.	0: Normal 1: System preparation is complete
132	READY	Output when the driver is ready to operate.	0: Not ready 1: Ready for operation
134	MOVE	Output when the motor operates.	0: Motor stopped 1: Motor operating
135	INFO	Output the information status of the driver.	0: Information not present 1: Information present
136	SYS-BSY	Output when the driver is in internal processing status.	0: No internal processed 1: During internal processing
138	IN-POS	Output when positioning operation is completed. This signal is not output in the cyclic synchronous position mode (CSP).	0: During positioning operation 1: Positioning operation is complete
140	TLC	Output when the output torque reaches the upper limit value.	0: Inside torque range 1: Outside torque range
141	VA	Output when the operating speed reaches the target speed. This signal is not output in the cyclic synchronous position mode (CSP).	0: Not reach the target speed 1: Reach the target speed
142	CRNT	Output while the motor is excited.	0: Motor non-excitation 1: Motor excitation
143	AUTO-CD	Output when the motor is in automatic current cutback status.	0: Normal 1: Automatic current cutback status
144	HOME-END	Output upon completion of return-to-home operation and when position preset (P-PRESET) is executed.	0: Not home 1: Home

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Assignment No.	Name	Function	Status
145	ABSPEN	Output when the position coordinate is set.	0: Position coordinate is not set 1: Position coordinate is set
149	PRST-DIS	Output when position preset (P-PRESET) is required again to operate the motor after position preset (P-PRESET).	0: Normal 1: Preset is not set
150	PRST-STLD	Output when the mechanical home is set.	0: Mechanical home is not set 1: Mechanical home has set
151	ORGN-STLD	Output when a mechanical home suitable to the product is set at the time of factory shipment.	0: Mechanical home is not set 1: Mechanical home has set
152	RND-OVF	Output is inverted when the wrap range is exceeded. (Toggle action)	0 and 1 are switched every time the wrap range is exceeded.
153	FW-SLS	Output when the software limit in the forward direction is reached.	0: Not reached the software limit in the forward direction 1: Reached the software limit in the forward direction
154	RV-SLS	Output when the software limit in the reverse direction is reached.	0: Not reached the software limit in the reverse direction 1: Reached the software limit in the reverse direction
155	ZSG	Output every time the actual position of the motor rotates one revolution from the preset position.	0: Normal 1: Motor one revolution
156	RND-ZERO	Output if the motor is at the home of wrap range when the "Wrap setting (41C7h)" is set to "Enable."	0: Not wrap home 1: Wrap home
157	TIM	Output every time the motor output shaft rotates by 7.2° with reference to the command position.	0: OFF 1: ON
160	AREA0	Output when the motor is within the AREA0.	0: Outside AREA 1: Inside AREA
161	AREA1	Output when the motor is within the AREA1.	
162	AREA2	Output when the motor is within the AREA2.	
163	AREA3	Output when the motor is within the AREA3.	
164	AREA4	Output when the motor is within the AREA4.	
165	AREA5	Output when the motor is within the AREA5.	
166	AREA6	Output when the motor is within the AREA6.	
167	AREA7	Output when the motor is within the AREA7.	
168	MPS	Output when the main power supply is turned on.	0: Main power supply off 1: Main power supply on
169	MBC	Output when the electromagnetic brake is in a state of releasing the motor output shaft.	0: Electromagnetic brake is in a state of holding 1: Electromagnetic brake is in a state of releasing
180	USR-OUT0	Output AND or OR of two types of output signals.	0: OFF 1: ON
181	USR-OUT1		
192	CRNT-LMTD	Output when current limiting is executed.	0: Without current limitation 1: With current limitation
193	SPD-LMTD	Output when speed limiting is executed.	0: Without speed limiting 1: With speed limiting
196	OPE-BSY	Output when internal oscillation is executed. This signal is not output in the cyclic synchronous position mode (CSP).	0: No internal oscillation 1: During internal oscillation
204	DCMD-RDY	Output when the driver is ready to operate.	0: Not ready 1: Ready for operation

Assignment No.	Name	Function	Status
205	DCMD-FULL	Output when data is written in the buffer area. If an operation of Set of Set-points is performed in the Profile position mode, the operation command is written in the buffer area.	0: No data in buffer 1: Data in buffer
224	INFO-USRIO	Output when corresponding information is generated.	0: Information not present 1: Information present
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	Output when corresponding information is generated.	0: Information not present 1: Information present
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		

4 Position coordinate management

> **This chapter explains setting methods using the MEXE02.**

4-1 Overview of position coordinate management

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

```
┌──────────────────────────────────────────────────────────────┐
│ Connect the motor and the driver and turn the control power   │
│                       supply on                                │
│        The initial coordinate is generated automatically.      │
└──────────────────────────────────────────────────────────────┘
                              ↓
┌──────────────────────────────────────────────────────────────┐
│                   Set the mechanical home                      │
│                  Factory home or user home                     │
└──────────────────────────────────────────────────────────────┘
                              ↓
┌──────────────────────────────────────────────────────────────┐
│   Set the generation range of the initial coordinate and      │
│                      the wrap range                            │
└──────────────────────────────────────────────────────────────┘
                              ↓
┌──────────────────────────────────────────────────────────────┐
│             Turn on the control power supply again             │
│               The changed parameter is enabled.                │
└──────────────────────────────────────────────────────────────┘
```
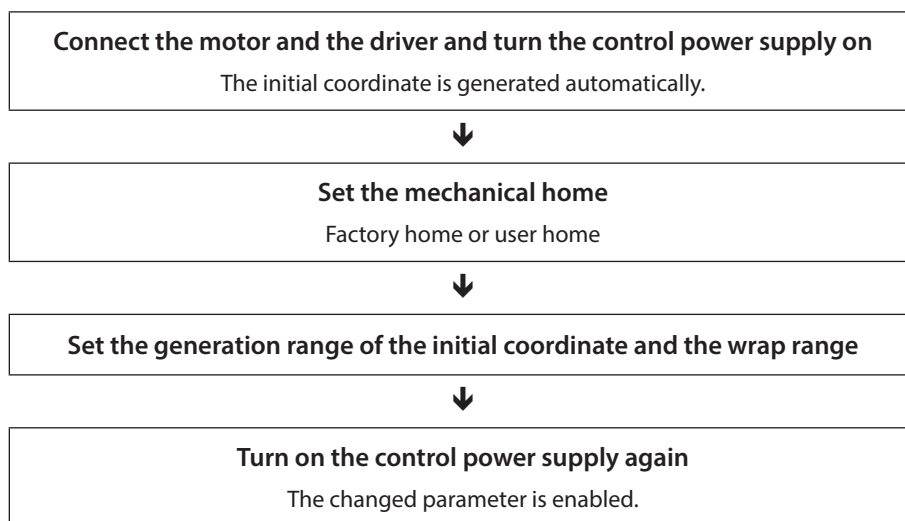
■ About ABZO sensor

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

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

Multi-rotation amount of ABZO sensor

Motor frame size [mm(in.)]	Specifications of ABZO sensor
20(0.79), 28(1.10)	900 revolutions
40(1.57), 42 (1.65), 60 (2.36), 85 (3.35), 90 (3.54)	1,800 revolutions

■ About initial coordinate generation

Initial coordinate generation indicates to decide how to use the rotation range of up to 1,800 revolutions (or 900 revolutions) that the ABZO sensor can manage. There are four parameters required for initial coordinate generation as shown below. These parameters are read when the control power supply is turned on.
- Initial coordinate generation & wrap coordinate setting
- Initial coordinate generation & wrap setting range
- Initial coordinate generation & wrap range offset ratio
- Initial coordinate generation & wrap range offset value

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

● **Factory setting example of the motor**

An example of the motor of the frame size 60 mm (2.36 in.) is shown below.
To use coordinates both in forward and reverse directions, 1,800 revolutions are divided into positive and negative revolutions, 50 % for each direction.

Motor output shaft
−900 to 900 revolutions

−900 rev   0   900 rev
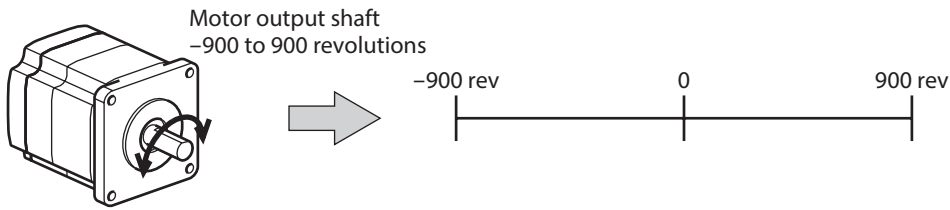
● **Setting example of motorized actuator**

The following is an example to set the home of a motorized actuator to 30 mm from the motor side.
- Model of motorized actuator: 4
- Stroke of motorized actuator: 600 mm
- Pitch of motorized actuator: 6 mm/rev

Concept of initial coordinate

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

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

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

−5 rev   0   95 rev

Setting examples of parameters

MEXE02 tree view	Name	Setting value
Motor and mechanism	Initial coordinate generation & wrap coordinate setting	Manual setting
	Initial coordinate generation & wrap setting range	100.0 rev
	Initial coordinate generation & wrap range offset ratio	5.00 %
	Initial coordinate generation & wrap range offset value	0 step

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■ Wrap function

The wrap function is a function to automatically preset the position information of the current position when the number of revolutions of the motor output shaft exceeds the set range. Setting of wrap offset allows you to limit the operation area of the equipment and control the index table with coordinates on the positive and negative sides.
For the specific setting methods, refer to p.111. (⇨ p.111)

> **Note** To set the wrap function using **MEXE02**, change the "Initial coordinate generation & wrap coordinate setting" parameter to "Manual setting." (Initial value: Prioritize ABZO setting)
> When this parameter is changed, turn on the control power supply of the driver again.

● Concept of wrap setting

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

Example: When the wrap function executes if the motor rotates 180 times in the same direction
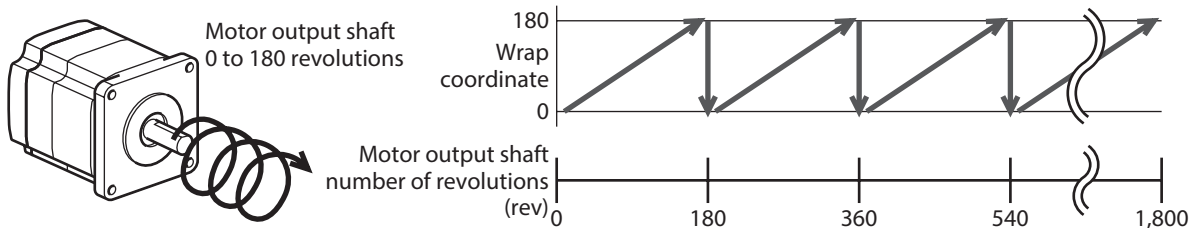
The present position of the motor is preset every 180 revolutions, however, the 32-bit counter in the driver is not preset.

Example: When the range of use of the motor is offset to −90 to 90 revolutions
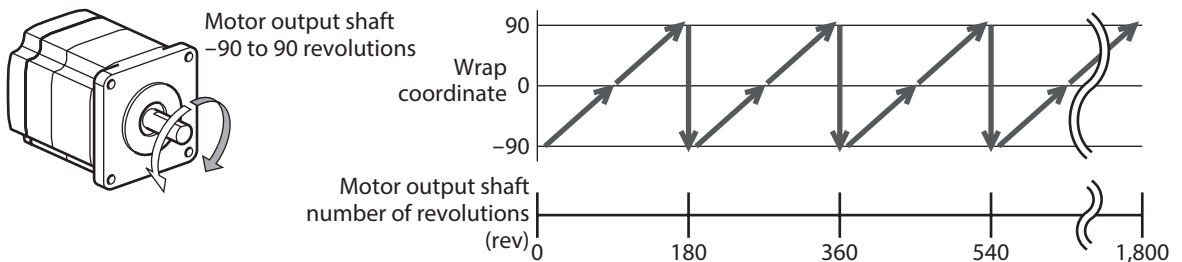
When the wrap setting range is exceeded, the symbol is reversed.

● **Setting example of index table**

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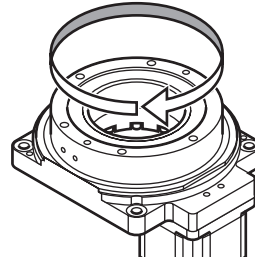
Concept of initial coordinate

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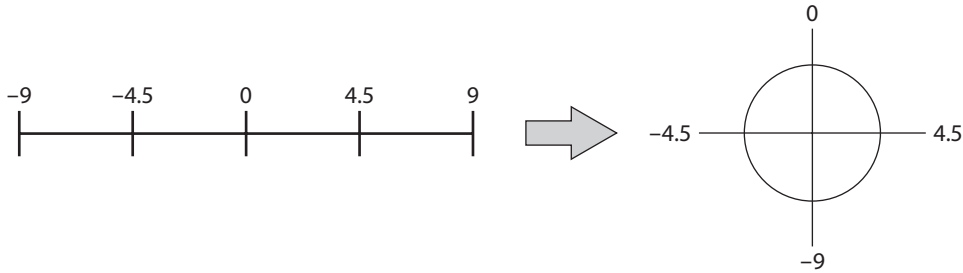
Setting examples of parameters

MEXE02 tree view	Name	Setting value
Motor and mechanism	Initial coordinate generation & wrap coordinate setting	Manual setting
	Wrap setting	Enable
	Initial coordinate generation & wrap setting range	18.0 rev
	Initial coordinate generation & wrap range offset ratio	50.0 %
	Initial coordinate generation & wrap range offset value	0 step

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

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

Example:
If the wrap function is performed when the motor rotates 180 revolutions in the same direction
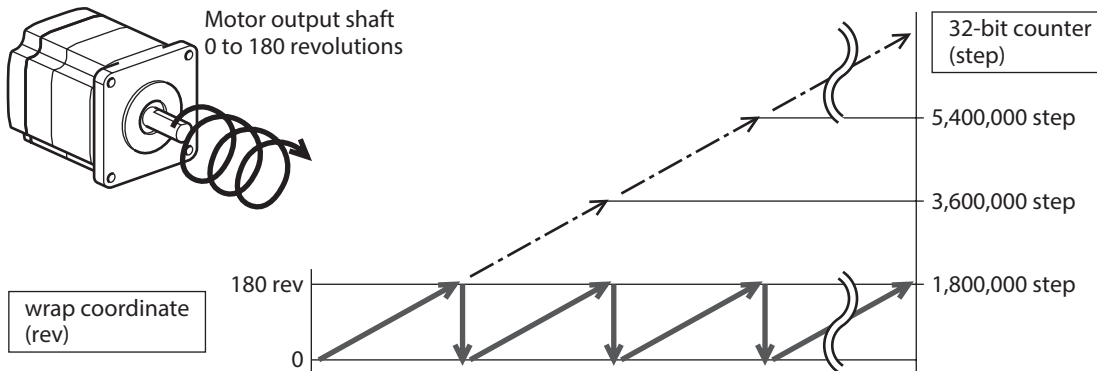
The present position of the motor is preset by 180 revolutions, but the 32-bit counter is not preset.

The value of the 32-bit counter can be checked on the status monitor (axis 1 to axis 4) screen of the **MEXE02**.
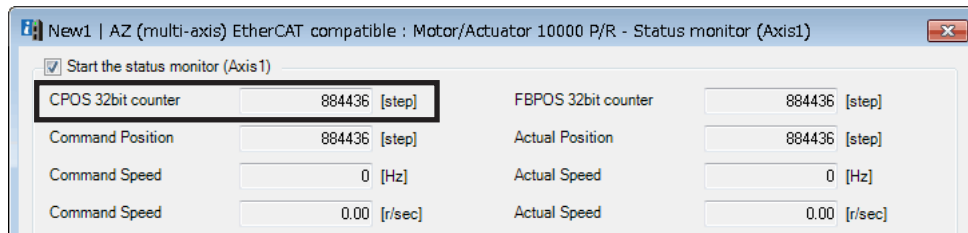
The 32-bit counter goes around between −2,147,483,648 to 2,147,483,647.

It shows 2,147,483,647 after −2,147,483,648,
and after that it shows in <u>descending order</u>.

−2,147,483,648   0   2,147,483,647

It shows −2,147,483,648 after 2,147,483,647,
and after that it shows in <u>ascending order</u>.
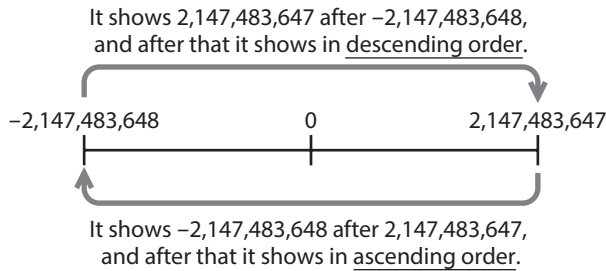
4-2   Position coordinate origin

When the position coordinate has been set, the ABSPEN output is turned ON.

Note If the position coordinate has not been set, the next operation cannot be performed.
- High-speed return-to-home operation
- Absolute positioning operation (when the "Permission of absolute positioning without setting absolute coordinates" parameter is "Disable")

Related parameter

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

■ Mechanical home

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

● Factory home

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

● User home

When the user home is set by performing return-to-home operation or position preset (P-PRESET), the PRST-STLD output is turned ON. The user home can be released by "Position preset clear" of the **MEXE02**.
If the user home is set, the home information is written to the non-volatile memory. The non-volatile memory can be rewritten approximately 100,000 times.

■ Setting of mechanical home

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

● Position preset (P-PRESET)

When position preset (P-PRESET) is executed, the command position and the actual position have the values set in the "Home offset" parameter and the home is set.

Related parameters

MEXE02 tree view	Name	Description	Initial value
Objects of profile area	Home offset	Sets the preset position. **Setting range** −2,147,483,648 to 2,147,483,647 steps	0
Base settings	Permission of absolute positioning without setting absolute coordinates	Permits absolute positioning operation when the position coordinate is not set. **Setting range** 0: Disable 1: Enable	0

● Return-to-home operation

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

■ Cases in which the position coordinate is not set

In the following cases, the position coordinate is not set. The ABSPEN output is turned OFF.
- Factory setting
- When position preset (P-PRESET) is performed with the "Home offset" parameter set to a value other than "0" and then resolution is changed
- When "Position preset clear" under the "Communication" menu of the **MEXE02** is executed
- During return-to-home operation

4-3   Parameters related to ABZO sensor

With the **AZ** Series, the specification of the ABZO sensor and parameters based on the pre-assembled mechanism to the motor are written in the ABZO sensor in advance. Normally, the setting of the ABZO sensor has priority over manual setting.

Related parameters

MEXE02 tree view	Name	Description	Initial value
Motor and mechanism	Mechanism settings	To change the mechanism settings parameter, select manual setting. **Setting range** 0: Prioritize ABZO setting 1: Manual setting	1
	Gear ratio setting	Sets the gear ratio for geared motor. Setting to "0: Prioritize ABZO setting" will cause the product-specific gear ratio to set automatically. **Setting range** 0: Prioritize ABZO setting 1 to 32,767: Gear ratio (1=0.01)	0
	Initial coordinate generation & wrap coordinate setting	To change the initial coordinate generation & wrap coordinate parameter, select manual setting. **Setting range** 0: Prioritize ABZO setting 1: Manual setting	0

MEXE02 tree view	Name	Description	Initial value
Motor and mechanism	Mechanism limit parameter setting	Disables the ABZO setting of the mechanism limit parameter. **Setting range** 0: Follow ABZO setting 1: Disable	0
	Mechanism protection parameter setting	Disables the ABZO setting of the mechanism protection parameter. **Setting range** 0: Follow ABZO setting 1: Disable	0
	JOG/HOME/ZHOME operation setting	To change the parameter for JOG operation and return-to-home operation, select manual setting. **Setting range** 0: Prioritize ABZO setting 1: Manual setting	0

■ When the parameter of the wrap function is set

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

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

2. Set each parameters as follows.

| MEXE02 tree view	Name	Setting value
Motor and mechanism	Wrap setting	Enable
	The number of the RND-ZERO output in wrap range	1
	Initial coordinate generation & wrap setting range	100.0 rev
	Initial coordinate generation & wrap range offset ratio	50.00 %
	Initial coordinate generation & wrap range offset value	0 step

4-4 Mechanism settings parameter

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

Note To change the mechanism settings parameter, change the "Mechanism settings" parameter to "Manual setting." (Initial value: Manual setting)
When this parameter is changed, turn on the control power supply of the driver again.

■ Motor rotation direction

Set the relationship between the coordinate system of the motor and the actual rotation direction.

Related parameter

MEXE02 tree view	Name	Description	Initial value
Motor and mechanism	Motor rotation direction	Sets the rotation direction of the motor output shaft. **Setting range** 0: Positive side=Counterclockwise direction 1: Positive side=Clockwise direction	1

4-5 Parameters related to initial coordinate generation & wrap coordinate

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

■ Wrap function

For the wrap function, refer to p.106. ()

● Related operation mode

When the following operations are performed with the profile position mode (PP), set the wrap function.
- Wrap absolute positioning operation
- Wrap proximity positioning operation
- Wrap forward direction absolute positioning operation
- Wrap reverse direction absolute positioning operation
- Wrap absolute push-motion operation
- Wrap proximity push-motion operation
- Wrap forward direction push-motion operation
- Wrap reverse direction push-motion operation

Related parameters

MEXE02 tree view	Name	Description	Initial value
Base settings	Wrap positioning mode	Sets the operation mode for wrap positioning operation. **Setting range** 0: Wrap absolute positioning 1: Wrap proximity 2: Wrap forward direction 3: Wrap reverse direction	0
Motor and mechanism	Initial coordinate generation & wrap coordinate setting	To use the wrap function, select manual setting. **Setting range** 0: Prioritize ABZO setting 1: Manual setting	0
	Wrap setting	Sets the wrap function. **Setting range** 0: Disable 1: Enable	1

MEXE02 tree view	Name	Description	Initial value
Motor and mechanism	Initial coordinate generation & wrap setting range	Sets the wrap range. The command position returns to 0 when the motor has rotated for the number of times set here. **Setting range** Refer to the next table. (1=0.1 rev)	10
	Initial coordinate generation & wrap range offset ratio	Sets the offset ratio of the wrap range. **Setting range** 0 to 10,000 (1=0.01 %)	5,000
	Initial coordinate generation & wrap range offset value	Sets the amount of offset of the wrap range. **Setting range** −536,870,912 to 536,870,911 steps	0

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

Since the internal coordinate of the ABZO sensor is 1,800 rev (or 900 rev), select a value from the table, and 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 in 900 rev.

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

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

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

Example 1: Coordinate when the wrap setting range is 1 rev and the resolution is 10,000 P/R

MEXE02 tree view	Name	Setting value
Objects of profile area	Electronic gear A	1
	Electronic gear B	1
Motor and mechanism	Initial coordinate generation & wrap coordinate setting	Manual setting
	Wrap setting	Enable
	Initial coordinate generation & wrap setting range	1 rev
	Initial coordinate generation & wrap range offset ratio	50.00 %
	Initial coordinate generation & wrap range offset value	0 step

Position coordinate image
When the parameters are set as in the table above, the motor can be operated on coordinates in the figure.
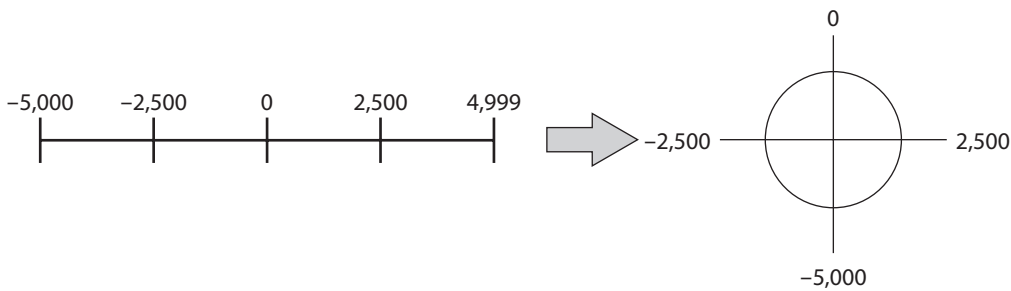
Example 2: Coordinate when the wrap setting range is 1,800 rev and the resolution is 10,000 P/R

MEXE02 tree view	Name	Setting value
Objects of profile area	Electronic gear A	1
	Electronic gear B	1
Motor and mechanism	Initial coordinate generation & wrap coordinate setting	Manual setting
	Wrap setting	Enable
	Initial coordinate generation & wrap setting range	1,800 rev
	Initial coordinate generation & wrap range offset ratio	50.00
	Initial coordinate generation & wrap range offset value	0

Position coordinate image
When the parameters are set as in the table above, the motor can be operated on coordinates in the figure.
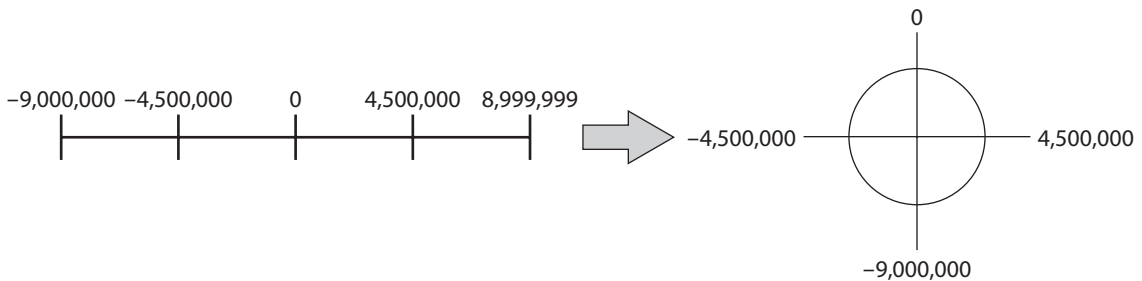
Note If the "Wrap setting" parameter or the "Initial coordinate generation & wrap setting range" parameter is changed, the absolute position may be shifted. When the parameter is changed, perform position preset (P-PRESET) or return-to-home operation.

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

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

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

$*$ The motors of frame size 20 mm (0.79 in.) and 28 mm (1.10 in.) are 900.

Condition (2) $\text{Wrap setting range} \times \text{Resolution} = \text{Wrap setting range} \times \dfrac{\text{Electronic gear B}}{\text{Electronic gear A}} \times 10{,}000 = \text{Integer}$

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

Setting example 1

- Wrap setting range: 100 rev
- Resolution: 10,000 P/R (electronic gear A=1, electronic gear B=1)
- Motor: Standard motor (gear ratio 1)

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

Condition (2) $\text{Wrap setting range} \times \dfrac{\text{Electronic gear B}}{\text{Electronic gear A}} \times 10{,}000 = 100 \times \dfrac{1}{1} \times 10{,}000 = 1{,}000{,}000$

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

Setting example 2

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

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

Condition (2) $\text{Wrap setting range} \times \dfrac{\text{Electronic gear B}}{\text{Electronic gear A}} \times 10{,}000 = 14.4 \times \dfrac{1}{3} \times 10{,}000 = 48{,}000$

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

Setting example 3

- Wrap setting range: 4.5 rev
- Resolution: 10,000 P/R (electronic gear A=1, electronic gear B=1)
- Motorized actuator: **DGII** Series (gear ratio 18)

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

Condition (2) $\text{Wrap setting range} \times \dfrac{\text{Electronic gear B}}{\text{Electronic gear A}} \times 10{,}000 = 4.5 \times \dfrac{1}{1} \times 10{,}000 = 45{,}000$

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

Setting example 4

- Wrap setting range: 1,000 rev
- Resolution: 10,000 P/R (electronic gear A=1, electronic gear B=1)
- Motor: **PS** geared motor (gear ratio 20)

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

Condition (2) $\text{Wrap setting range} \times \text{Resolution} = 1{,}000 \times 10{,}000 = 10{,}000{,}000$

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

■ Wrap offset function

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

● Wrap offset ratio setting

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

Setting example: When the wrap range is 1,800 rev and the resolution is 10,000 P/R

		0 (home)	
			17,999,999
Wrap offset ratio=0.00 %	−4,500,000		13,499,999
Wrap offset ratio=25.00 %	−9,000,000		8,999,999
Wrap offset ratio=50.00 %	−13,500,000		4,499,999
Wrap offset ratio=75.00 %	−17,999,999		
Wrap offset ratio=100.00 %			
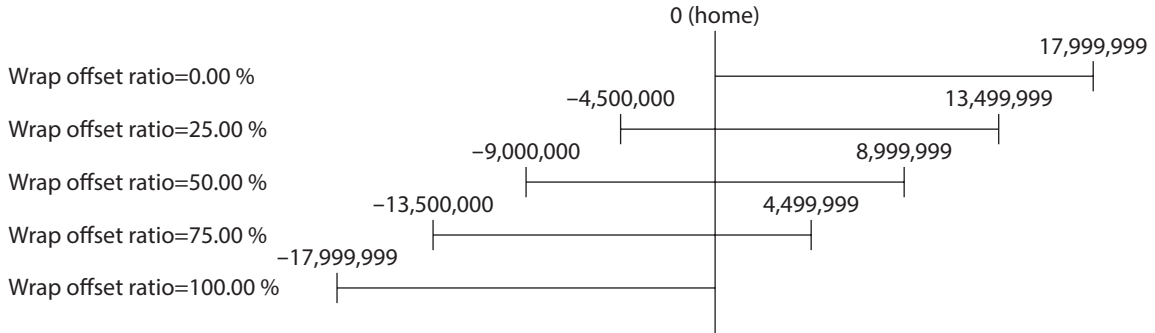
● Wrap range offset value setting

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

> **Note** When the coordinate is set in the "Initial coordinate generation & wrap range offset value" parameter, information of wrap setting error is generated if the home is not included in the coordinate. If the control power supply is turned on again or configuration is executed while the information of wrap setting error is present, an alarm of wrap setting error is generated.

Setting example 1:
When the wrap range is 1,800 rev, the resolution 10,000 P/R, and the wrap offset ratio setting 50 %.

	−9,000,000	0	8,999,999
Wrap offset value=0 step	−8,999,900		9,000,999
Wrap offset value=1,000 steps	−9,001,000		8,998,999
Wrap offset value=−1,000 steps			
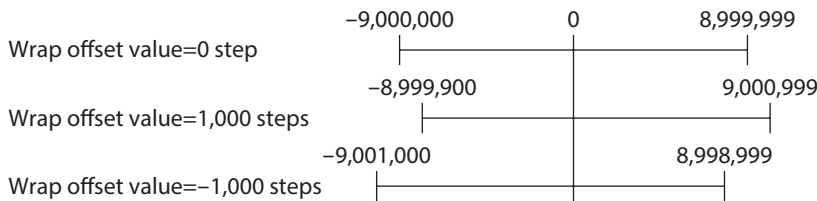
Setting example 2:
When the wrap range is 1,800 rev, the resolution 10,000 P/R, and the wrap offset ratio setting 0 %.

	0	17,999,999
Wrap offset value=0 step	1,000	18,000,999
Wrap offset value=1,000 steps *	−1,000	17,998,999
Wrap offset value=−1,000 steps		
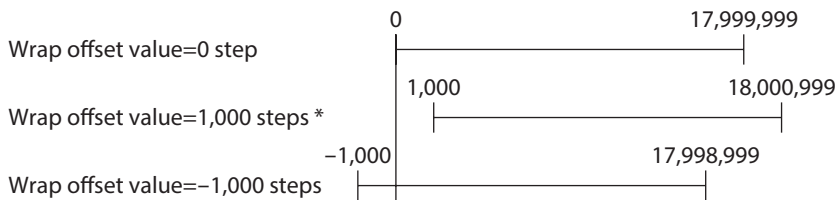
* Information of wrap setting error is generated

■ RND-ZERO output

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

● **Usage example 1**
When the RND-ZERO signal is output for every rotation of the output shaft
(In case of wrap range of 1,800 rev and a geared motor of gear ratio 7.2)

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

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

● **Usage example 2**
When the movable range is evenly divided by 90 degrees and the RND-ZERO signal is output for a certain travel amount

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

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

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

Related parameter

MEXE02 tree view	Name	Description	Initial value
Motor and mechanism	The number of the RND-ZERO output in wrap range	Sets the number of times to turn the RND-ZERO output ON in the wrap range. **Setting range** 1 to 536,870,911 divisions	1

5   Save of parameters

The parameters are saved in RAM or non-volatile memory of the driver. The parameters saved in RAM are erased once the control power supply is cut off, however, the parameters saved in the non-volatile memory are saved even if the control power supply is cut off. When the control power is applied to the driver, the parameters saved in the non-volatile memory are sent to RAM, and the recalculation and setup for the parameters are executed in RAM.

When the parameters are set to driver via EtherCAT communication, they are saved in the RAM space. To save the parameters stored in the RAM to the non-volatile memory, execute the "Write batch NV memory (40C9h)" of the maintenance command for each driver axis.

memo
- The non-volatile memory can be rewritten approximately 100,000 times.
- Do not turn off the control power supply while writing in the non-volatile memory, and also do not turn off within 5 seconds after the completion of writing. Doing so may abort writing the data and cause an EEPROM error alarm to generate (alarm code 41h).

■ How to execute maintenance commands

The following two methods are available to execute maintenance commands. Use them selectively in accordance with the intended use.

● Writing 1 to data (recommended)

When data is changed from 0 to 1 after 1 is written to it, the command is executed.
To execute the same command again, restore the data to 0 and then write 1. It is safe, because the command is not executed in succession even if 1 is written from the MainDevice continuously.

● Writing 2 to data

When 2 is written to data, the command is executed. After execution, the data is restored to 1 automatically.
Data does not need to restore to 1, and it can be written consecutively.
If commands which take time to write to the non-volatile memory such as "Write batch NV memory (40C9h)" are executed consecutively, increase the length of the intervals between commands.

2 Communication Specifications Edition

6　Object dictionary

This chapter explains the details of objects.

6-1　Composition of the object dictionary

Objects are constructed as follows.

Index (Hex)	Object	Overview
1000h to 1FFFh	CoE communication area	CoE Communication Area
2000h to 2FFFh	Manufacturer specific area	Controller object (for communication board)
3000h to 3FFFh		Not used
4000h to 4FFFh		Sets the axis number (1 to 4) to the Sub-index of the driver object.
5000h to 5FFFh		Not used
6000h to 67FFh	Profile area	Profile area of axis 1
6800h to 6FFFh		Profile area of axis 2
7000h to 77FFh		Profile area of axis 3
7800h to 7FFFh		Profile area of axis 4

memo
- This document describes indexes of the driver axis 1 for the objects of the profile area. Objects of the driver axis 2 to driver axis 4 are indexes to offset each 800h from the previous axis.
- In the manufacturer-specific area, the driver object for each driver axis is provided other than the controller object. Set the axis number (1 to 4) in the Sub-Index when setting the driver object.

■ Object dictionary item

Item	Description
Index, Sub, Name	Index, Sub-Index, and name of objects
Type	Definition objets of data type. Abbreviations described in the table below are used in this manual.

Abbreviation	Data type	Description	Range of value
BOOL	Boolean	1-bit unsigned data	0, 1
INT8	Integer8	8-bit signed data	−128 to 127
INT16	Integer16	16-bit signed data	−32,768 to 32,767
INT32	Integer32	32-bit signed data	−2,147,483,648 to 2,147,483,647
U8	Unsigned8	8-bit unsigned data	0 to 255
U16	Unsigned16	16-bit unsigned data	0 to 65,535
U32	Unsigned32	32-bit unsigned data	0 to 4,294,967,295
STRING	Visible String	Character string	−

Item	Description
Access	Access method of objects. • RW: Read and write of values are possible. • RO: Only read of values is possible.
PDO	Indicates whether the PDO mapping of objects is possible. • RxPDO: Mapping to RxPDO is possible. • TxPDO: Mapping to TxPDO is possible. • No: Mapping to PDO is not possible.

Item	Description
Save	Indicates whether data is saved in the non-volatile memory when the batch non-volatile memory write was executed. • O: Saved in the non-volatile memory. • −: Not saved in the non-volatile memory.
Update	Indicates the timing to update the change when a value in the object was changed. • A: Update immediately • B: Update after operation stop • C: Update after executing configuration • D: Update after turning on the control power supply again

6-2   Objects of the CoE communication area

These are objects to set about EtherCAT communication or to indicate the status.

● **Device type (1000h)**

Indicates the device profile.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1000h	00h	Device type	U32	RO	No	−	FFFF 0192h	−

Details of range

Bit	Name	Description
0 to 15	Device profile	0192h: DS402
16 to 31	Additional information	FFFFh: Multi-axis driver

● **Error register (1001h)**

Indicates the error status of the driver. If an error occurs in any of the axes of the driver, the "General error (Bit0)" is changed to 1. It is changed to 0 when all errors are canceled,

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1001h	00h	Error register	U8	RO	No	−	Bit0: General error Bit1 to 7: Reserved	−

● **Manufacturer device name (1008h)**

Indicates the product model name.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1008h	00h	Manufacturer device name	STRING	RO	No	−	**AZD2A-KED**, **AZD3A-KED**, **AZD4A-KED**, **AZD2B-KED**	−

● **Manufacturer hardware version (1009h)**

Indicates the hardware version of the driver. "V.1.00" is indicated when the version is 1.00.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1009h	00h	Manufacturer hardware version	STRING	RO	No	−	Hardware version	−

● **Manufacturer software version (100Ah)**

Indicates the software version of the driver. "V.1.00" is indicated when the version is 1.00.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
100Ah	00h	Manufacturer software version	STRING	RO	No	−	Software version	−

● **Identity object (1018h)**

Indicates the product information of the driver. The serial number is always 0.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1018h	00h	Number of entries	U8	RO	No	–	4	–
	01h	Vendor ID	U32	RO	No	–	0000 02BEh	–
	02h	Product code	U32	RO	No	–	**AZD2A-KED**: 0000 13AFh **AZD3A-KED**: 0000 13AFh **AZD4A-KED**: 0000 13AFh **AZD2B-KED**: 0000 13F4h	–
	03h	Revision number	U32	RO	No	–	**AZD2A-KED**: 0011 xxxxh **AZD3A-KED**: 0111 xxxxh **AZD4A-KED**: 1111 xxxxh **AZD2B-KED**: 0011 xxxxh	–
	04h	Serial number	U32	RO	No	–	0	–

● **Axis 1 receive PDO mapping 1 (1600h)**

Sets the receive PDO mapping 1 in the driver axis 1.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1600h	00h	Number of entries	U8	RW	No	–	0 to 8 (Initial value: 3)	A
	01h	Mapping entry 1	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 6040 0010h)	A
	02h	Mapping entry 2	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 607A 0020h)	A
	03h	Mapping entry 3	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 6060 0008h)	A
	04h	Mapping entry 4	U32	RW	No	–		A
	05h	Mapping entry 5	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 0000 0000h)	A
	06h	Mapping entry 6	U32	RW	No	–		A
	07h	Mapping entry 7	U32	RW	No	–		A
	08h	Mapping entry 8	U32	RW	No	–		A

● **Axis 1 receive PDO mapping 2 (1601h)**

Sets the receive PDO mapping 2 in the driver axis 1.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1601h	00h	Number of entries	U8	RW	No	–	0 to 8 (Initial value: 4)	A
	01h	Mapping entry 1	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 6040 0010h)	A
	02h	Mapping entry 2	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 607A 0020h)	A
	03h	Mapping entry 3	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 6081 0020h)	A
	04h	Mapping entry 4	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 6060 0008h)	A
	05h	Mapping entry 5	U32	RW	No	–		A
	06h	Mapping entry 6	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 0000 0000h)	A
	07h	Mapping entry 7	U32	RW	No	–		A
	08h	Mapping entry 8	U32	RW	No	–		A

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● **Axis 1 receive PDO mapping 3 (1602h)**

Sets the receive PDO mapping 3 in the driver axis 1.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1602h	00h	Number of entries	U8	RW	No	–	0 to 8 (Initial value: 3)	A
	01h	Mapping entry 1	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 6040 0010h)	A
	02h	Mapping entry 2	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 60FF 0020h)	A
	03h	Mapping entry 3	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 6060 0008h)	A
	04h	Mapping entry 4	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 0000 0000h)	A
	05h	Mapping entry 5	U32	RW	No	–		A
	06h	Mapping entry 6	U32	RW	No	–		A
	07h	Mapping entry 7	U32	RW	No	–		A
	08h	Mapping entry 8	U32	RW	No	–		A

● **Axis 1 receive PDO mapping 4 (1603h)**

Sets the receive PDO mapping 4 in the driver axis 1.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1603h	00h	Number of entries	U8	RW	No	–	0 to 8 (Initial value: 5)	A
	01h	Mapping entry 1	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 6040 0010h)	A
	02h	Mapping entry 2	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 607A 0020h)	A
	03h	Mapping entry 3	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 6060 0008h)	A
	04h	Mapping entry 4	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 60FF 0020h)	A
	05h	Mapping entry 5	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 60B8 0010h)	A
	06h	Mapping entry 6	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 0000 0000h)	A
	07h	Mapping entry 7	U32	RW	No	–		A
	08h	Mapping entry 8	U32	RW	No	–		A

● **Axis 2 receive PDO mapping 1 (1610h)**

Sets the receive PDO mapping 1 in the driver axis 2.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1610h	00h	Number of entries	U8	RW	No	–	0 to 8 (Initial value: 3)	A
	01h	Mapping entry 1	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 6840 0010h)	A
	02h	Mapping entry 2	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 687A 0020h)	A
	03h	Mapping entry 3	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 6860 0008h)	A
	04h	Mapping entry 4	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 0000 0000h)	A
	05h	Mapping entry 5	U32	RW	No	–		A
	06h	Mapping entry 6	U32	RW	No	–		A
	07h	Mapping entry 7	U32	RW	No	–		A
	08h	Mapping entry 8	U32	RW	No	–		A

● **Axis 2 receive PDO mapping 2 (1611h)**

Sets the receive PDO mapping 2 in the driver axis 2.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1611h	00h	Number of entries	U8	RW	No	–	0 to 8 (Initial value: 4)	A
	01h	Mapping entry 1	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 6840 0010h)	A
	02h	Mapping entry 2	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 687A 0020h)	A
	03h	Mapping entry 3	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 6881 0020h)	A
	04h	Mapping entry 4	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 6860 0008h)	A
	05h	Mapping entry 5	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 0000 0000h)	A
	06h	Mapping entry 6	U32	RW	No	–		A
	07h	Mapping entry 7	U32	RW	No	–		A
	08h	Mapping entry 8	U32	RW	No	–		A

● **Axis 2 receive PDO mapping 3 (1612h)**

Sets the receive PDO mapping 3 in the driver axis 2.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1612h	00h	Number of entries	U8	RW	No	–	0 to 8 (Initial value: 3)	A
	01h	Mapping entry 1	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 6840 0010h)	A
	02h	Mapping entry 2	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 68FF 0020h)	A
	03h	Mapping entry 3	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 6860 0008h)	A
	04h	Mapping entry 4	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 0000 0000h)	A
	05h	Mapping entry 5	U32	RW	No	–		A
	06h	Mapping entry 6	U32	RW	No	–		A
	07h	Mapping entry 7	U32	RW	No	–		A
	08h	Mapping entry 8	U32	RW	No	–		A

● **Axis 2 receive PDO mapping 4 (1613h)**

Sets the receive PDO mapping 4 in the driver axis 2.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1613h	00h	Number of entries	U8	RW	No	–	0 to 8 (Initial value: 5)	A
	01h	Mapping entry 1	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 6840 0010h)	A
	02h	Mapping entry 2	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 687A 0020h)	A
	03h	Mapping entry 3	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 6860 0008h)	A
	04h	Mapping entry 4	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 68FF 0020h)	A
	05h	Mapping entry 5	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 68B8 0010h)	A
	06h	Mapping entry 6	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 0000 0000h)	A
	07h	Mapping entry 7	U32	RW	No	–		A
	08h	Mapping entry 8	U32	RW	No	–		A

● **Axis 3 receive PDO mapping 1 (1620h)**

Sets the receive PDO mapping 1 in the driver axis 3.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1620h	00h	Number of entries	U8	RW	No	–	0 to 8 (Initial value: 3)	A
	01h	Mapping entry 1	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 7040 0010h)	A
	02h	Mapping entry 2	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 707A 0020h)	A
	03h	Mapping entry 3	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 7060 0008h)	A
	04h	Mapping entry 4	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 0000 0000h)	A
	05h	Mapping entry 5	U32	RW	No	–		A
	06h	Mapping entry 6	U32	RW	No	–		A
	07h	Mapping entry 7	U32	RW	No	–		A
	08h	Mapping entry 8	U32	RW	No	–		A

● **Axis 3 receive PDO mapping 2 (1621h)**

Sets the receive PDO mapping 2 in the driver axis 3.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1621h	00h	Number of entries	U8	RW	No	–	0 to 8 (Initial value: 4)	A
	01h	Mapping entry 1	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 7040 0010h)	A
	02h	Mapping entry 2	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 707A 0020h)	A
	03h	Mapping entry 3	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 7081 0020h)	A
	04h	Mapping entry 4	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 7060 0008h)	A
	05h	Mapping entry 5	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 0000 0000h)	A
	06h	Mapping entry 6	U32	RW	No	–		A
	07h	Mapping entry 7	U32	RW	No	–		A
	08h	Mapping entry 8	U32	RW	No	–		A

● **Axis 3 receive PDO mapping 3 (1622h)**

Sets the receive PDO mapping 3 in the driver axis 3.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1622h	00h	Number of entries	U8	RW	No	–	0 to 8 (Initial value: 3)	A
	01h	Mapping entry 1	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 7040 0010h)	A
	02h	Mapping entry 2	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 70FF 0020h)	A
	03h	Mapping entry 3	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 7060 0008h)	A
	04h	Mapping entry 4	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 0000 0000h)	A
	05h	Mapping entry 5	U32	RW	No	–		A
	06h	Mapping entry 6	U32	RW	No	–		A
	07h	Mapping entry 7	U32	RW	No	–		A
	08h	Mapping entry 8	U32	RW	No	–		A

● **Axis 3 receive PDO mapping 4 (1623h)**

Sets the receive PDO mapping 4 in the driver axis 3.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1623h	00h	Number of entries	U8	RW	No	–	0 to 8 (Initial value: 5)	A
	01h	Mapping entry 1	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 7040 0010h)	A
	02h	Mapping entry 2	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 707A 0020h)	A
	03h	Mapping entry 3	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 7060 0008h)	A
	04h	Mapping entry 4	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 70FF 0020h)	A
	05h	Mapping entry 5	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 70B8 0010h)	A
	06h	Mapping entry 6	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 0000 0000h)	A
	07h	Mapping entry 7	U32	RW	No	–		A
	08h	Mapping entry 8	U32	RW	No	–		A

● **Axis 4 receive PDO mapping 1 (1630h)**

Sets the receive PDO mapping 1 in the driver axis 4.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1630h	00h	Number of entries	U8	RW	No	–	0 to 8 (Initial value: 3)	A
	01h	Mapping entry 1	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 7840 0010h)	A
	02h	Mapping entry 2	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 787A 0020h)	A
	03h	Mapping entry 3	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 7860 0008h)	A
	04h	Mapping entry 4	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 0000 0000h)	A
	05h	Mapping entry 5	U32	RW	No	–		A
	06h	Mapping entry 6	U32	RW	No	–		A
	07h	Mapping entry 7	U32	RW	No	–		A
	08h	Mapping entry 8	U32	RW	No	–		A

● **Axis 4 receive PDO mapping 2 (1631h)**

Sets the receive PDO mapping 2 in the driver axis 4.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1631h	00h	Number of entries	U8	RW	No	–	0 to 8 (Initial value: 4)	A
	01h	Mapping entry 1	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 7840 0010h)	A
	02h	Mapping entry 2	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 787A 0020h)	A
	03h	Mapping entry 3	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 7881 0020h)	A
	04h	Mapping entry 4	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 7860 0008h)	A
	05h	Mapping entry 5	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 0000 0000h)	A
	06h	Mapping entry 6	U32	RW	No	–		A
	07h	Mapping entry 7	U32	RW	No	–		A
	08h	Mapping entry 8	U32	RW	No	–		A

● **Axis 4 receive PDO mapping 3 (1632h)**

Sets the receive PDO mapping 3 in the driver axis 4.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1632h	00h	Number of entries	U8	RW	No	–	0 to 8 (Initial value: 3)	A
	01h	Mapping entry 1	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 7840 0010h)	A
	02h	Mapping entry 2	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 78FF 0020h)	A
	03h	Mapping entry 3	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 7860 0008h)	A
	04h	Mapping entry 4	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 0000 0000h)	A
	05h	Mapping entry 5	U32	RW	No	–		A
	06h	Mapping entry 6	U32	RW	No	–		A
	07h	Mapping entry 7	U32	RW	No	–		A
	08h	Mapping entry 8	U32	RW	No	–		A

● **Axis 4 receive PDO mapping 4 (1633h)**

Sets the receive PDO mapping 4 in the driver axis 4.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1633h	00h	Number of entries	U8	RW	No	–	0 to 8 (Initial value: 5)	A
	01h	Mapping entry 1	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 7840 0010h)	A
	02h	Mapping entry 2	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 787A 0020h)	A
	03h	Mapping entry 3	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 7860 0008h)	A
	04h	Mapping entry 4	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 78FF 0020h)	A
	05h	Mapping entry 5	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 78B8 0010h)	A
	06h	Mapping entry 6	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 0000 0000h)	A
	07h	Mapping entry 7	U32	RW	No	–		A
	08h	Mapping entry 8	U32	RW	No	–		A

● **Controller receive PDO mapping (1700h)**

Sets the receive PDO mapping in the controller area.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1700h	00h	Number of entries	U8	RW	No	–	0 to 8 (Initial value: 2)	A
	01h	Mapping entry 1	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 2F01 0008h)	A
	02h	Mapping entry 2	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 2F02 0008h)	A
	03h	Mapping entry 3	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 0000 0000h)	A
	04h	Mapping entry 4	U32	RW	No	–		A
	05h	Mapping entry 5	U32	RW	No	–		A
	06h	Mapping entry 6	U32	RW	No	–		A
	07h	Mapping entry 7	U32	RW	No	–		A
	08h	Mapping entry 8	U32	RW	No	–		A

● **Axis 1 transmit PDO mapping 1 (1A00h)**

Sets the transmit PDO mapping 1 in the driver axis 1.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1A00h	00h	Number of entries	U8	RW	No	–	0 to 8 (Initial value: 3)	A
	01h	Mapping entry 1	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 6041 0010h)	A
	02h	Mapping entry 2	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 6064 0020h)	A
	03h	Mapping entry 3	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 6061 0008h)	A
	04h	Mapping entry 4	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 0000 0000h)	A
	05h	Mapping entry 5	U32	RW	No	–		A
	06h	Mapping entry 6	U32	RW	No	–		A
	07h	Mapping entry 7	U32	RW	No	–		A
	08h	Mapping entry 8	U32	RW	No	–		A

● **Axis 1 transmit PDO mapping 2 (1A01h)**

Sets the transmit PDO mapping 2 in the driver axis 1.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1A01h	00h	Number of entries	U8	RW	No	–	0 to 8 (Initial value: 4)	A
	01h	Mapping entry 1	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 6041 0010h)	A
	02h	Mapping entry 2	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 6064 0020h)	A
	03h	Mapping entry 3	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 606C 0020h)	A
	04h	Mapping entry 4	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 6061 0008h)	A
	05h	Mapping entry 5	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 0000 0000h)	A
	06h	Mapping entry 6	U32	RW	No	–		A
	07h	Mapping entry 7	U32	RW	No	–		A
	08h	Mapping entry 8	U32	RW	No	–		A

● **Axis 1 transmit PDO mapping 3 (1A02h)**

Sets the transmit PDO mapping 3 in the driver axis 1.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1A02h	00h	Number of entries	U8	RW	No	–	0 to 8 (Initial value: 3)	A
	01h	Mapping entry 1	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 6041 0010h)	A
	02h	Mapping entry 2	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 606C 0020h)	A
	03h	Mapping entry 3	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 6061 0008h)	A
	04h	Mapping entry 4	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 0000 0000h)	A
	05h	Mapping entry 5	U32	RW	No	–		A
	06h	Mapping entry 6	U32	RW	No	–		A
	07h	Mapping entry 7	U32	RW	No	–		A
	08h	Mapping entry 8	U32	RW	No	–		A

● **Axis 1 transmit PDO mapping 4 (1A03h)**

Sets the transmit PDO mapping 4 in the driver axis 1.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1A03h	00h	Number of entries	U8	RW	No	–	0 to 8 (Initial value: 8)	A
	01h	Mapping entry 1	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 6041 0010h)	A
	02h	Mapping entry 2	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 6064 0020h)	A
	03h	Mapping entry 3	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 6061 0008h)	A
	04h	Mapping entry 4	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 60B9 0010h)	A
	05h	Mapping entry 5	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 60BA 0020h)	A
	06h	Mapping entry 6	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 60BC 0020h)	A
	07h	Mapping entry 7	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 603F 0010h)	A
	08h	Mapping entry 8	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 60FD 0020h)	A

● **Axis 2 transmit PDO mapping 1 (1A10h)**

Sets the transmit PDO mapping 1 in the driver axis 2.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1A10h	00h	Number of entries	U8	RW	No	–	0 to 8 (Initial value: 3)	A
	01h	Mapping entry 1	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 6841 0010h)	A
	02h	Mapping entry 2	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 6864 0020h)	A
	03h	Mapping entry 3	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 6861 0008h)	A
	04h	Mapping entry 4	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 0000 0000h)	A
	05h	Mapping entry 5	U32	RW	No	–		A
	06h	Mapping entry 6	U32	RW	No	–		A
	07h	Mapping entry 7	U32	RW	No	–		A
	08h	Mapping entry 8	U32	RW	No	–		A

● **Axis 2 transmit PDO mapping 2 (1A11h)**

Sets the transmit PDO mapping 2 in the driver axis 2.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1A11h	00h	Number of entries	U8	RW	No	–	0 to 8 (Initial value: 4)	A
	01h	Mapping entry 1	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 6841 0010h)	A
	02h	Mapping entry 2	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 6864 0020h)	A
	03h	Mapping entry 3	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 686C 0020h)	A
	04h	Mapping entry 4	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 6861 0008h)	A
	05h	Mapping entry 5	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 0000 0000h)	A
	06h	Mapping entry 6	U32	RW	No	–		A
	07h	Mapping entry 7	U32	RW	No	–		A
	08h	Mapping entry 8	U32	RW	No	–		A

● **Axis 2 transmit PDO mapping 3 (1A12h)**

Sets the transmit PDO mapping 3 in the driver axis 2.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1A12h	00h	Number of entries	U8	RW	No	–	0 to 8 (Initial value: 3)	A
	01h	Mapping entry 1	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 6841 0010h)	A
	02h	Mapping entry 2	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 686C 0020h)	A
	03h	Mapping entry 3	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 6861 0008h)	A
	04h	Mapping entry 4	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 0000 0000h)	A
	05h	Mapping entry 5	U32	RW	No	–		A
	06h	Mapping entry 6	U32	RW	No	–		A
	07h	Mapping entry 7	U32	RW	No	–		A
	08h	Mapping entry 8	U32	RW	No	–		A

● **Axis 2 transmit PDO mapping 4 (1A13h)**

Sets the transmit PDO mapping 4 in the driver axis 2.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1A13h	00h	Number of entries	U8	RW	No	–	0 to 8 (Initial value: 8)	A
	01h	Mapping entry 1	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 6841 0010h)	A
	02h	Mapping entry 2	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 6864 0020h)	A
	03h	Mapping entry 3	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 6861 0008h)	A
	04h	Mapping entry 4	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 68B9 0010h)	A
	05h	Mapping entry 5	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 68BA 0020h)	A
	06h	Mapping entry 6	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 68BC 0020h)	A
	07h	Mapping entry 7	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 683F 0010h)	A
	08h	Mapping entry 8	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 68FD 0020h)	A

● **Axis 3 transmit PDO mapping 1 (1A20h)**

Sets the transmit PDO mapping 1 in the driver axis 3.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1A20h	00h	Number of entries	U8	RW	No	–	0 to 8 (Initial value: 3)	A
	01h	Mapping entry 1	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 7041 0010h)	A
	02h	Mapping entry 2	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 7064 0020h)	A
	03h	Mapping entry 3	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 7061 0008h)	A
	04h	Mapping entry 4	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 0000 0000h)	A
	05h	Mapping entry 5	U32	RW	No	–		A
	06h	Mapping entry 6	U32	RW	No	–		A
	07h	Mapping entry 7	U32	RW	No	–		A
	08h	Mapping entry 8	U32	RW	No	–		A

● **Axis 3 transmit PDO mapping 2 (1A21h)**

Sets the transmit PDO mapping 2 in the driver axis 3.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1A21h	00h	Number of entries	U8	RW	No	–	0 to 8 (Initial value: 4)	A
	01h	Mapping entry 1	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 7041 0010h)	A
	02h	Mapping entry 2	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 7064 0020h)	A
	03h	Mapping entry 3	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 706C 0020h)	A
	04h	Mapping entry 4	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 7061 0008h)	A
	05h	Mapping entry 5	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 0000 0000h)	A
	06h	Mapping entry 6	U32	RW	No	–		A
	07h	Mapping entry 7	U32	RW	No	–		A
	08h	Mapping entry 8	U32	RW	No	–		A

● **Axis 3 transmit PDO mapping 3 (1A22h)**

Sets the transmit PDO mapping 3 in the driver axis 3.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1A22h	00h	Number of entries	U8	RW	No	–	0 to 8 (Initial value: 3)	A
	01h	Mapping entry 1	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 7041 0010h)	A
	02h	Mapping entry 2	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 706C 0020h)	A
	03h	Mapping entry 3	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 7061 0008h)	A
	04h	Mapping entry 4	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 0000 0000h)	A
	05h	Mapping entry 5	U32	RW	No	–		A
	06h	Mapping entry 6	U32	RW	No	–		A
	07h	Mapping entry 7	U32	RW	No	–		A
	08h	Mapping entry 8	U32	RW	No	–		A

● **Axis 3 transmit PDO mapping 4 (1A23h)**

Sets the transmit PDO mapping 4 in the driver axis 3.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1A23h	00h	Number of entries	U8	RW	No	–	0 to 8 (Initial value: 8)	A
	01h	Mapping entry 1	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 7041 0010h)	A
	02h	Mapping entry 2	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 7064 0020h)	A
	03h	Mapping entry 3	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 7061 0008h)	A
	04h	Mapping entry 4	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 70B9 0010h)	A
	05h	Mapping entry 5	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 70BA 0020h)	A
	06h	Mapping entry 6	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 70BC 0020h)	A
	07h	Mapping entry 7	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 703F 0010h)	A
	08h	Mapping entry 8	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 70FD 0020h)	A

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● **Axis 4 transmit PDO mapping 1 (1A30h)**

Sets the transmit PDO mapping 1 in the driver axis 4.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1A30h	00h	Number of entries	U8	RW	No	–	0 to 8 (Initial value: 3)	A
	01h	Mapping entry 1	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 7841 0010h)	A
	02h	Mapping entry 2	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 7864 0020h)	A
	03h	Mapping entry 3	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 7861 0008h)	A
	04h	Mapping entry 4	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 0000 0000h)	A
	05h	Mapping entry 5	U32	RW	No	–		A
	06h	Mapping entry 6	U32	RW	No	–		A
	07h	Mapping entry 7	U32	RW	No	–		A
	08h	Mapping entry 8	U32	RW	No	–		A

● **Axis 4 transmit PDO mapping 2 (1A31h)**

Sets the transmit PDO mapping 2 in the driver axis 4.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1A31h	00h	Number of entries	U8	RW	No	–	0 to 8 (Initial value: 4)	A
	01h	Mapping entry 1	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 7841 0010h)	A
	02h	Mapping entry 2	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 7864 0020h)	A
	03h	Mapping entry 3	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 786C 0020h)	A
	04h	Mapping entry 4	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 7861 0008h)	A
	05h	Mapping entry 5	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 0000 0000h)	A
	06h	Mapping entry 6	U32	RW	No	–		A
	07h	Mapping entry 7	U32	RW	No	–		A
	08h	Mapping entry 8	U32	RW	No	–		A

● **Axis 4 transmit PDO mapping 3 (1A32h)**

Sets the transmit PDO mapping 3 in the driver axis 4.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1A32h	00h	Number of entries	U8	RW	No	–	0 to 8 (Initial value: 3)	A
	01h	Mapping entry 1	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 7841 0010h)	A
	02h	Mapping entry 2	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 786C 0020h)	A
	03h	Mapping entry 3	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 7861 0008h)	A
	04h	Mapping entry 4	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 0000 0000h)	A
	05h	Mapping entry 5	U32	RW	No	–		A
	06h	Mapping entry 6	U32	RW	No	–		A
	07h	Mapping entry 7	U32	RW	No	–		A
	08h	Mapping entry 8	U32	RW	No	–		A

● **Axis 4 transmit PDO mapping 4 (1A33h)**

Sets the transmit PDO mapping 4 in the driver axis 4.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1A33h	00h	Number of entries	U8	RW	No	–	0 to 8 (Initial value: 8)	A
	01h	Mapping entry 1	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 7841 0010h)	A
	02h	Mapping entry 2	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 7864 0020h)	A
	03h	Mapping entry 3	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 7861 0008h)	A
	04h	Mapping entry 4	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 78B9 0010h)	A
	05h	Mapping entry 5	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 78BA 0020h)	A
	06h	Mapping entry 6	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 78BC 0020h)	A
	07h	Mapping entry 7	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 783F 0010h)	A
	08h	Mapping entry 8	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 78FD 0020h)	A

● **Controller transmit PDO mapping (1B00h)**

Sets the transmit PDO mapping in the controller area.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1B00h	00h	Number of entries	U8	RW	No	–	0 to 8 (Initial value: 2)	A
	01h	Mapping entry 1	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 2E31 0008h)	A
	02h	Mapping entry 2	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 2E32 0008h)	A
	03h	Mapping entry 3	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 0000 0000h)	A
	04h	Mapping entry 4	U32	RW	No	–		A
	05h	Mapping entry 5	U32	RW	No	–		A
	06h	Mapping entry 6	U32	RW	No	–		A
	07h	Mapping entry 7	U32	RW	No	–		A
	08h	Mapping entry 8	U32	RW	No	–		A

● **Sync manager communication type (1C00h)**

Sets the communication type of sync manager (SM).

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1C00h	00h	Number of entries	U8	RO	No	–	4	–
	01h	Communication type sync manager 0	U8	RO	No	–	1: Mailbox output (MainDevice to driver)	–
	02h	Communication type sync manager 1	U8	RO	No	–	2: Mailbox input (driver to MainDevice)	–
	03h	Communication type sync manager 2	U8	RO	No	–	3: process data output (MainDevice to driver)	–
	04h	Communication type sync manager 3	U8	RO	No	–	4: Process data input (driver to MainDevice)	–

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● Sync manager 2 PDO assignment (1C12h)

Sets the object assigned in the process data output (receive PDO: RxPDO) of the sync manager2 (SM2).
It can be changed when the EtherCAT communication state machine is pre-operational.
Refer to "1-4 Process data object (PDO)" on p.46 for how to set the PDO mapping.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1C12h	00h	Number of entries	U8	RW	No	–	0 to 5 (Initial value: 5)	A
	01h	Index of assigned PDO 1	U16	RW	No	–	0000h to FFFFh (Initial value: 1600h)	A
	02h	Index of assigned PDO 2	U16	RW	No	–	0000h to FFFFh (Initial value: 1610h)	A
	03h	Index of assigned PDO 3	U16	RW	No	–	0000h to FFFFh (Initial value: 1620h)	A
	04h	Index of assigned PDO 4	U16	RW	No	–	0000h to FFFFh (Initial value: 1630h)	A
	05h	Index of assigned PDO 5	U16	RW	No	–	0000h to FFFFh (Initial value: 1700h)	A

● Sync manager 3 PDO assignment (1C13h)

Sets the object assigned in the process data input (transmit PDO: TxPDO) of the sync manager3 (SM3).
It can be changed when the EtherCAT communication state machine is pre-operational.
Refer to "1-4 Process data object (PDO)" on p.46 for how to set the PDO mapping.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1C13h	00h	Number of entries	U8	RW	No	–	0 to 5 (Initial value: 5)	A
	01h	Index of assigned PDO 1	U16	RW	No	–	0000h to FFFFh (Initial value: 1A00h)	A
	02h	Index of assigned PDO 2	U16	RW	No	–	0000h to FFFFh (Initial value: 1A10h)	A
	03h	Index of assigned PDO 3	U16	RW	No	–	0000h to FFFFh (Initial value: 1A20h)	A
	04h	Index of assigned PDO 4	U16	RW	No	–	0000h to FFFFh (Initial value: 1A30h)	A
	05h	Index of assigned PDO 5	U16	RW	No	–	0000h to FFFFh (Initial value: 1B00h)	A

● Sync manager 2 synchronization (1C32h)

Sets the synchronization type of the sync manager2 (SM2) and indicates the status.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1C32h	00h	Number of entries	U8	RO	No	–	20h	–
	01h	Synchronization type	U16	RW	No	–	00h, 01h, 02h (Initial value: 01h)	A
	02h	Cycle time [ns]	U32	RO	No	–	–	–
	03h	Shift time [ns]	U32	RO	No	–	0	–
	04h	Synchronization types supported	U16	RO	No	–	0007h	–
	05h	Minimum cycle time [ns]	U16	RO	No	–	0007 A120h (500,000 ns)	–
	06h	Calc and copy time [ns]	U16	RO	No	–	0001 E848h (125,000 ns)	–
	07h	Reserved	U32	–	–	–	–	–
	08h	Reserved	U16	–	–	–	–	–
	09h	Delay time [ns]	U16	RO	No	–	0	–
	0Ah to 1Fh	Reserved	U32	–	–	–	–	–
	20h	Sync error	BOOL	RO	No	–	0	–

Details of sync manager 2 synchronization object

Sub	Name	Description
01h	Synchronization type	00h: Free run mode (asynchronous) 01h: SM2 event synchronization mode 02h: DC mode (SYNC0 event synchronization)
02h	Cycle time [ns]	Indicates the cycle time of the SYNC0 event.
03h	Shift time [ns]	The shift time is not supported. The read value is always 0.
04h	Synchronization types supported	Indicates the synchronization type supported. Bit0: Free run mode (asynchronous) Bit1: SM2 event synchronization mode Bit2: DC mode (SYNC0 event synchronization)
05h	Minimum cycle time [ns]	Indicates the minimum cycle time supported.
06h	Calc and copy time [ns]	Indicates the minimum value of the internal calc and copy time that is needed from the SM2 event to the SYNC0 event.
09h	Delay time [ns]	The delay time is not supported. The read value is always 0.
20h	Sync error	Changes to 1 if the sync error is detected.

● **Sync manager 3 synchronization (1C33h)**

Sets the synchronization type of the sync manager3 (SM3) and indicates the status.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
1C33h	00h	Number of entries	U8	RO	No	–	20h	–
	01h	Synchronization type	U16	RW	No	–	00h, 02h, 22h (Initial value: 22h)	A
	02h	Cycle time [ns]	U32	RO	No	–	–	–
	03h	Shift time [ns]	U32	RO	No	–	0	–
	04h	Synchronization Types supported	U16	RO	No	–	0007h	–
	05h	Minimum cycle time [ns]	U16	RO	No	–	0007 A120h (500,000 ns)	–
	06h	Calc and Copy Time [ns]	U16	RO	No	–	0003 0D40h (200,000 ns)	–
	07h	Reserved	U32	–	–	–	–	–
	08h	Reserved	U16	–	–	–	–	–
	09h	Delay time [ns]	U16	RO	No	–	0	–
	0Ah to 1Fh	Reserved	U32	–	–	–	–	–
	20h	Sync error	BOOL	RO	No	–	0	–

Details of sync manager 3 synchronization object

Sub	Name	Description
01h	Synchronization type	00h: Free run mode (asynchronous) 02h: DC mode (SYNC0 event synchronization) 22h: SM2 event synchronization mode
02h	Cycle time [ns]	Indicates the cycle time of the SYNC0 event.
03h	Shift time [ns]	The shift time is not supported. The read value is always 0.
04h	Synchronization types supported	Indicates the synchronization type supported. Bit0: Free run mode (asynchronous) Bit1: SM2 event synchronization mode Bit2: DC mode (SYNC0 event synchronization)
05h	Minimum cycle time [ns]	Indicates the minimum cycle time supported.
06h	Calc and copy time [ns]	Indicates the minimum value of the internal calc and copy time that is needed from the SM3 event to the SYNC0 event.
09h	Delay time [ns]	The delay time is not supported. The read value is always 0.
20h	Sync error	Changes to 1 if the sync error is detected.

6-3 Objects of the profile area

Objects in the profile area are defined by the CiA402 drive profile. Operations of the driver are set, and the status is indicated.

● **Error code (603Fh)**

Indicates the error code being generated in the driver.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
603Fh	00h	Error code	U16	RO	TxPDO	–	–	–

> (memo) If an alarm is generated in the driver, the error code is indicated. The lower 8 bits of the error code represents the alarm code, and the upper 8 bits represents FFh. When an alarm is not present, "0000h" is indicated. See p.155 for alarm code.

● **Controlword (6040h)**

Controls the transition of the drive state machine, start/stop of an operation, and others.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
6040h	00h	Controlword	U16	RW	RxPDO	–	0000h to FFFFh (Initial value: 0000h)	A

Details of range

Bit	Name	Description
0	Switch on	Controls the status of the drive state machine. For details, refer to "State transition of the drive state machine" on p.53.
1	Enable voltage	
2	Quick stop	
3	Enable operation	
4	Operation mode specific	It varies according to the operation mode. For details, refer to each operation mode of the "2 Drive profile" on p.52.
5		
6		
7	Fault reset	Resets the alarm by changing from 0 to 1.
8	Halt	For details, refer to each operation mode of the "2 Drive profile" on p.52.
9	Operation mode specific	
10	Reserved	Reserved
11	Manufacturer specific	Manufacturer-specific bit. For details, refer to each operation mode of the "2 Drive profile" on p.52.
12		
13		
14		
15		

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● **Statusword (6041h)**

Indicates the status of the drive state machine and the operation status of the driver.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
6041h	00h	Statusword	U16	RO	TxPDO	–	–	–

Details of range

Bit	Name	Description
0	Ready to switch on	Indicates the status of the drive state machine. For details, refer to "Status output of the drive state machine" on p.54.
1	Switched on	
2	Operation enabled	
3	Fault	
4	Voltage enabled	
5	Quick stop	
6	Switch on disabled	
7	Warning	Changes to 1 if information is generated. When the information status is resolved, it is automatically cleared to 0.
8	Manufacturer specific	Manufacturer-specific bit. For details, refer to each operation mode of the "2 Drive profile" on p.52.
9	Remote	Changes to 1 when the driver initialization is complete.
10	Target reached	It varies according to the operation mode. For details, refer to each operation mode of the "2 Drive profile" on p.52.
11	Internal limit active	Indicates the status of the function limitation by the internal limit. For details, refer to each operation mode of the "2 Drive profile" on p.52.
12	Operation mode specific	It varies according to the operation mode. For details, refer to each operation mode of the "2 Drive profile" on p.52.
13		
14	Manufacturer specific	Manufacturer-specific bit. For details, refer to each operation mode of the "2 Drive profile" on p.52.
15		

● **Quick stop option code (605Ah)**

Sets the action by the quick stop command. When the setting is changed while the quick stop is operating, the new setting is updated after stop.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
605Ah	00h	Quick stop option code	INT16	RW	No	○	0, 1, 2, 3, 5, 6, 7 (Initial value: 2)	A

Details of range

Setting value	Description
0	Current off
1	Decelerates to a stop at the "Profile deceleration (6084h)." Transitions to "Switch on disabled" after stop.
2	Decelerates to a stop at the "Quick stop deceleration (6085h)." Transitions to "Switch on disabled" after stop.
3	Stops immediately. Transitions to "Switch on disabled" after stop.
5	Decelerates to a stop at the "Profile deceleration (6084h)." Keeps "Quick stop active" after stop.
6	Decelerates to a stop at the "Quick stop deceleration (6085h)." Keeps "Quick stop active" after stop.
7	Stops immediately. Keeps "Quick stop active" after stop.

(memo) If the quick stop command is executed while decelerating to a stop, the deceleration rate switches to the quick stop deceleration. However, when the deceleration stop is performed by the STOP input signal or the "STOP-DRV (Bit1)" of the "Controller command (2F02h)," the deceleration rate will not switch even if the quick stop command is executed.

● **Shutdown option code (605Bh)**

Sets the operation when transitioning from "Operation enabled" to "Ready to switch on."

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
605Bh	00h	Shutdown option code	INT16	RW	No	○	0, 1 (Initial value: 1)	A

Details of range

Setting value	Description
0	Current off
1	Decelerates to a stop at the "Profile deceleration (6084h)." The motor changes to a non-excitation state after stop.

● **Disable operation option code (605Ch)**

Sets the operation when transitioning from "Operation enabled" to "Switched on."

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
605Ch	00h	Disable operation option code	INT16	RW	No	○	0, 1 (Initial value: 1)	A

Details of range

Setting value	Description
0	Current off
1	Decelerates to a stop at the "Profile deceleration (6084h)." The motor changes to a non-excitation state after stop.

● **Halt option code (605Dh)**

Sets the operation when the "Halt (Bit8)" of the "Controlword (6040h)" was set.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
605Dh	00h	Halt option code	INT16	RW	No	○	1, 2, 3 (Initial value: 1)	A

Details of range

Setting value	Description
1	Decelerates to a stop at the "Profile deceleration (6084h)." Keeps "Operation enabled" after stop.
2	Decelerates to a stop at the "Quick stop deceleration (6085h)." Keeps "Operation enabled" after stop.
3	Stops immediately. Keeps "Operation enabled" after stop.

● **Modes of operation (6060h)**

Sets the operation mode of the driver. Change the operation mode while the motor is stopped. When the setting is changed during operation, the new setting is updated after stop.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
6060h	00h	Modes of operation	INT8	RW	RxPDO	○	0, 1, 3, 6, 8, 9 (Initial value: 0)	B

Details of range

Setting value	Description
0	Operation function disable
1	Profile position mode (PP)
3	Profile velocity mode (PV)
6	Homing mode (HM)
8	Cyclic synchronous position mode (CSP)
9	Cyclic synchronous velocity mode (CSV)

● **Modes of operation display (6061h)**

Indicates the operation mode that is enabled actually. The range is the same as "Modes of operation (6060h)."

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
6061h	00h	Modes of operation display	INT8	RO	TxPDO	–	–	–

● **Position demand value (6062h)**

Indicates the command position. When the "Wrap setting (41C7h)" is set to 1, the value in the wrap range is indicated.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
6062h	00h	Position demand value [step]	INT32	RO	TxPDO	–	–	–

● **Position actual value (6064h)**

Indicates the present position detected by the ABZO sensor. When the "Wrap setting (41C7h)" is set to 1, the value in the wrap range is indicated.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
6064h	00h	Position actual value [step]	INT32	RO	TxPDO	–	–	–

● **Following error window (6065h)**

Sets the condition under which the excessive position deviation alarm is generated.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
6065h	00h	Following error window [1=0.01 rev]	U32	RW	No	○	1 to 30,000 (Initial value: 300)	A

● **Position window (6067h)**

Sets the output range of the positioning completion output (IN-POS). It is the same as the "IN-POS positioning completion signal range" parameter of the **AZ** Series.
In the profile position mode, after positioning operation is properly completed, the Target Reached (6041h: Bit10) of the statusword changes 1 when the feedback position has converged in a range of the Position window (6067h) with respect to the command position.
The IN-POS output range can be offset by the "IN-POS positioning completion signal offset (4704h)."

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
6067h	00h	Position window [1=0.1°]	U32	RW	No	○	0 to 180 (Initial value: 18)	A

● **Velocity demand value (606Bh)**

Indicates the present command speed. (Hz)

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
606Bh	00h	Velocity demand value [Hz]	INT32	RO	TxPDO	–	–	–

● **Velocity actual value (606Ch)**

Indicates the present feedback speed. (Hz)

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
606Ch	00h	Velocity actual value [Hz]	INT32	RO	TxPDO	–	–	–

● **Target position (607Ah)**

Sets the target position in the cyclic synchronous position mode and profile position mode.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
607Ah	00h	Target position [step]	INT32	RW	RxPDO	–	−2,147,483,648 to 2,147,483,647 (Initial value: 0)	A

● **Home offset (607Ch)**

Offsets the home after completing return-to-home operation in the homing mode. The command position and the actual position after completing return-to-home will be the value set in the home offset.
Since the offset value is written to the same register as the "Preset position (41C6h)," if the "Home offset (607Ch)" is changed, the "Preset position (41C6h)" will be the same value.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
607Ch	00h	Home offset [step]	INT32	RW	No	○	−2,147,483,648 to 2,147,483,647 (Initial value: 0)	A

● **Software position limit (607Dh)**

Sets the software limit. The min. position limit represents the limit of the reverse direction, and the max. position limit represents the limit of the forward direction.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
607Dh	00h	Number of entries	U8	RO	No	−	2	−
	01h	Min. position limit [step]	INT32	RW	No	○	−2,147,483,648 to 2,147,483,647 (Initial value: −2,147,483,648)	A
	02h	Max. position limit [step]	INT32	RW	No	○	−2,147,483,648 to 2,147,483,647 (Initial value: 2,147,483,647)	A

● **Profile velocity (6081h)**

Sets the operating speed of the profile position mode.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
6081h	00h	Profile velocity [Hz]	U32	RW	RxPDO	○	0 to 4,000,000 (Initial value: 10,000)	A

● **Profile acceleration (6083h)**

Sets the acceleration rate for the profile position mode and profile velocity mode.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
6083h	00h	Profile acceleration [step/s^2]	U32	RW	RxPDO	○	1 to 1,000,000,000 (Initial value: 300,000)	B

● **Profile deceleration (6084h)**

Sets the deceleration rate for the profile position mode and profile velocity mode.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
6084h	00h	Profile deceleration [step/s^2]	U32	RW	RxPDO	○	1 to 1,000,000,000 (Initial value: 300,000)	B

● **Quick stop deceleration (6085h)**

Sets the deceleration rate for the quick stop. This is the deceleration rate when the quick stop command of the drive state machine was enabled while the "Quick stop option code (605Ah)" was set to 2 or 6.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
6085h	00h	Quick stop deceleration [step/s^2]	U32	RW	RxPDO	○	1 to 1,000,000,000 (Initial value: 1,000,000)	B

● **Gear ratio (6091h)**

Sets the electronic gear. The electronic gear A is the denominator of the electronic gear, and the electronic gear B is the numerator of the electronic gear.

If the electronic gear is set, the resolution per revolution of the motor output shaft can be changed. Refer to "3-2 Resolution" on p.92 for details.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
6091h	00h	Number of entries	U8	RO	No	–	2	–
	01h	Electronic gear A	U32	RW	No	○	1 to 65,535 (Initial value: 1)	C
	02h	Electronic gear B	U32	RW	No	○	1 to 65,535 (Initial value: 1)	C

● **Homing method (6098h)**

Sets the return-to-home method for return-to-home operation. Refer to p.77 for details.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
6098h	00h	Homing method	INT8	RW	No	○	17, 18, 24, 28, 35, 37, −1 (Initial value: 24)	B

Details of range

Setting value	Description
17	Return-to-home by the limit sensor (FW-LS/RV-LS), starts in the negative direction
18	Return-to-home by the limit sensor (FW-LS/RV-LS), starts in the positive direction
24	Return-to-home by the home sensor (HOMES), starts in the positive direction
28	Return-to-home by the home sensor (HOMES), starts in the negative direction
35, 37 *	Home preset
−1	Return-to-home operation of our specifications

* 35 and 37 perform the same action.

● **Homing speed (6099h)**

Sets the operating speed and actual speed for return-to-home operation. The actual speed is the operating speed when aligning with the home finally.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
6099h	00h	Number of entries	U8	RO	No	–	2	–
	01h	Speed during search for switch [Hz]	U32	RW	No	○	1 to 4,000,000 (Initial value: 10,000)	B
	02h	Speed during search for zero [Hz]	U32	RW	No	○	1 to 10,000 (Initial value: 5,000)	B

● **Homing acceleration (609Ah)**

Sets the acceleration and deceleration rate for return-to-home operation.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
609Ah	00h	Homing acceleration [step/s^2]	U32	RW	No	○	1 to 1,000,000,000 (Initial value: 300,000)	B

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● **Touch probe function (60B8h)**

Sets the action of the touch probe. Refer to p.89 for details.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
60B8h	00h	Touch probe function	U16	RW	RxPDO	–	0000h to FFFFh (Initial value: 0000h)	A

Details of range

Bit	Name	Value	Definition
0	Touch probe 1 permission	0	Disables touch probe 1.
		1	Enables touch probe 1.
1	Touch probe 1 trigger action	0	First trigger action Latches only once on the first trigger.
		1	Continuous operation Latches every time a trigger is input.
2	Touch probe 1 trigger selection	0	Sets the external latch input EXT1 as a trigger.
		1	Sets the ZSG output or TIM output as a trigger.
3	Reserved	0	Reserved
4	Touch probe 1 up-edge action	0	Disables the latch function at the up-edge of a trigger.
		1	Enables the latch function at the up-edge of a trigger.
5	Touch probe 1 down-edge action	0	Disables the latch function at the down-edge of a trigger.
		1	Enables the latch function at the down-edge of a trigger.
6	Reserved	0	Reserved
7	Reserved	0	Reserved
8	Touch probe 2 permission	0	Disables touch probe 2.
		1	Enables touch probe 2.
9	Touch probe 2 trigger action	0	First trigger action Latches only once on the first trigger.
		1	Continuous operation Latches every time a trigger is input.
10	Touch probe 2 trigger selection	0	Sets the external latch input EXT1 as a trigger.
		1	Sets the ZSG output or TIM output as a trigger.
11	Reserved	0	Reserved
12	Touch probe 2 up-edge action	0	Disables the latch function at the up-edge of a trigger.
		1	Enables the latch function at the up-edge of a trigger.
13	Touch probe 2 down-edge action	0	Disables the latch function at the down-edge of a trigger.
		1	Enables the latch function at the down-edge of a trigger.
14	Reserved	0	Reserved
15	Reserved	0	Reserved

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● **Touch probe status (60B9h)**

Indicates the status of the touch probe. Refer to p.89 for details.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
60B9h	00h	Touch probe status	U16	RO	TxPDO	–	–	–

Details of range

Bit	Name	Value	Definition
0	Touch probe 1 permission status	0	Touch probe 1 is disabled.
		1	Touch probe 1 is enabled.
1	Touch probe 1 up-edge latch	0	Has not latch on the up-edge of the touch probe 1.
		1	Latched on the up-edge of the touch probe 1.
2	Touch probe 1 down-edge latch	0	Has not latch on the down-edge of the touch probe 1.
		1	Latched on the down-edge of the touch probe 1.
3 to 7	Reserved	0	Reserved
8	Touch probe 2 permission status	0	Touch probe 2 is disabled.
		1	Touch probe 2 is enabled.
9	Touch probe 2 up-edge latch	0	Has not latch on the up-edge of the touch probe 2.
		1	Latched on the up-edge of the touch probe 2.
10	Touch probe 2 down-edge latch	0	Has not latch on the down-edge of the touch probe 2.
		1	Latched on the down-edge of the touch probe 2.
11 to 15	Reserved	0	Reserved

● **Touch probe position 1 positive value (60BAh)**

Indicates the position latched at the up-edge of the touch probe 1.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
60BAh	00h	Touch probe position 1 positive value [step]	INT32	RO	TxPDO	–	–	–

● **Touch probe position 1 negative value (60BBh)**

Indicates the position latched at the down-edge of the touch probe 1.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
60BBh	00h	Touch probe position 1 negative value [step]	INT32	RO	TxPDO	–	–	–

● **Touch probe position 2 positive value (60BCh)**

Indicates the position latched at the up-edge of the touch probe 2.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
60BCh	00h	Touch probe position 2 positive value [step]	INT32	RO	TxPDO	–	–	–

● **Touch probe position 2 negative value (60BDh)**

Indicates the position latched at the down-edge of the touch probe 2.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
60BDh	00h	Touch probe position 2 negative value [step]	INT32	RO	TxPDO	–	–	–

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● **Supported homing methods (60E3h)**

Indicates the method of return-to-home supported by the driver.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
60E3h	00h	Number of entries	U8	RO	No	–	6	–
	01h	1st supported homing method	U16	RO	No	–	17	–
	02h	2nd supported homing method	U16	RO	No	–	18	–
	03h	3rd supported homing method	U16	RO	No	–	24	–
	04h	4th supported homing method	U16	RO	No	–	28	–
	05h	5th supported homing method	U16	RO	No	–	35	–
	06h	6th supported homing method	U16	RO	No	–	37	–

Details of range

Setting value	Description
17	Return-to-home by the limit sensor (FW-LS/RV-LS), starts in the negative direction
18	Return-to-home by the limit sensor (FW-LS/RV-LS), starts in the positive direction
24	Return-to-home by the home sensor (HOMES), starts in the positive direction
28	Return-to-home by the home sensor (HOMES), starts in the negative direction
35, 37 *	Home preset

* 35 and 37 perform the same action.

● **Following error actual value (60F4h)**

Indicates the deviation between the command position and feedback position (actual position).

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
60F4h	00h	Following error actual value [step]	INT32	RO	TxPDO	–	–	–

● **Digital inputs (60FDh)**

Indicates the direct I/O status.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
60FDh	00h	Digital inputs	U32	RO	TxPDO	–	–	–

Details of range

Bit	Name	Description
0	RV-BLK *1	Status of the RV-BLK input (0: OFF, 1: ON) *2
1	FW-BLK *1	Status of the FW-BLK input (0: OFF, 1: ON) *2
2	HOMES *1	Status of the HOMES input (0: OFF, 1: ON) *2
3 to 15	–	Reserved
16	EXT1 *1	Status of the EXT1 input (0: OFF, 1: ON) *2
17	EXT2 *1	Status of the EXT2 input (0: OFF, 1: ON) *2
18 to 19	–	Reserved
20	ZSG	Status of the ZSG output (0: OFF, 1: ON) *2
21 to 23	–	Reserved
24	DIN0	Status of the DIN0 input (0: Not carrying current, 1: Carrying current) *3
25	DIN1	Status of the DIN1 input (0: Not carrying current, 1: Carrying current) *3
26	DIN2	Status of the DIN2 input (0: Not carrying current, 1: Carrying current) *3
27	DIN3	Status of the DIN3 input (0: Not carrying current, 1: Carrying current) *3
28 to 31	–	Reserved

*1 To acquire the status, input signals are required to assign to the input terminals IN0 to IN3 of the input signal connector (CN9). Assign using the DIN0 input function (4840h) to DIN3 input function (4843h).

*2 Normally open; ON: Carrying current, OFF: Not carrying current
Normally closed; ON: Not carrying current, OFF: Carrying current

*3 Carrying current or "Not carrying current" state of the internal photocoupler is represented.

● **Digital outputs (60FEh)**

Controls the electromagnetic brake.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
60FEh	00h	Number of entries	U8	RO	No	–	2	–
	01h	Physical outputs	U32	RW	RxPDO	–	0000 0000h to FFFF FFFFh (Initial value: 0000 0000h)	A
	02h	Bit mask	U32	RW	No	–	0000 0000h to FFFF FFFFh (Initial value: 0000 0000h)	A

Details of the physical outputs

Bit	Name	Description
0	Electromagnetic brake control	0: Electromagnetic brake is in a state of releasing 1: Electromagnetic brake is in a state of holding
1 to 31	–	Reserved

Details of the bit mask

Bit	Name	Description
0	Mask of Bit0	0: Brake control of physical outputs disable 1: Brake control of physical outputs enable
1 to 31	–	Reserved

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- **Target velocity (60FFh)**

Sets the operating speed for the cyclic synchronous velocity mode and Profile velocity mode.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
60FFh	00h	Target velocity [Hz]	INT32	RW	RxPDO	–	−4,000,000 to 4,000,000 (Initial value: 0)	A

- **Supported drive modes (6502h)**

Indicates the operation mode supported by the product.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
6502h	00h	Supported drive modes	U32	RO	No	–	0000 01A5h	–

Details of range

Bit	Name	Value	Description
0	PP (Profile position mode)	1	1: Supported.
1	VL (Velocity mode)	0	0: Not supported.
2	PV (Profile velocity mode)	1	1: Supported.
3	TQ (Toruque profile mode)	0	0: Not supported.
4	Reserved	0	Reserved
5	HM (Homing mode)	1	1: Supported.
6	IP (Interpolated position mode)	0	0: Not supported.
7	CSP (Cyclic synchronous position mode)	1	1: Supported.
8	CSV (Cyclic synchronous velocity mode)	1	1: Supported.
9	CST (Cyclic synchronous torque mode)	0	0: Not supported.
10 to 31	Reserved	0	Reserved

- **Device profile number (67FFh)**

Indicates the device type and profile number.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
67FFh	00h	Device profile number	U32	RO	No	–	0004 0192h	–

Details of range

Bit	Name	Description
0 to 15	Device profile	0192h: DS402
16 to 31	Device type	0004h: Stepping motor

6-4 Objects of the manufacturer-specific area

These are our specific objects.

■ Controller objects

Indicates the status of the entire driver, and perform the control.

● Controller status 1 (2E31h)

Indicates the status of the controller axis.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
2E31h	00h	Controller status 1	U8	RO	TxPDO	–	–	–

Details of range

Bit	Name	Value	Description
0	ALM	0	An alarm is not generated in the controller axis.
		1	An alarm is being generated in the controller axis.
1	Reserved	0	Reserved
2	C-SUC	0	An error occurs in communication between the controller axis and driver axis. Communication is normally started after about 2 seconds when the control power supply is turned on. The value is 0 during initialization of communication.
		1	Communication between the controller axis and driver axis is being performed normally. The value is 1 when communication is being performed normally in all axes that request the connection of the driver axis. The connection request of the driver axis can be checked by the "Controller status 5 (2E35h)," and the communication response can be checked with the "Controller status 6 (2E36h). "
3	Reserved	0	Reserved
4	TH-ALM	0	The regeneration resistor is not overheating.
		1	The regeneration resistor is overheating. Or thermal input signal of the regeneration resistor is not connected.
5	Reserved	0	Reserved
6	FAN-ALM	0	A standstill state of the fan is not detected.
		1	A standstill state of the fan was detected. Or a fan is not connected. If a standstill state of the fan was detected for 10 consecutive seconds during the operation command of the fan, the value changes to 1.
7	OH	0	The operation command of the fan is OFF.
		1	The operation command of the fan is performed. If information of an overheat in the driver axis is generated, the value changes to 1.

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● **Controller status 2 (2E32h)**

Indicates the status of the alarm generation in the driver axis.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
2E32h	00h	Controller status 2	U8	RO	TxPDO	–	–	–

Details of range

Bit	Name	Value	Description
0	ALM-Axis 1	0	An alarm is not generated in the driver axis 1.
		1	An alarm is being generated in the controller axis 1.
1	ALM-Axis 2	0	An alarm is not generated in the driver axis 2.
		1	An alarm is being generated in the controller axis 2.
2	ALM-Axis 3	0	An alarm is not generated in the driver axis 3.
		1	An alarm is being generated in the controller axis 3.
3	ALM-Axis 4	0	An alarm is not generated in the driver axis 4.
		1	An alarm is being generated in the controller axis 4.
4 to 7	Reserved	0	Reserved

● **Controller status 3 (2E33h)**

The Controller status 3 is reserved.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
2E33h	00h	Controller status 3	U8	RO	TxPDO	–	–	–

● **Controller status 4 (2E34h)**

The Controller status 4 is reserved.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
2E34h	00h	Controller status 4	U8	RO	TxPDO	–	–	–

● **Controller status 5 (2E35h)**

Indicates the connection request of internal communication.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
2E35h	00h	Controller status 5	U8	RO	TxPDO	–	–	–

Details of range

Bit	Name	Value	Description
0	REQ1	0	The status is disabled since there is no communication request with the driver axis 1.
		1	The status is enabled since there is a communication request with the driver axis 1.
1	REQ2	0	The status is disabled since there is no communication request with the driver axis 2.
		1	The status is enabled since there is a communication request with the driver axis 2.
2	REQ3	0	The status is disabled since there is no communication request with the driver axis 3.
		1	The status is enabled since there is a communication request with the driver axis 3.
3	REQ4	0	The status is disabled since there is no communication request with the driver axis 4.
		1	The status is enabled since there is a communication request with the driver axis 4.
4 to 7	Reserved	0	Reserved

● **Controller status 6 (2E36h)**

Indicates the connection response of internal communication.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
2E36h	00h	Controller status 6	U8	RO	TxPDO	–	–	–

Details of range

Bit	Name	Value	Description
0	LINK1	0	Communication with the driver axis 1 is not established.
		1	Communication with the driver axis 1 has been established.
1	LINK2	0	Communication with the driver axis 2 is not established.
		1	Communication with the driver axis 2 has been established.
2	LINK3	0	Communication with the driver axis 3 is not established.
		1	Communication with the driver axis 3 has been established.
3	LINK4	0	Communication with the driver axis 4 is not established.
		1	Communication with the driver axis 4 has been established.
4 to 7	Reserved	0	Reserved

● **Controller command 1 (2F01h)**

Controls the status of the controller axis.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
2F01h	00h	Controller command 1	U8	RW	RxPDO	–	00h to FFh	A

Details of range

Bit	Name	Value	Description
0	ALM-RST	0 to 1	Reset the alarm of the controller axis.
1 to 7	Reserved	0	Reserved

● **Controller command 2 (2F02h)**

Controls the status of the driver axis.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
2F02h	00h	Controller command 2	U8	RW	RxPDO	–	00h to FFh	A

Details of range

Bit	Name	Value	Description
0	ALM-RST-DRV	0 to 1	Resets alarms in all driver axes at a time.
1	STOP-DRV	0	The operation of the driver axis does not stop.
		1	Stops the operations for all driver axes. The stop action is followed by the "STOP input action (4700h)."
2 to 7	Reserved	0	Reserved

● **Controller command 3 (2F03h)**

Executes the position preset (P-PRESET) of the driver axis. If the position preset (P-PRESET) is performed, the command position and actual position becomes the value set in the "Home offset (607Ch)," and the home is set. Set the "Home offset (607Ch)" per axis.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
2F03h	00h	Controller command 3	U8	RW	RxPDO	–	00h to FFh	A

Details of range

Bit	Name	Value	Description
0	PRESET-Axis 1	0 to 1	Performs the position preset (P-PRESET) for the driver axis 1.
1	PRESET-Axis 2	0 to 1	Performs the position preset (P-PRESET) for the driver axis 2.
2	PRESET-Axis 3	0 to 1	Performs the position preset (P-PRESET) for the driver axis 3.
3	PRESET-Axis 4	0 to 1	Performs the position preset (P-PRESET) for the driver axis 4.
4 to 7	Reserved	0	Reserved

■ Driver objects

These are objects for the driver axis 1 to driver axis 4.
This document describes the sub-index as " * ." Access after setting the axis number (1 to 4) in the sub-index of each object. Refer to the **AZ** Series OPERATING MANUAL Function Edition for driver objects that are not described in this document.

● Operation voltage mode (40B7h)

Indicates the voltage mode of the actual main power supply. Sets the voltage mode of the main power supply using the "Main power mode (41FAh)."

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
	00h	Number of entries	U8	RO	No	–	4	–
	01h	Axis 1 Operation voltage mode	U8	RO	No	–	–	–
40B7h	02h	Axis 2 Operation voltage mode	U8	RO	No	–	–	–
	03h	Axis 3 Operation voltage mode	U8	RO	No	–	–	–
	04h	Axis 4 Operation voltage mode	U8	RO	No	–	–	–

Details of range

Setting value	Description
0	The main power supply is not turned on. [When the "Main power mode (41FAh)" is set to −1 (automatic discrimination)]
24	Operates in the 24 VDC mode.
48	Operates in the 48 VDC mode.

● Current setting during push-motion (413Ch)

Setting method of the current of push-motion operation is selected.
When "0: Push current" is selected, set with the push current (4121h). Set the current value other than push-motion operation with the Operating current (4120h).
When "1: Operating current" is selected, set the current value for all operation with the Operating current (4120h).

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
	00h	Number of entries	U8	RO	No	–	4	–
	01h	Axis 1 Current setting during push-motion	U8	RW	No	○		A
413Ch	02h	Axis 2 Current setting during push-motion	U8	RW	No	○	0, 1 (Initial vlaue: 0)	A
	03h	Axis 3 Current setting during push-motion	U8	RW	No	○		A
	04h	Axis 4 Current setting during push-motion	U8	RW	No	○		A

Details of range

Setting value	Description
0	Push current
1	Operating current

● **Non-excitation mode selection (413Dh)**

Selects whether to enable the dynamic brake status or the free-run status when the motor is in a non-excitation state. In the dynamic brake status, the motor windings will be in a state of being short-circuited inside the driver, and the braking torque will generate. In the free-run status, the dynamic brake will be disabled, and the braking torque will not generate.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
413Dh	00h	Number of entries	U8	RO	No	–	4	–
	01h	Axis 1 Non-excitation mode selection	U8	RW	No	○	0, 1 (Initial value: 0)	A
	02h	Axis 2 Non-excitation mode selection	U8	RW	No	○	0, 1 (Initial value: 0)	A
	03h	Axis 3 Non-excitation mode selection	U8	RW	No	○	0, 1 (Initial value: 0)	A
	04h	Axis 4 Non-excitation mode selection	U8	RW	No	○	0, 1 (Initial value: 0)	A

Details of range

Setting value	Description
0	Dynamic brake status
1	Free-run status

● **Wrap positioning mode (414Fh)**

Sets the operation mode for wrap positioning operation.
For details about operation mode, refer to "Operation mode of the profile position mode" on p.64.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
414Fh	00h	Number of entries	U8	RO	No	–	4	–
	01h	Axis 1 Wrap positioning mode	U8	RW	RxPDO	○	0, 1, 2, 3 (Initial value: 0)	B
	02h	Axis 2 Wrap positioning mode	U8	RW	RxPDO	○	0, 1, 2, 3 (Initial value: 0)	B
	03h	Axis 3 Wrap positioning mode	U8	RW	RxPDO	○	0, 1, 2, 3 (Initial value: 0)	B
	04h	Axis 4 Wrap positioning mode	U8	RW	RxPDO	○	0, 1, 2, 3 (Initial value: 0)	B

Details of range

Setting value	Description
0	Wrap absolute positioning
1	Wrap proximity
2	Wrap forward direction
3	Wrap reverse direction

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● **RG overheat alarm (4185h)**

Sets the action when the overheat status was detected by the regeneration resistor. If any of the driver axes is set to enable, all driver axes are enabled.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
	00h	Number of entries	U8	RO	No	–	4	–
	01h	Axis 1 RG overheat alarm	U8	RW	No	○	0, 1 (Initial value: 0)	A
4185h	02h	Axis 2 RG overheat alarm	U8	RW	No	○	0, 1 (Initial value: 0)	A
	03h	Axis 3 RG overheat alarm	U8	RW	No	○	0, 1 (Initial value: 0)	A
	04h	Axis 4 RG overheat alarm	U8	RW	No	○	0, 1 (Initial value: 0)	A

Details of range

Setting value	Description
0	Disable: Even if an overheat of the regeneration resistor was detected, an alarm is not generated.
1	Enable: If an overheat of the regeneration resistor is detected, an alarm is generated.

Note Do not set this object to "1: Enable" because **AZD2B-KED** cannot connect to the regeneration resistor. An alarm of the regeneration resistor overheat is generated if it is set to "1: Enable."

● **FAN low speed alarm (4186h)**

Sets the action when the standstill state of the fan was detected. If any of the driver axes is set to enable, all driver axes are enabled.
If the driver temperature information is generated in the driver axis, the operation command is sent from the driver to the fan. If a standstill state of the fan was detected for 10 consecutive seconds during the operation command of the fan, an alarm of the fan low-speed is generated.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
	00h	Number of entries	U8	RO	No	–	4	–
	01h	Axis 1 FAN low speed alarm	U8	RW	No	○	0, 1 (Initial value: 0)	A
4186h	02h	Axis 2 FAN low speed alarm	U8	RW	No	○	0, 1 (Initial value: 0)	A
	03h	Axis 3 FAN low speed alarm	U8	RW	No	○	0, 1 (Initial value: 0)	A
	04h	Axis 4 FAN low speed alarm	U8	RW	No	○	0, 1 (Initial value: 0)	A

Details of range

Setting value	Description
0	Disable: Even if a standstill state of the fan is detected, an alarm is not generated.
1	Enable: If a standstill state of the fan is detected, an alarm is generated.

Note Do not set this object to "1: Enable" because **AZD2B-KED** cannot connect to the fan. An alarm of the fan low-speed is generated if it is set to "1: Enable."

● **Other axis alarm (4187h)**

When an alarm is generated in any of the driver axes, it causes the alarm to generate in all other driver axes. If any of the driver axes is set to enable, all driver axes are enabled.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
4187h	00h	Number of entries	U8	RO	No	–	4	–
	01h	Axis 1 Other axis alarm	U8	RW	No	○	0, 1 (Initial value: 0)	A
	02h	Axis 2 Other axis alarm	U8	RW	No	○	0, 1 (Initial value: 0)	A
	03h	Axis 3 Other axis alarm	U8	RW	No	○	0, 1 (Initial value: 0)	A
	04h	Axis 4 Other axis alarm	U8	RW	No	○	0, 1 (Initial value: 0)	A

Details of range

Setting value	Description
0	Disable: Even if an alarm was generated in any of the driver axes, it is not generated in other driver axes.
1	Enable: If an alarm is generated in any of the driver axes, it is generated in all other driver axes.

● **Main power mode (41FAh)**

Sets the voltage mode of the main power supply. Apply the same setting for all the driver axes.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
41FAh	00h	Number of entries	U8	RO	No	–	4	–
	01h	Axis 1 main power mode	INT8	RW	No	○	−1, 0, 1 (Initial value: −1)	D
	02h	Axis 2 main power mode	INT8	RW	No	○	−1, 0, 1 (Initial value: −1)	D
	03h	Axis 3 main power mode	INT8	RW	No	○	−1, 0, 1 (Initial value: −1)	D
	04h	Axis 4 main power mode	INT8	RW	No	○	−1, 0, 1 (Initial value: −1)	D

Details of range

Setting value	Description
−1	Automatic discrimination (discriminates the input power supply voltage automatically.)
0	24 VDC mode
1	48 VDC mode

Note
- The optimal values in the motor control parameters are set in the driver according to the voltage mode. Unless the voltage mode is set correctly, the torque may decrease or vibration may increase.
- If −1 is set, after the control power supply is supplied, the voltage value is automatically discriminated when the main power supply is turned on first. Be sure to shut off the control power supply before changing the voltage of the main power supply.
- When 48 VDC is used, if the rise time of 50 ms or more is needed while the driver input voltage rises to 32 V from 10 V, set the value to 1 instead of −1 (automatic discrimination). If the rise time is slow, the voltage mode may wrongly be recognized as 24 VDC, resulting in torque deterioration or vibration.
- The voltage mode actually operated can be checked by the "Operation voltage mode (40B7h)."

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● **Touch probe 1 latch position (44B0h)**

Sets the position to latch by the external latch input (EXT1). The changed value is updated when the "Touch probe 1 permission (60B8h: Bit0)" is changed from 0 to 1.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
44B0h	00h	Number of entries	U8	RO	No	–	4	–
	01h	Axis 1 touch probe 1 latch position	U8	RW	No	○	0, 1 (Initial value: 0)	A
	02h	Axis 2 touch probe 1 latch position	U8	RW	No	○	0, 1 (Initial value: 0)	A
	03h	Axis 3 touch probe 1 latch position	U8	RW	No	○	0, 1 (Initial value: 0)	A
	04h	Axis 4 touch probe 1 latch position	U8	RW	No	○	0, 1 (Initial value: 0)	A

Details of range

Setting value	Description
0	Latches the feedback position (actual position).
1	Latches the command position.

● **Touch probe 2 latch position (44B1h)**

Sets the position to latch by the external latch input (EXT2). The changed value is updated when the "Touch probe 2 permission (60B8h: Bit0)" is changed from 0 to 1.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
44B1h	00h	Number of entries	U8	RO	No	–	4	–
	01h	Axis 1 touch probe 2 latch position	U8	RW	No	○	0, 1 (Initial value: 0)	A
	02h	Axis 2 touch probe 2 latch position	U8	RW	No	○	0, 1 (Initial value: 0)	A
	03h	Axis 3 touch probe 2 latch position	U8	RW	No	○	0, 1 (Initial value: 0)	A
	04h	Axis 4 touch probe 2 latch position	U8	RW	No	○	0, 1 (Initial value: 0)	A

Details of range

Setting value	Description
0	Latches the feedback position (actual position).
1	Latches the command position.

● **Touch probe 1 TIM/ZSG signal select (44B2h)**

Sets the ZGS output or TIM output as a trigger. The changed value is updated when the "Touch probe 1 permission (60B8h: Bit0)" is changed from 0 to 1.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
44B2h	00h	Number of entries	U8	RO	No	–	4	–
	01h	Axis 1 touch probe 1 TIM/ZSG signal select	U8	RW	No	○	0, 1 (Initial value: 0)	A
	02h	Axis 2 touch probe 1 TIM/ZSG signal select	U8	RW	No	○	0, 1 (Initial value: 0)	A
	03h	Axis 3 touch probe 1 TIM/ZSG signal select	U8	RW	No	○	0, 1 (Initial value: 0)	A
	04h	Axis 4 touch probe 1 TIM/ZSG signal select	U8	RW	No	○	0, 1 (Initial value: 0)	A

Details of range

Setting value	Description
0	Latches by the ZSG output.
1	Latches by the TIM output.

● **Touch probe 2 TIM/ZSG signal select (44B3h)**

Sets the ZGS output or TIM output as a trigger. The changed value is updated when the "Touch probe 2 permission (60B8h: Bit8)" is changed from 0 to 1.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
44B3h	00h	Number of entries	U8	RO	No	–	4	–
	01h	Axis 1 touch probe 2 TIM/ZSG signal select	U8	RW	No	○	0, 1 (Initial value: 0)	A
	02h	Axis 2 touch probe 2 TIM/ZSG signal select	U8	RW	No	○	0, 1 (Initial value: 0)	A
	03h	Axis 3 touch probe 2 TIM/ZSG signal select	U8	RW	No	○	0, 1 (Initial value: 0)	A
	04h	Axis 4 touch probe 2 TIM/ZSG signal select	U8	RW	No	○	0, 1 (Initial value: 0)	A

Details of range

Setting value	Description
0	Latches by the ZSG output.
1	Latches by the TIM output.

● **Driver axis CPU number (4642h)**

Indicates the CPU number of the software of the driver axis.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
4642h	00h	Number of entries	U8	RO	No	–	4	–
	01h	Axis 1 Driver axis CPU number	U16	RO	No	–	–	–
	02h	Axis 2 Driver axis CPU number	U16	RO	No	–	–	–
	03h	Axis 3 Driver axis CPU number	U16	RO	No	–	–	–
	04h	Axis 4 Driver axis CPU number	U16	RO	No	–	–	–

● **Driver axis software version (4643h)**

Indicates the software version of the driver. 0100h is indicated when the version is 1.00.

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
4643h	00h	Number of entries	U8	RO	No	–	4	–
	01h	Axis 1 Driver axis software version	U16	RO	No	–	–	–
	02h	Axis 2 Driver axis software version	U16	RO	No	–	–	–
	03h	Axis 3 Driver axis software version	U16	RO	No	–	–	–
	04h	Axis 4 Driver axis software version	U16	RO	No	–	–	–

7   Alarm and information

This chapter explains the alarm function and the information function.

7-1   Alarm

This driver has the alarm function to protect from temperature rise, poor connection, error in operation, and others. 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 ALARM LED blinks in red. The present alarm can be checked by counting the number of times the ALARM LED blinks, or via EtherCAT communication.

Example of the ALARM LED blinking (when the number of blinking times is seven)
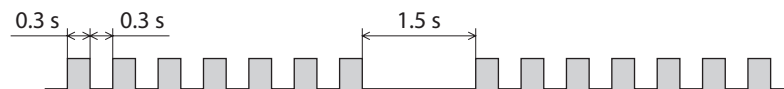
■ Alarm reset

Before resetting an alarm, always remove the cause of the alarm and ensure safety, and perform one of the reset operations specified below.
- Set the "Fault reset (6040h: Bit7)" of the controlword to 1. (It is enabled when changing from 0 to 1.)
- Set the "ALM-RST-DRV (Bit0)" of the "Controller command 2 (2F02h)" to 1. (It is enabled when changing from 0 to 1.)
- Set the alarm reset (40C0h) of EtherCAT communication to 1. (It is enabled when changing from 0 to 1.)
- Turn the ALM-RST input from OFF to ON. (The alarm will be reset at the ON edge of the ALM-RST input.)
- Perform the alarm reset using the **MEXE02**.
- Turn on the control power supply again.

> **Note** When turning on the control power supply again, turn off the control power supply and wait for at least 5 seconds before doing so. Turning on the control power supply again immediately after turning off may cause damage to the driver.

> **memo** • Some alarms cannot be reset by other methods than turning on the control power supply again. For details, check with "Alarm list" on p.155.
> • An alarm of the absolute position error can be reset if the control power supply is turned on again after the position preset (P-PRESET) is executed. If it cannot be reset with this method, the ABZO sensor may be damaged.

■ Alarm history

Up to 10 generated alarm items are stored in the non-volatile memory in order of the latest to oldest. The alarm history stored in the non-volatile memory can be read or cleared if one of the following is performed.
- Read the alarm records by the "Alarm history (4041h to 404Ah)" via EtherCAT communication.
- Clear the records by setting the "Clear alarm history (40C2h)" of EtherCAT communication to 1. (It is enabled when changing from 0 to 1.)
- Read and clear the alarm records using the **MEXE02**.

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■ Alarm list

● Alarms of the controller axis

Alarm code	Number of times LED blinks	Alarm type	Cause	Remedial action	How to reset (p.154)
41h	9	EEPROM error	Data stored in the controller axis was damaged.	Initialize all parameters.	Turn on the control power supply again
4Ch	7	Network initialization error	An error was detected during initialization of the EtherCAT module.	Turn on the control power supply again. If the problem persists, contact your nearest Oriental Motor sales office.	Turn on the control power supply again
82h	7	Driver internal communication error 1	An error was detected via communication with the network CPU.	Refer to "Alarm reset" on p.154, and reset the alarm. If the problem persists, contact your nearest Oriental Motor sales office.	Any of the reset operations
84h	7	Driver internal communication error 2	An error was detected in internal RS-485 communication.	Turn on the control power supply again. If the problem persists, contact your nearest Oriental Motor sales office.	Turn on the control power supply again
F0h	Light	CPU error	The CPU was malfunctioned.	Turn on the control power supply again.	Turn on the control power supply again

● Alarms of the driver axis

Note If an alarm is generated in the driver axis, the motor will put into a non-excitation state.

Alarm code	Number of times LED blinks	Alarm type	Cause	Remedial action	How to reset (p.154)
10h	4	Excessive position deviation	● When the motor was in a state of current on, the deviation between the command position and feedback position exceeded the value set in the "Following error window (6065h)" in the motor output shaft. ● The load is large, or the acceleration/deceleration is too short for the load. ● The operation range of push-motion positioning operation was exceeded.	● Decrease the load. ● Increase the acceleration/ deceleration time or slow the acceleration/deceleration rate. ● Increase the operating current. ● Reconsider the operation data.	Any of the reset operations
20h	5	Overcurrent	The motor, cable and driver output circuit were shorted.	Turn off the main power supply and the control power supply, and check the motor, the cable, and the driver are not damaged before turning on the main power supply and the control power supply again.	Turn on the control power supply again
21h	2	Main circuit overheat	The internal temperature of the driver reached the upper limit of the specified value.	Reconsider the ventilation condition.	Any of the reset operations

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Alarm code	Number of times LED blinks	Alarm type	Cause	Remedial action	How to reset (p.154)
22h	3	Overvoltage	• The main power supply voltage exceeded the allowable value. • A large inertia load was suddenly stopped. • Vertical operation was performed.	• Check the input voltage of the main power supply. • Decrease the load. • Increase the acceleration/deceleration time or slow the acceleration/deceleration rate. • In the case of **AZD2A-KED**, **AZD3A-KED**, and **AZD4A-KED**, connect the Oriental Motor regeneration resistor. check the model name on p.41.	Any of the reset operations
23h	3	Main power off	• The main power supply was shut off while operating. • The temperature of the power supply circuit inside the driver reached the upper limit of the specifications.	• Check if the main power supply is applied normally. • Reconsider the load condition or operating condition so that the input current of the main power supply is the average of 4.0 A (maximum of 7.0 A) or less. • Reconsider the ventilation condition.	Any of the reset operations
25h	3	Undervoltage	The main power supply was shut off momentarily or a voltage shortage was generated.	Check the input voltage of the main power supply.	Any of the reset operations
26h	8	Motor overheat	The detection temperature of the ABZO sensor reached the upper limit of the specified value.	• Check the heat radiating status of the motor. • Reconsider the ventilation condition.	Any of the reset operations
28h	8	Sensor error	An error of the ABZO sensor was detected during operation.	Turn off the main power supply and control power supply, and check the connection of the motor. After that, turn on the main power supply and control power supply again	Turn on the control power supply again
29h	9	CPU peripheral circuit error	The voltage around the CPU was decreased by shutting of the control power supply instantaneously.	• Turn on the control power supply again. • Check the input voltage of the control power supply. • Check the capacity of control power supply.	Turn on the control power supply again
2Ah	8	ABZO sensor communication error	An error was detected in communication between the driver and ABZO sensor.	Turn off the main power supply and control power supply, and check the connection of the ABZO sensor. After that, turn on the main power supply and control power supply again.	Turn on the control power supply again
30h	2	Overload	A load exceeding the maximum torque was applied for the time exceeding the value set in the "Overload alarm (4180h)."	• Decrease the load. • Increase the acceleration/deceleration time or slow the acceleration/deceleration rate. • Increase the operating current.	Any of the reset operations

Alarm code	Number of times LED blinks	Alarm type	Cause	Remedial action	How to reset (p.154)
31h	2	Overspeed	The actual speed of the motor output shaft exceeded the specified value.	• Reconsider the "Gear ratio (6091h)" and set the speed of the motor output shaft to the specified value or less. • If the motor is overshooting at the time of acceleration, increase the acceleration time or slow the acceleration rate.	Any of the reset operations
33h	7	Absolute position error	The home information of the ABZO sensor was damaged.	Execute the position preset (P-PRESET), and turn on the control power supply again. After that, set the home again.	Turn on the control power supply again
34h	2	Command pulse error	• The command pulse frequency exceeded the specified value. • The position preset (P-PRESET) of the driver was executed in the cyclic synchronous position mode when the motor was in an excitation state.	• Decrease the command pulse frequency. • Put the motor into a non-excitation state before executing the position preset (P-PRESET) of the driver in the cyclic synchronous position mode.	Any of the reset operations
35h	2	Alarm detection of other axes	An alarm was generated in any of the driver axes in a state where the "Other axis alarm (4187h)" was enabled.	Check the details of the alarm, and perform the remedial action. After that, execute the alarm reset per driver axis.	Any of the reset operations
41h	9	EEPROM error	Data stored in the controller axis was damaged.	Initialize all parameters.	Turn on the control power supply again
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 control power supply, and check the connection of the ABZO sensor. After that, turn on the main power supply and control power supply again.	Turn on the control power supply again
43h	8	Rotation error at power on	The motor was rotating when the control power supply was turned on.	Adjust the load conditions and make sure the motor output shaft does not rotate due to an external force when the control power supply is turned on.	Turn on the control power supply again
44h	8	Encoder EEPROM error	Data stored in the ABZO sensor was damaged.	Execute one of the following operations. If the same alarm is still generated, the ABZO sensor is damaged. Contact your nearest Oriental Motor sales office. • Reset the Z-phase with the maintenance command "ZSG-PRESET." • Execute "Clear tripmeter" of the **MEXE02** or "Clear tripmeter" of the maintenance command.	Turn on the control power supply again
45h	8	Motor combination error	A motor not supported by the driver is connected. (For details, refer to p.161.)	Check the motor model and driver model, and connect them in the correct combination.	Turn on the control power supply again

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Alarm code	Number of times LED blinks	Alarm type	Cause	Remedial action	How to reset (p.154)
4Ah	7	Return-to-home incomplete	Absolute positioning operation was started in a state where the position coordinate had not been set.	• Reconsider the setting of the "Permission of absolute positioning without setting absolute coordinates (4148h)." • Perform position preset (P-PRESET) or return-to-home operation.	Any of the reset operations
51h	2	Regeneration resistor overheat	• The "RG overheat alarm (4185h)" was enabled without connecting the regeneration resistor. • Regeneration resistor is not connected correctly. • Regeneration resistor was overheated extraordinarily.	• When the regeneration resistor is not used, disable the "RG overheat alarm (4185h)." • Connect the regeneration resistor correctly. • The allowable regenerative power of the regeneration resistor is exceeded. Reconsider the load and operating condition.	Any of the reset operations
54h	2	Fan rotation deterioration	• The "FAN low speed alarm (4186h)" was enabled without connecting the fan. • The "FAN low speed alarm (4186h)" was enabled in a state where nothing is connected to the stall alarm input of the fan (1 pin of CN13). • The fan is not connected properly. • A standstill state of the fan was detected for 10 consecutive seconds during the operation command of the fan.	• When the fan is not used, disable the "FAN low speed alarm (4186h)." • Connect the stall alarm signal of the fan properly. When the fan without the stall alarm signal is used, disable the "FAN low speed alarm (4186h)." • Connect the fan properly. • Check the fan connected.	Any of the reset operations
60h	7	±LS both sides active	• When the "FW-LS/RV-LS input action (4701h)" is set to "alarm present," both FW-LS and RV-LS inputs were detected. • Return-to-home operation was executed in a condition where both FW-LS and -RV-LS inputs were detected.	Check the sensor logic and the logic setting parameter.	Any of the reset operations
61h	7	Reverse ±LS connection	The LS input opposite to the operating direction has been detected while performing return-to-home operation in 2-sensor mode or 3-sensor mode.	Check the wiring of the sensor.	Any of the reset operations

Alarm code	Number of times LED blinks	Alarm type	Cause	Remedial action	How to reset (p.154)
62h	7	Return-to-home operation error	• An unanticipated load was applied during the return-to-home operation. • The installation positions of the FW-LS and RV-LS sensors and the HOME sensor are near to each other. • Position preset (P-PRESET) processing upon completion of return-to-home operation failed. • In return-to-home operation in one-way rotation mode, the motor passed by the HOME sensor during deceleration stop.	• Check the load. • Reconsider the sensor installation positions and the starting direction of motor operation. • See that a load exceeding the maximum torque is not applied upon completion of return-to-home operation. • Reconsider the specifications of the HOME sensor and the "Homing acceleration (609Ah)."	Any of the reset operations
63h	7	No HOMES	The HOMES input was not detected at a position between the FW-LS and RV-LS inputs while performing return-to-home operation in 3-sensor mode.	Install the HOME sensor at a position between the FW-LS and RV-LS sensors.	Any of the reset operations
64h	7	TIM, ZSG, SLIT signal error	None of the TIM output, ZSG output, or SLIT input could be detected while performing return-to-home operation.	• Reconsider the connection status of the load and the position of the HOMES sensor so that these signals should be ON while the HOMES input is ON. • Set the "(HOME) TIM/ZSG signal detection (4167h)" and the "(HOME) SLIT detection (4166h)" to "Disable" if the signals are not used.	Any of the reset operations
66h	7	Hardware overtravel	When the "FW-LS/RV-LS input action (4701h)" is set to "alarm present," FW-LS input or RV-LS input was detected.	• Reconsider the operation data. • Operate the motor in the opposite direction to escape from the sensor. You can operate in any of operation modes. It can be escaped even in return-to-home operation.	Any of the reset operations
67h	7	Software overtravel	When the "Software overtravel (41C3h)" is set to "alarm present," the motor position reached the set value of the software limit.	• Reconsider the operation data. • Operate the motor in the opposite direction to escape from the sensor. You can operate in any of operation modes. It can be escaped even in return-to-home operation.	Any of the reset operations
6Ah	7	Return-to-home operation offset error	When performing offset movement as part of return-to-home operation, FW-LS or RV-LS input has been detected.	Check the offset value.	Any of the reset operations
6Dh	7	Mechanical overtravel	A product for which home has been set reached the mechanical end.	Check the travel amount (position).	Any of the reset operations

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Alarm code	Number of times LED blinks	Alarm type	Cause	Remedial action	How to reset (p.154)
70h	7	Operation data error	• The operation was performed at the operating speed or operating current that was exceeded the setting value of the mechanism limit parameter. • The operation in the profile position mode was started when the operating speed was 0. • Wrap operation was executed when "Wrap setting (41C7h)" was disabled. • Push-motion operation or push-motion return-to-home operation was performed with the **DGII** Series.	• Reconsider the operation data. • Check the setting of the "Wrap setting (41C7h)." • Push-motion operation as well as push-motion return-to-home operation cannot be performed with the **DGII** Series.	Any of the reset operations
71h	7	Electronic gear setting error	The resolution set by the "Gear ratio (6091h)" was out of the specification.	Reconsider the "Gear ratio (6091h)" and set the resolution within the specified value.	Turn on the control power supply again
72h	7	Wrap setting error	The control power supply was turned on with a value of the wrap setting value that is inconsistent with the resolution set in the "Gear ratio (6091h)."	Set the wrap setting correctly and turn on the control power supply again.	Turn on the control power supply again
81h	7	Network bus error	• A communication error of EtherCAT communication was detected during operation. • The EtherCAT communication state machine (ESM) was transitioned to other than operational during operation.	Check the conditions of the connector, cable, and MainDevice of EtherCAT communication.	Any of the reset operations
82h	7	Driver internal communication error 1	An error was detected via communication with the network CPU.	Refer to "Alarm reset" on p.154, and reset the alarm. If the problem persists, contact your nearest Oriental Motor sales office.	Any of the reset operations
84h	7	Driver internal communication error 2	An error was detected three times consecutively in internal RS-485 communication.	Refer to "Alarm reset" on p.154, and reset the alarm. If the problem persists, contact your nearest Oriental Motor sales office.	Any of the reset operations
85h	7	Driver internal communication timeout	Internal RS-485 communication was not performed for 200 ms or more.	Refer to "Alarm reset" on p.154, and reset the alarm. If the problem persists, contact your nearest Oriental Motor sales office.	Any of the reset operations
F0h	Light	CPU error	CPU malfunctioned.	Turn on the control power supply again.	Turn on the control power supply again

■ Alarm generation conditions

The alarms in the table are generated when the generation conditions are exceeded.

Alarm code	Alarm name	Motor model	Generation condition
21h	Main circuit overheat [°C (°F)]	–	85 (185)
22h	Overvoltage (V)	–	63
23h	Main power supply OFF [°C (°F)]	–	100 (212)
26h	Motor overheat [°C (°F)]	–	85 (185)
31h	Overspeed (r/min)	**AZM14**, **AZM15** **AZM24**, **AZM26**	8,000
		AZM46, **AZM48**, **AZM66**	4,500
		AZM69	2,500
34h	Command pulse error (r/min)	–	38,400

■ Related objects

Index	Sub	Name	Description	Initial value
6065h	00h	Following error window	Sets the condition under which the excessive position deviation alarm is generated. **Setting range** 1 to 30,000 (1=0.01 rev)	300
4180h	*	Overload alarm	Sets the generation condition of the overload alarm. **Setting range** 1 to 300 (1=0.1 s)	50
4185h	*	RG overheat alarm	An alarm is generated when the regeneration resistor exceeded the allowable power consumption. If any of the driver axes is set to enable, all driver axes are enabled. **Setting range** 0: Disable 1: Enable	0
4186h	*	FAN low speed alarm	An alarm is generated when a standstill state of the fan was detected for 10 consecutive seconds during the operation command of the fan. If any of the driver axes is set to enable, all driver axes are enabled. **Setting range** 0: Disable 1: Enable	0
4187h	*	Other axis alarm	When an alarm is generated in any of the driver axes, it causes the alarm to generate in all other driver axes. If any of the driver axes is set to enable, all driver axes are enabled. **Setting range** 0: Disable 1: Enable	0

* Set the axis number (1 to 4) in the sub-index because of the driver object in the manufacturer-specific area.

■ 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 (motorized actuator) for the AC power supply was connected.
- When 48 VDC was supplied while connecting a motor (motorized actuator) which frame size was 20 mm (0.79 in.) or 28 mm (1.10 in.).
- When a motor (motorized actuator) not compatible with the software version of the driver axis is connected.
- When a motor (motorized actuator) of the frame size 20 mm (0.79 in.) or 28 mm (1.10 in.) was connected in a state where the "Power supply voltage mode (41FAh)" was set to "1: 48 VDC."

2 Communication Specifications Edition

7-2　　Information

The driver is equipped with a function to generate information output before an alarm is generated.
Setting of appropriate values to the parameter of each information will be a help for periodic maintenance of the equipment.
For example, a failure of the equipment or production stop due to motor overheat can be prevented by using the "Motor temperature information (41A8h)." In addition, the "Tripmeter information (41AFh)" will be a reference for maintenance conducted after a certain travel distance is reached.

◼ Status when information is generated

● Bit output of information

When information is generated, the bit output (INFO-** output) of the corresponding information is turned ON. (Details of bit outputs ⇨ p.165)
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.

● INFO output

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

● LED indicator

When information is generated, the POWER LED (green) and ALARM LED (red) of the driver axis blink twice at the same time.

● Operation of motor

Unlike an alarm, even if information is generated, the motor is operated continuously.

● Parameter

Each information has a corresponding "INFO action" parameter. When the parameter is set to "Not refleted," only the bit output of information is turned ON. The INFO output and LED are not changed.

Related parameters

Name	Description	Initial value
Information auto clear	When the cause of information is eliminated, the INFO output and the bit output of the corresponding information are turned OFF automatically. **Setting range** 0: Disable (not turned OFF automatically) 1: Enable (turned OFF automatically)	1
Information LED indicator	Sets the LED status when information is generated. **Setting range** 0: LED does not blink 1: LED blinks	1
INFO-USRIO output selection	Selects an output signal to be checked in the INFO-USRIO output. **Setting range** Output signal ⇨ p.101	128: CONST-OFF
INFO-USRIO output inversion	Sets the output logic of the INFO-USRIO output. **Setting range** 0: Not inverted 1: Inverted	0
Position deviation information (INFO-POSERR)	Sets the generation condition of the position deviation information (INFO-POSERR). **Setting range** 1 to 30,000 (1=0.01 rev)	300
Driver temperature information (INFO-DRVTMP)	Sets the generation condition of the driver temperature information (INFO-DRVTMP). **Setting range** 40 to 85 ℃	85

Name	Description	Initial value
Motor temperature information (INFO-MTRTMP)	Sets the generation condition of the motor temperature information (INFO-MTRTMP). **Setting range** 40 to 120 °C	85
Overvoltage information (INFO-OVOLT)	Sets the generation condition of the overvoltage information (INFO-OVOLT). **Setting range** 150 to 630 (1=0.1 V)	630
Undervoltage information (INFO-UVOLT)	Sets the generation condition of the undervoltage information (INFO-UVOLT). **Setting range** 150 to 630 (1=0.1 V)	180
Overload time information (INFO-OLTIME)	Sets the generation condition of the overload time information (INFO-OLTIME). **Setting range** 1 to 300 (1=0.1 s)	50
Speed information (INFO-SPD)	Sets the generation condition of the speed information (INFO-SPD). **Setting range** 0 to 12,000 r/min	0
Cumulative load 0 information (INFO-CULD0)	Sets the generation condition of the cumulative load 0 information (INFO-CULD0). **Setting range** 0 to 2,147,483,647	0
Cumulative load 1 information (INFO-CULD1)	Sets the generation condition of the cumulative load 1 information (INFO-CULD1). **Setting range** 0 to 2,147,483,647	0
Cumulative load value auto clear	Clears the cumulative load when operation is started (at the ON edge of the MOVE output). **Setting range** 0: Not cleare 1: Cleared	1
Cumulative load value count divisor	Sets the divisor of the cumulative load. **Setting range** 1 to 32,767	1
Tripmeter information (INFO-TRIP)	Sets the generation condition of the tripmeter information (INFO-TRIP). **Setting range** 0: Disable 1 to 2,147,483,647 (1=0.1 kRev)	0
Odometer information (INFO-ODO)	Sets the generation condition of the odometer information (INFO-ODO). **Setting range** 0: Disable 1 to 2,147,483,647 (1=0.1 kRev)	0
INFO action (Assigned I/O status information (INFO-USRIO)) INFO action (Position deviation information (INFO-POSERR)) INFO action (Driver temperature information (INFO-DRVTMP)) INFO action (Motor temperature information (INFO-MTPTMP))	Sets the bit output, the INFO output, and the LED status when information is generated. **Setting range** 0: Only the bit output is turned ON. 1: Bit output and INFO output is turned ON, and LED blinks.	1

2 Communication Specifiations Edition

Name	Description	Initial value
INFO action (Overvoltage information (INFO-OVOLT))	Sets the bit output, the INFO output, and the LED status when information is generated. **Setting range** 0: Only the bit output is turned ON. 1: Bit output and INFO output is turned ON, and LED blinks.	1
INFO action (Undervoltage information (INFO-UVOLT))		
INFO action (Overload time information (INFO-OLTIME))		
INFO action (Speed information (INFO-SPD))		
INFO action (Start operation error information (INFO-START))		
INFO action (Start ZHOME error information (INFO-ZHOME))		
INFO action (Preset request information (INFO-PR-REQ))		
INFO action (Electronic gear setting error information (INFO-EGR-E))		
INFO action (Wrap setting error information (INFO-RND-E))		
INFO action (Forward operation prohibition information (INFO-FW-OT))		
INFO action (Reverse operation prohibition information (INFO-RV-OT))		
INFO action (Cumulative load 0 information (INFO-CULD0))		
INFO action (Cumulative load 1 information (INFO-CULD1))		
INFO action (Tripmeter information (INFO-TRIP))		
INFO action (Odometer information (INFO-ODO))		
INFO action (Start operation restricted mode information (INFO-DSLMTD))		
INFO action (I/O test mode information (INFO-IOTEST))		
INFO action (Configuration request information (INFO-CFG))		
INFO action (Reboot request information (INFO-RBT))		

For index numbers of parameters, check with the "4 Driver objects of the manufacturer-specific area" on p.220.

■ Information history

Up to 16 generated information pieces are saved in the RAM in order of the latest to oldest. The information items kept as information records are the information code, generation time, and contents of information.
The information history can be read or cleared when one of the following is performed.

- Read the information records by the "Information history (4510h to 451Fh)" via EtherCAT communication.
- Clear the records by setting the "Clear information history (40D4h)" of EtherCAT communication to 1. (It is enabled when changing from 0 to 1.)
- Read and clear the information records using the **MEXE02**.

(memo) Since information records are saved in the RAM, they are cleared when the control power supply of the driver is turned off.

■ Information list

Contents of information	Information bit output signal	Cause	Releasing condition
Assigned I/O status	INFO-USRIO	The I/O signal set in the "INFO-USRIO output selection (41BCh)" was turned ON.	The I/O signal set in the "INFO-USRIO output selection (41BCh)" was turned OFF.
Position deviation	INFO-POSERR	The deviation between the command position and actual position exceeded the value set in the "Position deviation information (41A5h)" in the motor output shaft.	The deviation between the command position and actual position became lower than the value set in the "Position deviation information (41A5h)" in the motor output shaft.
Driver temperature	INFO-DRVTMP	The internal temperature of the driver exceeded the value set in the "Driver temperature information (41A0h)."	The internal temperature of the driver became lower than the value set in the "Driver temperature information (41A0h)."
Motor temperature	INFO-MTRTMP	The detection temperature of the encoder exceeded the value set in the "Motor temperature information (41A8h)."	The detection temperature of the encoder fell about 5 °C (9 °F) below the value set in the "Motor temperature information (41A8h)."
Overvoltage	INFO-OVOLT	• The main power supply voltage exceeded the value set in the "Overvoltage information (41ABh)." • A large inertia load was suddenly stopped. • Vertical operation was performed.	The main power supply voltage became lower than the value set in the "Overvoltage information (41ABh)."
Undervoltage	INFO-UVOLT	• The main power supply voltage became lower than the value set in the "Undervoltage information (41ACh)." • The main power supply was shut off momentarily or a voltage shortage was generated.	The main power supply voltage exceeded the value set in the "Undervoltage information (41ACh)."
Overload time	INFO-OLTIME	A load exceeding the maximum torque was applied for the time exceeding the value set in the "Overload time information (41A1h)."	The overload counter became lower than the value set in the "Overload time information (41A1h)."
Speed	INFO-SPD	The actual speed of the motor exceeded the value set in the "Speed information (41A2h)."	The actual speed of the motor became lower than the value set in the "Speed information (41A2h)."
Start operation error	INFO-START	• An operation in the direction being stopped by the FW-BLK input or the RV-BLK input was started. • An operation in the direction being stopped by the FW-LS input or the RV-LS input was started. • An operation in the direction being stopped by the software limit was started.	Operation was started normally.
Start ZHOME error	INFO-ZHOME	When the position coordinate was not set (the ABSPEN output was OFF), the high-speed return-to-home operation was started.	Operation was started normally.
Preset request	INFO-PR-REQ	Preset was executed by position preset (P-PRESET) or return-to-home operation.	Preset was completed.
Electronic gear setting error	INFO-EGR-E	The resolution set by the "Gear ratio (6091h)" was out of the specification.	The resolution was set in the range of the specification.
Wrap setting error	INFO-RND-E	The resolution and "Initial coordinate generation & wrap setting range (41C9h)" were inconsistent.	The "Initial coordinate generation & wrap setting range (41C9h)" was set in the range of the specification.

Contents of information	Information bit output signal	Cause	Releasing condition
Forward operation prohibition	INFO-FW-OT	• The positive software limit was exceeded. • Either the FW-LS input or the FW-BLK input was turned ON.	The positive software limit was not exceeded, and both FW-LS and FW-BLK inputs were turned OFF.
Reverse operation prohibition	INFO-RV-OT	• The negative software limit was exceeded. • Either the RV-LS input or the RV-BLK input was turned ON.	The negative software limit was not exceeded, and both RV-LS and RV-BLK inputs were turned OFF.
Cumulative load 0	INFO-CULD0	The cumulative load exceeded the value set in the "Cumulative load information 0 (41B1h)."	The cumulative load became lower than the value set in the "Cumulative load information 0 (41B1h)."
Cumulative load 1	INFO-CULD1	The cumulative load exceeded the value set in the "Cumulative load information 1 (41B2h)."	The cumulative load became lower than the value set in the "Cumulative load information 1 (41B2h)."
Tripmeter	INFO-TRIP	The travel distance of the motor exceeded the value set in the "Tripmeter information (41AFh)."	After performing one of the following operations, the travel distance (Tripmeter) of the motor became lower than the value set in the "Tripmeter information (41AFh)." – The "Tripmeter information (41AFh)" was reset. – Tripmeter was cleared with the **MEXE02**.
Odometer	INFO-ODO	The cumulative travel distance of the motor exceeded the value set in the "Odometer information (41B0h)."	After performing the following operation, the cumulative travel distance (Odometer) of the motor became lower than the value set in the "Odometer information (41B0h)." – The "Odometer information (41B0h)" was reset.
Start operation restricted mode	INFO-DSLMTD	• "Remote operation" was executed with the **MEXE02.** • Configuration was executed.	• Remote operation was released. • Configuration was completed.
I/O test mode	INFO-IOTEST	• "I/O test" was executed with the **MEXE02.** • Configuration was executed.	• The I/O test mode was released. • Configuration was completed.
Configuration request	INFO-CFG	Execution of configuration was required.	Configuration is executed.
Reboot request	INFO-RBT	Reboot was requested.	Reboot was performed.

(memo) If the "Preset request" information was generated for 100 ms or more while the "Information auto clear (41BFh)" is set to disable, the preset may have been failed.

■ Monitor of information

Information in details can be checked by the "Information (407B)" of the driver objects.
The read information code is indicated in eight hexadecimal digits. It can also be read in 32 bits.
If multiple information items are generated, the logical sum (OR) of the information codes is indicated.

Information code	32 bits indication	Information name	Output signal
00000001h	0000 0000 0000 0000 0000 0000 0000 0001	Assigned I/O status	INFO-USRIO
00000002h	0000 0000 0000 0000 0000 0000 0000 0010	Position deviation	INFO-POSERR
00000004h	0000 0000 0000 0000 0000 0000 0000 0100	Driver temperature	INFO-DRVTMP
00000008h	0000 0000 0000 0000 0000 0000 0000 1000	Motor temperature	INFO-MTRTMP
00000010h	0000 0000 0000 0000 0000 0000 0001 0000	Overvoltage	INFO-OVOLT
00000020h	0000 0000 0000 0000 0000 0000 0010 0000	Undervoltage	INFO-UVOLT
00000040h	0000 0000 0000 0000 0000 0000 0100 0000	Overload time	INFO-OLTIME
00000100h	0000 0000 0000 0000 0000 0001 0000 0000	Speed	INFO-SPD
00000200h	0000 0000 0000 0000 0000 0010 0000 0000	Start operation error	INFO-START
00000400h	0000 0000 0000 0000 0000 0100 0000 0000	Start ZHOME error	INFO-ZHOME
00000800h	0000 0000 0000 0000 0000 1000 0000 0000	Preset request	INFO-PR-REQ
00002000h	0000 0000 0000 0000 0010 0000 0000 0000	Electronic gear setting error	INFO-EGR-E
00004000h	0000 0000 0000 0000 0100 0000 0000 0000	Wrap setting error	INFO-RND-E
00010000h	0000 0000 0000 0001 0000 0000 0000 0000	Forward operation prohibition	INFO-FW-OT
00020000h	0000 0000 0000 0010 0000 0000 0000 0000	Reverse operation prohibition	INFO-RV-OT
00040000h	0000 0000 0000 0100 0000 0000 0000 0000	Cumulative load 0	INFO-CULD0
00080000h	0000 0000 0000 1000 0000 0000 0000 0000	Cumulative load 1	INFO-CULD1
00100000h	0000 0000 0001 0000 0000 0000 0000 0000	Tripmeter	INFO-TRIP
00200000h	0000 0000 0010 0000 0000 0000 0000 0000	Odometer	INFO-ODO
10000000h	0001 0000 0000 0000 0000 0000 0000 0000	Start operation restricted mode	INFO-DSLMTD
20000000h	0010 0000 0000 0000 0000 0000 0000 0000	I/O test mode	INFO-IOTEST
40000000h	0100 0000 0000 0000 0000 0000 0000 0000	Configuration request	INFO-CFG
80000000h	1000 0000 0000 0000 0000 0000 0000 0000	Reboot request	INFO-RBT

■ Related objects

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
41A0h	*	Driver temperature information (INFO-DRVTMP) [°C]	INT16	RW	RxPDO	○	40 to 85 (Initial value: 85)	A
41A1h	*	Overload time information (INFO-OLTIME) [1=0.1 s]	INT16	RW	RxPDO	○	1 to 300 (Initial value: 50)	A
41A2h	*	Speed information (INFO-SPD) [r/min]	INT16	RW	RxPDO	○	0 to 12,000 (Initial value: 0)	A
41A5h	*	Position deviation information (INFO-POSERR) [1=0.01 rev]	INT16	RW	RxPDO	○	1 to 30,000 (Initial value: 300)	A
41A8h	*	Motor temperature information (INFO-MTRTMP) [°C]	INT16	RW	RxPDO	○	40 to 120 (Initial value: 85)	A
41ABh	*	Overvoltage information (INFO-OVOLT) [V]	INT16	RW	RxPDO	○	150 to 630 (Initial value: 630)	A
41ACh	*	Undervoltage information (INFO-UVOLT) [V]	INT16	RW	RxPDO	○	150 to 630 (Initial value: 180)	A
41AFh	*	Tripmeter information (INFO-TRIP) [1=0.1 kRev]	INT32	RW	RxPDO	○	0 to 2,147,483,647 (Initial value: 0)	A
41B0h	*	Odometer information (INFO-ODO) [1=0.1 kRev]	INT32	RW	RxPDO	○	0 to 2,147,483,647 (Initial value: 0)	A
41B1h	*	Cumulative load information 0 (INFO-CULD0)	INT32	RW	RxPDO	○	0 to 2,147,483,647 (Initial value: 0)	A
41B2h	*	Cumulative load information 1 (INFO-CULD1)	INT32	RW	RxPDO	○	0 to 2,147,483,647 (Initial value: 0)	A
41B3h	*	Cumulative load value auto clear	U8	RW	No	○	0, 1 (Initial value: 1)	A
41B4h	*	Cumulative load value count divisor	U16	RW	No	○	1 to 32,767 (Initial value: 1)	A
41BCh	*	INFO-USRIO output selection	U8	RW	No	○	0 to 255 (Initial value: 128)	A
41BDh	*	INFO-USRIO output inversion	U8	RW	No	○	0: Not invert 1: Invert (Initial value: 0)	A
41BEh	*	Information LED condition	U8	RW	No	○	0: LED does not blink 1: LED blinks (Initial value: 1)	A
41BFh	*	Information auto clear	U8	RW	No	○	0: Disable (not turned OFF automatically) 1: Enable (turned OFF automatically) (Initial value: 1)	A
47A0h	*	INFO action (Assigned I/O status information (INFO-USRIO))	U8	RW	No	○	0: Only the bit output is turned ON. 1: Bit output and INFO output is turned ON, and LED blinks. (Initial value: 1)	A
47A1h	*	INFO action (Position deviation information (INFO-POSERR))	U8	RW	No	○		A

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
47A2h	*	INFO action (Driver temperature information (INFO-DRVTMP))	U8	RW	No	○		A
47A3h	*	INFO action (Motor temperature information (INFO-MTRTMP))	U8	RW	No	○		A
47A4h	*	INFO action (Overvoltage information (INFO-OVOLT))	U8	RW	No	○		A
47A5h	*	INFO action (Undervoltage information (INFO-UVOLT))	U8	RW	No	○		A
47A6h	*	INFO action (Overload time information (INFO-OLTIME))	U8	RW	No	○		A
47A8h	*	INFO action (Speed information (INFO-SPD))	U8	RW	No	○		A
47ABh	*	INFO action (PRESET request information (INFO-PR-REQ))	U8	RW	No	○		A
47ADh	*	INFO action (Electronic gear setting error information (INFO-EGR-E))	U8	RW	No	○	0: Only the bit output is turned ON. 1: Bit output and INFO output is turned ON, and LED blinks. (Initial value: 1)	A
47AEh	*	INFO action (Wrap setting error information (INFO-RND-E))	U8	RW	No	○		A
47B0h	*	INFO action (Forward operation prohibiton information (INFO-FW-OT))	U8	RW	No	○		A
47B1h	*	INFO action (Reverse operation prohibiton information (INFO-RV-OT))	U8	RW	No	○		A
47B2h	*	INFO action (Cumulative load 0 information (INFO-CULD0))	U8	RW	No	○		A
47B3h	*	INFO action (Cumulative load 1 information (INFO-CULD1))	U8	RW	No	○		A
47B4h	*	INFO action (Tripmeter information (INFO-TRIP))	U8	RW	No	○		A
47B5h	*	INFO action (Odometer information (INFO-ODO))	U8	RW	No	○		A
47BCh	*	INFO action (Start operation restricted mode information (INFO-DSLMTD))	U8	RW	No	○		A
47BDh	*	INFO action (I/O test mode information (INFO-IOTEST))	U8	RW	No	○		A

2 Communication Specifiations Edition

Alarm and information

Index	Sub	Name	Type	Access	PDO	Save	Range	Update
47BEh	*	INFO action (Configuration request information (INFO-CFG))	U8	RW	No	○	0: Only the bit output is turned ON. 1: Bit output and INFO output is turned ON, and LED blinks. (Initial value: 1)	A
47BFh	*	INFO action (Reboot request information (INFO-RBT))	U8	RW	No	○		A

* Set the axis number (1 to 4) in the Sub-index because of the driver object in the manufacturer-specific area.

2 Communication Specifications Edition

3   Operation Edition

This part explains operation examples using the **MEXE02**.

◆ **Table of contents**

1   Starting the MEXE02

1. Connect motors, a main power supply, a control power supply, and a PC in which the **MEXE02** has been installed to the driver.
   The figure shows the connection example of **AZD4A-KED**.
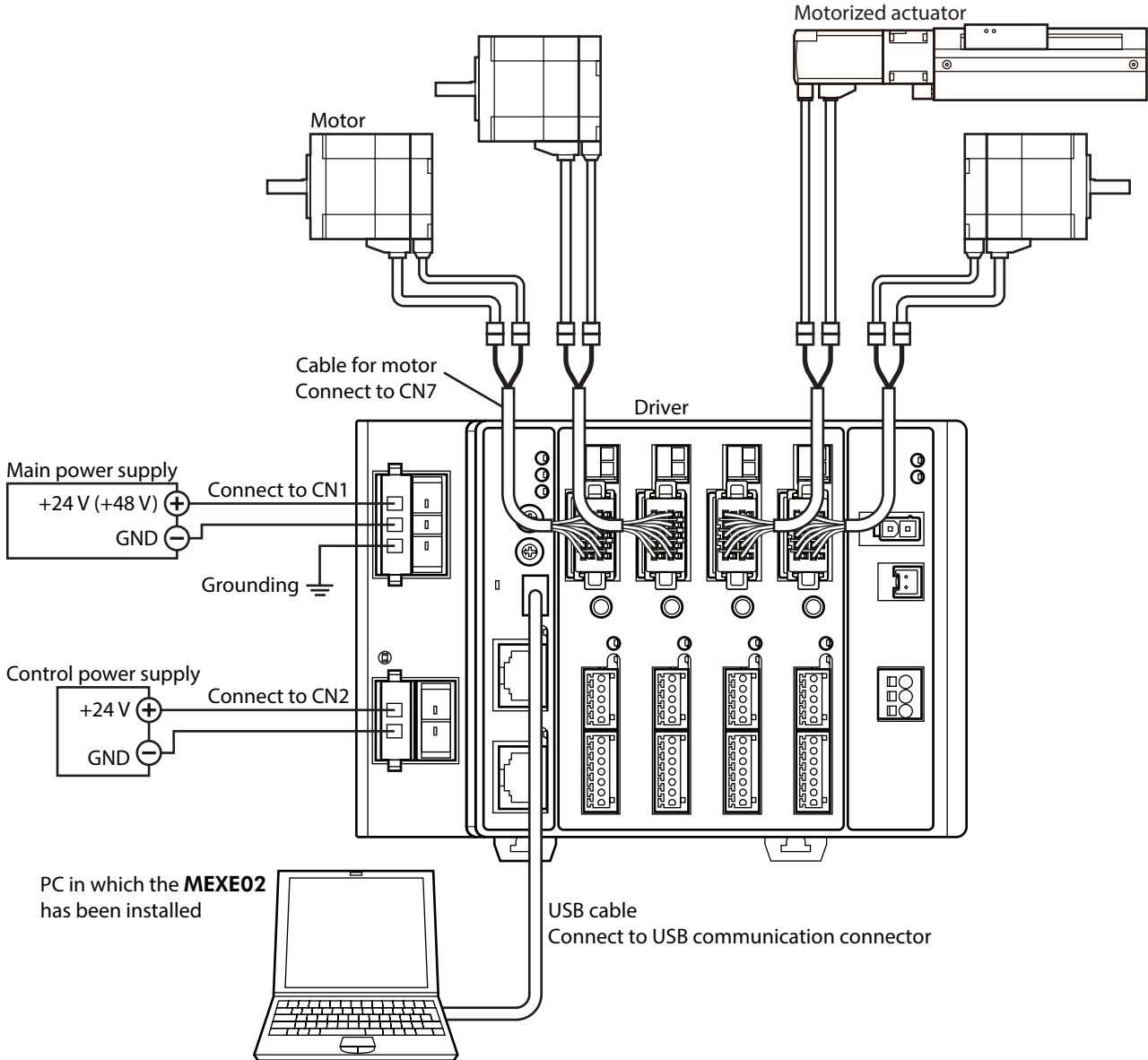
2. Turn on the main power supply and control power supply.

3. Start a PC, and continuously start the **MEXE02**.

4. Set the communication port in the following steps.

   1) Click [Setting of the communication] from the [Communication] menu.

   2) Select "ORIENTAL MOTOR/common virtual COM port", and click [OK].
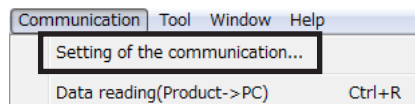
5. Select the product in the following steps.
   1) Click the [New] icon in the toolbar.

   2) Click [Search model] on the select product window.
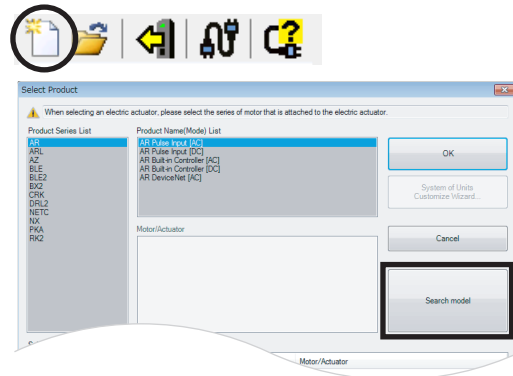
   3) Check the connected product is selected and click [OK].
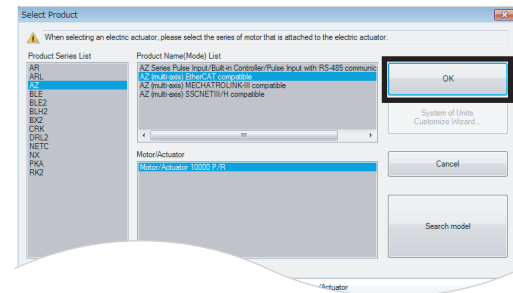
6. Select the axis type.
   Select the 4-axis type here.

Model	Axis type
AZD2A-KED **AZD2B-KED**	2-axis type
AZD3A-KED	3-axis type
AZD4A-KED	4-axis type
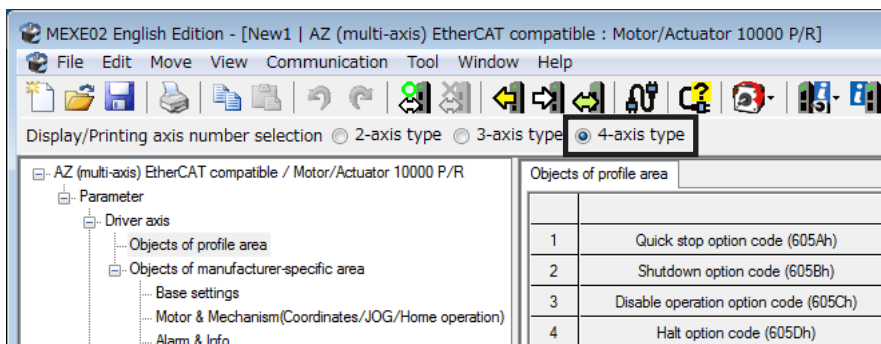
2   Notes when a motorized actuator is used

Be sure to create the recovery data file initially when a motorized actuator is used.
The recovery data file represents a file saved the factory setting of the product. Copy the ABZO information (fixed value) to the driver before creating the recovery data file.
Create the recovery data file initially in case of replacing the product for maintenance or product damage.
Save the recovery data file in a PC as a data file.

2-1   Copying the fixed value (parameter) of the ABZO sensor to driver

For parameters of the **AZ** Series, the different values are stored in the ABZO sensor and driver.
The values based on the product specifications such as recommended operation condition and position coordinate information are stored in the ABZO sensor. The values stored in the ABZO sensor cannot be changed because of the fixed value.
Meantime, the values for the standard type (motor only) are stored in the driver parameters.

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

■ Procedure

1. Click the [Communication] menu of the **MEXE02**, and select [Copy the ABZO (fixed) information to the driver in a lump].
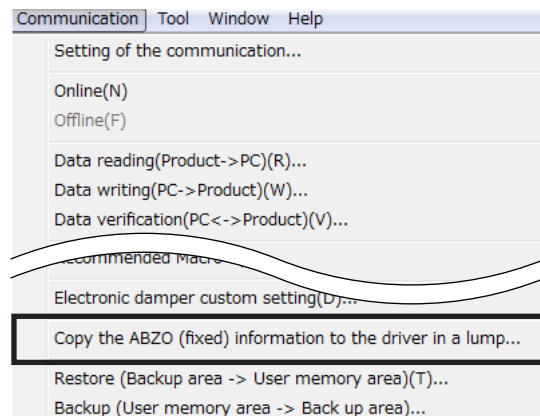
2. Select the axis that the motorized actuator is connected, and click [OK].

3 Operation Edition

3. After it is completed, click [OK].
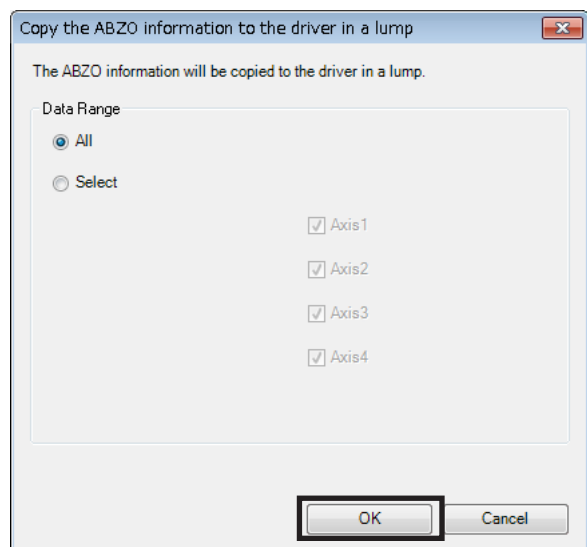
> **Information** ☒
>
> ⓘ ABZO (fixed) copy in a lump is completed.
> Restore the driver.
>
> [OK]
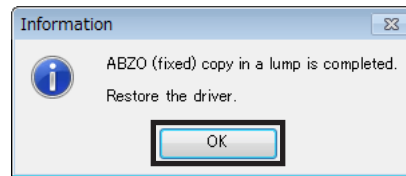
4. Turn on the control power supply of the driver again.

5. Check whether the copied value is updated on the unit information monitor window (axis 1 to axis 4).

New1 | AZ (multi-axis) EtherCAT compatible : Motor/Actuator 10000 P/R - Unit information monitor (Axis1)

☑ Start the unit information monitor (Axis1)

	Motor	Mechanism	Device
User memo			
Product name	AZM46AK	-	AZD4A-KED-1
Serial number	SS11834003	-	UZ41Z12308

CPU	6040	Control power count	175 [times]	Resolution	10000 [P/R]
Ver.	2.10	Main power count	135 [times]	Fraction of resolution	0
PID	3420 h	Main power supply time	948 [min]		
SID	0000 h			ROUND processing	Enable
Series (Mech.)	0000 h	Comm.I/F(1st)	USB	ROUND range	18000000 [step]
Model (Mech.)	0000 h	Comm.I/F(2nd)	ECAT	ROUND maximum	8999999 [step]
Used multi-rotation amount	1800	Comm.I/F(3rd)	----	ROUND minimum	-9000000 [step]
Driver simulation mode	Use the real motor			ROUND offset	9000000 [step]
Parameter Rev.	0001 h	POW-TYPE	DC-		
		ABZO connection	Yes	STATION No.	01 h

[Help ?]

	Active	Driver parameter	ABZO (fixed)
Manual setting of the mechanism settings	Driver parameter	Manual setting	
Electronic gear A	1	1	1
Electronic gear B	1	1	1
Motor rotation direction	Positive side=Clockwise	Positive side=Clockwise	Positive side=Clockwise
Mechanism type			No setting
Mechanism lead [mm]			
Mechanism lead			1
Mechanism lead decimal digit setting			×1 [mm]
Mechanism stroke			1 [mm]
Magnetic brake	None		None
Manual setting of gear ratio	ABZO		
Gear ratio	1.00	Prioritize ABZO setting	1.00
Initial coordinate generation & manual wrap setting	ABZO	Prioritize ABZO setting	Setting exists
Initial coordinate generation & wrap setting range	1800.0 [rev]	1800.0 [rev]	1800.0 [rev]
Initial coordinate generation & wrap range offset ratio	50.00 [%]	50.00 [%]	50.00 [%]
Initial coordinate generation & wrap range offset value	0 [step]	0 [step]	0 [step]
Wrap setting	Enable	Enable	Enable
The number of the RND-ZERO output in wrap range	1800	1	1800
Mechanism limit parameter	Disable	Follow ABZO setting	
Mechanism limit (distance from F home position) positive direction	Disable		Disable
Mechanism limit (distance from F home position) negative direction	Disable		Disable
Mechanism protection parameter	Disable	Follow ABZO setting	No setting
Maximum starting speed	0 [r/min]		8000 [r/min]
Maximum Operating speed	0 [r/min]		8000 [r/min]
Maximum pushing speed	0 [r/min]		8000 [r/min]
Maximum pushing return-to-home speed	0 [r/min]		8000 [r/min]
Maximum push current	Pushing not possible		100.0 [%]
(JOG/HOME/ZHOME)Manual setting	Driver parameter	Prioritize ABZO setting	No setting
(JOG/HOME/ZHOME) Command filter time constant	1 [ms]	1 [ms]	1 [ms]
(JOG/HOME/ZHOME) Operating current	100.0 [%]	100.0 [%]	100.0 [%]
(JOG) Travel amount			1 [step]
(JOG) Operating speed	10000 [Hz]	10000 [Hz]	60 [r/min]
(JOG) Acceleration/deceleration	300.000 [kHz/s]	300.000 [kHz/s]	1.000 [s]
(JOG) Starting speed	5000 [Hz]	5000 [Hz]	30 [r/min]
(JOG) Operating speed (high)	50000 [Hz]	50000 [Hz]	300 [r/min]

Description of each item

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

2-2   Creating the recovery data file

> **Note** Be sure to create the recovery data file before installing the motorized actuator to equipment.

■ Procedure

After copying the fixed value (factory setting) of the ABZO sensor to the driver, read the fixed value from the driver to create the recovery data file.

1. Click [Data reading (product → PC)] from the [Communication] menu or click the [Data reading (product → PC)] icon in the toolbar.
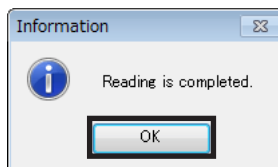
   Communication | Tool | Window | Help
   Setting of the communication...
   Online(N)
   Offline(F)
   Data reading(Product->PC)(R)...
   Data writing(PC->Product)(W)...
   Data verification(PC<->Product)(V)...

   or
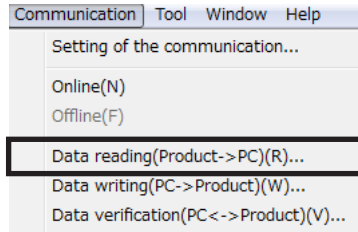
2. Click [Yes].
   Data reading is started.

   Data reading. (Product ->PC)
   Reading will be started.
   OK   Cancel

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

   Information
   Reading is completed.
   OK
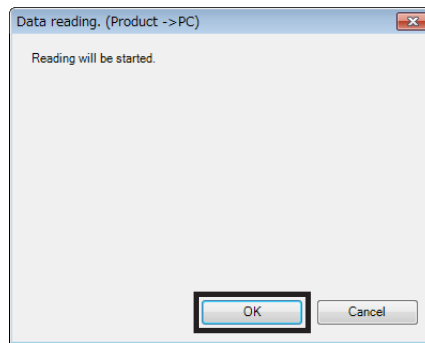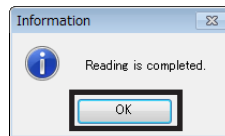
4. Create the recovery data file.
   Click [Save as] from the [File] menu.
   A desired file name and storage destination can be used.

   File | Edit | Move | View | Communica
   New...   Ctrl+N
   Open...   Ctrl+O
   Close
   Save   Ctrl+S
   Save As...
   Export...
   Page Setup(U)...
   Print Preview(V)...
   Print...   Ctrl+P
   Exit(X)
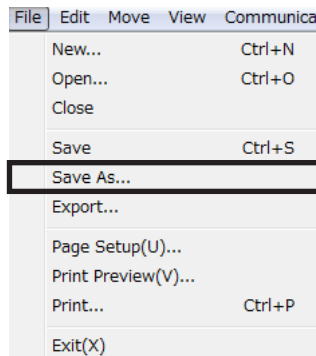
   The fixed value (factory setting) of the ABZO sensor is saved as the recovery data file.

> **Note** For the recovery, create two files that are the recovery data file stored the factory setting and the final backup file applied the operation data and others. If the recovery data file and backup file have been created in advance, the equipment can be restored smoothly. For details of backup file, refer to **AZ** Series OPERATING MANUAL Function Edition.

2-3　　Method of recovery

The recovery can be performed under the precondition of having created the recovery data file according to the "2-2 Creating the recovery data file" on p.176.

⚠WARNING	When the motor or driver was replaced, be sure to perform the recovery and the home resetting. Unless the recovery and the home resetting are performed, the followings may happen. • The moving part may cause unexpected operations, resulting in injury or damage to equipment. • The moving part may hit with the mechanical stopper. • A load may hit with other equipment. Refer to p.181 for resetting the home.

memo　Refer to the OPERATING MANUAL Actuator Edition for how to replace the motor.

■ When the motor and driver were malfunctioned

1. Replace the motor and driver, and turn on the main power supply and control power supply.

2. Open the recovery data file in the **MEXE02** in the following steps.
   1) Click [Open] from the [File] menu or click the [Open] icon in the toolbar.
   2) Select the recovery data file, and click [Open].

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

   2) Select the axis that the motorized actuator is connected, and click [OK].

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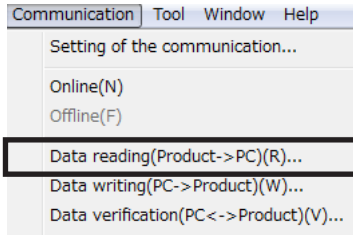   Writing data is started.

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

Information

Writing is completed
Restore the driver.

OK
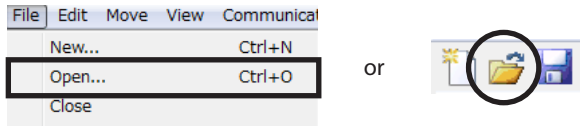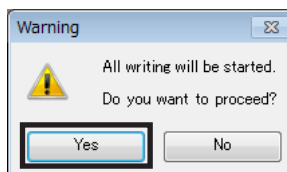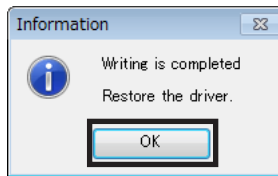
5) Turn on the control power supply of the driver again.

4. Read the information of the factory setting written to the driver in the following steps.
When the motor is replaced, set the home again after reading the driver information.
The communication function of the **MEXE02** cannot be used without reading the driver information.

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

Communication | Tool | Window | Help

Setting of the communication...

Online(N)
Offline(F)

Data reading(Product->PC)(R)...
Data writing(PC->Product)(W)...
Data verification(PC<->Product)(V)...

or

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

Data reading. (Product ->PC)

Reading will be started.

OK   Cancel

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

Information

Reading is completed.

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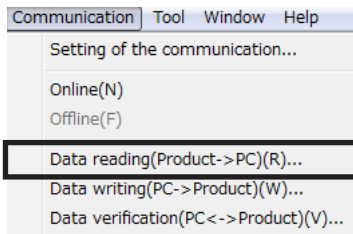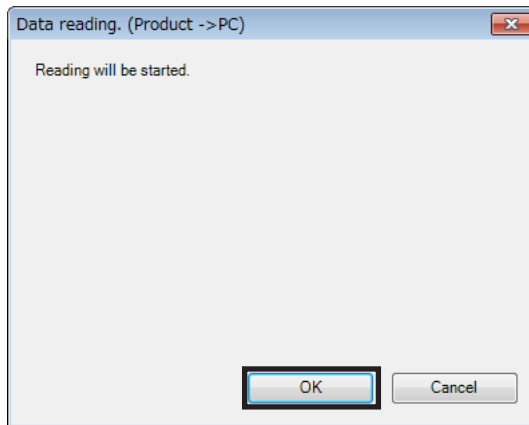
All data and parameters in the driver including the ABZO information were read in the **MEXE02**.

5. Refer to p.181 and set the home again.

6. Refer to p.176 and create the recovery data file for the product after replacement.

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

memo The details of the written parameters can be checked with the "unit information monitor (axis 1 to axis 4)."

■ When the driver was malfunctioned

1. Replace the driver, and turn on the main power supply and control power supply.

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

   1) Click [Open] from the [File] menu or click the [Open] icon in the toolbar.

   2) Select the recovery data file, and click [Open].

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

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

   2) Select the axis that the motorized actuator is connected, and click [OK].
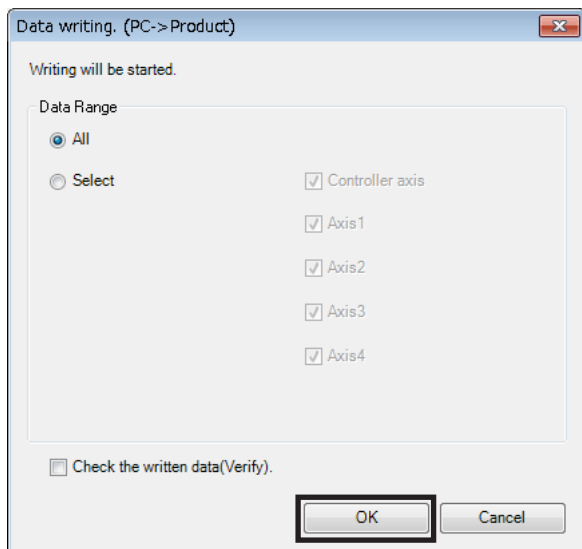
   3) Click [Yes].
      Writing data is started.
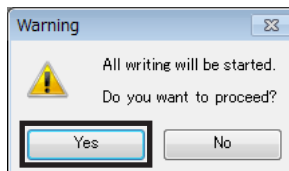
   4) After it is completed, click [OK].
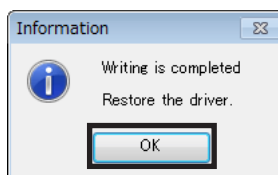
   5) Turn on the control power supply of the driver again.

   memo The details of the written parameters can be checked with the "unit information monitor (axis 1 to axis 4)."

■ When the motor was malfunctioned

1. Replace the motor, and turn on the main power supply and control power supply.

2. Read the driver information to the PC in the following steps.
   When the motor is replaced, set the home again after reading the driver information.
   The communication function of the **MEXE02** cannot be used without reading the driver information.

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

      or

   2) Click [OK].
      Data reading is started.
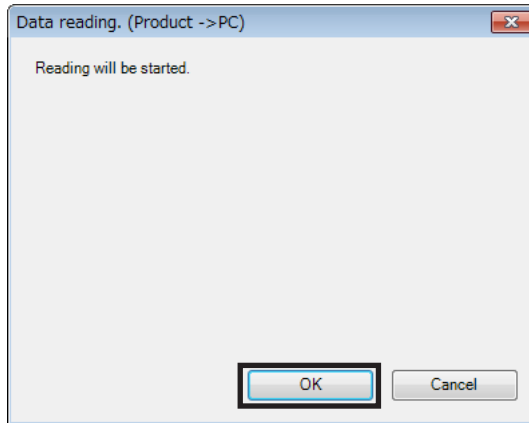
   3) After it is completed, click [OK].
      The read data is shown on the screen.
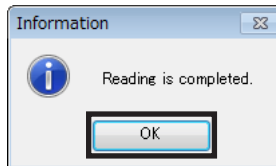
   All data and parameters in the driver including the ABZO information were read in the **MEXE02**.

3. Refer to p.181 and set the home again.

4. Refer to p.176 and create the recovery data file for the product after replacement.

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

3   Home setting

The home has not set at the time of shipment. Before starting operation, be sure to set the home.
Perform the home setting only once initially. Once the home is set, the driver keeps the home information even if the main power supply and control power supply are shut down.
This chapter explains how to set the home with the extension switch (EXT-IN) of the driver axis. The figure shows the **AZD4A-KED**.

> memo
> ● The home is written to the non-volatile memory. The non-volatile memory can be rewritten approximately 100,000 times.
> ● The home for motorized actuators has been set at the time of shipment. Set the home only when you want to change it.

■ Procedure

1. Turn the main power supply off when the power is supplied.

2. Move the motor output shaft to a desired home manually.

3. Turn on the main power supply and keep pressing the extension switch for one second.
   The POWER LED (green) and ALARM LED (red) blinks.

Extension switch (EXT-IN)
POWER LED (green)
ALARM LED (red)
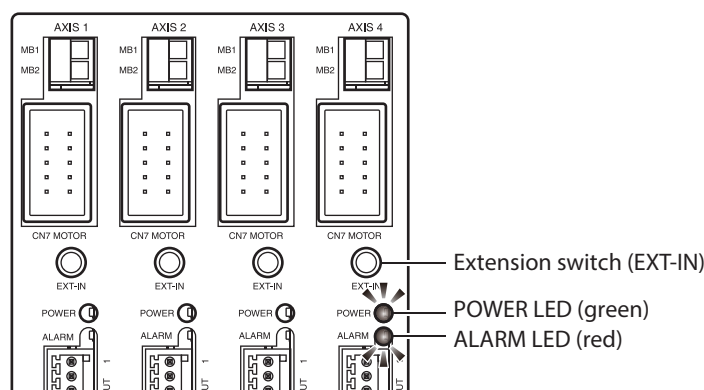
4. Release a hand off within three seconds after the POWER LED and ALARM LED started blinking, and press the extension switch again within three seconds after releasing the hand off.
   After both POWER LED and ALARM LED are lit, only POWER LED continues to be lit.

Extension switch (EXT-IN)
POWER LED (green)
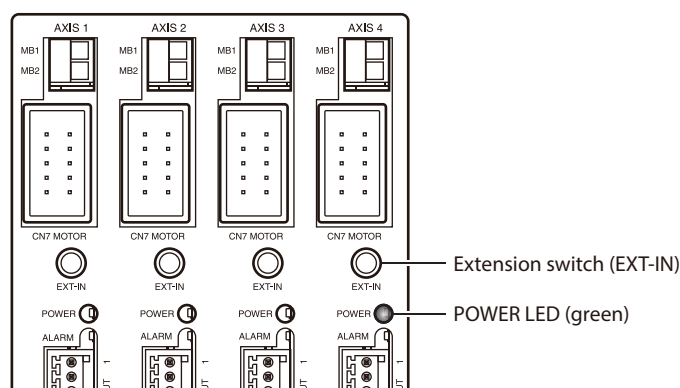
5. The home is set.

> memo
> About an operation of the procedure 4, be sure to release a hand off after the POWER LED and ALARM LED started blinking, and perform within three seconds. If three seconds were passed, the POWER LED will return to the state being lit in green. In this case, perform from the procedure 3 again.

4 Test operation

This chapter explains how to perform test operation using the **MEXE02**.
With test operation, the motor can be operated without connecting the MainDevice. Perform when checking vibrations, noises, and movements.
For the basic operation and data storage for the **MEXE02**, refer to the <u>OPERATING MANUAL</u> of the **MEXE02**.

memo
- Test operation (remote operation) cannot be started while the motor is in an excitation state via EtherCAT communication.
- Controlling the motor excitation state or executing an operation cannot be executed via EtherCAT communication while performing test operation (remote operation).

■ **Procedure**

Here, test operation for the motor connected to the axis 1 of the driver axis is performed.

1. Connect motors, a main power supply, a control power supply, and a PC in which the **MEXE02** has been installed to the driver.

2. Turn on the main power supply and control power supply.

3. Start a PC, and continuously start the **MEXE02**.

4. Click [Remote operation] to select [Remote operation (axis1)].
   The window of the remote operation (axis 1) appears.

5. Click "Start the remote operation (axis1)."
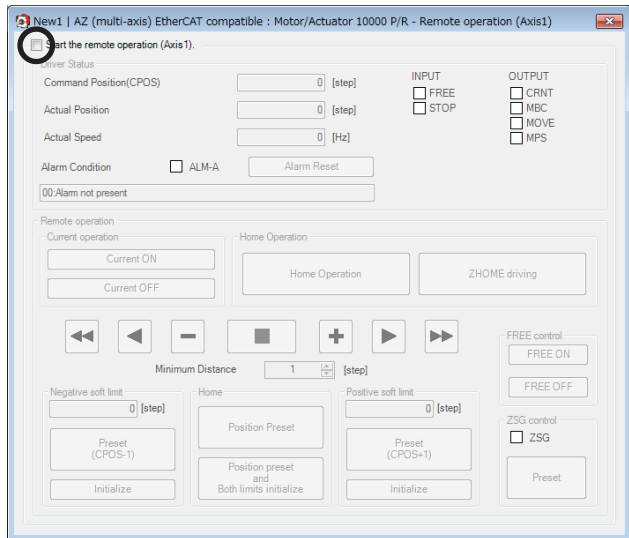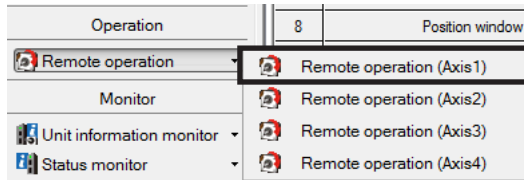
6. Click [Yes].

7. Since the window which uses to synchronize the **MEXE02** data and the driver data appears, select the synchronization method and click [OK].
   • When test operation (remote operation) is performed using the driver data
     → Selects "Reading of all data (product –> PC)"
   • When test operation (remote operation) is performed using the **MEXE02** data
     → Selects "Writing of all data (PC –> product)"
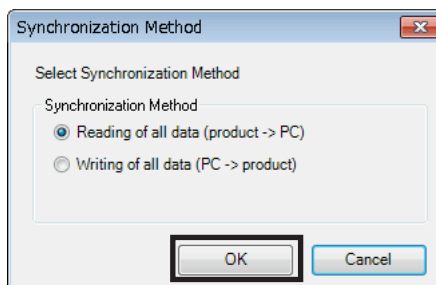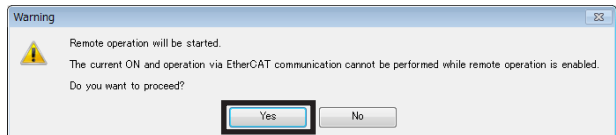
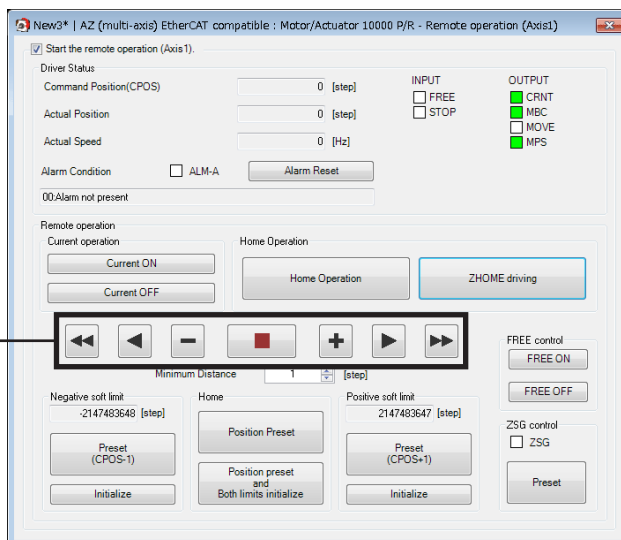8. Click [Current on] to excite the motor.
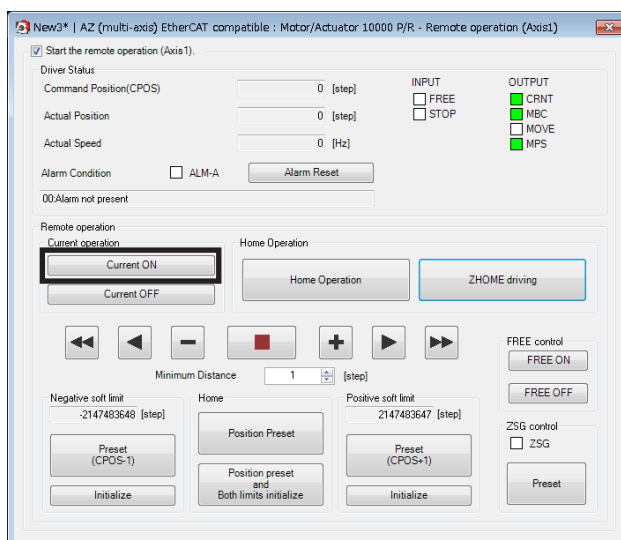
9. Click [Yes].
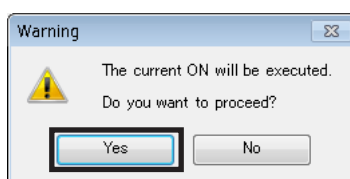
10. Operate the motor using the JOG operation buttons.

JOG operation buttons

Descriptions of JOG operation buttons

| Button	Description
◀◀	Performs continuous operation in the negative direction at the operating speed set in the "(JOG) Operating speed (high)" parameter.
◀	Performs continuous operation in the negative direction at the operating speed set in the "(JOG) Operating speed" parameter.
−	Performs positioning operation in the negative direction for the travel amount set in the "Minimum distance" of the JOG operation switches.
■	This is used to stop the motor immediately.
+	Performs positioning operation in the positive direction for the travel amount set in the "Minimum distance" of the JOG operation switches.
▶	Performs continuous operation in the positive direction at the operating speed set in the "(JOG) Operating speed" parameter.
▶▶	Performs continuous operation in the positive direction at the operating speed set in the "(JOG) Operating speed (high)" parameter.

3 Operation Edition

If the motor does not operate even when the JOG operation buttons are clicked, check the following points.
· Are the main power supply, control power supply, motor, and **MEXE02** connected properly?
· Is an alarm present?

11. To end the test operation (remote operation), unselect "Start the remote operation (axis1)."

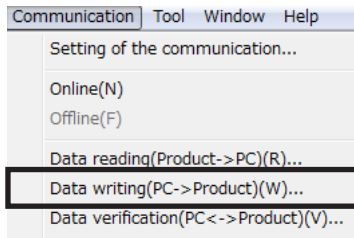● **When changing the operating condition of JOG operation**

1. From TreeView in the left side of the screen, click [Motor & mechanism (coordinates/JOG/home operation)] under [Objects of manufacturer-specific area] under [Driver axis].
The "Motor & mechanism" parameter window appears.
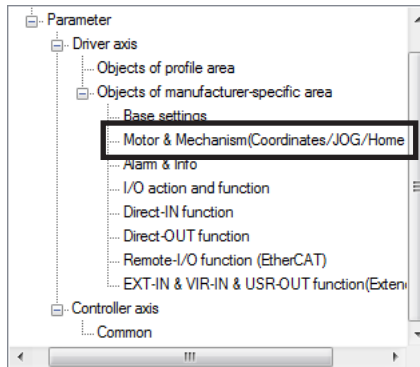
2. The operating condition can be changed using the right four parameters.

3. After changing the operating condition, click [Data writing (PC → product)] from the [Communication] menu or click the [Data writing (PC → product)] icon in the toolbar.

memo   Set the resolution with the "Electronic gear" in objects of profile area.
It cannot be set with the parameter of the "Motor & mechanism (coordinates/JOG/home operation)."
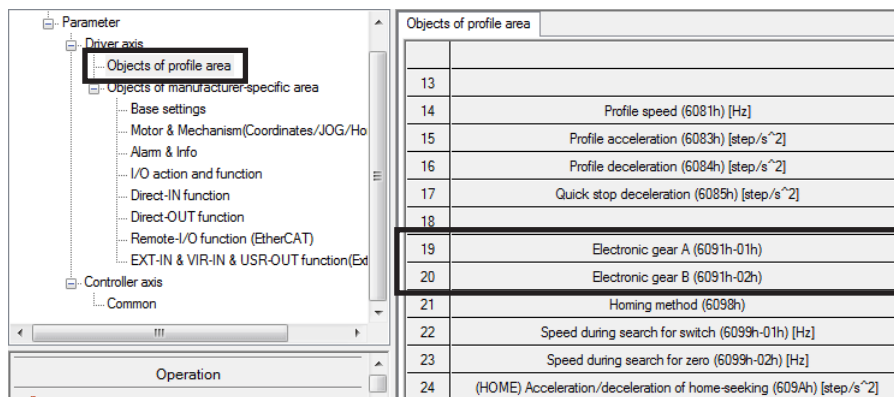
5   Return-to-home

The **MEXE02** allows two types of return-to-home operations: return-to-home operation and high-speed return-to-home operation.
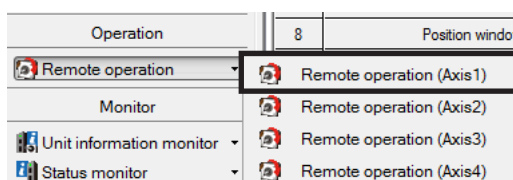
- Return-to-home operation
  Return-to-home operation is an operation to return to the home in the homing mode (HM). Refer to p.75 for details about return-to-home mode (HM).
- High-speed return-to-home operation
  High-speed return-to-home operation is an operation to return to the mechanical home on the absolute position coordinate set in advance. Since the home is recognized by the ABZO sensor, return-to-home operation can be executed at the same speed as that of the normal positioning operation without using an external sensor.

Note Two types of return-to-home operations, which can be executed using the **MEXE02**, are both the driver specific return operations. In these operations, it may return to a different position from the home that the MainDevice manages. Note that an unexpected movement may cause when the operation is executed.
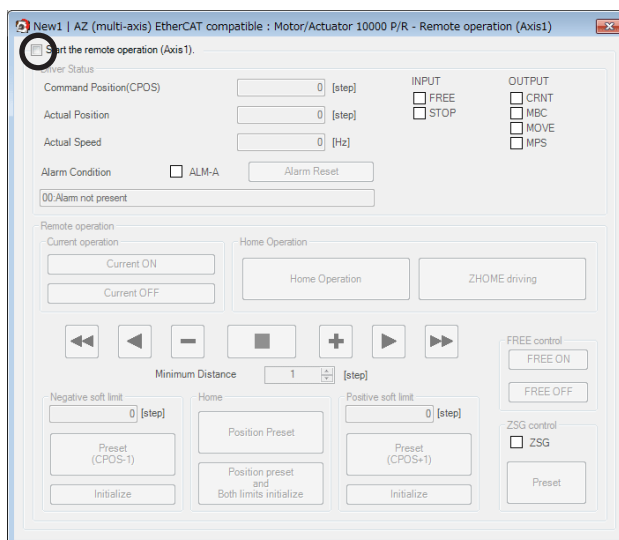
5-1   Return-to-home operation

Here, return-to-home operation for the motor connected to the axis 1 of the driver axis is performed.
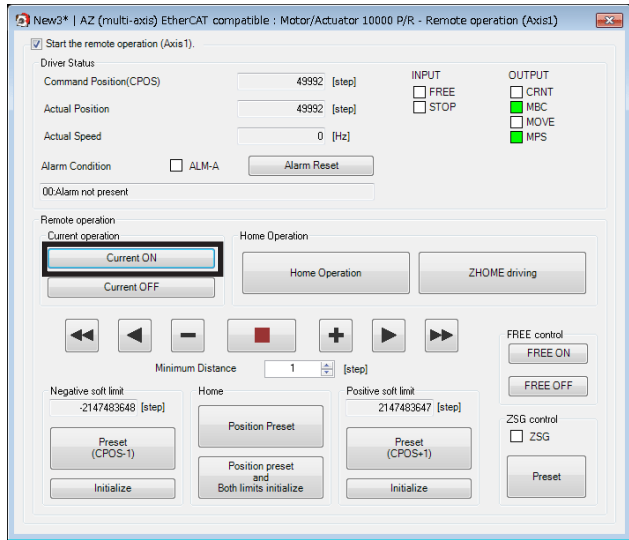
1. Click [Remote operation] to select [Remote operation (axis1)].
   The window of the remote operation (axis1) is shown.

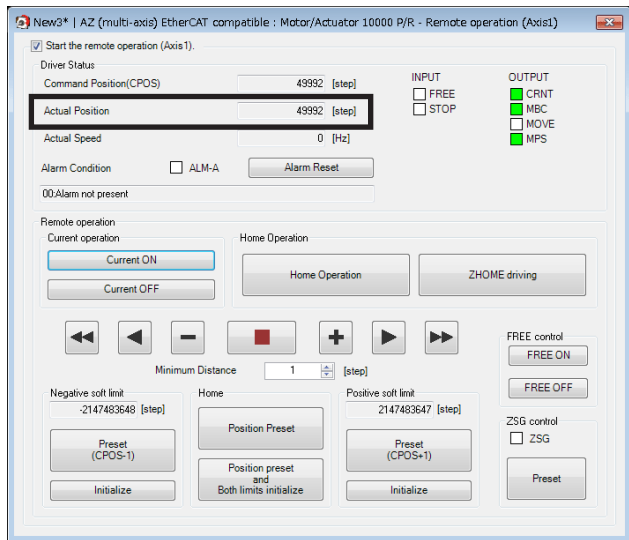2. Click "Start the remote operation (axis1)."
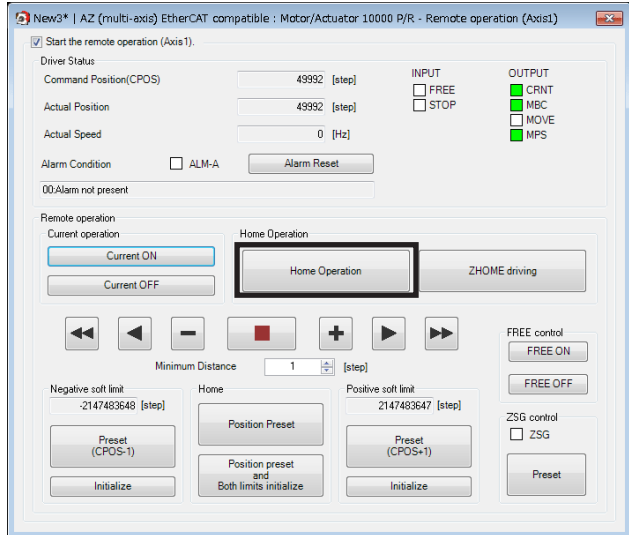
3. Click [Yes].
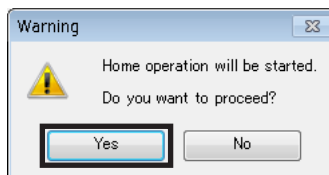
4. Click [Current on] to excite the motor.

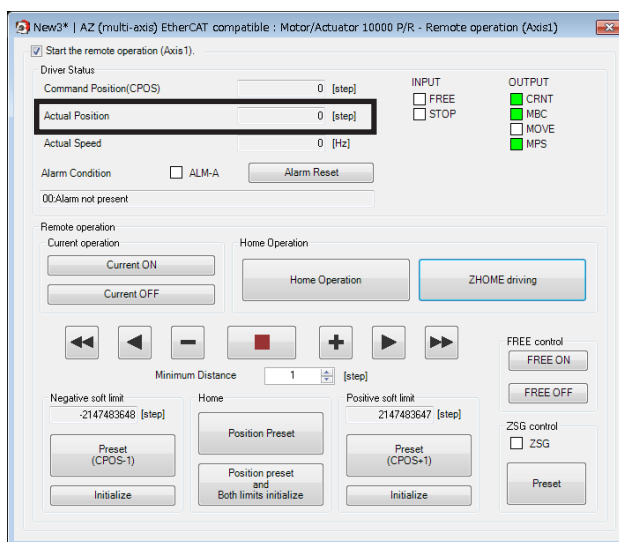5. Check the value in the "Actual position."

6. Click [HOME operation.]

7. Click [Yes].
The motor will start return-to-home operation.

8. After the motor returns to the home, check that the "Actual position" is 0.

9. To end the remote operation, unselect "Start the remote operation (axis1)."

■ When changing the operating condition of return-to-home operation

● When the "Homing method (6098h)" is set to other than "−1" (return-to-home our specifications)
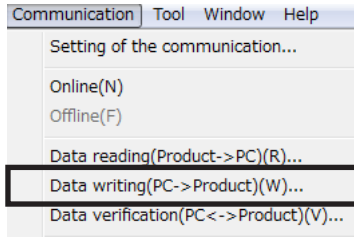
1. From TreeView in the left side of the screen, click [Objects of profile area] under [Driver axis]. The objects of profile area appears.

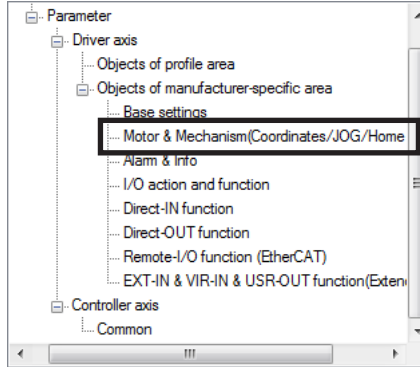2. The operating condition can be changed using the five parameters.

3. After changing the operating condition, click [Data writing (PC → product)] from the [Communication] menu or click the [Data writing (PC → product)] icon in the toolbar.

| Communication | Tool | Window | Help |
| Setting of the communication... |
| Online(N) |
| Offline(F) |
| Data reading(Product->PC)(R)... |
| **Data writing(PC->Product)(W)...** |
| Data verification(PC<->Product)(V)... |

or

● **When the "Homing method (6098h)" is set to "−1" (return-to-home our specifications)**

1. From TreeView in the left side of the screen, click [Motor & mechanism (coordinates/JOG/home operation)] under [Objects of manufacturer-specific area] under [Driver axis].
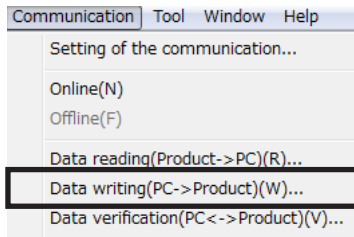The "Motor & mechanism" parameter window appears.

- Parameter
  - Driver axis
    - Objects of profile area
    - Objects of manufacturer-specific area
      - Base settings
      - **Motor & Mechanism(Coordinates/JOG/Home**
      - Alarm & Info
      - I/O action and function
      - Direct-IN function
      - Direct-OUT function
      - Remote-I/O function (EtherCAT)
      - EXT-IN & VIR-IN & USR-OUT function(Exten
  - Controller axis
    - Common

2. Change the "(JOG/HOME/ZHOME) Manual setting" parameter to "Manual setting."

Motor & Mechanism(Coordinates/JOG/Home operation)

		Axis 1
19	(JOG/HOME/ZHOME)Manual setting	Manual setting
20	(JOG/HOME/ZHOME) Command filter time constant [ms]	1

3. The operating condition can be changed using the 15 parameters.

Motor & Mechanism(Coordinates/JOG/Home operation)

30	(HOME) Home-seeking mode
31	(HOME) Starting direction
32	(HOME) Acceleration/deceleration of home-seeking [kHz/s]
33	(HOME) Starting speed [Hz]
34	(HOME) Operating speed [Hz]
35	(HOME) Home seeking speed [Hz]
36	(HOME) SLIT detection
37	(HOME) TIM/ZSG signal detection
38	(HOME) Sets the amount of offset from mechanical home. [step]
39	(HOME) Backward steps in 2 sensor home-seeking [step]
40	(HOME) Operating amount in uni-directional home-seeking [step]
41	(HOME) Operating current for push motion home-seeking [%]
42	(HOME) Backward steps after first entry in push-home-seeking [step]
43	(HOME) Pushing-time in push-home-seeking [ms]
44	(HOME)Backward steps in push-home-seeking [step]

4. After changing the operating condition, click [Data writing (PC → product)] from the [Communication] menu or click the [Data writing (PC → product)] icon in the toolbar.

| Communication | Tool | Window | Help |
| Setting of the communication... |
| Online(N) |
| Offline(F) |
| Data reading(Product->PC)(R)... |
| **Data writing(PC->Product)(W)...** |
| Data verification(PC<->Product)(V)... |

or

3 Operation Edition

■ **When the "Homing method (6098h)" is set to "Home preset (35 or 37)"**

Use [Position preset] when selecting "Home preset (35 or 37)" in the "Homing method (6098h)."
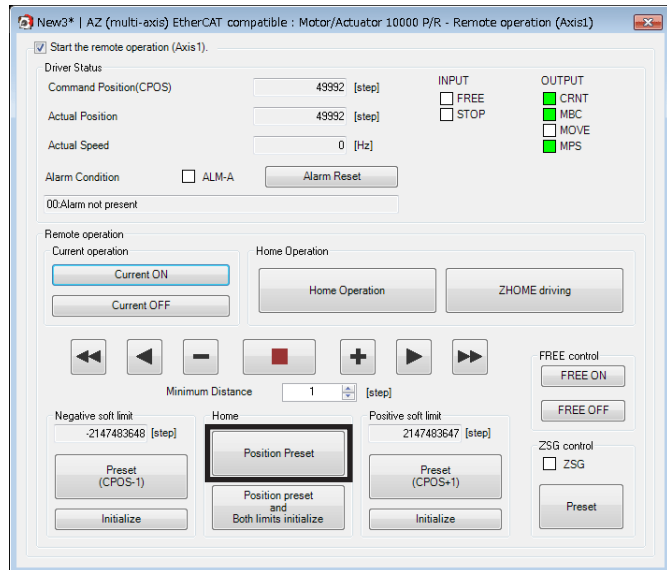

Note Be sure to click [Position preset] when performing the position preset (P-PRESET). If [HOME operation] or [ZHOME driving] is used, since return-to-home operation is performed instead of the position preset (P-PRESET), the motor will suddenly start moving.

3 Operation Edition

5-2   High-speed return-to-home operation

Here, high-speed return-to-home operation for the motor connected to the axis 1 of the driver axis is performed.

Note The home for motorized actuators has been set at the time of shipment. (Excluding the rod type of the **DR** Series, non-guide type of the **DRS2** Series, and **L** Series.) However, in the case of a motor alone, the home has not been set at the time of shipment. In addition, the home becomes an unset state when the resolution is changed. If high-speed return-to-home operation is started in a condition like this, the "Start ZHOME error" information is generated, and operation is not performed. Be sure to set the home before performing high-speed return-to-home operation. Refer to p.181 for resetting the home.

1. Click [Remote operation] to select [Remote operation (axis1)].
   The window of the remote operation (axis1) is shown.
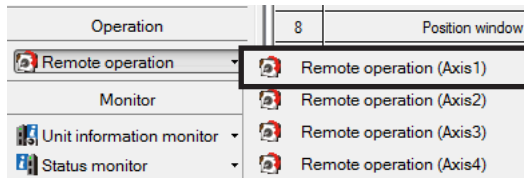
2. Click "Start the remote operation (axis1)."
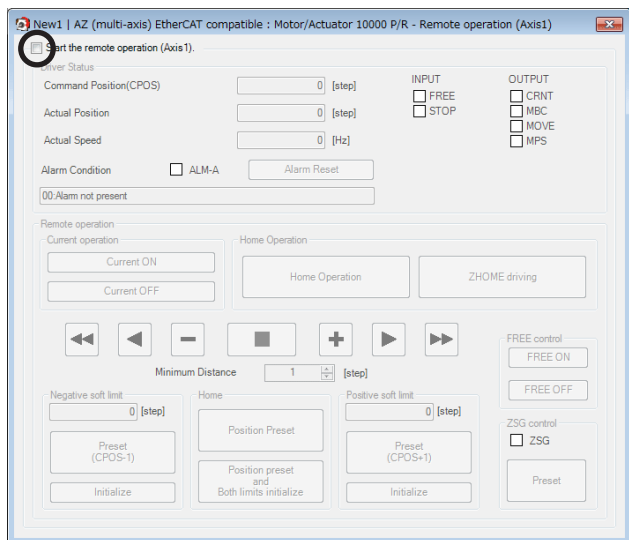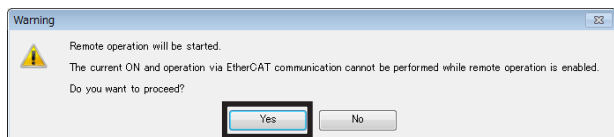
3. Click [Yes].

4. Click [Current on] to excite the motor.
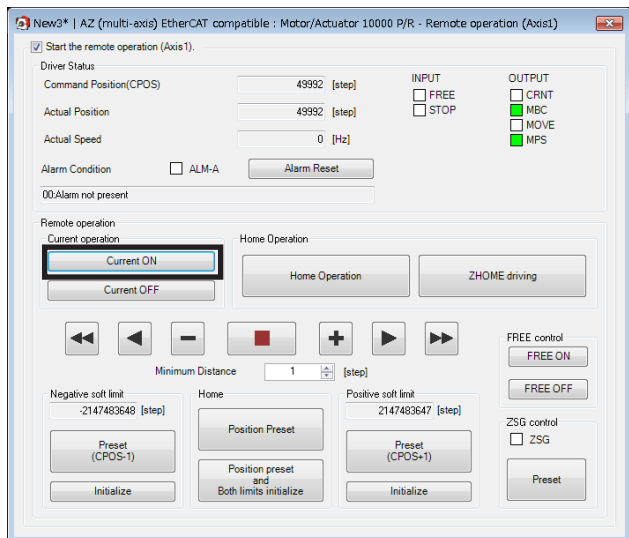
5. Check the value in the "Actual position."
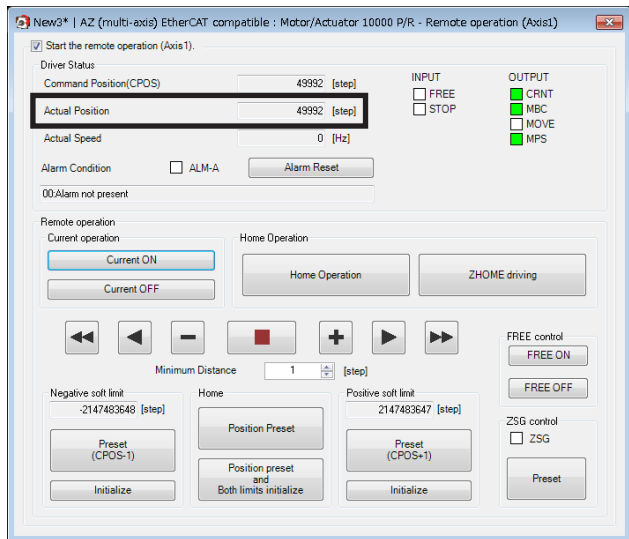
6. Click [ZHOME driving.]
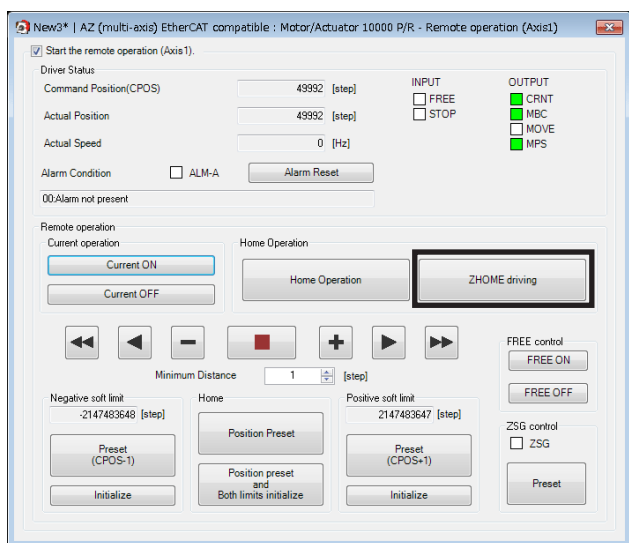
7. Click [Yes].
   The motor will start high-speed return-to-home operation.
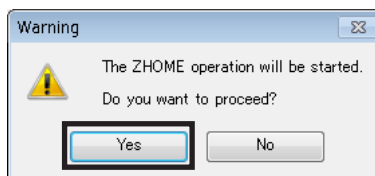
8. After the motor returns to the home, check that the "Actual position" is 0.

9. To end the remote operation, unselect "Start the remote operation (axis1)."
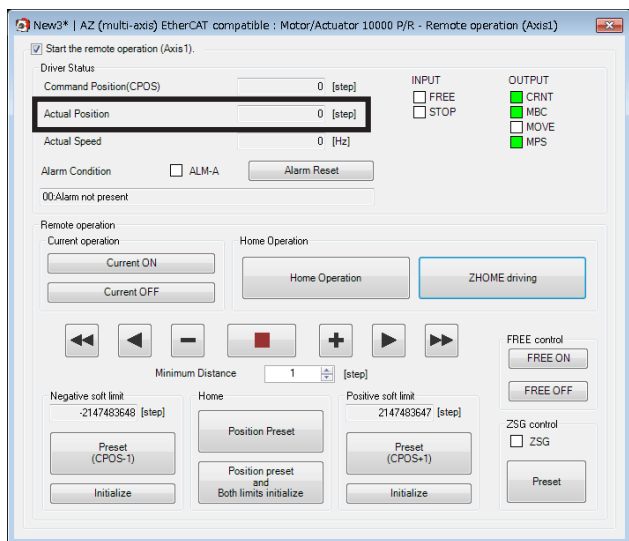
3 Operation Edition

■ When changing the operating condition of high-speed return-to-home operation

1. From TreeView in the left side of the screen, click [Motor & mechanism (coordinates/JOG/home operation)] under [Objects of manufacturer-specific area] under [Driver axis].
   The "Motor & mechanism" parameter window appears.

2. Change the "(JOG/HOME/ZHOME) Manual setting" parameter to "Manual setting."

3. The operating condition can be changed using the five parameters.

4. After changing the operating condition, click [Data writing (PC → product)] from the [Communication] menu or click the [Data writing (PC → product)] icon in the toolbar.

6 Monitor

This chapter shows how to monitor the items specific to the multi-axis driver.

6-1 Unit information monitor

The following two unit information monitors are available:

Monitor name	Description
Unit information monitor (all axes)	The setting status of switches for the controller axis in addition to the product information such as the model name and the serial number for the driver can be checked.
Unit information monitor (axis 1 to axis 4)	The setting status of switches and parameters in addition to the product information such as the model name and the serial number can be checked for each driver axis.

■ Unit information monitor (all axes)

1. Click [Unit information monitor] to select [Unit information monitor (all axes)].

The unit information monitor (all axes) window appears.

2. Click "Start the unit information monitor (all axes)."
   Unit information monitor (all axes) starts.

Controller axis information area

Driver axis information area

3 Operation Edition

How to read the unit information monitor (all axes) screen

Area	Main monitor item	Description
Controller axis information area	Driver user name	A desired name can be given with the parameter.
	Product name	The name of the product connected to the **MEXE02** is displayed.
	Serial number	This is a serial number assigned to each product. It is written at the time of factory shipment and cannot be changed.
	Ver.	The software version of the controller axis is shown.
Driver axis information area	• Motor user memo • Driver user memo	A desired memo can be written with a parameter.
	• Motor product name • Actuator product name	The model name being connected to each driver axis is shown.
	• Motor serial number • Actuator serial number	This is a serial number assigned to each product. It is written at the time of factory shipment and cannot be changed.
	Ver.	The software version of the driver axis is shown.
	Control power count	The number of times when the control power supply was turned on.
	Main power count	The number of times when the main power supply was turned on.
	Main power supply time	The total time while the main power supply was turned on.

3. To end the monitor unselect "Start the unit information monitor (all axes)."

■ Unit information monitor (axis 1 to axis 4)

This explains how to use by taking the axis 1 of the driver axis as an example.

1. Click [Unit information monitor] to select [Unit information monitor (axis1)].
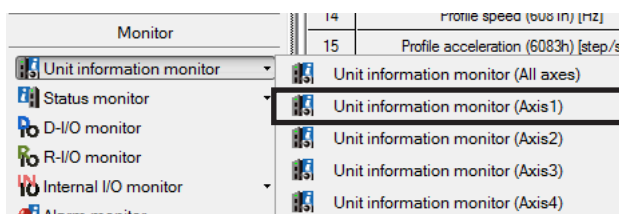
The unit information monitor (axis1) window appears.

2. Click "Start the unit information monitor (axis1)."
Unit information monitor (axis1) starts. Gray colored cells represent that the value is not set.

How to read the unit information monitor (axis1) screen

Area	Main monitor item	Description
Product information area	User memo	A desired memo can be given with the parameter.
	Product name	The name of the product connected to the **MEXE02** is displayed.
	Serial number	This is a serial number assigned to each product. It is written at the time of factory shipment and cannot be changed.
Driver axis information area	Ver.	The software version of the driver axis is shown.
	Control power count	The number of times when the control power supply was turned on.
	Main power count	The number of times when the main power supply was turned on.
	Main power supply time	The total time while the main power supply was turned on.
Motor and mechanism information area	Active	Parameter value presently used.
	Driver parameter	Parameter value set in the driver axis using the **MEXE02** or EtherCAT communication.
	ABZO (fixed)	Parameter value stored in the ABZO sensor. This is the fixed value. It cannot be changed.

3. To end the monitor unselect "Start the unit information monitor (axis1)."

6-2 Status monitor

The following three status monitors are available:

Monitor name	Description
Status monitor (controller axis)	The status of the fan and regeneration resistor in addition to the communication status of EtherCAT communication can be checked.
Status monitor (all axes)	The present status of the driver axis can be checked.
Status monitor (axis 1 to axis 4)	The present status can be checked for each axis. More detailed status than the status monitor (all axes) can be checked.

■ Status monitor (controller axis)

1. Click [Status monitor] to select [Status monitor (controller axis)].
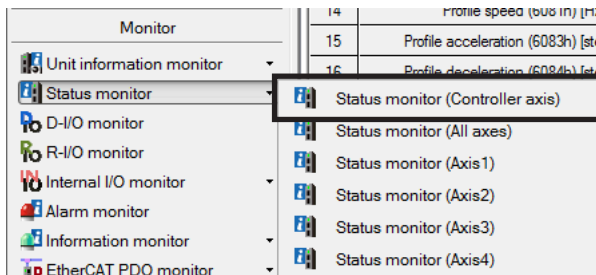
The status monitor (controller axis) window appears.

2. Click "Start the status monitor (controller axis)."
   Status monitor (controller axis) starts.
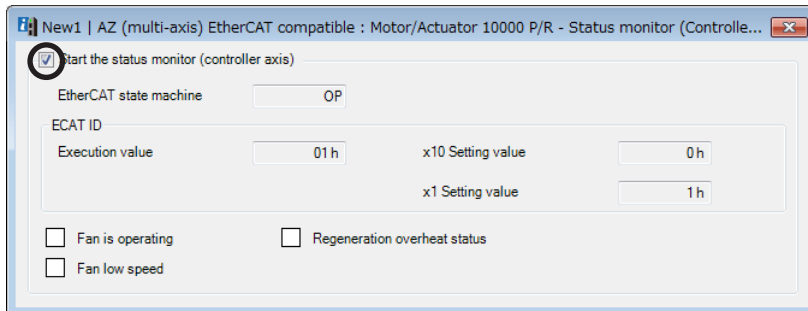
How to read the status monitor (controller axis) screen

Main monitor item	Description
EtherCAT state machine	Indicates the status of the state machine of EtherCAT communication. The state machine of EtherCAT communication is controlled by the MainDevice. **Displayed items** • INIT: During initialization • PREOP: Pre-operational state • SAFEOP: Safe-operational state • OP: Operational state
Execution value	Indicates the node address presently applied. The node address is set when the power is turned on.
×10 Setting value ×1 Setting value	Indicates the status of the node address setting switches.
Fan is operating	This is turned ON during the action command of the fan.
Fan low speed	This is turned ON if the following state is continued for 10 seconds during the action command of the fan. • The standstill of the fan was detected. • The fan was not connected.

Main monitor item	Description
Regeneration overheat status	This is turned ON if the following state is brought while the main power supply is supplied. ● An overheat of the regeneration resistor was detected. ● The thermal signal of the regeneration resistor was not connected.

3. To end the monitor unselect "Start the status monitor (controller axis)."

■ Status monitor (all axes)

1. Click [Status monitor] to select [Status monitor (all axes)].
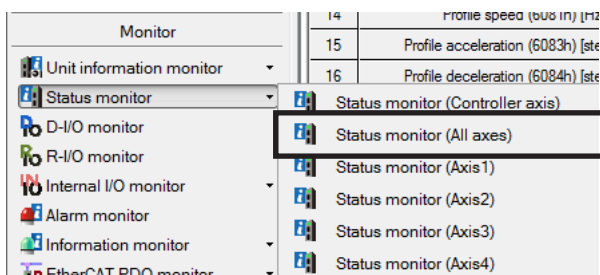
The status monitor (all axes) window appears.

2. Click "Start the status monitor (all axes)."
   Status monitor (all axes) starts.

3. To end the monitor unselect "Start the status monitor (all axes)."

3 Operation Edition

■ **Status monitor (axis 1 to axis 4)**

This explains how to use by taking the status monitor (axis 1) as an example.

1. Click [Status monitor] to select [Status monitor (axis1)].
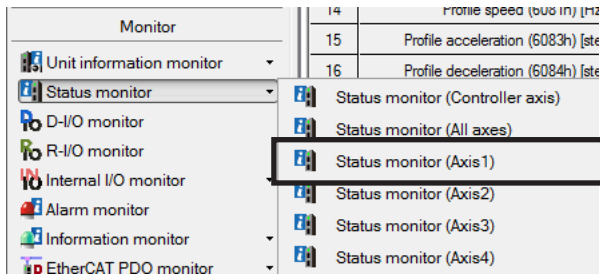
The status monitor (axis1) window appears.

2. Click "Start the status monitor (axis1)."
   Status monitor (axis1) starts.
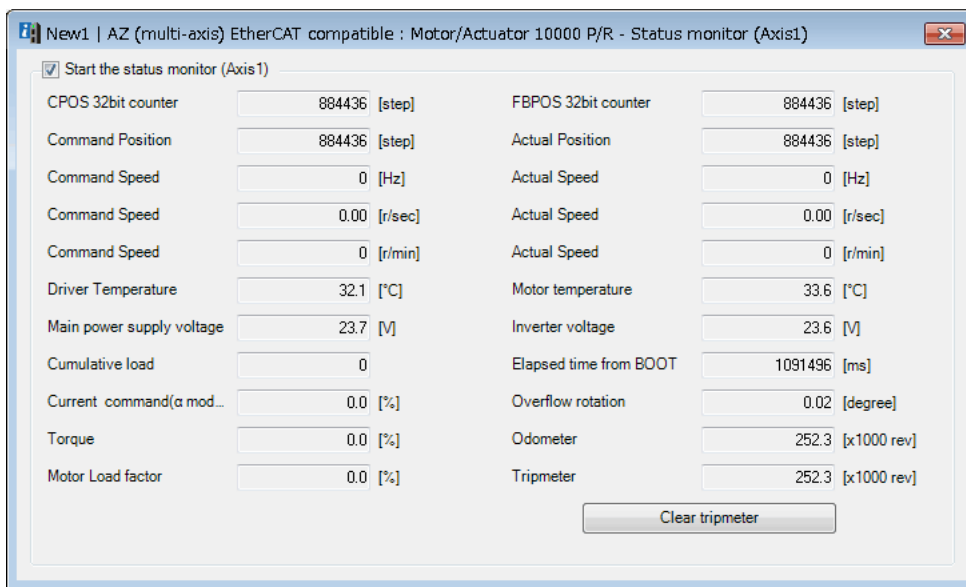
3. To end the monitor unselect "Start the status monitor (axis1)."

6-3　　EtherCAT PDO monitor

The following three EtherCAT PDO monitors are available:

Monitor name	Description
EtherCAT PDO monitor (receive PDO mapping monitor)	The receive PDO mapping object can be checked.
EtherCAT PDO monitor (transmit PDO mapping monitor)	The transmit PDO mapping object can be checked.
EtherCAT PDO monitor (PDO frame monitor)	The communication data for the receive PDO and the transmit PDO can be checked.

■ EtherCAT PDO monitor (receive PDO mapping monitor)

1. Click [EtherCAT PDO monitor] to select [EtherCAT PDO monitor (receive PDO mapping monitor)].
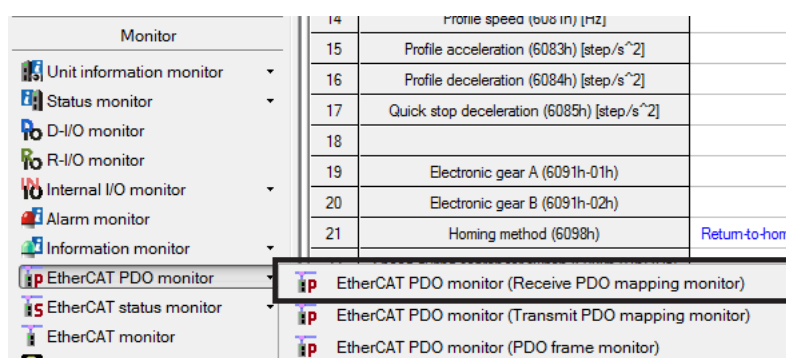
The EtherCAT PDO monitor (receive PDO mapping monitor) window appears.

2. Click "Start the EtherCAT PDO monitor (receive PDO mapping monitor)."
EtherCAT PDO monitor (receive PDO mapping monitor) starts.
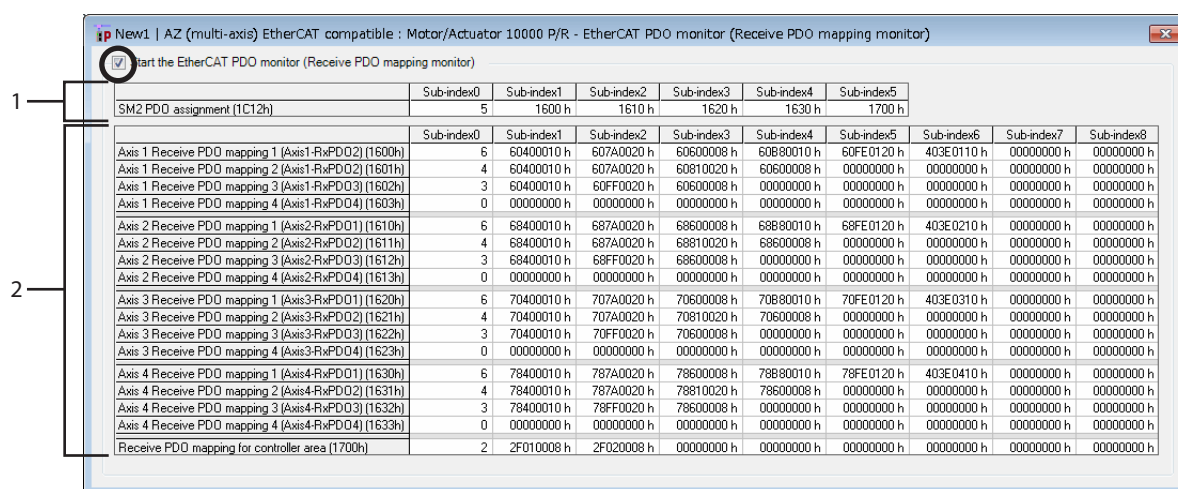
How to read the EtherCAT PDO monitor (receive PDO mapping monitor)

Area	Description
1	Indicates the effective receive PDO mapping on each axis.
2	Indicates the receive PDO mapping object on each axis.

3. To end the monitor unselect "Start the EtherCAT PDO monitor (receive PDO mapping monitor)."

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■ EtherCAT PDO monitor (transmit PDO mapping monitor)

1. Click [EtherCAT PDO monitor] to select [EtherCAT PDO monitor (transmit PDO mapping monitor)].
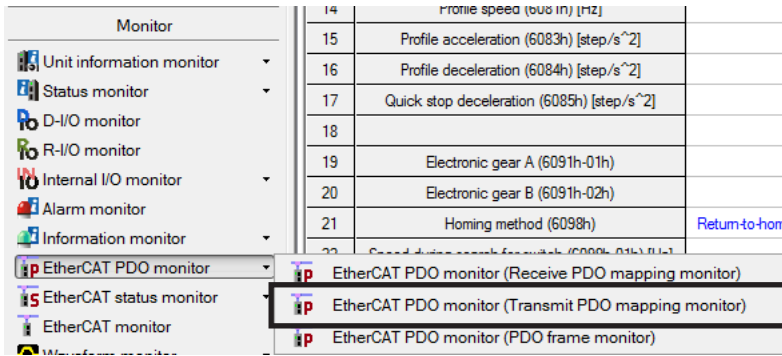
The EtherCAT PDO monitor (transmit PDO mapping monitor) window appears.

2. Click "Start the EtherCAT PDO monitor (transmit PDO mapping monitor)."
EtherCAT PDO monitor (transmit PDO mapping monitor) starts.

How to read the EtherCAT PDO monitor (transmit PDO mapping monitor)

Area	Description
1	Indicates the effective transmit PDO mapping on each axis.
2	Indicates the transmit PDO mapping object on each axis.

3. To end the monitor unselect "Start the EtherCAT PDO monitor (transmit PDO mapping monitor)".

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■ EtherCAT PDO monitor (PDO frame monitor)

1. Click [EtherCAT PDO monitor] to select [EtherCAT PDO monitor (PDO frame monitor)].
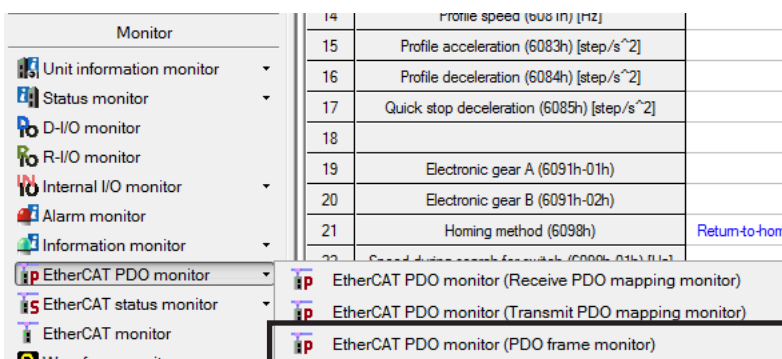
The EtherCAT PDO monitor (PDO frame monitor) window appears.

2. Click "Start the EtherCAT PDO monitor (PDO frame monitor)."
   EtherCAT PDO monitor (PDO frame monitor) starts.
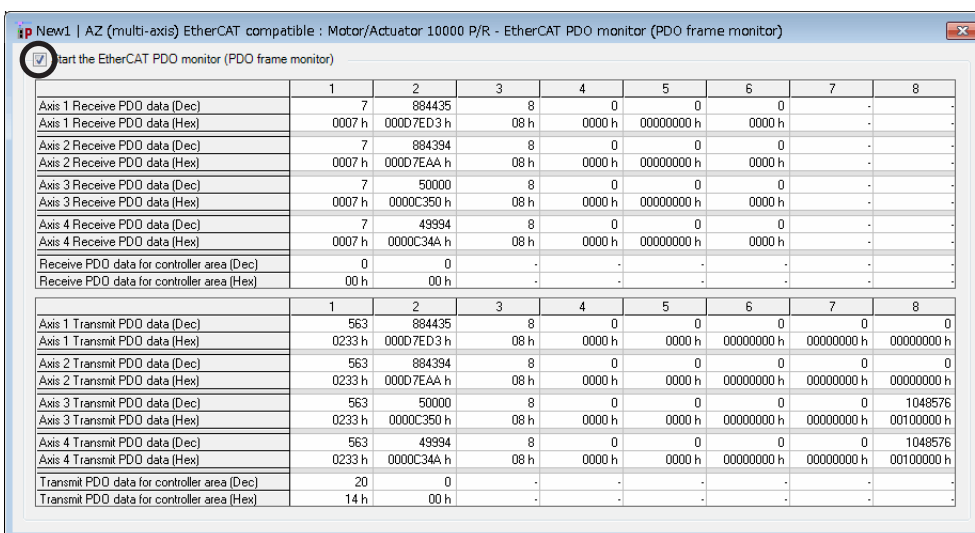
3. To end the monitor unselect "Start the EtherCAT PDO monitor (PDO frame monitor)".

3 Operation Edition

6-4   EtherCAT status monitor

The following two EtherCAT status monitors are available:

Monitor name	Description
EtherCAT status monitor (controller command/status monitor)	The command and the status for the controller axis can be checked.
EtherCAT status monitor (CoE communication object)	The object of CoE communication area can be checked.

■ EtherCAT status monitor (controller command/status monitor)

1. Click [EtherCAT status monitor] to select [EtherCAT status monitor (controller command/status monitor)].
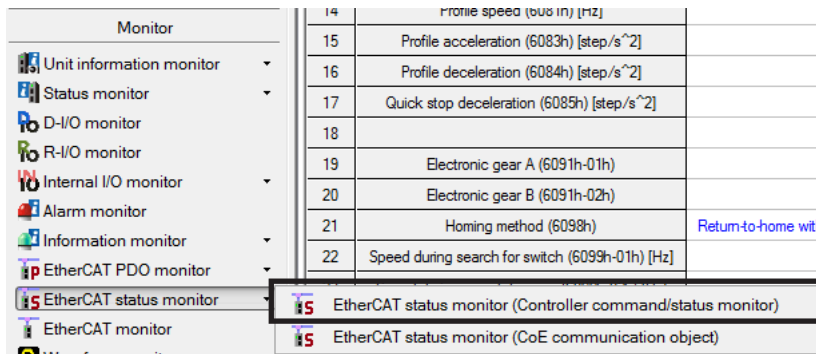
The EtherCAT status monitor (controller command/status monitor) window appears.

2. Click "Start the EtherCAT status monitor (controller command/status monitor)."
   EtherCAT status monitor (controller command/status monitor) starts.
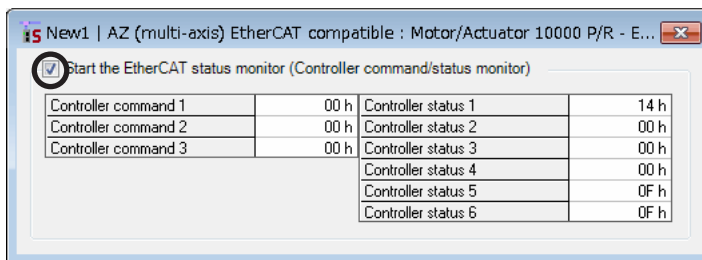
3. To end the monitor unselect "Start the EtherCAT status monitor (controller command/status monitor)".

■ EtherCAT status monitor (CoE communication object)

1. Click [EtherCAT status monitor] to select [EtherCAT status monitor (CoE communication object)].
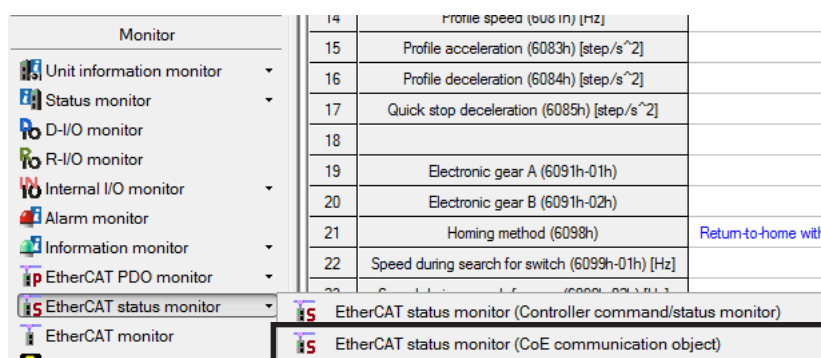
The EtherCAT status monitor (CoE communication object) window appears.

2. Click "Start the EtherCAT status monitor (CoE communication object)."
EtherCAT status monitor (CoE communication object) starts.
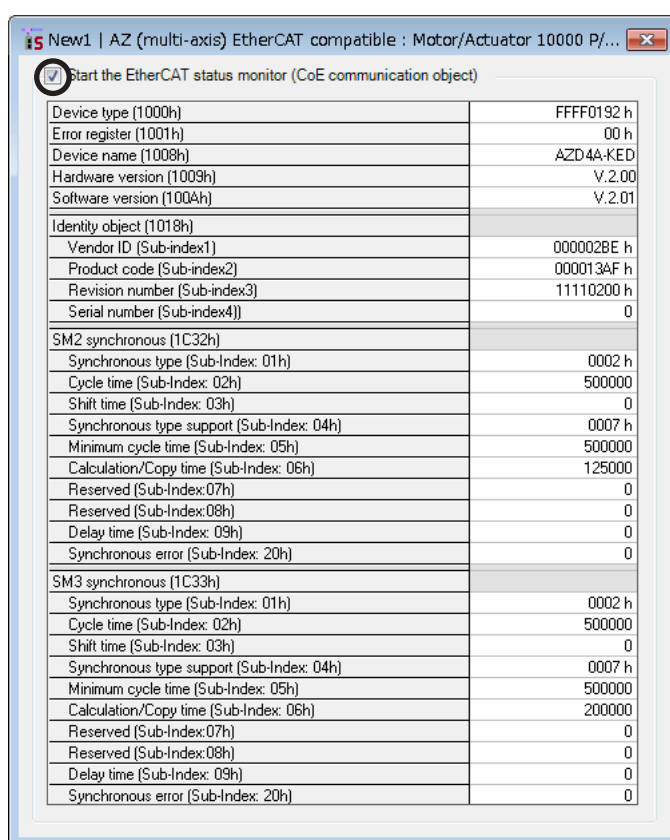
3. To end the monitor unselect "Start the EtherCAT status monitor (CoE communication object)."

6-5 EtherCAT monitor

The objects of profile area can be monitored.

1. Click [EtherCAT monitor].
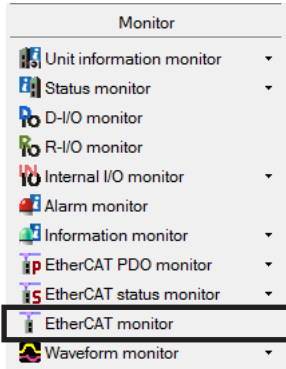
The EtherCAT monitor window appears.

2. Click "Start the EtherCAT monitor."
   EtherCAT monitor starts.

3. To end the monitor unselect "Start the EtherCAT monitor."

3 Operation Edition
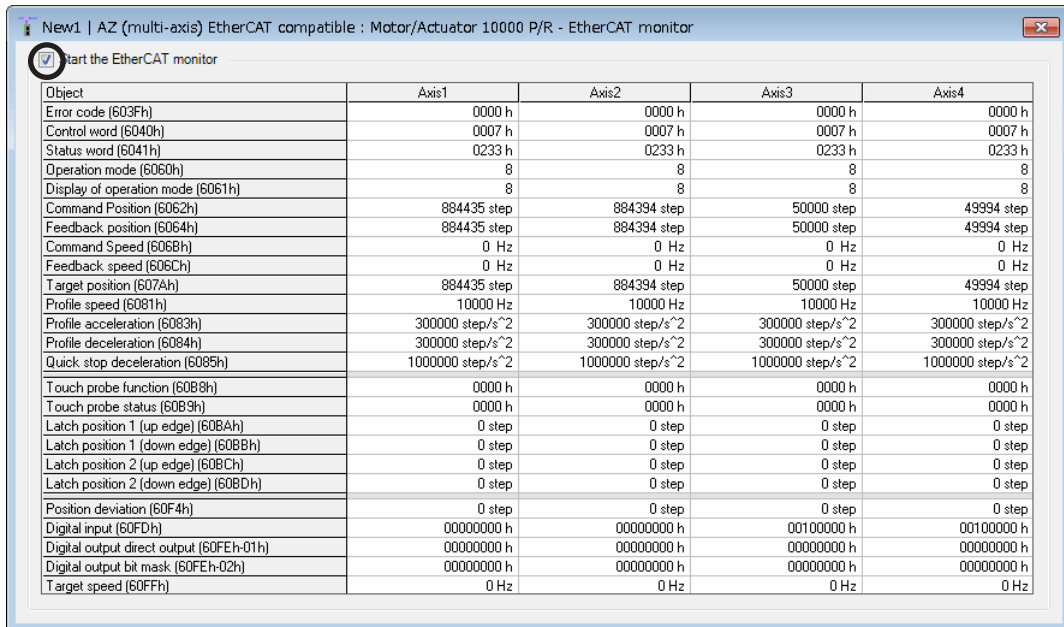
6-6   Waveform monitor

The waveform monitor is a function to output the output signal as a waveform in addition to the command speed and actual speed of the motor.
Since each output signal such as READY, MOVE and TLC can be monitored simultaneously according to the operating status of the motor, creating and debugging of ladder programs can be performed efficiently.
This explains how to use by taking the axis 1 of the driver axis as an example.

1. Click [Waveform monitor] to select [Waveform monitor (axis1)].
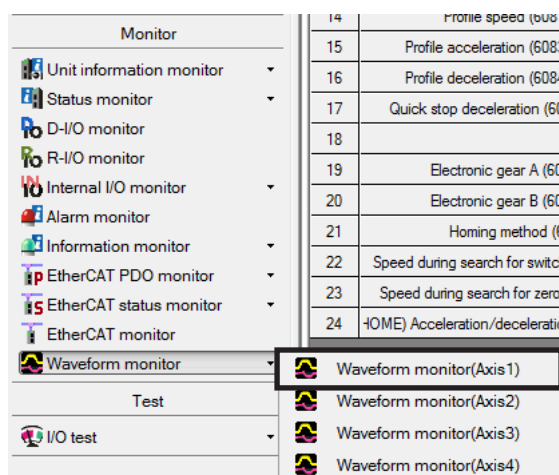
The waveform monitor (axis1) window appears.

2. Click "Start the waveform monitor (axis1)."
   The buttons in the window are enabled, allowing for measurement of the waveform monitor.
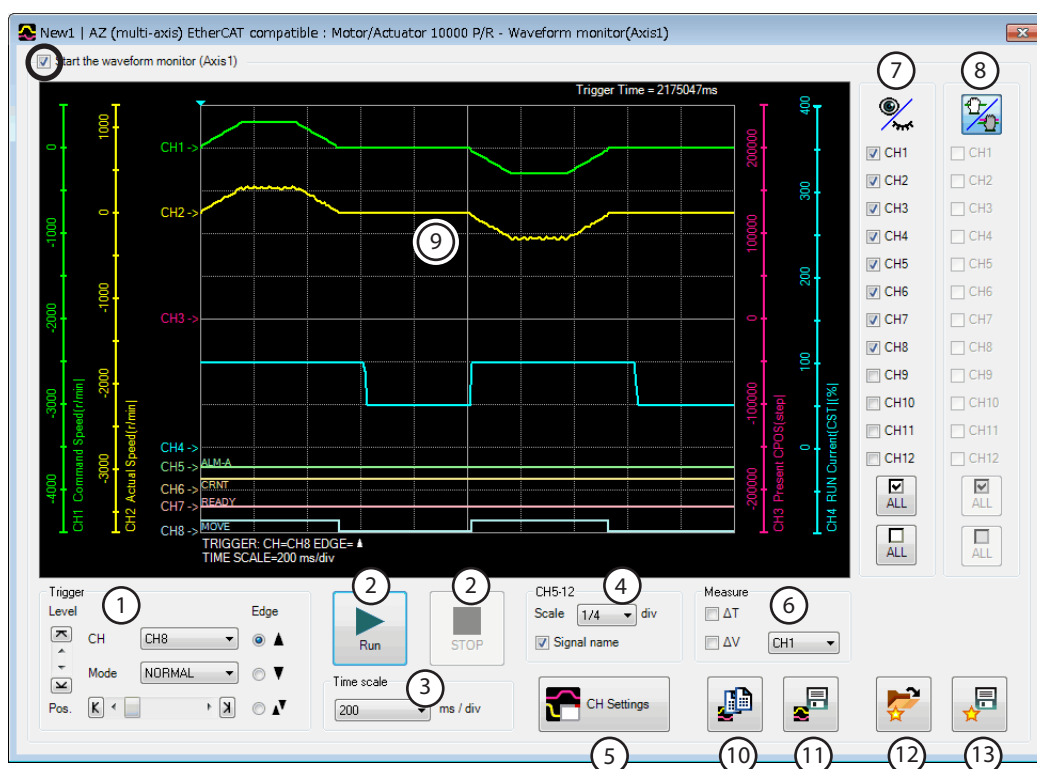
1	Sets the level, CH, mode, edge (detection condition), and pos (trigger position) that are used when the waveform is measured. For "CH," only CH shown on ⑨ can be used.
2	Run: This button is used to start measurement. Stop: This button is used to stop measurement.
3	Sets the measurement time range.

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4	Sets the display method for CH5 to CH12. Scale: Selects the display size from 1/1 (100 %), 1/2 (50 %), or 1/4 (25 %). Signal name: Switches between show or hide for the signal name.
5	Shows the CH setting window.
6	Switches between show or hide for the measure for measurement. Also, selects the CH to be measured.
7	Switches between show or hide for each CH.
8	When the display position of the waveform drawn on the screen is moved, CHs selected here can be moved collectively.
9	This is the area the measurement result is drawn.
10	Copies the waveform presently shown to the clipboard.
11	Saves the waveform presently shown to an external file.
12	Reads the setting for measurement from "Favorites."
13	Saves the setting for measurement as "Favorites."

3. Click [CH settings].
   The CH setting window is shown. Set the measurement condition for each CH.
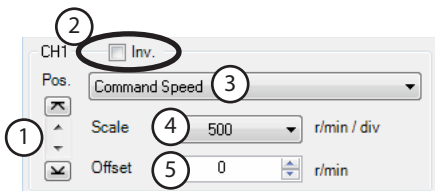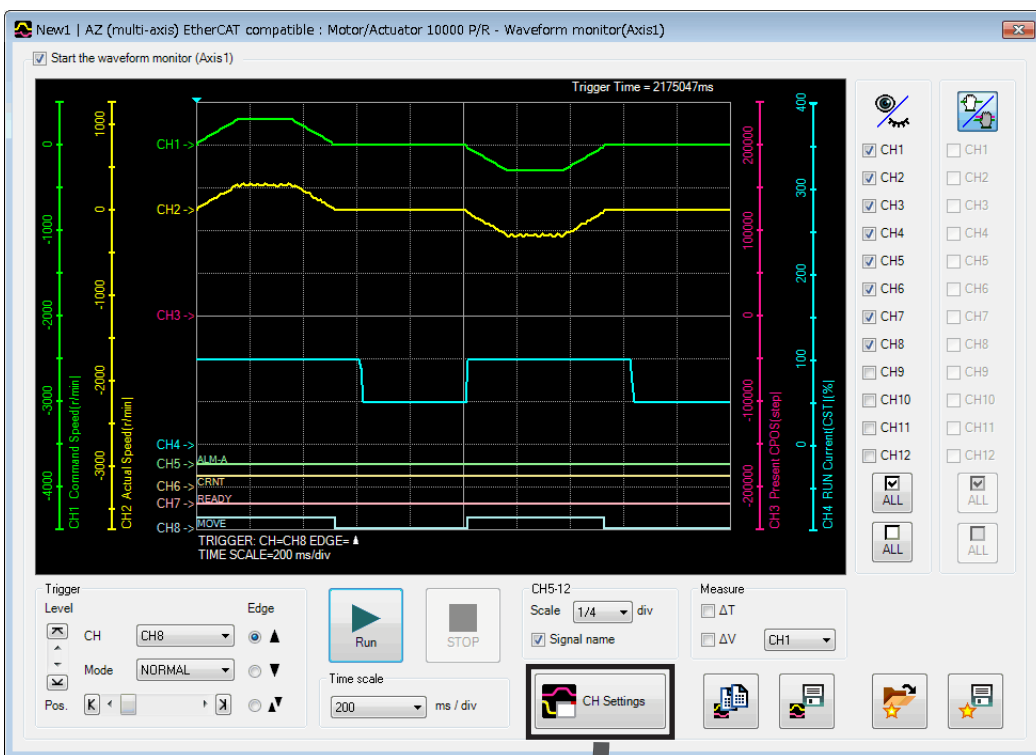
1	Moves the display position of the waveform up and down.
2	Shows the measured item inverted.
3	Selects the item to be measured. The CH1 to CH4 are items for the command speed, actual speed, receive PDO, transmit PDO and others, and the CH5 to CH12 are items for I/O signals.
4	Selects the display size (for CH1 to CH4 only). The display size can be enlarged in combination with ⑤.
5	Adds the set offset value to the measured value (for CH1 to CH4 only). The display size can be enlarged in combination with ④.

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4. Click [Run].
   Waveform measurement starts.

5. If the [Stop] button is clicked during the measurement, the waveform measurement is ended.
   If "Single" is selected in the mode of trigger, the measurement is automatically ended when the drawing of the waveform is complete.

6. To end the waveform measurement, unselect "Start the waveform monitor (axis1)."

3 Operation Edition

4   Object Lists

This part describes the lists of the objects supported by the driver.

◆ **Table of contents**

■ Notation rules

● Timing to update

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

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

1   Objects of the CoE communication area

These are objects to set about EtherCAT communication or to indicate the status.

Index	Sub	Name	Type	Access	PDO	Save	initial value	Range	Update
1000h	00h	Device type	U32	RO	No	–	FFFF0192h	–	–
1001h	00h	Error register	U8	RO	No	–	0	–	–
1008h	00h	Manufacturer device name	STRING	RO	No	–	**AZD2A-KED, AZD3A-KED, AZD4A-KED, AZD2B-KED**	–	–
1009h	00h	Manufacturer hardware version	STRING	RO	No	–	Indicates the version number	–	–
100Ah	00h	Manufacturer software version	STRING	RO	No	–	Indicates the version number	–	–
1018h		Identity object							
	00h	Number of entries	U8	RO	No	–	4	–	–
	01h	Vendor ID	U32	RO	No	–	000002BEh	–	–
	02h	Product code	U32	RO	No	–	**AZD2A-KED**: 0000 13AFh **AZD3A-KED**: 0000 13AFh **AZD4A-KED**: 0000 13AFh **AZD2B-KED**: 0000 13F4h	–	
	03h	Revision number	U32	RO	No	–	**AZD2A-KED**: 0011 xxxxh **AZD3A-KED**: 0111 xxxxh **AZD4A-KED**: 1111 xxxxh **AZD2B-KED**: 0011 xxxxh	–	
	04h	Serial number	U32	RO	No	–	0	–	–
1600h		Axis 1 receive PDO mapping 1							
	00h	Number of entries	U8	RW	No	–	3	0 to 8	A
	01h	Mapping entry 1	U32	RW	No	–	6040 0010h	0000 0000h to FFFF FFFFh	A
	02h	Mapping entry 2	U32	RW	No	–	607A 0020h	0000 0000h to FFFF FFFFh	A
	03h	Mapping entry 3	U32	RW	No	–	6060 0008h	0000 0000h to FFFF FFFFh	A
	04h to 08h	Mapping entry 4-8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1601h		Axis 1 receive PDO mapping 2							
	00h	Number of entries	U8	RW	No	–	4	0 to 8	A
	01h	Mapping entry 1	U32	RW	No	–	6040 0010h	0000 0000h to FFFF FFFFh	A
	02h	Mapping entry 2	U32	RW	No	–	607A 0020h	0000 0000h to FFFF FFFFh	A
	03h	Mapping entry 3	U32	RW	No	–	6081 0020h	0000 0000h to FFFF FFFFh	A
	04h	Mapping entry 4	U32	RW	No	–	6060 0008h	0000 0000h to FFFF FFFFh	A
	05h to 08h	Mapping entry 5-8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1602h		Axis 1 receive PDO mapping 3							
	00h	Number of entries	U8	RW	No	–	3	0 to 8	A
	01h	Mapping entry 1	U32	RW	No	–	6040 0010h	0000 0000h to FFFF FFFFh	A
	02h	Mapping entry 2	U32	RW	No	–	60FF 0020h	0000 0000h to FFFF FFFFh	A
	03h	Mapping entry 3	U32	RW	No	–	6060 0008h	0000 0000h to FFFF FFFFh	A
	04h to 08h	Mapping entry 4-8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1603h		Axis 1 receive PDO mapping 4							
	00h	Number of entries	U8	RW	No	–	5	0 to 8	A
	01h	Mapping entry 1	U32	RW	No	–	6040 0010h	0000 0000h to FFFF FFFFh	A
	02h	Mapping entry 2	U32	RW	No	–	607A 0020h	0000 0000h to FFFF FFFFh	A
	03h	Mapping entry 3	U32	RW	No	–	6060 0008h	0000 0000h to FFFF FFFFh	A
	04h	Mapping entry 4	U32	RW	No	–	60FF 0020h	0000 0000h to FFFF FFFFh	A
	05h	Mapping entry 5	U32	RW	No	–	60B8 0010h	0000 0000h to FFFF FFFFh	A
	06h to 08h	Mapping entry 6-8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1610h		Axis 2 receive PDO mapping 1							
	00h	Number of entries	U8	RW	No	–	3	0 to 8	A
	01h	Mapping entry 1	U32	RW	No	–	6840 0010h	0000 0000h to FFFF FFFFh	A
	02h	Mapping entry 2	U32	RW	No	–	687A 0020h	0000 0000h to FFFF FFFFh	A
	03h	Mapping entry 3	U32	RW	No	–	6860 0008h	0000 0000h to FFFF FFFFh	A
	04h to 08h	Mapping entry 4-8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A

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Index	Sub	Name	Type	Access	PDO	Save	initial value	Range	Update
1611h		Axis 2 receive PDO mapping 2							
	00h	Number of entries	U8	RW	No	–	4	0 to 8	A
	01h	Mapping entry 1	U32	RW	No	–	6840 0010h	0000 0000h to FFFF FFFFh	A
	02h	Mapping entry 2	U32	RW	No	–	687A 0020h	0000 0000h to FFFF FFFFh	A
	03h	Mapping entry 3	U32	RW	No	–	6881 0020h	0000 0000h to FFFF FFFFh	A
	04h	Mapping entry 4	U32	RW	No	–	6860 0008h	0000 0000h to FFFF FFFFh	A
	05h to 08h	Mapping entry 5-8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1612h		Axis 2 receive PDO mapping 3							
	00h	Number of entries	U8	RW	No	–	3	0 to 8	A
	01h	Mapping entry 1	U32	RW	No	–	6840 0010h	0000 0000h to FFFF FFFFh	A
	02h	Mapping entry 2	U32	RW	No	–	68FF 0020h	0000 0000h to FFFF FFFFh	A
	03h	Mapping entry 3	U32	RW	No	–	6860 0008h	0000 0000h to FFFF FFFFh	A
	04h to 08h	Mapping entry 4-8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1613h		Axis 2 receive PDO mapping 4							
	00h	Number of entries	U8	RW	No	–	5	0 to 8	A
	01h	Mapping entry 1	U32	RW	No	–	6840 0010h	0000 0000h to FFFF FFFFh	A
	02h	Mapping entry 2	U32	RW	No	–	687A 0020h	0000 0000h to FFFF FFFFh	A
	03h	Mapping entry 3	U32	RW	No	–	6860 0008h	0000 0000h to FFFF FFFFh	A
	04h	Mapping entry 4	U32	RW	No	–	68FF 0020h	0000 0000h to FFFF FFFFh	A
	05h	Mapping entry 5	U32	RW	No	–	68B8 0010h	0000 0000h to FFFF FFFFh	A
	06h to 08h	Mapping entry 6-8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1620h		Axis 3 receive PDO mapping 1							
	00h	Number of entries	U8	RW	No	–	3	0 to 8	A
	01h	Mapping entry 1	U32	RW	No	–	7040 0010h	0000 0000h to FFFF FFFFh	A
	02h	Mapping entry 2	U32	RW	No	–	707A 0020h	0000 0000h to FFFF FFFFh	A
	03h	Mapping entry 3	U32	RW	No	–	7060 0008h	0000 0000h to FFFF FFFFh	A
	04h to 08h	Mapping entry 4-8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1621h		Axis 3 receive PDO mapping 2							
	00h	Number of entries	U8	RW	No	–	4	0 to 8	A
	01h	Mapping entry 1	U32	RW	No	–	7040 0010h	0000 0000h to FFFF FFFFh	A
	02h	Mapping entry 2	U32	RW	No	–	707A 0020h	0000 0000h to FFFF FFFFh	A
	03h	Mapping entry 3	U32	RW	No	–	7081 0020h	0000 0000h to FFFF FFFFh	A
	04h	Mapping entry 4	U32	RW	No	–	7060 0008h	0000 0000h to FFFF FFFFh	A
	05h to 08h	Mapping entry 5-8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1622h		Axis 3 receive PDO mapping 3							
	00h	Number of entries	U8	RW	No	–	3	0 to 8	A
	01h	Mapping entry 1	U32	RW	No	–	7040 0010h	0000 0000h to FFFF FFFFh	A
	02h	Mapping entry 2	U32	RW	No	–	70FF 0020h	0000 0000h to FFFF FFFFh	A
	03h	Mapping entry 3	U32	RW	No	–	7060 0008h	0000 0000h to FFFF FFFFh	A
	04h to 08h	Mapping entry 4-8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1623h		Axis 3 receive PDO mapping 4							
	00h	Number of entries	U8	RW	No	–	5	0 to 8	A
	01h	Mapping entry 1	U32	RW	No	–	7040 0010h	0000 0000h to FFFF FFFFh	A
	02h	Mapping entry 2	U32	RW	No	–	707A 0020h	0000 0000h to FFFF FFFFh	A
	03h	Mapping entry 3	U32	RW	No	–	7060 0008h	0000 0000h to FFFF FFFFh	A
	04h	Mapping entry 4	U32	RW	No	–	70FF 0020h	0000 0000h to FFFF FFFFh	A
	05h	Mapping entry 5	U32	RW	No	–	70B8 0010h	0000 0000h to FFFF FFFFh	A
	06h to 08h	Mapping entry 6-8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1630h		Axis 4 receive PDO mapping 1							
	00h	Number of entries	U8	RW	No	–	3	0 to 8	A
	01h	Mapping entry 1	U32	RW	No	–	7840 0010h	0000 0000h to FFFF FFFFh	A
	02h	Mapping entry 2	U32	RW	No	–	787A 0020h	0000 0000h to FFFF FFFFh	A
	03h	Mapping entry 3	U32	RW	No	–	7860 0008h	0000 0000h to FFFF FFFFh	A
	04h to 08h	Mapping entry 4-8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A

Index	Sub	Name	Type	Access	PDO	Save	initial value	Range	Update
1631h		Axis 4 receive PDO mapping 2							
	00h	Number of entries	U8	RW	No	–	4	0 to 8	A
	01h	Mapping entry 1	U32	RW	No	–	7840 0010h	0000 0000h to FFFF FFFFh	A
	02h	Mapping entry 2	U32	RW	No	–	787A 0020h	0000 0000h to FFFF FFFFh	A
	03h	Mapping entry 3	U32	RW	No	–	7881 0020h	0000 0000h to FFFF FFFFh	A
	04h	Mapping entry 4	U32	RW	No	–	7860 0008h	0000 0000h to FFFF FFFFh	A
	05h to 08h	Mapping entry 5-8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1632h		Axis 4 receive PDO mapping 3							
	00h	Number of entries	U8	RW	No	–	3	0 to 8	A
	01h	Mapping entry 1	U32	RW	No	–	7840 0010h	0000 0000h to FFFF FFFFh	A
	02h	Mapping entry 2	U32	RW	No	–	78FF 0020h	0000 0000h to FFFF FFFFh	A
	03h	Mapping entry 3	U32	RW	No	–	7860 0008h	0000 0000h to FFFF FFFFh	A
	04h to 08h	Mapping entry 4-8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1633h		Axis 4 receive PDO mapping 4							
	00h	Number of entries	U8	RW	No	–	5	0 to 8	A
	01h	Mapping entry 1	U32	RW	No	–	7840 0010h	0000 0000h to FFFF FFFFh	A
	02h	Mapping entry 2	U32	RW	No	–	787A 0020h	0000 0000h to FFFF FFFFh	A
	03h	Mapping entry 3	U32	RW	No	–	7860 0008h	0000 0000h to FFFF FFFFh	A
	04h	Mapping entry 4	U32	RW	No	–	78FF 0020h	0000 0000h to FFFF FFFFh	A
	05h	Mapping entry 5	U32	RW	No	–	78B8 0010h	0000 0000h to FFFF FFFFh	A
	06h to 08h	Mapping entry 6-8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1700h		Controller receive PDO mapping							
	00h	Number of entries	U8	RW	No	–	2	0 to 8	A
	01h	Mapping entry 1	U32	RW	No	–	2F01 0008h	0000 0000h to FFFF FFFFh	A
	02h	Mapping entry 2	U32	RW	No	–	2F02 0008h	0000 0000h to FFFF FFFFh	A
	03h to 08h	Mapping entry 3-8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1A00h		Axis 1 transmit PDO mapping 1							
	00h	Number of entries	U8	RW	No	–	3	0 to 8	A
	01h	Mapping entry 1	U32	RW	No	–	6041 0010h	0000 0000h to FFFF FFFFh	A
	02h	Mapping entry 2	U32	RW	No	–	6064 0020h	0000 0000h to FFFF FFFFh	A
	03h	Mapping entry 3	U32	RW	No	–	6061 0008h	0000 0000h to FFFF FFFFh	A
	04h to 08h	Mapping entry 4-8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1A01h		Axis 1 transmit PDO mapping 2							
	00h	Number of entries	U8	RW	No	–	4	0 to 8	A
	01h	Mapping entry 1	U32	RW	No	–	6041 0010h	0000 0000h to FFFF FFFFh	A
	02h	Mapping entry 2	U32	RW	No	–	6064 0020h	0000 0000h to FFFF FFFFh	A
	03h	Mapping entry 3	U32	RW	No	–	606C 0020h	0000 0000h to FFFF FFFFh	A
	04h	Mapping entry 4	U32	RW	No	–	6061 0008h	0000 0000h to FFFF FFFFh	A
	05h to 08h	Mapping entry 5-8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1A02h		Axis 1 transmit PDO mapping 3							
	00h	Number of entries	U8	RW	No	–	3	0 to 8	A
	01h	Mapping entry 1	U32	RW	No	–	6041 0010h	0000 0000h to FFFF FFFFh	A
	02h	Mapping entry 2	U32	RW	No	–	606C 0020h	0000 0000h to FFFF FFFFh	A
	03h	Mapping entry 3	U32	RW	No	–	6061 0008h	0000 0000h to FFFF FFFFh	A
	04h to 08h	Mapping entry 4-8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1A03h		Axis 1 transmit PDO mapping 4							
	00h	Number of entries	U8	RW	No	–	8	0 to 8	A
	01h	Mapping entry 1	U32	RW	No	–	6041 0010h	0000 0000h to FFFF FFFFh	A
	02h	Mapping entry 2	U32	RW	No	–	6064 0020h	0000 0000h to FFFF FFFFh	A
	03h	Mapping entry 3	U32	RW	No	–	6061 0008h	0000 0000h to FFFF FFFFh	A
	04h	Mapping entry 4	U32	RW	No	–	60B9 0010h	0000 0000h to FFFF FFFFh	A
	05h	Mapping entry 5	U32	RW	No	–	60BA 0020h	0000 0000h to FFFF FFFFh	A
	06h	Mapping entry 6	U32	RW	No	–	60BC 0020h	0000 0000h to FFFF FFFFh	A
	07h	Mapping entry 7	U32	RW	No	–	603F 0010h	0000 0000h to FFFF FFFFh	A
	08h	Mapping entry 8	U32	RW	No	–	60FD 0020h	0000 0000h to FFFF FFFFh	A

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Index	Sub	Name	Type	Access	PDO	Save	initial value	Range	Update
1A10h		Axis 2 transmit PDO mapping 1							
	00h	Number of entries	U8	RW	No	–	3	0 to 8	A
	01h	Mapping entry 1	U32	RW	No	–	6841 0010h	0000 0000h to FFFF FFFFh	A
	02h	Mapping entry 2	U32	RW	No	–	6864 0020h	0000 0000h to FFFF FFFFh	A
	03h	Mapping entry 3	U32	RW	No	–	6861 0008h	0000 0000h to FFFF FFFFh	A
	04h to 08h	Mapping entry 4-8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1A11h		Axis 2 transmit PDO mapping 2							
	00h	Number of entries	U8	RW	No	–	4	0 to 8	A
	01h	Mapping entry 1	U32	RW	No	–	6841 0010h	0000 0000h to FFFF FFFFh	A
	02h	Mapping entry 2	U32	RW	No	–	6864 0020h	0000 0000h to FFFF FFFFh	A
	03h	Mapping entry 3	U32	RW	No	–	686C 0020h	0000 0000h to FFFF FFFFh	A
	04h	Mapping entry 4	U32	RW	No	–	6861 0008h	0000 0000h to FFFF FFFFh	A
	05h to 08h	Mapping entry 5-8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1A12h		Axis 2 transmit PDO mapping 3							
	00h	Number of entries	U8	RW	No	–	3	0 to 8	A
	01h	Mapping entry 1	U32	RW	No	–	6841 0010h	0000 0000h to FFFF FFFFh	A
	02h	Mapping entry 2	U32	RW	No	–	686C 0020h	0000 0000h to FFFF FFFFh	A
	03h	Mapping entry 3	U32	RW	No	–	6861 0008h	0000 0000h to FFFF FFFFh	A
	04h to 08h	Mapping entry 4-8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1A13h		Axis 2 transmit PDO mapping 4							
	00h	Number of entries	U8	RW	No	–	8	0 to 8	A
	01h	Mapping entry 1	U32	RW	No	–	6841 0010h	0000 0000h to FFFF FFFFh	A
	02h	Mapping entry 2	U32	RW	No	–	6864 0020h	0000 0000h to FFFF FFFFh	A
	03h	Mapping entry 3	U32	RW	No	–	6861 0008h	0000 0000h to FFFF FFFFh	A
	04h	Mapping entry 4	U32	RW	No	–	68B9 0010h	0000 0000h to FFFF FFFFh	A
	05h	Mapping entry 5	U32	RW	No	–	68BA 0020h	0000 0000h to FFFF FFFFh	A
	06h	Mapping entry 6	U32	RW	No	–	68BC 0020h	0000 0000h to FFFF FFFFh	A
	07h	Mapping entry 7	U32	RW	No	–	683F 0010h	0000 0000h to FFFF FFFFh	A
	08h	Mapping entry 8	U32	RW	No	–	68FD 0020h	0000 0000h to FFFF FFFFh	A
1A20h		Axis 3 transmit PDO mapping 1							
	00h	Number of entries	U8	RW	No	–	3	0 to 8	A
	01h	Mapping entry 1	U32	RW	No	–	7041 0010h	0000 0000h to FFFF FFFFh	A
	02h	Mapping entry 2	U32	RW	No	–	7064 0020h	0000 0000h to FFFF FFFFh	A
	03h	Mapping entry 3	U32	RW	No	–	7061 0008h	0000 0000h to FFFF FFFFh	A
	04h to 08h	Mapping entry 4-8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1A21h		Axis 3 transmit PDO mapping 2							
	00h	Number of entries	U8	RW	No	–	4	0 to 8	A
	01h	Mapping entry 1	U32	RW	No	–	7041 0010h	0000 0000h to FFFF FFFFh	A
	02h	Mapping entry 2	U32	RW	No	–	7064 0020h	0000 0000h to FFFF FFFFh	A
	03h	Mapping entry 3	U32	RW	No	–	706C 0020h	0000 0000h to FFFF FFFFh	A
	04h	Mapping entry 4	U32	RW	No	–	7061 0008h	0000 0000h to FFFF FFFFh	A
	05h to 08h	Mapping entry 5-8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1A22h		Axis 3 transmit PDO mapping 3							
	00h	Number of entries	U8	RW	No	–	3	0 to 8	A
	01h	Mapping entry 1	U32	RW	No	–	7041 0010h	0000 0000h to FFFF FFFFh	A
	02h	Mapping entry 2	U32	RW	No	–	706C 0020h	0000 0000h to FFFF FFFFh	A
	03h	Mapping entry 3	U32	RW	No	–	7061 0008h	0000 0000h to FFFF FFFFh	A
	04h to 08h	Mapping entry 4-8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A

Index	Sub	Name	Type	Access	PDO	Save	initial value	Range	Update
1A23h		Axis 3 transmit PDO mapping 4							
	00h	Number of entries	U8	RW	No	–	8	0 to 8	A
	01h	Mapping entry 1	U32	RW	No	–	7041 0010h	0000 0000h to FFFF FFFFh	A
	02h	Mapping entry 2	U32	RW	No	–	7064 0020h	0000 0000h to FFFF FFFFh	A
	03h	Mapping entry 3	U32	RW	No	–	7061 0008h	0000 0000h to FFFF FFFFh	A
	04h	Mapping entry 4	U32	RW	No	–	70B9 0010h	0000 0000h to FFFF FFFFh	A
	05h	Mapping entry 5	U32	RW	No	–	70BA 0020h	0000 0000h to FFFF FFFFh	A
	06h	Mapping entry 6	U32	RW	No	–	70BC 0020h	0000 0000h to FFFF FFFFh	A
	07h	Mapping entry 7	U32	RW	No	–	703F 0010h	0000 0000h to FFFF FFFFh	A
	08h	Mapping entry 8	U32	RW	No	–	70FD 0020h	0000 0000h to FFFF FFFFh	A
1A30h		Axis 4 transmit PDO mapping 1							
	00h	Number of entries	U8	RW	No	–	3	0 to 8	A
	01h	Mapping entry 1	U32	RW	No	–	7841 0010h	0000 0000h to FFFF FFFFh	A
	02h	Mapping entry 2	U32	RW	No	–	7864 0020h	0000 0000h to FFFF FFFFh	A
	03h	Mapping entry 3	U32	RW	No	–	7861 0008h	0000 0000h to FFFF FFFFh	A
	04h to 08h	Mapping entry 4-8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1A31h		Axis 4 transmit PDO mapping 2							
	00h	Number of entries	U8	RW	No	–	4	0 to 8	A
	01h	Mapping entry 1	U32	RW	No	–	7841 0010h	0000 0000h to FFFF FFFFh	A
	02h	Mapping entry 2	U32	RW	No	–	7864 0020h	0000 0000h to FFFF FFFFh	A
	03h	Mapping entry 3	U32	RW	No	–	786C 0020h	0000 0000h to FFFF FFFFh	A
	04h	Mapping entry 4	U32	RW	No	–	7861 0008h	0000 0000h to FFFF FFFFh	A
	05h to 08h	Mapping entry 5-8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1A32h		Axis 4 transmit PDO mapping 3							
	00h	Number of entries	U8	RW	No	–	3	0 to 8	A
	01h	Mapping entry 1	U32	RW	No	–	7841 0010h	0000 0000h to FFFF FFFFh	A
	02h	Mapping entry 2	U32	RW	No	–	786C 0020h	0000 0000h to FFFF FFFFh	A
	03h	Mapping entry 3	U32	RW	No	–	7861 0008h	0000 0000h to FFFF FFFFh	A
	04h to 08h	Mapping entry 4-8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1A33h		Axis 4 transmit PDO mapping 4							
	00h	Number of entries	U8	RW	No	–	8	0 to 8	A
	01h	Mapping entry 1	U32	RW	No	–	7841 0010h	0000 0000h to FFFF FFFFh	A
	02h	Mapping entry 2	U32	RW	No	–	7864 0020h	0000 0000h to FFFF FFFFh	A
	03h	Mapping entry 3	U32	RW	No	–	7861 0008h	0000 0000h to FFFF FFFFh	A
	04h	Mapping entry 4	U32	RW	No	–	78B9 0010h	0000 0000h to FFFF FFFFh	A
	05h	Mapping entry 5	U32	RW	No	–	78BA 0020h	0000 0000h to FFFF FFFFh	A
	06h	Mapping entry 6	U32	RW	No	–	78BC 0020h	0000 0000h to FFFF FFFFh	A
	07h	Mapping entry 7	U32	RW	No	–	783F 0010h	0000 0000h to FFFF FFFFh	A
	08h	Mapping entry 8	U32	RW	No	–	78FD 0020h	0000 0000h to FFFF FFFFh	A
1B00h		Controller transmit PDO mapping							
	00h	Number of entries	U8	RW	No	–	2	0 to 8	A
	01h	Mapping entry 1	U32	RW	No	–	2E31 0008h	0000 0000h to FFFF FFFFh	A
	02h	Mapping entry 2	U32	RW	No	–	2E32 0008h	0000 0000h to FFFF FFFFh	A
	03h to 08h	Mapping entry 3-8	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
1C00h		Sync manager communication type							
	00h	Number of entries	U8	RO	No	–	4	–	–
	01h	Communication type sync manager 0	U8	RO	No	–	1: Mailbox output (MainDevice to driver)		–
	02h	Communication type sync manager 1	U8	RO	No	–	2: Mailbox input (Driver to MainDevice)		–
	03h	Communication type sync manager 2	U8	RO	No	–	3: Process data output (MainDevice to driver)		–
	04h	Communication type sync manager 3	U8	RO	No	–	4: Process data input (Driver to MainDevice)		–

4 Object Lists

Index	Sub	Name	Type	Access	PDO	Save	initial value	Range	Update
1C12h	Sync manager 2 PDO assignment								
	00h	Number of entries	U8	RW	No	–	5	0 to 5	A
	01h	Index of assigned PDO 1	U16	RW	No	–	1600h	0000 0000h to FFFF FFFFh	A
	02h	Index of assigned PDO 2	U16	RW	No	–	1610h	0000 0000h to FFFF FFFFh	A
	03h	Index of assigned PDO 3	U16	RW	No	–	1620h	0000 0000h to FFFF FFFFh	A
	04h	Index of assigned PDO 4	U16	RW	No	–	1630h	0000 0000h to FFFF FFFFh	A
	05h	Index of assigned PDO 5	U16	RW	No	–	1700h	0000 0000h to FFFF FFFFh	A
1C13h	Sync manager 3 PDO assignment								
	00h	Number of entries	U8	RW	No	–	5	0 to 5	A
	01h	Index of assigned PDO 1	U16	RW	No	–	1A00h	0000 0000h to FFFF FFFFh	A
	02h	Index of assigned PDO 2	U16	RW	No	–	1A10h	0000 0000h to FFFF FFFFh	A
	03h	Index of assigned PDO 3	U16	RW	No	–	1A20h	0000 0000h to FFFF FFFFh	A
	04h	Index of assigned PDO 4	U16	RW	No	–	1A30h	0000 0000h to FFFF FFFFh	A
	05h	Index of assigned PDO 5	U16	RW	No	–	1B00h	0000 0000h to FFFF FFFFh	A
1C32h	Sync manager 2 Synchronization								
	00h	Number of entries	U8	RO	No	–	20h	–	–
	01h	Synchronization type	U16	RW	No	–	01h	00h: Free run mode (asynchronous) 01h: SM2 event synchronization mode 02h: DC mode (SYNC0 event synchronization)	A
	02h	Cycle time [ns]	U32	RO	No	–	–	–	–
	03h	Shift time [ns]	U32	RO	No	–	0	–	–
	04h	Synchronization types supported	U16	RO	No	–	0007h	–	–
	05h	Minimum cycle time [ns]	U32	RO	No	–	0007 A120h (500,000 ns)	–	–
	06h	Calc and copy time [ns]	U32	RO	No	–	0001 E848h (125,000 ns)	–	–
	07h	Reserved	U32	–	–	–	–	–	–
	08h	Reserved	U16	–	–	–	–	–	–
	09h	Delay time [ns]	U32	RO	No	–	0	–	–
	0Ah to 1Fh	Reserved	U16	–	–	–	–	–	–
	20h	Sync error	BOOL	RO	No	–	0	–	–
1C33h	Sync manager 3 Synchronization								
	00h	Number of entries	U8	RO	No	–	20h	–	–
	01h	Synchronization type	U16	RW	No	–	22h	00h: Free run mode (asynchronous) 02h: DC mode (SYNC0 event synchronization) 22h: SM2 event synchronization mode	A
	02h	Cycle time [ns]	U32	RO	No	–	–	–	–
	03h	Shift time [ns]	U32	RO	No	–	0	–	–
	04h	Synchronization types supported	U16	RO	No	–	0007h	–	–
	05h	Minimum cycle time [ns]	U32	RO	No	–	0007 A120h (500,000 ns)	–	–
	06h	Calc and copy time [ns]	U32	RO	No	–	0003 0D40h (200,000 ns)	–	–
	07h	Reserved	U32	–	–	–	–	–	–
	08h	Reserved	U16	–	–	–	–	–	–
	09h	Delay time [ns]	U32	RO	No	–	0	–	–
	0Ah to 1Fh	Reserved	U16	–	–	–	–	–	–
	20h	Sync error	BOOL	RO	No	–	0	–	–

4 Object Lists

2 Objects of the profile area

Objects in the profile area are defined by the CiA402 drive profile. Operations of the driver are set, and the status is indicated.

memo This document describes indexes of the driver axis 1 for the objects of the profile area. Objects of the driver axis 2 to driver axis 4 are indexes to offset each 800h from the previous axis.

Index	Sub	Name	Type	Access	PDO	Save	Initial value	Range	Update
603Fh	00h	Error code	U16	RO	TxPDO	–	–	–	–
6040h	00h	Controlword	U16	RW	RxPDO	–	0	0000h to FFFFh	A
6041h	00h	Statusword	U16	RO	TxPDO	–	–	–	–
605Ah	00h	Quick stop option code	INT16	RW	No	O	2	0, 1, 2, 3, 5, 6, 7	A
605Bh	00h	Shutdown option code	INT16	RW	No	O	1	0, 1	A
605Ch	00h	Disable operation option code	INT16	RW	No	O	1	0, 1	A
605Dh	00h	Halt option code	INT16	RW	No	O	1	1 to 3	A
6060h	00h	Modes of operation	INT8	RW	RxPDO	O	0	0: Operation function disable 1: Profile position mode (PP) 3: Profile velocity mode (PV) 6: Homing mode (HM) 8: Cyclic synchronous position mode (CSP) 9: Cyclic synchronous velocity mode (CSV)	B
6061h	00h	Modes of operation display	INT8	RO	TxPDO	–	–	–	–
6062h	00h	Position demand value [step]	INT32	RO	TxPDO	–	–	–	–
6064h	00h	Position actual value [step]	INT32	RO	TxPDO	–	–	–	–
6065h	00h	Following error window [1=0.01rev]	U32	RW	No	O	300	1 to 30,000	A
6067h	00h	Position window [1=0.1°]	U32	RW	No	O	18	0 to 180	A
606Bh	00h	Velocity demand value [Hz]	INT32	RO	TxPDO	–	–	–	–
606Ch	00h	Velocity actual value [Hz]	INT32	RO	TxPDO	–	–	–	–
607Ah	00h	Target position [step]	INT32	RW	RxPDO	–	0	−2,147,483,648 to 2,147,483,647	A
607Ch	00h	Home offset [step]	INT32	RW	No	O	0	−2,147,483,648 to 2,147,483,647	A
607Dh		Software position limit							
	00h	Number of entries	U8	RO	No	–	2	–	–
	01h	Min. position limit [step]	INT32	RW	No	O	−2,147,483,648	−2,147,483,648 to 2,147,483,647	A
	02h	Max. position limit [step]	INT32	RW	No	O	2,147,483,647	−2,147,483,648 to 2,147,483,647	A
6081h	00h	Profile velocity [Hz]	U32	RW	RxPDO	O	10,000	0 to 4,000,000	A
6083h	00h	Profile acceleration [step/s^2]	U32	RW	RxPDO	O	300,000	1 to 1,000,000,000	B
6084h	00h	Profile deceleration [step/s^2]	U32	RW	RxPDO	O	300,000	1 to 1,000,000,000	B
6085h	00h	Quick stop deceleration [step/s^2]	U32	RW	RxPDO	O	1,000,000	1 to 1,000,000,000	B
6091h		Gear ratio							
	00h	Number of entries	U8	RO	No	–	2	–	–
	01h	Electronic gear A	U32	RW	No	O	1	1 to 65,535	C
	02h	Electronic gear B	U32	RW	No	O	1	1 to 65,535	C
6098h	00h	Homing method	INT8	RW	No	O	24	17, 18, 24, 28, 35, 37, −1	B
6099h		Homing speed							
	00h	Number of entries	U8	RO	No	–	2	–	–
	01h	Speed during search for switch [Hz]	U32	RW	No	O	10,000	1 to 4,000,000	B
	02h	Speed during search for zero [Hz]	U32	RW	No	O	5000	1 to 10,000	B
609Ah	00h	Homing acceleration [step/s^2]	U32	RW	No	O	300,000	1 to 1,000,000,000	B
60B8h	00h	Touch probe function	U16	RW	RxPDO	–	0000h	0000h to FFFFh	A
60B9h	00h	Touch probe status	U16	RO	TxPDO	–	–	–	–

4 Object Lists

Index	Sub	Name	Type	Access	PDO	Save	Initial value	Range	Update
60BAh	00h	Touch probe position 1 positive value [step]	INT32	RO	TxPDO	–	–	–	–
60BBh	00h	Touch probe position 1 negative value [step]	INT32	RO	TxPDO	–	–	–	–
60BCh	00h	Touch probe position 2 positive value [step]	INT32	RO	TxPDO	–	–	–	–
60BDh	00h	Touch probe position 2 negative value [step]	INT32	RO	TxPDO	–	–	–	–
60E3h		Supported homing methods							
	00h	Number of entries	U8	RO	No	–	6	–	–
	01h	1st supported homing method	U16	RO	No	–	17	–	–
	02h	2nd supported homing method	U16	RO	No	–	18	–	–
	03h	3rd supported homing method	U16	RO	No	–	24	–	–
	04h	4th supported homing method	U16	RO	No	–	28	–	–
	05h	5th supported homing method	U16	RO	No	–	35	–	–
	06h	6th supported homing method	U16	RO	No	–	37	–	–
60F4h	00h	Following error actual value [step]	INT32	RO	TxPDO	–	0	–	–
60FDh	00h	Digital inputs	U32	RO	TxPDO	–	–	–	–
60FEh		Digital outputs							
	00h	Number of entries	U8	RO	No	–	2	–	–
	01h	Physical outputs	U32	RW	RxPDO	–	0000 0000h	0000 0000h to FFFF FFFFh	A
	02h	Bit mask	U32	RW	No	–	0000 0000h	0000 0000h to FFFF FFFFh	A
60FFh	00h	Target velocity [Hz]	INT32	RW	RxPDO	–	0	−4,000,000 to 4,000,000	A
6502h	00h	Supported drive modes	U32	RO	No	–	0000 01A5h	–	–
67FFh	00h	Device profile number	U32	RO	No	–	0004 0192h	–	–

3 Controller objects of the manufacturer-specific area

These are our specific objects. The controller objects indicate the status of the entire driver, and perform control.

Index	Sub	Name	Type	Access	PDO	Save	Initial value	Range	Update
2E31h	00h	Controller status 1	U8	RO	TxPDO	–	–	–	–
2E32h	00h	Controller status 2	U8	RO	TxPDO	–	–	–	–
2E33h	00h	Controller status 3	U8	RO	TxPDO	–	–	–	–
2E34h	00h	Controller status 4	U8	RO	TxPDO	–	–	–	–
2E35h	00h	Controller status 5	U8	RO	TxPDO	–	–	–	–
2E36h	00h	Controller status 6	U8	RO	TxPDO	–	–	–	–
2F01h	00h	Controller command 1	U8	RW	RxPDO	–	00h	00h to FFh	A
2F02h	00h	Controller command 2	U8	RW	RxPDO	–	00h	00h to FFh	A
2F03h	00h	Controller command 3	U8	RW	RxPDO	–	00h	00h to FFh	A

4 Object Lists

4 Driver objects of the manufacturer-specific area

These are our specific objects. The driver objects represent the objects for the driver axis 1 to driver axis 4. This document describes the Sub-index as "∗." Access after setting the axis number (1 to 4) in the sub-index of each object. Refer to the "Parameter" and "Address/code lists" in the **AZ** Series "OPERATING MANUAL Function Edition" for details of each object.

Index	Sub	Name	Type	Access	PDO	Save	Initial value	Range	Update
4020h	*1	Backup DATA access key	INT32	RW	No	–	0	Key code: 20519253 (01391955h)	A
4021h	*1	Backup DATA write key	INT32	RW	No	–	0	Key code: 1977326743 (75DB9C97h)	A
403Eh	*1	Driver input command	U16	RW	RxPDO	–	0	0000h to FFFFh	A
403Fh	*1	Driver output status	U16	RO	TxPDO	–	–		
4040h	*1	Present alarm	U16	RO	TxPDO	–	–		
4041h	*1	Alarm history 1	U16	RO	No	–	–		
4042h	*1	Alarm history 2	U16	RO	No	–	–		
4043h	*1	Alarm history 3	U16	RO	No	–	–		
4044h	*1	Alarm history 4	U16	RO	No	–	–		
4045h	*1	Alarm history 5	U16	RO	No	–	–		
4046h	*1	Alarm history 6	U16	RO	No	–	–		
4047h	*1	Alarm history 7	U16	RO	No	–	–		
4048h	*1	Alarm history 8	U16	RO	No	–	–		
4049h	*1	Alarm history 9	U16	RO	No	–	–		
404Ah	*1	Alarm history 10	U16	RO	No	–	–		
4064h	*1	Command speed [r/min]	INT32	RO	TxPDO	–	–		
4067h	*1	Feedback speed [r/min]	INT32	RO	TxPDO	–	–		
406Ah	*1	Direct I/O	U32	RO	TxPDO	–	–		
406Bh	*1	Torque monitor [1=0.1 %]	INT16	RO	TxPDO	–	–		
406Dh	*1	Cumulative load monitor	INT32	RO	TxPDO	–	–		
407Bh	*1	Information	INT32	RO	TxPDO	–	–		
407Ch	*1	Driver temperature [1=0.1 ℃]	INT16	RO	TxPDO	–	–		
407Dh	*1	Motor temperature [1=0.1 ℃]	INT16	RO	TxPDO	–	–	–	–
407Eh	*1	Odometer [1=0.1 kRev]	INT32	RO	TxPDO	–	–		
407Fh	*1	Tripmeter [1=0.1 kRev]	INT32	RO	TxPDO	–	–		
4090h	*1	Feedback position 32bit counter	INT32	RO	TxPDO	–	–		
4091h	*1	Command position 32bit counter	INT32	RO	TxPDO	–	–		
4092h	*1	CST operating current [1=0.1 %]	INT16	RO	TxPDO	–	–		
40A0h	*1	Main power supply count	INT32	RO	TxPDO	–	–		
40A1h	*1	Main power supply time [min]	INT32	RO	TxPDO	–	–		
40A2h	*1	Control power supply count	INT32	RO	TxPDO	–	–		
40A3h	*1	Inverter voltage [1=0.1 V]	INT16	RO	TxPDO	–	–		
40A4h	*1	Main power voltage [1=0.1 V]	INT16	RO	TxPDO	–	–		
40A9h	*1	Elapsed time from BOOT [ms]	INT32	RO	TxPDO	–	–		
40B7h	*1	Operation voltage mode [V]	U8	RO	TxPDO	–	–		
40B8h	*1	I/O status 1	U32	RO	TxPDO	–	–		
40B9h	*1	I/O status 2	U32	RO	TxPDO	–	–		
40BAh	*1	I/O status 3	U32	RO	TxPDO	–	–		
40BBh	*1	I/O status 4	U32	RO	TxPDO	–	–		
40BCh	*1	I/O status 5	U32	RO	TxPDO	–	–		
40BDh	*1	I/O status 6	U32	RO	TxPDO	–	–		
40BEh	*1	I/O status 7	U32	RO	TxPDO	–	–		
40BFh	*1	I/O status 8	U32	RO	TxPDO	–	–		

Index	Sub	Name	Type	Access	PDO	Save	Initial value	Range	Update
40C0h	*1	Alarm reset	U8	RW	No	–	0	0: Not executed. 1: A command is executed when the data changes from 0 to 1. 2: A command is executed. It will automatically return to 1 after executing.	–
40C2h	*1	Clear alarm history	U8	RW	No	–	0		
40C5h	*1	P-PRESET execution	U8	RW	No	–	0		
40C6h	*1	Configuration	U8	RW	No	–	0		
40C8h	*1	Read batch NV memory	U8	RW	No	–	0		
40C9h	*1	Write batch NV memory	U8	RW	No	–	0		
40CAh	*1	All data initialization	U8	RW	No	–	0		
40CBh	*1	Read from backup	U8	RW	No	–	0		
40CCh	*1	Write to backup	U8	RW	No	–	0		
40CDh	*1	Clear latch information	U8	RW	No	–	0		
40CFh	*1	Clear tripmeter	U8	RW	No	–	0		
40D1h	*1	ZSG-PRESET	U8	RW	No	–	0		
40D2h	*1	Clear ZSG-PRESET	U8	RW	No	–	0		
40D3h	*1	Clear information	U8	RW	No	–	0		
40D4h	*1	Clear information history	U8	RW	No	–	0		
4120h	*1	Operating current [1=0.1 %]	INT16	RW	RxPDO	○	1,000	0 to 1,000	A *2
4121h	*1	Push current [1=0.1 %]	INT16	RW	RxPDO	○	200		
4126h	*1	Base current [1=0.1 %]	INT16	RW	RxPDO	○	1,000	0 to 1,000	A
4128h	*1	Stop current [1=0.1 %]	INT16	RW	RxPDO	○	500		A
4129h	*1	Command filter setting	INT8	RW	No	○	1	1: LPF (speed filter) 2: Moving average filter	B
412Ah	*1	Command filter time constant [ms]	INT16	RW	RxPDO	○	1	0 to 200	B
412Ch	*1	Smooth drive function	U8	RW	No	○	1	0: Disable 1: Enable	C
412Dh	*1	Current control mode	U8	RW	No	○	0	0: The setting of the CCM input is followed 1: α control mode (CST) 2: Servo emulation mode (SVE)	A
412Eh	*1	Servo emulation (SVE) ratio [1=0.1 %]	INT16	RW	No	○	1,000	0 to 1,000	A
412Fh	*1	SVE position loop gain	INT16	RW	No	○	10	1 to 50	A
4130h	*1	SVE speed loop gain	INT16	RW	No	○	180	10 to 200	A
4131h	*1	SVE speed loop integral time constant [1=0.1 ms]	INT16	RW	No	○	1,000	100 to 2,000	A
4132h	*1	Automatic current cutback function	U8	RW	No	○	1	0: Disable 1: Enable	A
4133h	*1	Automatic current cutback switching time [ms]	INT16	RW	No	○	100	0 to 1,000	A
4134h	*1	Operating current ramp up rate [ms/100 %]	U8	RW	No	○	0	0 to 100	A
4135h	*1	Operating current ramp down rate [ms/100 %]	U8	RW	No	○	0		
4136h	*1	Electronic damper function	INT8	RW	No	○	1	0: Disable 1: Enable	A
4137h	*1	Resonance suppression control frequency [Hz]	INT16	RW	No	○	1,000	100 to 2,000	A
4138h	*1	Resonance suppression control gain	INT16	RW	No	○	0	−500 to 500	A
4139h	*1	Deviation acceleration suppressing gain	INT16	RW	No	○	45	0 to 500	A
413Ch	*1	Current setting during push-motion	U8	RW	No	○	0	0: Push current 1: Operating current	A
413Dh	*1	Non-excitation mode selection	U8	RW	No	○	0	0: Dynamic brake status 1: Free-run status	A
4142h	*1	Starting speed [Hz]	INT32	RW	No	○	5,000	0 to 4,000,000	B
4148h	*1	Permission of absolute positioning without setting absolute coordinates	U8	RW	No	○	0	0: Disable 1: Enable	B
414Fh	*1	Wrap positioning mode	U8	RW	RxPDO	○	0	0: Wrap absolute positioning 1: Wrap proximity 2: Wrap forward direction 3: Wrap reverse direction	B

Index	Sub	Name	Type	Access	PDO	Save	Initial value	Range	Update
4151h	*1	(JOG) Operating speed [Hz]	INT32	RW	No	○	10,000	1 to 4,000,000	B
4152h	*1	(JOG) Acceleration/deceleration [kHz/s]	INT32	RW	No	○	300,000	1 to 1,000,000,000	B
4153h	*1	(JOG) Starting speed [Hz]	INT32	RW	No	○	5,000	0 to 4,000,000	B
4154h	*1	(JOG) Operating speed (high) [Hz]	INT32	RW	No	○	50,000	1 to 4,000,000	B
4158h	*1	(ZHOME) Operating speed [Hz]	INT32	RW	No	○	50,000	1 to 4,000,000	B
4159h	*1	(ZHOME) Acceleration/deceleration [kHz/s]	INT32	RW	No	○	300,000	1 to 1,000,000,000	B
415Ah	*1	(ZHOME) Starting speed [Hz]	INT32	RW	No	○	50,000	0 to 4,000,000	B
415Eh	*1	JOG/HOME/ZHOME command filter time constant [ms]	INT16	RW	No	○	1	1 to 200	B
415Fh	*1	JOG/HOME/ZHOME operating current [1=0.1 %]	INT16	RW	No	○	1,000	0 to 1,000	B
4160h	*1	(HOME)Home-seeking mode	U8	RW	No	○	1	0: 2-sensor mode 1: 3-sensor mode 2: One-way rotation mode 3: Push mode	B
4161h	*1	(HOME)Starting direction	U8	RW	No	○	1	0: Negative direction 1: Positive direction	B
4163h	*1	(HOME)Starting speed [Hz]	INT32	RW	No	○	5,000	1 to 4,000,000	B
4166h	*1	(HOME)SLIT detection	U8	RW	No	○	0	0: Disable 1: Enable	B
4167h	*1	(HOME)TIM/ZSG signal detection	U8	RW	No	○	0	0: Disable 1: TIM output 2: ZSG output	B
4168h	*1	(HOME) Position offset [step]	INT32	RW	No	○	0	−2,147,483,647 to 2,147,483,647	B
4169h	*1	(HOME) Backward steps in 2 sensor home-seeking [step]	INT32	RW	No	○	5,000	0 to 8,388,607	B
416Ah	*1	(HOME)Operating amount in uni-directional home-seeking [step]	INT32	RW	No	○	5,000		
416Bh	*1	(HOME) Operating current for push-home-seeking [1=0.1 %]	INT16	RW	No	○	1,000	0 to 1,000	B
416Ch	*1	(HOME)Backward steps after first entry in push-home-seeking [step]	INT32	RW	No	○	0	0 to 8,388,607	B
416Dh	*1	(HOME)Pushing-time in push-home-seeking [ms]	U16	RW	No	○	200	1 to 65,535	B
416Eh	*1	(HOME)Backward steps in push-home-seeking [step]	INT32	RW	No	○	5,000	0 to 8,388,607	B
4180h	*1	Overload alarm [1=0.1 s]	INT16	RW	No	○	50	1 to 300	A
4185h	*1	RG overheat alarm	U8	RW	No	○	0	0: Disable 1: Enable	A
4186h	*1	FAN low speed alarm	U8	RW	No	○	0		
4187h	*1	Other axis alarm	U8	RW	No	○	0		
41A0h	*1	Driver temperature information (INFO-DRVTMP) [°C]	INT16	RW	RxPDO	○	85	40 to 85	A
41A1h	*1	Overload time information (INFO-OLTIME) [1=0.1 s]	INT16	RW	RxPDO	○	50	1 to 300	A
41A2h	*1	Speed information (INFO-SPD) [r/min]	INT16	RW	RxPDO	○	0	0: Disable 1 to 12,000	A
41A5h	*1	Position deviation information (INFO-POSERR) [1=0.01 rev]	INT16	RW	RxPDO	○	300	1 to 30,000	A
41A8h	*1	Motor temperature information (INFO-MTRTMP) [°C]	INT16	RW	RxPDO	○	85	40 to 120	A
41ABh	*1	Overvoltage information (INFO-OVOLT) [V]	INT16	RW	RxPDO	○	630	150 to 630	A
41ACh	*1	Undervoltage information (INFO-UVOLT) [V]	INT16	RW	RxPDO	○	180		
41AFh	*1	Tripmeter information (INFO-TRIP) [1=0.1 kRev]	INT32	RW	RxPDO	○	0	0: Disable 1 to 2,147,483,647	A
41B0h	*1	Odometer information (INFO-ODO) [1=0.1 kRev]	INT32	RW	RxPDO	○	0		
41B1h	*1	Cumulative load information 0 (INFO-CULD0)	INT32	RW	RxPDO	○	0	0 to 2,147,483,647	A

4 Object Lists

Index	Sub	Name	Type	Access	PDO	Save	Initial value	Range	Update
41B2h	*1	Cumulative load information 1 (INFO-CULD1)	INT32	RW	RxPDO	O	0	0 to 2,147,483,647	A
41B3h	*1	Cumulative load value auto clear	U8	RW	No	O	1	0: Does not clear 1: Clear	A
41B4h	*1	Cumulative load value count divisor	U16	RW	No	O	1	1 to 32,767	A
41BCh	*1	INFO-USRIO output selection	U8	RW	No	O	128	Output signals list ⇨ p.101	A
41BDh	*1	INFO-USRIO output inversion	U8	RW	No	O	0	0: Not invert 1: Invert	A
41BEh	*1	Information LED condition	U8	RW	No	O	1	0: The LED does not blink 1: The LED blinks	A
41BFh	*1	Information auto clear	U8	RW	No	O	1	0: Disable (not turned OFF automatically) 1: Enable (turned OFF automatically)	A
41C2h	*1	Motor rotation direction	U8	RW	No	O	1	0: Positive side=Counterclockwise direction 1: Positive side=Clockwise direction	C
41C3h	*1	Software overtravel	INT8	RW	No	O	3	−1: Disable 0: Immediate stop 1: Deceleration stop 2: Immediate stop with alarm 3: Deceleration stop with alarm	A
41C6h	*1	Preset position [step]	INT32	RW	No	O	0	−2,147,483,648 to 2,147,483,647	A
41C7h	*1	Wrap setting	U8	RW	No	O	1	0: Disable 1: Enable	C
41C9h	*1	Initial coordinate generation & wrap setting range [1=0.1 rev]	INT32	RW	No	O	10	5 to 655,360	C
41CBh	*1	Initial coordinate generation & wrap range offset ratio [1=0.01 %]	U16	RW	No	O	5,000	0 to 10,000	C
41CCh	*1	Initial coordinate generation & wrap range offset value [step]	INT32	RW	No	O	0	−536,870,912 to 536,870,911	C
41CDh	*1	The number of the RND-ZERO output in wrap range	INT32	RW	No	O	1	1 to 536,870,911	C
41FAh	*1	Main power mode	INT8	RW	No	O	−1	−1: Automatic recognition 0: 24 VDC 1: 48 VDC	D
41FFh	*1	Drive simulation mode	U8	RW	No	O	0	0: The motor is actually connected 1: A virtual motor is used (No ABZO sensor information) 2: A virtual motor is used (A wrap function with up to 1800 revolutions is enabled) 3: A virtual motor is used (A wrap function with up to 900 revolutions is enabled) *3	D
44B0h	*1	Touch probe 1 latch position	U8	RW	No	O	0	0: Latches the feedback position 1: Latches the command position	A
44B1h	*1	Touch probe 2 latch position	U8	RW	No	O	0		A
44B2h	*1	Touch probe 1 TIM/ZSG signal select	U8	RW	No	O	0	0: Latch on the ZSG output 1: Latch on the TIM output	A
44B3h	*1	Touch probe 2 TIM/ZSG signal select	U8	RW	No	O	0		A
4510h	*1	Information history 1	INT32	RO	No	–	–		
4511h	*1	Information history 2	INT32	RO	No	–	–		
4512h	*1	Information history 3	INT32	RO	No	–	–		
4513h	*1	Information history 4	INT32	RO	No	–	–		
4514h	*1	Information history 5	INT32	RO	No	–	–		
4515h	*1	Information history 6	INT32	RO	No	–	–	–	–
4516h	*1	Information history 7	INT32	RO	No	–	–		
4517h	*1	Information history 8	INT32	RO	No	–	–		
4518h	*1	Information history 9	INT32	RO	No	–	–		
4519h	*1	Information history 10	INT32	RO	No	–	–		
451Ah	*1	Information history 11	INT32	RO	No	–	–		
451Bh	*1	Information history 12	INT32	RO	No	–	–		
451Ch	*1	Information history 13	INT32	RO	No	–	–		
451Dh	*1	Information history 14	INT32	RO	No	–	–		

4 Object Lists

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Index	Sub	Name	Type	Access	PDO	Save	Initial value	Range	Update
451Eh	*1	Information history 15	INT32	RO	No	–	–	–	–
451Fh	*1	Information history 16	INT32	RO	No	–	–		
4520h	*1	Information time history 1	INT32	RO	No	–	–		
4521h	*1	Information time history 2	INT32	RO	No	–	–		
4522h	*1	Information time history 3	INT32	RO	No	–	–		
4523h	*1	Information time history 4	INT32	RO	No	–	–		
4524h	*1	Information time history 5	INT32	RO	No	–	–		
4525h	*1	Information time history 6	INT32	RO	No	–	–		
4526h	*1	Information time history 7	INT32	RO	No	–	–	–	–
4527h	*1	Information time history 8	INT32	RO	No	–	–		
4528h	*1	Information time history 9	INT32	RO	No	–	–		
4529h	*1	Information time history 10	INT32	RO	No	–	–		
452Ah	*1	Information time history 11	INT32	RO	No	–	–		
452Bh	*1	Information time history 12	INT32	RO	No	–	–		
452Ch	*1	Information time history 13	INT32	RO	No	–	–		
452Dh	*1	Information time history 14	INT32	RO	No	–	–		
452Eh	*1	Information time history 15	INT32	RO	No	–	–		
452Fh	*1	Information time history 16	INT32	RO	No	–	–		
4642h	*1	Driver axis CPU number	U16	RO	No	–	–	–	–
4643h	*1	Driver axis software version	U16	RO	No	–	–	–	–
4700h	*1	STOP input action	INT8	RW	No	O	3	0: Immediate stop 3: Deceleration stop	A
4701h	*1	FW-LS/RV-LS input action	INT8	RW	No	O	2	−1: Used as a return-to-home sensor 0: Immediate stop 1: Deceleration stop 2: Immediate stop with alarm 3: Deceleration stop with alarm	A
4702h	*1	FW-BLK/RV-BLK input action	INT8	RW	No	O	0	0: Immediate stop 1: Deceleration stop	A
4704h	*1	IN-POS positioning completion signal offset [1=0.1°]	INT16	RW	No	O	0	−18 to 18	A
4707h	*1	ZSG signal width [1=0.1°]	U16	RW	No	O	18	1 to 1,800	A
4708h	*1	RND-ZERO signal width [step]	U16	RW	No	O	10	1 to 10,000	A
4709h	*1	RND-ZERO signal source	U8	RW	No	O	0	0: Based on actual position 1: Based on command position	A
470Ah	*1	MOVE minimum ON time [ms]	U8	RW	No	O	0	0 to 255	A
470Dh	*1	CRNT-LMT operating current limit value [1=0.1 %]	INT16	RW	No	O	500	0 to 1,000	A
470Eh	*1	SPD-LMT speed limit type selection	INT8	RW	No	O	0	0: Ratio 1: Value	A
470Fh	*1	SPD-LMT speed limit ratio [%]	INT8	RW	No	O	50	1 to 100	A
4710h	*1	SPD-LMT speed limit value [Hz]	INT32	RW	No	O	10,000	1 to 4,000,000	A
4718h	*1	VA mode selection	U8	RW	No	O	1	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)	A
4719h	*1	VA detection speed range [r/min]	U8	RW	No	O	30	1 to 200	B
4740h	*1	AREA0 positive direction position/offset [step]	INT32	RW	No	O	0		
4741h	*1	AREA0 negative direction position/detection range [step]	INT32	RW	No	O	0		
4742h	*1	AREA1 positive direction position/offset [step]	INT32	RW	No	O	0		
4743h	*1	AREA1 negative direction position/detection range [step]	INT32	RW	No	O	0	−2,147,483,648 to 2,147,483,647	A
4744h	*1	AREA2 positive direction position/offset [step]	INT32	RW	No	O	0		
4745h	*1	AREA2 negative direction position/detection range [step]	INT32	RW	No	O	0		

Index	Sub	Name	Type	Access	PDO	Save	Initial value	Range	Update
4746h	*1	AREA3 positive direction position/ offset [step]	INT32	RW	No	○	0	−2,147,483,648 to 2,147,483,647	A
4747h	*1	AREA3 negative direction position/ detection range [step]	INT32	RW	No	○	0		
4748h	*1	AREA4 positive direction position/ offset [step]	INT32	RW	No	○	0		
4749h	*1	AREA4 negative direction position/ detection range [step]	INT32	RW	No	○	0		
474Ah	*1	AREA5 positive direction position/ offset [step]	INT32	RW	No	○	0		
474Bh	*1	AREA5 negative direction position/ detection range [step]	INT32	RW	No	○	0		
474Ch	*1	AREA6 positive direction position/ offset [step]	INT32	RW	No	○	0		
474Dh	*1	AREA6 negative direction position/ detection range [step]	INT32	RW	No	○	0		
474Eh	*1	AREA7 positive direction position/ offset [step]	INT32	RW	No	○	0		
474Fh	*1	AREA7 negative direction position/ detection range [step]	INT32	RW	No	○	0		
4750h	*1	AREA0 range setting mode	U8	RW	No	○	0	0: Range setting with absolute value 1: Offset/width setting from the target position	A
4751h	*1	AREA1 range setting mode	U8	RW	No	○	0		
4752h	*1	AREA2 range setting mode	U8	RW	No	○	0		
4753h	*1	AREA3 range setting mode	U8	RW	No	○	0		
4754h	*1	AREA4 range setting mode	U8	RW	No	○	0		
4755h	*1	AREA5 range setting mode	U8	RW	No	○	0		
4756h	*1	AREA6 range setting mode	U8	RW	No	○	0		
4757h	*1	AREA7 range setting mode	U8	RW	No	○	0		
4758h	*1	AREA0 positioning standard	U8	RW	No	○	0	0: Based on actual position 1: Based on command position	A
4759h	*1	AREA1 positioning standard	U8	RW	No	○	0		
475Ah	*1	AREA2 positioning standard	U8	RW	No	○	0		
475Bh	*1	AREA3 positioning standard	U8	RW	No	○	0		
475Ch	*1	AREA4 positioning standard	U8	RW	No	○	0		
475Dh	*1	AREA5 positioning standard	U8	RW	No	○	0		
475Eh	*1	AREA6 positioning standard	U8	RW	No	○	0		
475Fh	*1	AREA7 positioning standard	U8	RW	No	○	0		
47A0h	*1	INFO action (Assigned I/O status information (INFO-USRIO))	U8	RW	No	○	1	0: Only the bit output is ON 1: The bit output and the INFO output are ON and the LED blinks	A
47A1h	*1	INFO action (Position deviation information (INFO-POSERR))	U8	RW	No	○	1		
47A2h	*1	INFO action (Driver temperature information (INFO-DRVTMP))	U8	RW	No	○	1		
47A3h	*1	INFO action (Motor temperature information (INFO-MTRTMP))	U8	RW	No	○	1		
47A4h	*1	INFO action (Overvoltage information (INFO-OVOLT))	U8	RW	No	○	1		
47A5h	*1	INFO action (Undervoltage information (INFO-UVOLT))	U8	RW	No	○	1		
47A6h	*1	INFO action (Overload time information (INFO-OLTIME))	U8	RW	No	○	1	0: Only the bit output is ON 1: The bit output and the INFO output are ON and the LED blinks	A
47A8h	*1	INFO action (Speed information (INFO-SPD))	U8	RW	No	○	1		
47A9h	*1	INFO action (Start operation error information (INFO-START))	U8	RW	No	○	1		
47AAh	*1	INFO action (Start ZHOME error information (INFO-ZHOME))	U8	RW	No	○	1		
47ABh	*1	INFO action (PRESET request information (INFO-PR-REQ))	U8	RW	No	○	1		
47ADh	*1	INFO action (Electronic gear setting error information (INFO-EGR-E))	U8	RW	No	○	1		
47AEh	*1	INFO action (Wrap setting error information (INFO-RND-E))	U8	RW	No	○	1		

4 Object Lists

Index	Sub	Name	Type	Access	PDO	Save	Initial value	Range	Update
47B0h	*1	INFO action (Forward operation prohibiton information (INFO-FW-OT))	U8	RW	No	○	1	0: Only the bit output is ON 1: The bit output and the INFO output are ON and the LED blinks	A
47B1h	*1	INFO action (Reverse operation prohibiton information (INFO-RV-OT))	U8	RW	No	○	1		
47B2h	*1	INFO action (Cumulative load 0 information (INFO-CULD0))	U8	RW	No	○	1		
47B3h	*1	INFO action (Cumulative load 1 information (INFO-CULD1))	U8	RW	No	○	1		
47B4h	*1	INFO action (Tripmeter information (INFO-TRIP))	U8	RW	No	○	1		
47B5h	*1	INFO action (Odometer information (INFO-ODO))	U8	RW	No	○	1		
47BCh	*1	INFO action (Start operation restricted mode information (INFO-DSLMTD))	U8	RW	No	○	1		
47BDh	*1	INFO action (I/O test mode information (INFO-IOTEST))	U8	RW	No	○	1		
47BEh	*1	INFO action (Configuration request information (INFO-CFG))	U8	RW	No	○	1		
47BFh	*1	INFO action (Reboot request information (INFO-RBT))	U8	RW	No	○	1		
47F0h	*1	Mechanism settings	U8	RW	No	○	1	0: ABZO setting is prioritized 1: Manual setting	D
47F1h	*1	Gear ratio setting	INT16	RW	No	○	0	0: ABZO setting is prioritized 1 to 32,767	C
47F2h	*1	Initial coordinate generation & wrap coordinate setting	U8	RW	No	○	0	0: ABZO setting is prioritized 1: Manual setting	D
47F3h	*1	Mechanism limit parameter setting	U8	RW	No	○	0	0: ABZO setting is followed 1: Disable	D
47F4h	*1	Mechanism protection parameter setting	U8	RW	No	○	0	0: ABZO setting is followed 1: Disable	D
47F5h	*1	JOG/HOME/ZHOME operation setting	U8	RW	No	○	0	0: ABZO setting is prioritized 1: Manual setting	D
4840h	*1	DIN0 input function	U8	RW	No	○	28	Input signal list ➾ p.100	C
4841h	*1	DIN1 input function	U8	RW	No	○	29		
4842h	*1	DIN2 input function	U8	RW	No	○	30		
4843h	*1	DIN3 input function	U8	RW	No	○	1		
4850h	*1	DIN0 inverting mode	U8	RW	No	○	0	0: Non invert 1: Invert	C
4851h	*1	DIN1 inverting mode	U8	RW	No	○	0		
4852h	*1	DIN2 inverting mode	U8	RW	No	○	0		
4853h	*1	DIN3 inverting mode	U8	RW	No	○	0		
4860h	*1	DOUT0 (Normal) output function	U8	RW	No	○	130	Output signal list ➾ p.101	C
4861h	*1	DOUT1 (Normal) output function	U8	RW	No	○	142		
4862h	*1	DOUT2 (Normal) output function	U8	RW	No	○	134		
4870h	*1	DOUT0 inverting mode	U8	RW	No	○	0	0: Non invert 1: Invert	C
4871h	*1	DOUT1 inverting mode	U8	RW	No	○	0		
4872h	*1	DOUT2 inverting mode	U8	RW	No	○	0		
4880h	*1	DIN0 composite input function	U8	RW	No	○	0	Input signal list ➾ p.100	C
4881h	*1	DIN1 composite input function	U8	RW	No	○	0		
4882h	*1	DIN2 composite input function	U8	RW	No	○	0		
4883h	*1	DIN3 composite input function	U8	RW	No	○	0		
4890h	*1	DOUT0 composite output function	U8	RW	No	○	128	Output signal list ➾ p.101	C
4891h	*1	DOUT1 composite output function	U8	RW	No	○	128		
4892h	*1	DOUT2 composite output function	U8	RW	No	○	128		
48A0h	*1	DOUT0 composite inverting mode	U8	RW	No	○	0	0: Non invert 1: Invert	C
48A1h	*1	DOUT1 composite inverting mode	U8	RW	No	○	0		
48A2h	*1	DOUT2 composite inverting mode	U8	RW	No	○	0		

Index	Sub	Name	Type	Access	PDO	Save	Initial value	Range	Update
48B0h	*1	DOUT0 composite logical combination	U8	RW	No	○	1		
48B1h	*1	DOUT1 composite logical combination	U8	RW	No	○	1	0: AND 1: OR	C
48B2h	*1	DOUT2 composite logical combination	U8	RW	No	○	1		
48C0h	*1	DIN0 ON signal dead-time [ms]	U8	RW	No	○	0		
48C1h	*1	DIN1 ON signal dead-time [ms]	U8	RW	No	○	0	0 to 250	C
48C2h	*1	DIN2 ON signal dead-time [ms]	U8	RW	No	○	0		
48C3h	*1	DIN3 ON signal dead-time [ms]	U8	RW	No	○	0		
48D0h	*1	DIN0 1 shot signal	U8	RW	No	○	0		
48D1h	*1	DIN1 1 shot signal	U8	RW	No	○	0	0: Disable	
48D2h	*1	DIN2 1 shot signal	U8	RW	No	○	0	1: Enable	C
48D3h	*1	DIN3 1 shot signal	U8	RW	No	○	0		
48E0h	*1	DOUT0 OFF delay time [ms]	U8	RW	No	○	0		
48E1h	*1	DOUT1 OFF delay time [ms]	U8	RW	No	○	0	0 to 250	C
48E2h	*1	DOUT2 OFF delay time [ms]	U8	RW	No	○	0		
4900h	*1	R-IN0 input function	U8	RW	No	○	0		
4901h	*1	R-IN1 input function	U8	RW	No	○	0		
4902h	*1	R-IN2 input function	U8	RW	No	○	0		
4903h	*1	R-IN3 input function	U8	RW	No	○	0	Input signal list ⇨ p.100	C
4904h	*1	R-IN4 input function	U8	RW	No	○	0		
4905h	*1	R-IN5 input function	U8	RW	No	○	0		
4906h	*1	R-IN6 input function	U8	RW	No	○	0		
4907h	*1	R-IN7 input function	U8	RW	No	○	0		
4910h	*1	R-OUT0 output function	U8	RW	No	○	28		
4911h	*1	R-OUT1 output function	U8	RW	No	○	29		
4912h	*1	R-OUT2 output function	U8	RW	No	○	155		
4913h	*1	R-OUT3 output function	U8	RW	No	○	0		
4914h	*1	R-OUT4 output function	U8	RW	No	○	144	Output signal list ⇨ p.101	C
4915h	*1	R-OUT5 output function	U8	RW	No	○	204		
4916h	*1	R-OUT6 output function	U8	RW	No	○	135		
4917h	*1	R-OUT7 output function	U8	RW	No	○	129		
4918h	*1	R-OUT8 output function	U8	RW	No	○	136		
4919h	*1	R-OUT9 output function	U8	RW	No	○	160		
491Ah	*1	R-OUT10 output function	U8	RW	No	○	161		
491Bh	*1	R-OUT11 output function	U8	RW	No	○	162		
491Ch	*1	R-OUT12 output function	U8	RW	No	○	157	Output signal list ⇨ p.101	C
491Dh	*1	R-OUT13 output function	U8	RW	No	○	134		
491Eh	*1	R-OUT14 output function	U8	RW	No	○	138		
491Fh	*1	R-OUT15 output function	U8	RW	No	○	140		
4930h	*1	R-OUT0 OFF delay time [ms]	U8	RW	No	○	0		
4931h	*1	R-OUT1 OFF delay time [ms]	U8	RW	No	○	0		
4932h	*1	R-OUT2 OFF delay time [ms]	U8	RW	No	○	0		
4933h	*1	R-OUT3 OFF delay time [ms]	U8	RW	No	○	0		
4934h	*1	R-OUT4 OFF delay time [ms]	U8	RW	No	○	0		
4935h	*1	R-OUT5 OFF delay time [ms]	U8	RW	No	○	0		
4936h	*1	R-OUT6 OFF delay time [ms]	U8	RW	No	○	0		
4937h	*1	R-OUT7 OFF delay time [ms]	U8	RW	No	○	0		
4938h	*1	R-OUT8 OFF delay time [ms]	U8	RW	No	○	0	0 to 250	C
4939h	*1	R-OUT9 OFF delay time [ms]	U8	RW	No	○	0		
493Ah	*1	R-OUT10 OFF delay time [ms]	U8	RW	No	○	0		
493Bh	*1	R-OUT11 OFF delay time [ms]	U8	RW	No	○	0		
493Ch	*1	R-OUT12 OFF delay time [ms]	U8	RW	No	○	0		
493Dh	*1	R-OUT13 OFF delay time [ms]	U8	RW	No	○	0		
493Eh	*1	R-OUT14 OFF delay time [ms]	U8	RW	No	○	0		
493Fh	*1	R-OUT15 OFF delay time [ms]	U8	RW	No	○	0		

4 Object Lists

Index	Sub	Name	Type	Access	PDO	Save	Initial value	Range	Update
4940h	*1	Virtual input (VIR-IN0) function	U8	RW	No	○	0	Input signal list ⇨ p.100	C
4941h	*1	Virtual input (VIR-IN1) function	U8	RW	No	○	0		
4942h	*1	Virtual input (VIR-IN2) function	U8	RW	No	○	0		
4943h	*1	Virtual input (VIR-IN3) function	U8	RW	No	○	0		
4944h	*1	Virtual input (VIR-IN0) source selection	U8	RW	No	○	128	Output signal list ⇨ p.101	C
4945h	*1	Virtual input (VIR-IN1) source selection	U8	RW	No	○	128		
4946h	*1	Virtual input (VIR-IN2) source selection	U8	RW	No	○	128		
4947h	*1	Virtual input (VIR-IN3) source selection	U8	RW	No	○	128		
4948h	*1	Virtual input (VIR-IN0) inverting mode	U8	RW	No	○	0	0: Non invert 1: Invert	C
4949h	*1	Virtual input (VIR-IN1) inverting mode	U8	RW	No	○	0		
494Ah	*1	Virtual input (VIR-IN2) inverting mode	U8	RW	No	○	0		
494Bh	*1	Virtual input (VIR-IN3) inverting mode	U8	RW	No	○	0		
494Ch	*1	Virtual input (VIR-IN0) ON signal dead time [ms]	U8	RW	No	○	0	0 to 250	C
494Dh	*1	Virtual input (VIR-IN1) ON signal dead time [ms]	U8	RW	No	○	0		
494Eh	*1	Virtual input (VIR-IN2) ON signal dead time [ms]	U8	RW	No	○	0		
494Fh	*1	Virtual input (VIR-IN3) ON signal dead time [ms]	U8	RW	No	○	0		
4950h	*1	Virtual input (VIR-IN0) 1 shot signal mode	U8	RW	No	○	0	0: Disable 1: Enable	C
4951h	*1	Virtual input (VIR-IN1) 1 shot signal mode	U8	RW	No	○	0		
4952h	*1	Virtual input (VIR-IN2) 1 shot signal mode	U8	RW	No	○	0		
4953h	*1	Virtual input (VIR-IN3) 1 shot signal mode	U8	RW	No	○	0		
4960h	*1	User output (USR-OUT0) source A function	U8	RW	No	○	128	Output signal list ⇨ p.101	C
4961h	*1	User output (USR-OUT1) source A function	U8	RW	No	○	128		
4962h	*1	User output (USR-OUT0) source A inverting mode	U8	RW	No	○	0	0: Non invert 1: Invert	C
4963h	*1	User output (USR-OUT1) source A inverting mode	U8	RW	No	○	0		
4964h	*1	User output (USR-OUT0) source B function	U8	RW	No	○	128	Output signal list ⇨ p.101	C
4965h	*1	User output (USR-OUT1) source B function	U8	RW	No	○	128		
4966h	*1	User output (USR-OUT0) source B inverting mode	U8	RW	No	○	0	0: Non invert 1: Invert	C
4967h	*1	User output (USR-OUT1) source B inverting mode	U8	RW	No	○	0		
4968h	*1	User output (USR-OUT0) logical operation	U8	RW	No	○	1	0: AND 1: OR	C
4969h	*1	User output (USR-OUT1) logical operation	U8	RW	No	○	1		
4970h	*1	Extended input (EXT-IN) function	U8	RW	No	○	9	Input signal list ⇨ p.100	C
4971h	*1	Extended input (EXT-IN) inverting mode	U8	RW	No	○	0	0: Non invert 1: Invert	C
4972h	*1	Extended input (EXT-IN) interlock releasing time [1=0.1s]	INT8	RW	No	○	10	0: Disable 1 to 50	A
4973h	*1	Extended input (EXT-IN) interlock releasing duration [1=0.1s]	INT8	RW	No	○	30	0 to 50	A
4974h	*1	Extended input (EXT-IN) ON monitor time [1=0.1s]	INT8	RW	No	○	10	0 to 50	A

4 Object Lists

Index	Sub	Name	Type	Access	PDO	Save	Initial value	Range	Update
49FAh	*1	Current setting during motor standstill at T-MODE	INT32	RW	No	○	0	0: Standstill current 1: Operating current	A

*1 Set the axis number (1 to 4) in the Sub-index because of the driver object in the manufacturer-specific area.

*2 With the profile position mode, it will be updated at start of operation.

*3 It is effective for drivers with software version 2.00 or later. Setting to the drivers older than version 2.00 will be the same action as "1: A virtual motor is used (No ABZO sensor information)."
The software version of the driver can be checked using the unit information monitor of the **MEXE02**. (Unit information monitor ➡ p.193)

■ Reference picture of ON signal dead-time [ms]

ON signal dead-time

Direct input (DIN) ON / OFF

Internal signal ON / OFF
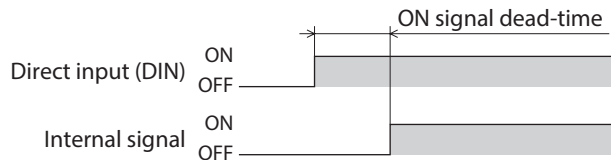
■ Reference picture of OFF output-delay time [ms]

OFF output-delay time

Internal signal ON / OFF

Direct output (DOUT) ON / OFF

4 Object Lists

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